

**Perspectives of rehabilitation professionals on
assistive technology provision for young children with
disabilities in South Africa**

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ABSTRACT

When assistive technology is selected for young children within a context with limited resources such as South Africa, research is needed to determine the factors influencing the recommendation and provision process. This is necessary as these factors could either facilitate or hinder the accessibility and availability of assistive technology that is adaptable, affordable, acceptable and high quality. The aim of this study was to identify the factors perceived by rehabilitation professionals to influence the recommendation and provision of assistive technology to young children within the South African context and to determine the extent to which these factors are perceived as influential. The study followed a sequential exploratory mixed methods design. The qualitative phase of the study consisted of a systematic review of studies identifying factors influencing assistive technology provision to children, as well as two online focus groups with South African rehabilitation professionals experienced in recommending and providing assistive technology to young children. The qualitative phase enabled the researcher to adapt an existing assistive technology selection framework for use with young children within the South African context. The adapted theoretical framework was utilised to construct a best-worst questionnaire, where participants were asked to select the items (corresponding to factors of the adapted theoretical framework) that were most and least influential on their assistive technology provision. The survey was distributed electronically and completed by 451 rehabilitation professionals throughout South Africa. Analysis of the results enabled the researcher to confirm the inclusion of the identified factors in the adapted theoretical framework and identify a rank order of factors that influence the recommendation and provision of assistive technology in South Africa, as perceived by rehabilitation professionals. Differences between the perceptions of professionals with various years of experience were explored to illustrate the influence of experience on reasoning regarding assistive technology provision.

Keywords: assistive technology selection, assistive technology selection framework, best-worst survey, rehabilitation professional, sequential exploratory mixed methods design, young children

OPSOMMING

Wanneer hulpmiddels geselekteer word vir jong kinders binne 'n konteks met beperkte hulpbronne soos Suid-Afrika, word navorsing benodig om die faktore te bepaal wat die aanbevelings- en voorsieningsproses beïnvloed. Dit is nodig aangesien hierdie faktore die toeganklikheid en beskikbaarheid van aanpasbare, bekostigbare, aanvaarbare en hoë kwaliteit hulpmiddels kan belemmer of fasiliteer. Die doel van hierdie studie was om die faktore te identifiseer wat professionele rehabilitasiewerkers as invloedryk beskou op die aanbeveling en voorsiening van hulpmiddels aan jong kinders binne die Suid-Afrikaanse konteks en om te bepaal tot watter mate hierdie faktore as invloedryk beskou word. Die studie het 'n sekwensiële verkennende gemengde metode navorsingsontwerp gevolg. Die kwalitatiewe fase van die studie het 'n sistematiese hersiening van studies behels wat faktore wat die aanbeveling en voorsiening van hulpmiddels vir kinders beïnvloed geïdentifiseer het, asook twee aanlyn fokusgroepe wat gehou is met Suid-Afrikaanse professionele rehabilitasiewerkers wat ervare is in die aanbeveling en voorsiening van hulpmiddels aan jong kinders. Die kwalitatiewe fase het die navorser in staat gestel om 'n bestaande hulpmiddel seleksie raamwerk aan te pas vir gebruik met jong kinders binne die Suid-Afrikaanse konteks. Die aangepaste teoretiese raamwerk is gebruik om 'n beste-slegste vraelys saam te stel, waar deelnemers gevra is om items te selekteer (wat ooreenstem met faktore in die aangepaste raamwerk) wat die meeste en minste invloed op hulle voorsiening van hulpmiddels het. Die vraelys is elektronies versprei en ingevul deur 451 professionele rehabilitasiewerkers regoor Suid-Afrika. Die analise van die resultate het dit vir die navorser moontlik gemaak om die insluiting van die geïdentifiseerde faktore in die aangepaste teoretiese raamwerk te beaam en om 'n rangorde van faktore te identifiseer wat die aanbeveling en voorsiening van hulpmiddels in Suid Afrika beïnvloed, soos gesien deur rehabilitasiewerkers. Verskille in die persepsies van rehabilitasiewerkers met verskeie jare ervaring is geëksploreer om die uitwerking van ervaring op die redenasie van rehabilitasiewerkers oor die voorsiening van hulpmiddels te beskryf.

Steutelwoorde: beste-slegste opname, hulpmiddel seleksie, hulpmiddel seleksie raamwerk, jong kinders, professionele rehabilitasiewerker, sekwensiële verkennende gemengde metode navorsingsontwerp

CHAPTER 1

PROBLEM STATEMENT AND RATIONALE

1.1. Introduction

This first chapter serves as an introduction and orientation to this study. The problem statement and rationale for the study is explained. Definitions for frequently used terms are provided and meanings of abbreviations used throughout the text are included. An overview of all the chapters is provided to orientate the reader to the content of the thesis.

1.2. Problem statement and rationale

It is estimated that 11.2% of South African children have some form of disability (United Nations International Childrens Emergency Fund, Department of Social Development, & Department of Women, Children and People with Disability, 2012). Many South African children are exposed to several risk factors that contribute to the high levels of disability within the country.

The quadruple burden of disease can provide some insight into the prevalence of disability in the South African context. These disease burdens include maternal and child health, HIV and TB, trauma and violence, as well as non-communicable diseases such as mental illness, that may all directly or indirectly contribute to disability in young South African children (Kathard & Pillay, 2013; Sherry, 2015). In addition, approximately 63% of children in South Africa live in poor households (Hall & Lake, 2012). With the link between poverty and disability widely understood (Emmett, 2005; Sherry, 2015), poverty is another risk factor for disability for South African children.

Contemporary models of disability emphasise that disability is either experienced or ameliorated as a result of the interaction between the person with the disability and the environment. This is evident in the International Classification of Functioning, Disability and Health (ICF) (World Health Organisation, 2001), an international classification system that combined the social and medical models of disability (Eide & Ingstad, 2013). An unaccommodating environment leads to barriers to participation (Anaby et al., 2013) that could deny children with disabilities countless opportunities for learning and development, and may inhibit their integration in society (World Health Organisation & United Nations International Children's Emergency Fund, 2015).

As the models of disability have evolved, the focus of rehabilitation has shifted from an intra-personal to a social-ecological approach, focussed on the environment (Bernd, Van Der Pijl, & De Witte, 2009). When implementing this approach, the rehabilitation professional (RP) may consider the recommendation of different strategies to limit barriers to participation in the environment. By providing assistive technology (AT), access to participation and learning could be facilitated in all spheres of life (Henderson, Skelton, & Rosenbaum, 2008).

AT is generally recommended by an RP after a process of matching the abilities of the person, the capabilities of the AT, the characteristics of the environment (Scherer, 1998), and the activities that the client wants to perform (Cook & Polgar, 2008). For a young child, this process should be family-centred and should incorporate the perspectives of parents and caregivers, as well as those of the young child. The selection of AT for a young child requires complex professional reasoning skills from the recommending RP, due to the multitude of factors that should be considered in order to reach a recommendation for AT.

While AT appears to be more frequently provided and used in well-resourced countries, in resource-limited settings, such as South Africa, its provision appears more limited (Borg, Lindström, & Larsson, 2009; World Health Organisation & United States Agency for International Development, 2011). Furthermore, the rural South African context where an estimated 38% of the population resides, provides additional challenges to accessing any rehabilitation services (Neille & Penn, 2015; Vergunst et al., 2017). Within a context with limited resources and challenges to accessing services, careful selection of AT is particularly important as the best use must be made of available resources.

Although several theoretical frameworks describe the factors influencing the selection of AT in terms of broad components (Cook & Polgar, 2008; Scherer, 1998; Scherer et al., 2007), limited information is available regarding detailed factors that influence AT selection and the resulting AT recommendation and provision. No studies have been identified that provide a comprehensive overview of factors that influence the recommendation and provision of AT to young children internationally, or within the South African context. Aspects of the environment (e.g., service delivery in rural areas) and limited access to financial resources are often viewed as substantial barriers to the recommendation and provision of AT to young children in resource-limited environments. However, no studies have been identified that determine the perceived extent of the influence (as viewed by RPs providing AT services) of the different factors on the recommendation and provision of AT to young children in the South African context.

It is believed that unpacking these factors, as well as investigating the extent to which they are perceived to influence AT recommendation and provision, will lead to an increased understanding of the nature of the AT recommendation and provision process.

1.3. Terminology

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

1.3.1. Assistive technology

For this study, the definition for AT utilised in the World Report on Disability (World Health Organisation, 2011), as formulated in American legislation, is used (Individuals with Disabilities Education Act of 2004, 2004). Here, AT is defined as “any item, piece of equipment or product system, whether acquired commercially off the shelf, modified, or customised, that is used to increase, maintain or improve the functional capabilities of a child with a disability” (Individuals with Disabilities Education Act of 2004, 2004). For the South African context, low cost items/products that have been created by the RP for a particular person will be included in the definition.

Due to the wide variety of available AT, addressing a wide variety of limitations, this study will focus on AT typically recommended by occupational therapists (OTs), physiotherapists (PTs) as well as speech language therapists (SLTs) for use by young children (birth to 6 years). This could therefore include complex assistive devices such as computerised communication devices or motorised wheelchairs, or simpler assistive technology such as paper communication boards or adapted utensils. The study would therefore exclude, for example, hearing aids, spectacles and prosthesis, as these are not recommended by the mentioned professionals.

1.3.2. Assistive technology selection/recommendation/provision

In this thesis, the terms AT “selection”, “recommendation” and “provision” are frequently used. The different terms all have a slightly different focus, but when used in this thesis, all refer to aspects of the process that is followed before a person obtains a piece of AT.

The term “AT selection” is used to refer to the process where different factors are considered to make decisions regarding the AT that will be most suitable to the child and family. “Recommendation” is the preferred term when the professional, after following the selection process, is able to make a suggestion regarding AT. Although professionals would try to make recommendations that would enable the eventual provision/procurement of AT, AT recommendations do not necessarily lead to the provision of the AT and the child having the AT available for use.

The term “provision” could be viewed as the outcome of the selection process and would be appropriate when a professional is able to create/make the AT (e.g., a paper-based communication system) or when the professional is able to provide the AT (often free of charge) in the public sector (e.g., when the selected wheelchair is provided at a public hospital). When AT is recommended in the private sector, medical aids or families may provide/procure the AT. Additionally, “provision” is also the term used in the guidelines provided by the *Standardisation of Provision of Assistive Devices* document (Department of Health, n.d.).

1.3.3. Disability

The definition provided by the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) is utilised for this study (United Nations, 2006). It acknowledges that disability is an evolving concept and states that disability results from the interaction between the person with the impairments and barriers that stem from the attitudes of people and from the environment. These barriers hinder full and effective participation in society.

1.3.4. *Rehabilitation*

For this study, the definition of rehabilitation is utilised as provided in the World Report on Disability (World Health Organisation, 2011). This states that rehabilitation is “a set of measures that assist individuals who experience, or are likely to experience, disability to achieve and maintain optimal functioning in interaction with their environments” (World Health Organisation, 2011, p. 96).

1.3.5. *Evidence-based practice*

For this study, the researcher utilised the definition provided for evidence-based practice by Schlosser and Raghavendra (2004) for the field of Augmentative and Alternative Communication (AAC). It states that evidence-based AAC practice is “the integration of best and current research evidence with clinical/educational expertise and relevant stakeholder perspectives, in order to facilitate decisions about assessment and intervention that are deemed effective and efficient for a given direct stakeholder” (Schlosser & Raghavendra, 2004, p. 3).

1.3.6. *Rehabilitation professional*

For this study, the term “rehabilitation professional” is used when referring to OTs, PTs and SLTs. In South Africa, certain speech language therapists may have an additional audiology qualification. Although several professionals may become involved in rehabilitation, OTs, PTs and SLTs are typically involved in the rehabilitation and specifically in the recommendation of AT to young children with disabilities.

1.3.7. *Young children*

Within this study, “young children” refers to children from birth to 6 years of age. In South Africa, free healthcare is provided to children up to the age of 6 years and to persons with disabilities (National Health Act, No 61 of 2003, 2003). This includes the free provision of certain assistive technologies.

1.3.8. *Professional reasoning*

Professional reasoning has been described as the process used by any professional to “plan, direct, perform and reflect on client care” (Boyt Schell, 2009, p. 314). This concept has been called different names, including clinical reasoning (e.g., Schell & Cervero, 1993), but has been renamed to move away from the medical connotation. Professional reasoning can be applied in any practice setting and makes it possible for professionals to take the best action within the specific context (Higgs & Jones, 2008).

1.4. **Abbreviations**

AAC	:	Augmentative and Alternative Communication
AT	:	Assistive technology
ATD	:	Assistive technology device
HAAT	:	Human Activity Assistive Technology Model (Cook & Polgar, 2008)
HPCSA	:	Health Professions Council of South Africa
ICF	:	International Classification of Functioning, Disability and Health (World Health Organisation, 2001)
MPT	:	Matching Person and Technology Model (Scherer, 1998)

OT	:	Occupational therapist
PT	:	Physiotherapist
RP	:	Rehabilitation Professional
SLT	:	Speech language therapist
SLTA	:	Speech language therapist and audiologist (dual qualification)
UNCRC	:	United Nations Convention on the Rights of the Child
UNCRPD	:	United Nations Convention on the Rights of Persons with Disabilities
WHO	:	World Health Organisation

1.5. Outline of chapters

This study includes eight chapters. Chapter 1 describes the problem statement and rationale for the study. Definitions for frequently used terms are provided and meanings of abbreviations are included. An outline of chapters in the thesis is also provided.

Chapter 2 describes the literature study. The importance of AT for children with disabilities is described, as well as theoretical frameworks that are applied when recommending or providing AT. Certain factors influencing the recommendation and provision of AT are discussed. This includes a discussion of South African legislation and policy that underlie the provision of AT in the South African context. Furthermore, professional reasoning and its application to AT selection is discussed.

In Chapter 3, the aim and sub-aims, as well as the design of the overall study, are discussed. Information is provided on how the different phases of the study flow into each other. Furthermore, aims specifically for Phase 1 are included, as well as a detailed description of the methods followed in Phase 1. The methodology and results of the systematic review and online

focus groups conducted in Phase 1 are discussed. The chapter concludes with the presentation of an adaptation of the ATD Selection Framework (Scherer et al., 2007), that was used extensively in the development of the survey instrument in Phase 2 of the study.

Chapter 4 provides the aims of Phase 2 of this study. The methods for the development of the survey instrument are discussed. The chapter concludes with the presentation of the final survey instrument that was utilised in Phase 3 of the study.

Chapter 5 explains the aims and methods for Phase 3 of the study. Materials and equipment, as well as data collection during Phase 3, is described. Furthermore, a description is provided of participants in the survey and details are provided regarding reliability and validity measures that were considered.

Chapter 6 contains the results of the survey that was conducted as part of Phase 3 of the study. Rank orders of items are provided (from most to least influential and least to most influential), indicating the perceived influence of different factors on AT recommendation and provision. Differences are explored between the results obtained from RPs with various levels of experience.

The discussion of the results of the study is included in Chapter 7. Results are discussed according to the adapted ATD Selection Framework. The perceived influence of environmental factors, as well as personal factors of the child and family and the providing RP, is discussed. Furthermore, the perceived influence of factors pertaining to assistive technology and AT assessment is included. At the end of this chapter, the implications of the discussion are explored.

Overall conclusions as drawn from the study are presented in Chapter 8. Implications for practice are discussed. The study is critically evaluated in terms of strengths and limitations, and suggestions are made for further research.

1.6. Summary

This chapter presented the problem statement and rationale for this study. The importance of gaining an increased understanding of the factors influencing the recommendation and provision of AT to young children in South Africa was explained. Frequently used terms were defined and the meaning of abbreviations used in the text was provided. The chapter concluded with an outline of all the chapters that form part of this thesis.

CHAPTER 2

LITERATURE REVIEW

2.1. Introduction

The overall aim of this chapter is to provide an overview of the literature reviewed for this study. In accordance with this aim, the chapter serves two purposes. First, literature pertaining to assistive technology and young children is discussed and theoretical models for the selection of AT are reviewed. Second, the theoretical framework selected as the underlying framework for this study is explained. The framework formed the starting point for the eventual development and application of the measuring instrument utilised in the study. Certain components of the framework are discussed with reference to literature that exemplifies the possible influence of these components on AT selection and resulting AT recommendations and provision. The need to expand on and adapt the framework to guide instrument development for the study is then highlighted, and a brief preview is provided on the steps followed to do so.

2.2. Assistive Technology (AT) for young children

For this study, AT includes “any item, piece of equipment or product system, whether acquired commercially off the shelf, modified, or customised, that is used to increase, maintain or improve the functional capabilities of a child with a disability” (Individuals with Disabilities Education Act of 2004, 2004). For the South African context, low cost items/products that have been created from by the RP for a particular person will also be included.

Research has shown that professionals find AT difficult to define. Professionals are not always sure of what is included when referring to AT and may find it difficult to distinguish between different types of AT, for example, high and low technology (Parette & Brotherson,

2004; Wilcox, Dugan, Campbell, & Guimond, 2006). For this study, low technology refers to AT that is “inexpensive, simple to make and easy to obtain” (Cook & Polgar, 2008, p. 7), while high technology refers to “sophisticated, usually programmable types of equipment” (Glennen & DeCoste, 1997, p. 379).

When providing intervention services to young children with disabilities, the focus is often on promoting participation in multiple, naturally occurring learning opportunities (Fleming, Sawyer, & Campbell, 2010; Sawyer & Campbell, 2009). Participation in naturally occurring activities is the source of countless learning opportunities for young children (Dunst, Hamby, Trivette, Raab, & Bruder, 2000), and they learn as they engage with elements of the physical environment (e.g., toys or utensils) or with persons around them.

In essence, the benefit derived from using AT lies therein that it enables participation in activities that may be very difficult or impossible without the AT (Campbell, Milbourne, Dugan, & Wilcox, 2006; Henderson et al., 2008; Judge et al., 2010; Light & Drager, 2007; Sadao & Robinson, 2010). AT may enable the child to participate, even though they may not have the skill required to participate in a typical manner (Campbell, Milbourne, & Wilcox, 2008). As an example, participation in routine activities such as mealtimes or play activities (Lane & Mistrett, 1996) can be increased using AT, thereby also facilitating social and physical inclusion. AT can facilitate the participation of children with a wide range of developmental difficulties, including those with mild delays, as well as children with severe or multiple disabilities (Guerette, Furumasu, & Tefft, 2013).

AT (particularly when used with young children) has also been described as a “set of tools” (Judge, Floyd, & Wood-Fields, 2010, p. 85) that can be employed to reach certain goals. In a systematic review by Dunst et al. (2013), the positive effect of AT on several child outcomes

was confirmed. The review included studies that looked at the use of switch interfaces (for access to e.g., toys), powered mobility, computer use and use of AAC, as well as use of weighted/pressure vests. Of all these forms of AT, only the use of weighted/pressure vests was not associated with positive changes in terms of the children's cognitive, motor, social, literacy, communication, adaptive behaviour or engagement in activity.

The benefit of appropriate AT use for the families/caregiver of the child using the AT has also been documented, although not as comprehensively as the benefit to the child themselves (Henderson et al., 2008). The benefits to the family/caregivers include, for example, a reduction in the physical effort required to perform caregiving activities with the child (Nicolson, Moir, & Millsteed, 2012; Østensjø, Carlberg, & Vøllestad, 2005), possibly due to the increased independence of the child (Nicolson et al., 2012).

Despite the benefits documented, research shows that AT tends to be underutilised with young children with disability (e.g., Dugan, Campbell, & Wilcox, 2006; Kling et al., 2010). AT may be underutilised for various reasons (e.g., Bailey, Parette, Stoner, Angell, & Carroll, 2006; Lahm & Sizemore, 2002; Parette, Vanbiervliet, & Hourcade, 2000), that may stem from various points within the AT service delivery process.

Although some children (particularly in contexts with limited resources) may underutilise AT as they do not have access to AT services, (e.g., Borg, Larsson, & Östergren, 2011; Matter, Harniss, Oderud, Borg, & Eide, 2016), others may underutilise or possibly even abandon AT due to challenges experienced during AT selection. The family-centred selection of AT where the preferences and needs of the family are incorporated is believed to be an important step in ensuring the long-term utilisation of AT by a specific child and family (Judge, 2002; Parette & Brotherson, 2004; Parette et al., 2000). Within resource-limited settings, the importance of

appropriate and contextually relevant AT selection is highlighted (Alant, 2005), as limited resources have to be optimised in order to provide the best possible interventions to large numbers of individuals requiring services.

2.3. Selection of AT

2.3.1. *Nature of AT selection*

AT selection refers to the process where different factors are considered in order to make decisions regarding the AT that will be most suitable to the child and family. These selections will lead the RP to make recommendations regarding AT and will guide the eventual provision of AT. For the recommending RP, AT selection is a complex professional reasoning task. Professional reasoning involves the thinking and decision-making skills that make it possible for RPs to take the best action within a specific context (Higgs & Jones, 2008).

When AT selections are made pertaining to young children, it is vital that a family-centred selection process is followed (Judge & Parette, 1998; Parette & Brotherson, 2004). Family-centred AT selection requires the recommending RP/RPs to weigh up different factors influencing their recommendations (including, e.g., the input of the family) so to come up with the best possible solution to the clinical problems they want to address and opportunities they want to create by use of the AT.

2.3.2. *Theoretical frameworks for AT selection*

To guide the selection practices of RPs, theoretical frameworks describing this process can be very useful. Frameworks are used when training new RPs in AT selection (e.g., de Jonge & McDonald, 2010) and can also be applied by more experienced RPs to evaluate their AT

selection practices. Theoretical frameworks may also be utilised as a starting point for the development of AT assessment tools (e.g., Scherer & Craddock, 2002) and can guide research on the topic of AT selection (e.g., Scherer et al., 2007). However, RPs do not necessarily consider theoretical frameworks when selecting AT, but often rely on experience and intuition when making recommendations (Friederich, Bernd, & De Witte, 2010).

Several authors have called for a move towards evidence-based practices, where validated theoretical frameworks can be used to guide RPs in their AT assessment and selection practices (Desideri, Roentgen, Hoogerwerf, & De Witte, 2013; Friederich et al., 2010). This points to the importance of continuously reviewing existing models (Giesbrecht, 2013), to ensure that they reflect current evidence.

Several theoretical frameworks exist that can be used to guide the selection of AT. A systematic literature review (Bernd et al., 2009) identified several models that were utilised in research papers on AT selection. Only three of the seven models identified were AT specific and were found to be suitable for use in the AT selection process. These include the Human Activity Assistive Technology (HAAT) Model (Cook & Polgar, 2008), the Matching Person and Technology (MPT) Model (Scherer, 1998) and the Assistive Technology Device (ATD) Selection Framework (Scherer et al., 2007). The ICF, a classification system (World Health Organisation, 2001), was also noted in relation to the selection of AT. The ICF is not specific to AT and its applicability has been debated in the literature (Bernd et al., 2009). Some authors have described it as a promising tool to use for AT outcomes research (Lenker & Paquet, 2003), while others have noted its shortcomings in identifying specific factors that influence the selection of AT (Scherer et al., 2007). For this study, the use of the ICF as a framework to guide AT selection was not considered, as models specific to AT selection were deemed more appropriate.

2.3.2.1. *Human Activity Assistive Technology (HAAT) Model*

The HAAT model (Cook & Polgar, 2008) is widely used to guide AT selection (Desideri et al., 2013). It was developed from the Model of Human Performance (Bailey, 1996) and has continued to develop since it was first published in 1995 (Giesbrecht, 2013). The original model was authored by Albert M. Cook from the field of rehabilitation engineering and Susan M. Hussey from the field of occupational therapy (Giesbrecht, 2013). It is a consumer-centred model, with four main components. These include the user of the AT, assistive technology, the activity, and the context.

According to de Jonge and McDonald (2010), an assessment utilising this model will start with activities that a child would like to perform. This would then be fitted to the child's existing abilities. To increase/facilitate the occupational performance/participation of the child in the chosen activity within a particular context, appropriate AT is selected.

The context is comprehensively described in the HAAT and divided into four different subgroups. The contexts are viewed as determining factors in successful utilisation of AT. The different components of the context specified by the HAAT model, together with a definition of each, can be viewed in Table 2.1.

Table 2.1

Components of the Context Utilised in the HAAT Model

Component of the context	Definition provided within the HAAT Model (Cook & Polgar, 2008)
Cultural context	The HAAT model defines culture as "... a system of learned patterns of behaviour", that is "shared by members of the group rather than being the property of an individual" (Krefting & Krefting, 1991, p. 102). Furthermore, it includes a way to interact with other people and with the environment. The culture of a person provides a lens through which the world is viewed and cultural influences should be considered when AT is recommended (Cook & Polgar, 2008).
Institutional context	This refers to "larger organisations within a society" (Cook & Polgar, 2008, p.43). These organisations are responsible for, for example, legislation and policy.
Social context	This refers to individuals that interact with the client using the AT. This may be directly or indirectly. The social context may include attitudes of persons in the environment. This also includes the acceptability of certain AT in the context, that is greatly influenced by stigma (Cook & Polgar, 2008).
Physical context	According to Cook and Polgar (2008), this may be the easiest to understand and includes the physical attributes of the environment.

Several research studies have utilised this model (e.g., Arthanat, Wu, Bauer, Lenker, & Nochajski, 2009) either as background or to inform study design (Giesbrecht, 2013). The HAAT model has not been tested for validity (Bernd et al., 2009), but has undergone three revisions since first publication.

The HAAT model does not pertinently reflect the influence of the professional themselves on the AT selection process.

2.3.2.2. The Matching Person and Technology (MPT) Model

The MPT model (Scherer & Craddock, 2002) is client-centred and emerged from a grounded theory study (Bernd et al., 2009). The model looks at the interaction between the client (user of the AT), the milieu and the assistive technology. It aims to lead to the selection of AT that is the best match for the person within their environment.

Measurement instruments that are aligned with the MPT are available for purchase and have been used in numerous studies (e.g., Scherer, Craddock, & Mackeogh, 2011; Scherer,

McAnaney, & Sax, 2006; Scherer, Sax, Vanbiervliet, Cushman, & Scherer, 2005). The instruments have been validated for use with people with disabilities who are 15 years or older (Scherer & Craddock, 2002). The MATCH (Matching Assistive Technology and Child) instruments are specifically available for use with children birth to 5 years (Scherer et al., 2011).

Unlike the HAAT model, the MPT model does not appear to have a clear focus on activity or participation, as this is not one of the main components of the model. Furthermore, the model does not pertinently indicate the influence of the RP themselves on the selection of AT.

2.3.2.3. ATD Selection Framework (Scherer et al, 2007)

In the ATD Selection Framework (Scherer et al., 2007), the authors indicate that the interplay between environmental factors (such as legislation and policy), personal factors of both consumer and provider (including e.g., knowledge and information), as well as specific ATD decision-making and device selection components (based on assessments of the objective and subjective needs of the consumer and provider) contribute to the selection of a device. One can then theorise that any one of the factors indicated in the ATD Selection Framework (Figure 2.1) can have an influence on the selection, recommendation and eventual provision of AT to a specific user.

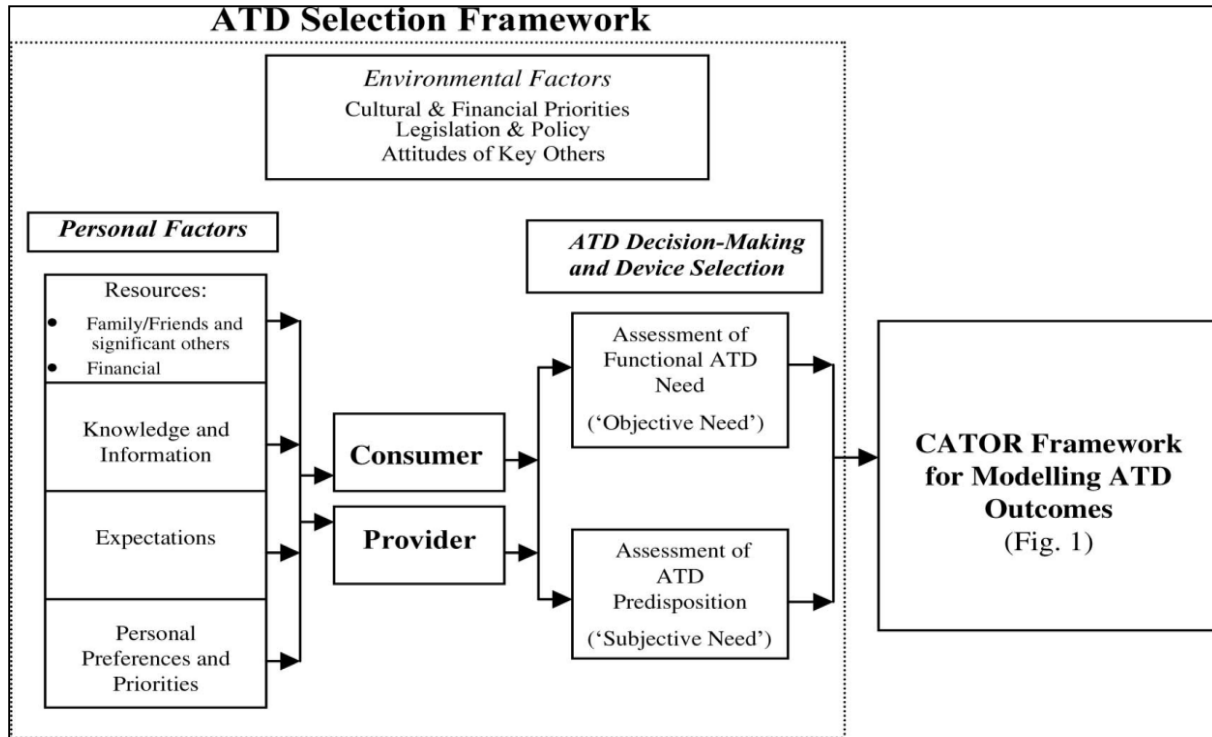


Figure 2.1. ATD Selection Framework (Scherer et al, 2007). Image used with permission from publisher.

The ATD Selection Framework is the only AT-specific theoretical framework identified that pertinently includes the professional as part of the framework. Unlike the HAAT model, it does not have a clear focus on the activity/participation of the person that will be using the AT. It also does not pertinently include assistive technology as a component, as both the HAAT model (Cook & Polgar, 2008) and the MPT Model (Scherer, 1998) do.

All three of the theoretical frameworks discussed provide a big picture of factors that are thought to influence the selection and therefore the resulting recommendation and provision of AT. The researcher selected the ATD Selection Framework (Scherer et al., 2007) as the theoretical framework to be utilised for this study as it was the only framework that pertinently indicated that aspects pertaining to the recommending RP, together with the personal factors of

the client, will influence the selection of AT. Several studies have indicated that personal factors of recommending professionals, such as their experience (e.g., Griffiths & Price, 2011; Thistle & Wilkinson, 2015; Weintraub Moore & Wilcox, 2006; Wilcox, Guimond, Campbell, & Weintraub Moore, 2006), and level of training (e.g., Long & Perry, 2008; Long, Woolverton, Perry, & Thomas, 2007; Orton, 2008) influence AT provision. Due to its inclusion of the personal factors of the recommending RP, the ATD Selection Framework is viewed as the most inclusive of the broad factors influencing AT provision.

2.4. Factors influencing AT recommendation and provision according to the ATD Selection Framework

Environmental factors (specifically pertaining to the South African context), personal factors of the provider and client, as well as certain aspects pertaining to assessment will be discussed in this section. Throughout the discussion, possible shortcomings of the ATD Selection Framework (Scherer et al., 2007) are identified, pointing towards the need to adapt and expand the framework to ensure that it reflects current evidence.

2.4.1. *Factors pertaining to the South African environment*

Several environmental factors within the South African context may influence the selection and resulting recommendation and provision of AT to young children. These include factors pertaining to policy and legislation, the systems of healthcare within the country, as well as challenges associated with providing services in rural areas.

2.4.1.1. *Policy and legislation*

As indicated in the ATD Selection Framework (Scherer et al., 2007), policies and legislation influence AT provision.

2.4.1.1.1. *International Conventions*

The United Nations Convention on the Rights of the Child (UNCRC) (United Nations, 1989) was ratified by South Africa in 1996. In doing so, the government committed itself to the principles of non-discrimination; considering the best interest of the child; protecting the rights of the child to survival; protection and development; as well as the right of children to participate fully (in family, cultural and social life).

The United Nations Convention on the Rights of People with Disabilities (UNCRPD) (United Nations, 2006) was ratified by the South African government in 2007. The UNCRPD specifies the right to education for children with disabilities and mentions the importance of removing barriers to education (Article 24). Furthermore, it describes the importance of rehabilitation (Article 26), requiring the government to promote the use of AT as it facilitates independence and maximum participation.

2.4.1.1.2. *South African legislation and policy that underlie provision of rehabilitation services to children*

Several pieces of legislation and policy underlie the provision of rehabilitation services to children within the South African context. A summary of applicable legislation and policy documents is provided in Table 2.2.

Table 2.2

Legislation and Policy that Underlie Disability Services in South Africa

Legislation/policy	Description	Example of application to young children with disabilities
Constitution (The Constitution of the Republic of South Africa, Act 108 of 1996, 1996)	This is the supreme law of the country, ensuring the rights of all citizens.	Ensuring children under 18 the right to, for example, basic healthcare and social services, as well as protection from maltreatment, neglect or abuse.
Promotion of Equality and Prevention of Unfair Discrimination Act (Promotion of Equality and Prevention of Unfair Discrimination Act, No 4 of 2000, 2000)	This act deals with the prevention, prohibition and elimination of unfair discrimination, hate speech and harassment.	It addresses environmental accessibility and reasonable accommodation for people with disabilities.
Mental Health Care Act (Mental Health Care Act, No 17 of 2002, 2002)	Aims to provide the best possible mental healthcare services to the population.	It aims to provide coordinated access to treatment and rehabilitation services to users of mental healthcare. This includes persons with intellectual disabilities (African Child Policy Forum, 2011).
National Health Act (National Health Act, No 61 of 2003, 2003)	This act regulates the health services. It establishes a national health system and aims to guarantee that all South Africans have access to health services (African Child Policy Forum, 2011).	It aims specifically to protect, respect and promote the right to health for vulnerable groups, such as children with disabilities.
The Children's Act (Children's Act, No 38 of 2005, 2005)	This outlines the rights of children in South Africa and is aligned to the UNCRC.	The Department of Social Development has a role in establishing early childhood development services, as well as prevention and early intervention services.

2.4.1.1.3. *Policies of specific government departments*

Several government departments also have policy documents providing guidance to the provision of services to children with disabilities in South Africa. These are summarised in Table 2.3.

Table 2.3

Policies from Government Departments that Underlie Disability Services in South Africa

Legislation/policy	Description	Example of application to young children with disabilities
Integrated national strategy on support services to children with disabilities (Department of Social Development, 2009)	This aims to improve the quality of life of children with disabilities in South Africa. It aims to create an environment where children with disabilities have access to equal services, function independently, enjoy a decent quality of life and actively participate in society.	It aims to promote the rights of children with disabilities to participate in all spheres of life by use of AT.
White Paper on the Rights of persons with disabilities (WPRPD) (Department of Social Development, 2015)	Aims to provide guidance to the application of the UNCRPD in the South African context. All policies and legislation affecting persons with disability may be reviewed to determine if they meet the obligations of the WPRPD and UNCRPD. Provides an update to the White Paper on an Integrated National Disability Strategy of 1997.	Promotes the realisation of equal rights to persons with disability and supports equal opportunities for persons with disabilities, as well as their integration into society.
Framework and strategy for disability and rehabilitation services in South Africa (Department of Health, 2015b)	Aims to provide integrated rehabilitation services, with increased finances allocated to human resources for disability and rehabilitation services.	It aims to improve access to rehabilitation services – specifically to AT.
Guidelines of provision of assistive technology (Department of Health, n.d.)	Provides guidelines regarding the standardisation of provision of AT across provinces.	This provides guidelines regarding the assessment, provision and repair of various devices. It also confirms that AT should be provided free of charge to qualifying persons, including children under 6 years and persons with disability.

2.4.1.2. Healthcare systems

South African children typically access AT through one of the two systems of healthcare – the public and the private healthcare systems. The possibility does exist that young children could access AT through the education system. However, this system focuses mostly on children older than 6 years of age (when schooling becomes compulsory). AT may also be obtained through private funding or non-government organisations.

Within the public healthcare system, all citizens have access to free primary healthcare (Coovadia, Jewkes, Barron, Sanders, & McIntyre, 2009). Additional healthcare services are also available to all citizens and are billed based on the income of the user. Free (comprehensive) public healthcare services are provided to all pregnant women and children under 6 years (Harrison, 2009). This includes free access to certain AT. Within the public healthcare system, RPs select AT from the options specified in the “tender” documentation (e.g., Department of Health, 2015a), that specify approved products and suppliers for all rehabilitation consumables.

Well-resourced families tend to prefer to access the private healthcare system, despite the fact that free healthcare services are available to children under 6 years (Maillacheruvu & Mcduff, 2014). This may be due to the challenges associated with the public healthcare system. These include, for example, limited numbers of professionals providing services in overburdened health facilities and deteriorating infrastructure (van Rensburg, 2014). Well-resourced families are typically covered by medical aids (medical insurance). Statistics South Africa (2015) reported that 17.5% of the population of 54.4 million people were covered by a medical aid. Within the more affluent provinces, this increases, with 27.7% of the Gauteng population and 24.2% of the population of the Western Cape having medical aid cover. For metropolitan areas, the average percentage increases to 26.4%. Within the capital city of Tshwane, 33% of the population have medical aid coverage (Statistics South Africa, 2015).

In the private healthcare sector, RPs, teachers, AT suppliers or parents may select and procure AT. AT is ordered from a supplier directly and, depending on the AT and the benefits of a particular medical aid, may or may not be covered by the medical aid (AT should be prescribed by a healthcare professional in order for a medical aid to consider payment). This implies that

persons utilising the private healthcare sector are often required to pay their medical aid contribution as well as their AT (van Niekerk & Tönsing, 2015).

Although certain of the factors pertaining to the health systems implemented in South Africa are reflected in the ATD Selection Framework (Scherer et al., 2007) (e.g., financial provision), other factors mentioned (e.g., the influence of institutions providing AT), are not clearly reflected in the existing framework. This may point to the need to expand and adapt the ATD Selection Framework (Scherer et al., 2007) to reflect the South African context.

2.4.1.3. Challenges of the rural context

It has been reported that South African persons with disabilities face additional challenges in accessing health services compared to persons without disabilities and that they report poorer health outcomes (Tomlinson et al., 2009). When persons with disabilities require services in rural areas, these challenges are amplified (Vergunst et al., 2017). Difficulties experienced in rural areas of South Africa include, for example, transportation issues (Samuels, Slemming, & Balton, 2012; Vergunst et al., 2017) as well as an unfavourable distribution of healthcare professionals in these areas (World Health Organisation & United Nations International Children's Emergency Fund, 2015). In terms of assistive technology, it has been reported that persons living in rural areas (internationally) may experience difficulties accessing different types of AT (Keramidas & Collins, 2009).

Many of the factors mentioned as challenges to the implementation of health services, and in particular providing AT in rural contexts, may be viewed as practice barriers that could potentially influence the selection and eventual provision of AT. The influence of these factors does not seem to be well reflected in the ATD Selection Framework (Scherer et al., 2007) and may point to the need to expand and adapt this framework.

2.4.2. *Personal factors pertaining to the RP*

2.4.2.1. *RPs in the South African context*

Although over 80% of the South African population of 54.4 million access the public healthcare service (Statistics South Africa, 2015), the majority of healthcare professionals provide services within the private healthcare environment. Statistics available from 2010 indicate that 82.5% of PTs and 76.1% of OTs provided services in the private health sector at that time (van Rensburg, 2014). This implies that (in 2010) only 17.5% of PTs (1009 therapists) and 23.9% of OTs (838 therapists) were employed in the public healthcare sector (van Rensburg, 2014). According to Kathard and Pillay (2013), the total number of South African SLTs registered with the Health Professions Council of South Africa (HPCSA) in 2012, was 2011. These therapists provide services in public and private healthcare settings, and several of those registered may be inactive or working outside of the country. This illustrates the limitations in human resource availability in the country, as limited numbers of RPs essentially provide services to a population of several million people.

To increase the RPs in the public health sector and particularly in rural areas, all graduating professionals are required, after completing their degree training, to complete one year of compulsory community service in the public sector. This has been implemented since the early 2000s and has led to a marked increase in the number of professionals employed in the public sector (Harrison, 2009). However, the distribution remains disproportionate. Furthermore, it has led to newly qualified, so-called “community-service therapists” often given the difficult task of providing appropriate AT in resource-limited and often rural areas without any support or assistance (Ned, Cloete, & Mji, 2017; van Niekerk, Dada, & Tönsing, 2017). An

additional challenge lies therein that professionals' language, cultural and/or economic background often differs from that of their clients (Kathard et al., 2011).

All healthcare professionals within South Africa are governed by the HPCSA, with which they are required to register after completing their studies. The various professional boards of the HPCSA (as appointed by the Minister of Health) publish the scope of practice of every profession, that provides guidance regarding the types of AT that each profession may recommend. RPs rely on their professional reasoning to make specific AT selections, within the boundaries provided by their particular scope of practice.

2.4.2.2. Professional reasoning of RPs

Professional reasoning is a complex process that allows the RP to determine priorities and negotiate the interests of different people (Higgs & Jones, 2008). RPs utilise professional reasoning skills when selecting AT, and it allows them to weigh up the different factors that influence the AT selection process. Unfortunately, limited information is available about professionals' reasoning during this process (Friederich et al., 2010).

According to Boyt Schell (2009), writing specifically within the field of occupational therapy, the reasoning of professionals is shaped by two main aspects – their personal and professional perspectives. The professional brings to any therapy situation (including the selection of AT) his/her own values, personality, beliefs, knowledge and skills (grounded in their own life experiences). This all forms their personal self. This acts as a “lens” through which the professional views events (Boyt Schell, 2009, p.323). In addition to this, every professional has a professional self that includes their knowledge and skills, education, experience and so forth. Boyt Schell (2009, p. 323) explains that the personal and professional selves “act in concert” when responding to problems.

When considering that RPs use professional reasoning when selecting AT, the factors that influence professional reasoning may be expected to influence RPs in their selections regarding AT. The inclusion of personal factors (such as knowledge and information) regarding the RP within the ATD Selection Framework (Scherer et al., 2007) are therefore supported. An understanding of the factors that influence professional reasoning may also indicate that an expansion of the ATD Selection Framework (Scherer et al., 2007) may be required to include aspects pertaining to the professional not currently stipulated.

2.4.2.2.1. *Types of professional reasoning*

Boyt Schell (2009) describes several types of professional reasoning. *Scientific reasoning* includes the understanding of the condition of the client and deciding on interventions (Boyt Schell, 2009). This runs parallel to scientific inquiry. This has been described by various authors including Fleming (1991), who referred to procedural reasoning, and Rogers and Holm (1991), who referred to it as diagnostic reasoning.

Narrative reasoning involves understanding the meaning of the disability for the client (and family), which goes beyond the scientific/procedural understanding (Boyt Schell, 2009; Schell & Cervero, 1993). Narrative reasoning is used to assist clients (and families) to create new stories for themselves that transcend the impact of their disability (Boyt Schell, 2009).

Pragmatic reasoning involves a step beyond the client and considers the world where the intervention occurs (Schell & Cervero, 1993). This includes the practice context and the personal context (including the RP's personal situation, their competencies, preferences and so forth) (Boyt Schell, 2009). Pragmatic reasoning involves the ability to negotiate the practice and the personal contexts and deal with the practicalities of intervention.

Ethical reasoning occurs when different forms of professional reasoning lead the professional to take the best possible (most ethical) action to address the difficulties of the client (Boyt Schell, 2009). Rogers (1983, p. 602) explained that the “... reasoning process terminates in an ethical decision...”, and therefore ethical reasoning is viewed as projecting over the whole reasoning process.

Interactive reasoning is involved when the professional builds a good interpersonal relationship with the client (and family) (Boyt Schell, 2009). This would include, for example, strategies to gain the trust of the client and family and strategies to motivate them to participate (Boyt Schell, 2009).

Ryan and Hills (2012) include an additional type of reasoning, namely contextual reasoning. This is conceptualised to go beyond pragmatic reasoning (that incorporates aspects of the personal and practice context). It has been suggested that contextual reasoning forms an overarching type of framework that should be used as a backdrop to all other types of reasoning (Ryan & Hills, 2012). Furthermore, contextual reasoning is said to influence the emphasis placed on the different types of reasoning (e.g., scientific, narrative or pragmatic) used in different contexts. In other words, the context of intervention may help determine what types of reasoning may be used by RPs (Ryan & Hills, 2012).

2.4.2.3. The influence of experience on professional reasoning

Experience is said to have great influence on the professional’s ability to use their professional reasoning (Boyt Schell, 2009; Schell & Cervero, 1993; Unsworth, 2001). Unsworth (2001) notes that the greatest difference between the expert and novice professional lies within their ability to use their professional reasoning skills. Experts have better reasoning skills than

novices (Schell & Cervero, 1993; Unsworth, 2001) and experts are said to solve problems faster and better.

The development of professional reasoning has been said to occur on a continuum. Boyt Schell (2009) represented this, specifically for the field of occupational therapy, in a hierarchy in terms of years of reflective practice. This was modified from work by several authors (Benner, 1984; Clark, Ennevor, & Richardson, 1996; Creighton, Dijkers, Bennett, & Brown, 1995; Dreyfus & Dreyfus, 1986; Mattingly & Fleming, 1994; Slater & Cohn, 1991; Strong, Gilbert, Cassidy, & Bennett, 1995) and is included in Table 2.4. As this continuum was developed within the field of occupational therapy, caution is indicated when applying to other professions.

Table 2.4

Professional Reasoning Continuum (Boyt Schell, 2009)

Category	Years of Reflective Practice	Characteristics
Novice	0	Novices are dependent on theory and use procedural reasoning to determine actions as it is more rule-based. Novices are not able to adapt rules to fit different situations or contexts. Narrative reasoning does not inform practice significantly, while pragmatic reasoning is used in order to survive on the job. Novices recognise only very clear ethical issues.
Advanced Beginner	<1	They start to incorporate information regarding the context. An advanced beginner can recognise the difference between their expectations (based on theory) and the reality of the presenting problem. They struggle to prioritise well. Their skills in pragmatic, narrative and ethical reasoning are increasing.
Competent	3	Competent professionals are able to automatically perform many skills. They are able to “develop communal horizon” with their clients (Boyt Schell, 2009, p. 325). They are better able to prioritise goals and can make efficient plans according to the requirements of the context. They can modify intervention but are not as flexible as more experienced professionals.
Proficient	5	Proficient professionals can perceive a situation as a whole. As they have collected many experiences, they are able to have more focused evaluations and flexible intervention. They are able to be creative when combining procedural approaches. They are more in tune with people's stories and how the intervention can be relevant to the client. They are increasingly skilful in negotiating whatever the resources may be, in order to meet the need. They are more skilful in understanding the situational component of ethical reasoning.
Expert	10	Experts are able to reason quickly and intuitively. Their reasoning is internalised and stems from a wide range of experiences. They are very skilled and able to promote the long-term satisfaction of the client (Boyt Schell, 2009).

Novice and beginner therapists are thought to depend heavily on theory (Robertson, 2012) and use procedural reasoning to guide their practice to a great extent (Boyt Schell, 2009). They tend to focus on identifying deficits in the client (Robertson, 2012). As they gain experience, they incorporate more and more aspects of narrative reasoning (where the client and family's perspective on the problem is considered), but they struggle to use this to inform their practice. Novice and beginner therapists are gaining skills in pragmatic reasoning, while more experienced therapists are able to utilise this type of reasoning more easily.

Expert professionals use quick and intuitive professional reasoning. As they have a great variety of experiences (most likely in multiple contexts), they mostly use routine analysis (except in cases where this does not work) (Boyt Schell, 2009). They are highly skilled in pragmatic reasoning and are able to navigate the resources in their personal and practice contexts according to the needs of their clients. In a study by Unsworth (2001), experts appeared to use different types of reasoning together more often than novice therapists.

Importantly, Boyt Schell (2009) indicates that the development of professional reasoning is dynamic. Although it is presented in the continuum in terms of years of practice, many factors could potentially influence this development. These factors include professional and personal experiences, as well as how reflective the professional was on those experiences. These aspects are said to be critical in becoming an expert. As professional reasoning is dependent on the specific context where the RP is working (Chapparo & Ranka, 2008; Ryan & Hills, 2012), a professional that is an expert in one context may not necessarily be an expert in a different context.

The influence of experience is not pertinently included in the ATD Selection Framework (Scherer et al., 2007), although it has been shown to influence AT selections (e.g., Thistle &

Wilkinson, 2015; Wilcox et al., 2006). This, therefore, may point to the need to expand the ATD Selection Framework (Scherer et al., 2007).

2.4.3. *Personal factors pertaining to the client (child and family)*

In addition to the personal factors of the professional, the ATD Selection Framework (Scherer et al., 2007) includes personal factors of the user of the AT. The importance of following a client-centred approach in AT selection has often been described (e.g., Federici et al., 2014; Giesbrecht, 2013; Scherer et al., 2007) and within this type of approach, the personal factors of the user of the AT should be an important consideration. It has been reported that user satisfaction with AT is higher when the client is informed and their needs incorporated into the selection process (e.g., Martin, Martin, Stumbo, & Morrill, 2011). Increased user involvement has led to better outcomes associated with AT, also in developing countries (Borg et al., 2012).

Although the client-centred approach may be appropriate for adults, when services are provided to a young child, the child cannot be viewed as the client in isolation. A family-centred AT selection process has been recommended, as full family involvement in the selection and decision-making process is essential (Dugan et al., 2006; Judge & Parette, 1998; Wilcox et al., 2006). Therefore, the child and family both become the users of the AT. As this is not reflected in the ATD Selection Framework (Scherer et al., 2007), it may be suggested that the framework be adapted for use specifically with young children.

The failure to incorporate the needs and preferences of the family has been associated with negative consequences regarding the long term use of AT and may contribute to abandonment (Bailey et al., 2006; Kling et al., 2010; Parette et al., 2000; Wilcox, Guimond, et al., 2006). Families may view the benefits of particular AT differently than RPs (e.g., McDonald,

Surtees, & Wirz, 2007) and may have different expectations and preferences regarding the AT, which may affect their satisfaction with the AT provided.

The preference of the child themselves has been described as highly important in AT selection. Several authors (e.g., Johnson, Bornman, & Tönsing, 2017; Thistle & Wilkinson, 2015) have reported the importance of child preference in the design of AAC displays and vocabulary selection. There has also been some focus on incorporating child preference in AT manufacturing (Light, Drager, & Nemser, 2004; Light, Page, Curran, & Pitkin, 2007). The importance of child preference has also been discussed pertaining to creating AT solutions for play (e.g., Lane & Mistrett, 1996) and the selection of mobility devices (e.g., Calhoun, Schottler, & Vogel, 2013).

Therefore, the inclusion of the preferences of the users of the AT (child and family) in the ATD Selection Framework (Scherer et al., 2007) is well supported.

2.4.4. *Factors related to AT assessment*

Within the ATD Selection Framework (Scherer et al., 2007, p. 4), the “assessment of functional ATD need” (objective need) as well as the “assessment of ATD predisposition” (subjective need) is specified. Although the assessment of needs are important in order to ensure that the users of the AT are provided with AT that would match their needs (Scherer, 1998), the importance of comprehensive AT assessments, including child, family, technology and service system factors have been described (Østensjø et al., 2005). Furthermore, the activities the user of the AT would like to participate in may influence the assessment process, as suggested by Cook and Polgar (2008) and specified in the HAAT model. To determine the comprehensiveness of the ATD Selection Framework (Scherer et al., 2007) regarding the factors pertaining to AT assessment, a revision of the framework may be indicated.

2.4.5. Critical evaluation of ATD Selection Framework (Scherer et al., 2007)

Clear from the discussion is that the ATD Selection Framework (Scherer et al., 2007) is a comprehensive framework providing overarching components that could be linked to AT selection and the resulting recommendation and provision of AT. However, the need to adapt and expand this framework was discussed throughout, as possible limitations of the framework were identified.

In addition to this, assistive technology is not pertinently included as a component of the ATD Selection Framework (Scherer et al., 2007), although it is included as one of the main components in both the MPT model (Scherer, 1998) and the HAAT model (Cook & Polgar, 2008). The results of various studies have indicated that considerations regarding the characteristics of the AT could influence the selection and ultimately the use of the AT (e.g., McDonald et al., 2007; Wilcox, Guimond, et al., 2006), that may further point to the need to revise the ATD Selection Framework (Scherer et al., 2007).

The fact that the framework will be applied in the South African context (as opposed to a well-resourced country such as the United States where it was developed), and specifically with young children, further emphasise the need to adapt and expand this framework.

2.5. Summary

This chapter described the important benefits of AT for young children and their families and discussed the importance of appropriate AT selection. Several different theoretical frameworks that could be applied when selecting AT were discussed, and the reasoning behind the selection of the ATD Selection Framework (Scherer et al., 2007) for use in this study was explained.

Through the discussion it has been illustrated that an adaptation and expansion of this framework may be indicated. The adaptation and expansion may be done by incorporating the best research evidence available into the framework, as well as including perspectives of PRs providing AT in the context where the framework will be applied, as suggested by Schlosser and Raghavendra (2004).

This adapted framework could provide empirically supported guidance to RPs regarding the recommendation and provision of AT to young children. Furthermore, as the framework will be used as the basis for the development of a measurement instrument in this study, it could ensure the comprehensiveness of the instrument regarding factors that influence AT selection and resulting recommendation and provision of AT.

CHAPTER 3

METHODOLOGY: PHASE 1

3.1. Introduction

This chapter explains the overall methodology followed in this study, as well as a detailed description of the methods followed in Phase 1 of the study. The aim and sub-aims of the overall study will be discussed and information will be provided on how the different phases of the study flow into each other. Detailed information on the aims of Phase 1 will also be discussed. Two papers published on different aspects of this phase are included as Appendices A (van Niekerk, Dada, Tönsing, & Boshoff, 2018) and B (van Niekerk et al., 2017).

3.2. Aim of the study

The study was guided by the following primary research aim:

To describe the perceptions of RPs (occupational therapists, physiotherapists and speech language therapists) regarding the factors influencing the recommendation and provision of assistive technology to young children (birth to 6 years of age) within the South African context.

To fully address the primary research aim, the following secondary aims were set, each of which is detailed in a different phase of the study:

- i. Verification, adaptation and expansion of the ATD Selection Framework (Scherer et al., 2007) for use with young children within the South African context (Phase 1, described in Chapter 3).
- ii. Utilising the theoretical framework adapted and expanded during Phase 1, to develop a survey instrument aimed at determining the perceptions of RPs on the

recommendation and provision of AT to young children in South Africa (Phase 2, described in Chapter 4).

- iii. To conduct the survey developed in Phase 2 with South African RPs in order to determine the perceptions of RPs on the recommendation and provision of AT to young children in South Africa (Phase 3, described in Chapter 5).

3.3. Research design

A mixed-methods approach was selected in order to answer the primary research aim of the overall study, as this would require the consideration of multiple viewpoints and perspectives. The use of a mixed-methods design enables the researcher to utilise the strengths of both the qualitative and quantitative methodologies, as it acknowledges the strengths of both approaches (Johnson, Onwuegbuzie, & Turner, 2007).

A mixed-methods sequential exploratory design (Creswell & Clark, 2011) was utilised for this study. The first phase of the design informed the second, and the second phase informed the third – with an instrument adapted and developed as a product in the research process.

According to Creswell and Clark (2011), the strength of the sequential exploratory design is that the description, implementation and reporting is straightforward. It is also suitable when a measurement instrument is being developed. The limitation of this design includes that it requires a long time to implement and that it is difficult to specify exactly what the later phases of the study will look like, as this will be determined by the first phase.

The research design is illustrated in Figure 3.1, highlighting in colour the phase that this chapter focuses on.

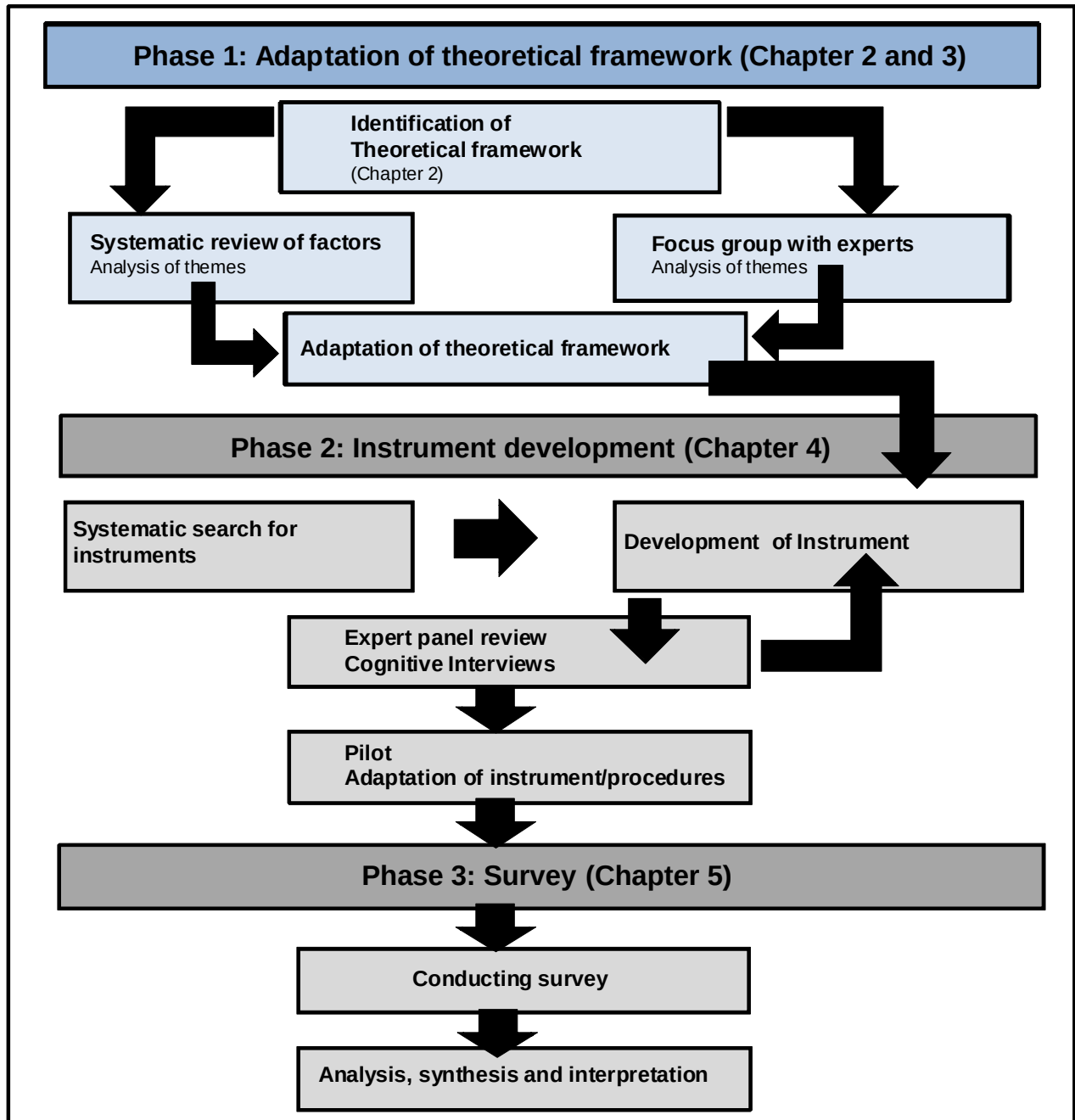


Figure 3.1. Research design (highlighting Phase 1).

3.4. Phase 1

The first phase of the study was aimed at verification, adaptation and expansion of the theoretical framework (as specified in sub-aim 1) to be utilised in the second phase of the study. Several steps were identified in this process. These included:

- i. To conduct a literature search to determine the most suitable theoretical framework for use in the study (as described in Chapter 2).
- ii. To conduct a systematic review of literature on the factors perceived by RPs to influence the recommendation and provision of assistive technology for children that require AT.
- iii. To conduct focus groups with experienced South African RPs to explore their perceptions on the factors that influence the recommendation and provision of AT to young children that require AT within South Africa.
- iv. To integrate the data obtained from both the systematic review and the focus groups into the theoretical framework in order to adapt and expand the framework.

3.5. Steps in Phase 1

3.5.1. *Identification of most suitable theoretical framework*

In Chapter 2 (Section 2.3.2), several theoretical frameworks for the selection of AT were discussed. The Assistive Technology Device (ATD) Selection Framework (Scherer et al., 2007) was selected as the most appropriate framework for use as a starting point in this study.

This was mainly because this framework appeared to be the only identified framework specifically related to AT selection to clearly acknowledge the role of the professional (e.g., their knowledge and preferences) in the AT selection process.

3.5.2. *Systematic review of factors*

In order to determine whether the components of the ATD Selection Framework (Scherer et al., 2007) were comprehensive and supported by empirical data, a systematic review of published research studies aimed at identifying/describing factors perceived by RPs to influence the recommendation and provision of AT to children was indicated. Articles meeting the set inclusion criteria would then be analysed according to the ATD Selection Framework to highlight any discrepancies between the framework and research conducted in this area. This systematic review was published in a peer-reviewed journal (van Niekerk et al., 2018). For the post-print version of this paper, please see Appendix A.

Ten databases (CINAHL, ERIC, PsycINFO, Academic Search Complete, Medline, Health Source: Nursing/Academic Edition, Humanities Source, African Wide Information, IEEEExplore) were searched. The articles identified through the searches ($n = 805$) were supplemented by hand searches ($n = 19$).

The search terms included variations of the terms *professional*, *child with a disability* and *assistive technology*, with specific types of AT included as alternatives. For a detailed description of the exact search terms used in EbscoHost, please see Appendix A, p. 226.

After a process of elimination of studies according to strict eligibility criteria, six articles (two qualitative and four quantitative) were identified in the mixed studies review. For a detailed view of this process, please see the PRISMA diagram compiled during this process, as suggested by Liberati et al. (2009). This is contained in Appendix A, p. 245.

The six identified articles were appraised using the Mixed Methods Appraisal Tool (Pluye, Robert, Cargo, & Bartlett, 2011). The appraisal indicated that, for the quantitative studies, the measurement instruments did not generally meet the strict criteria set by the appraisal tool. This indicated the need for the development of more rigorous measurement instruments to determine the influence of various factors on AT recommendation and provision. For a comprehensive overview of the results of this appraisal, please see Appendix A, pp. 249-250. Using the Lloyd-Smith hierarchy (Lloyd-Smith, 1997), all four quantitative studies were on Level 3 (non-experimental descriptive studies). Daly's Hierarchy (Daly et al., 2007) was utilised to categorise both qualitative studies, which were found to be on Level 3 (descriptive studies).

The results section of the qualitative papers and the measurement instruments in the quantitative papers were then thematically analysed, as the researcher was interested only in identifying factors mentioned/studied in the papers that would influence AT recommendation and provision.

The existing components of the ATD Selection Framework (Scherer et al., 2007) were used as themes for the deductive thematic analysis. The first three themes pertained to the environment and included cultural and financial priorities, legislation and policy, and attitudes of key others. The following four themes pertained to personal factors of the consumer and provider of the AT and included resources (family, friends, significant others, financial), knowledge and information, expectations, and personal preferences and priorities. The eighth theme, assessment, was an amalgamation of “assessment of functional ATD need” and “assessment of ATD predisposition” that occurs in the ATD Selection Framework (Scherer et al., 2007). During this early phase of analysis, a theme was created for data that did not fit into any of the existing eight themes. This ninth theme was initially named “other”.

In the next round of analysis, subthemes were created inductively under all eight of the existing themes (originating from the ATD Selection Framework), as well as the newly identified theme. The newly created (ninth) theme was then termed assistive technology. For a detailed discussion of this process, please see Appendix A, pp. 230-231.

3.5.2.1. Findings from the systematic review

This review illustrated the paucity of empirical studies that investigate the factors influencing AT provision to children, with not one of the identified studies conducted in a resource-limited environment. This supported the rationale for this study.

Figure 3.2 is a representation of the themes and subthemes that were identified in the systematic review that were perceived by RPs to influence the recommendation and provision of AT to children. The identification of the subthemes under each theme (taken from the existing framework), verifies the inclusion of the components in the ATD Selection Framework. Furthermore, the identification of subthemes facilitated the understanding of the existing theoretical framework in more depth. The identification of the additional theme (assistive technology), not contained in the original framework, supports the recommendation to expand and revise the theoretical framework utilised for the review. The results of the review also illustrated that the user of the AT (as depicted in the framework) was not only the child but also the family of the child, which should be involved together with the RP in decision-making regarding AT.

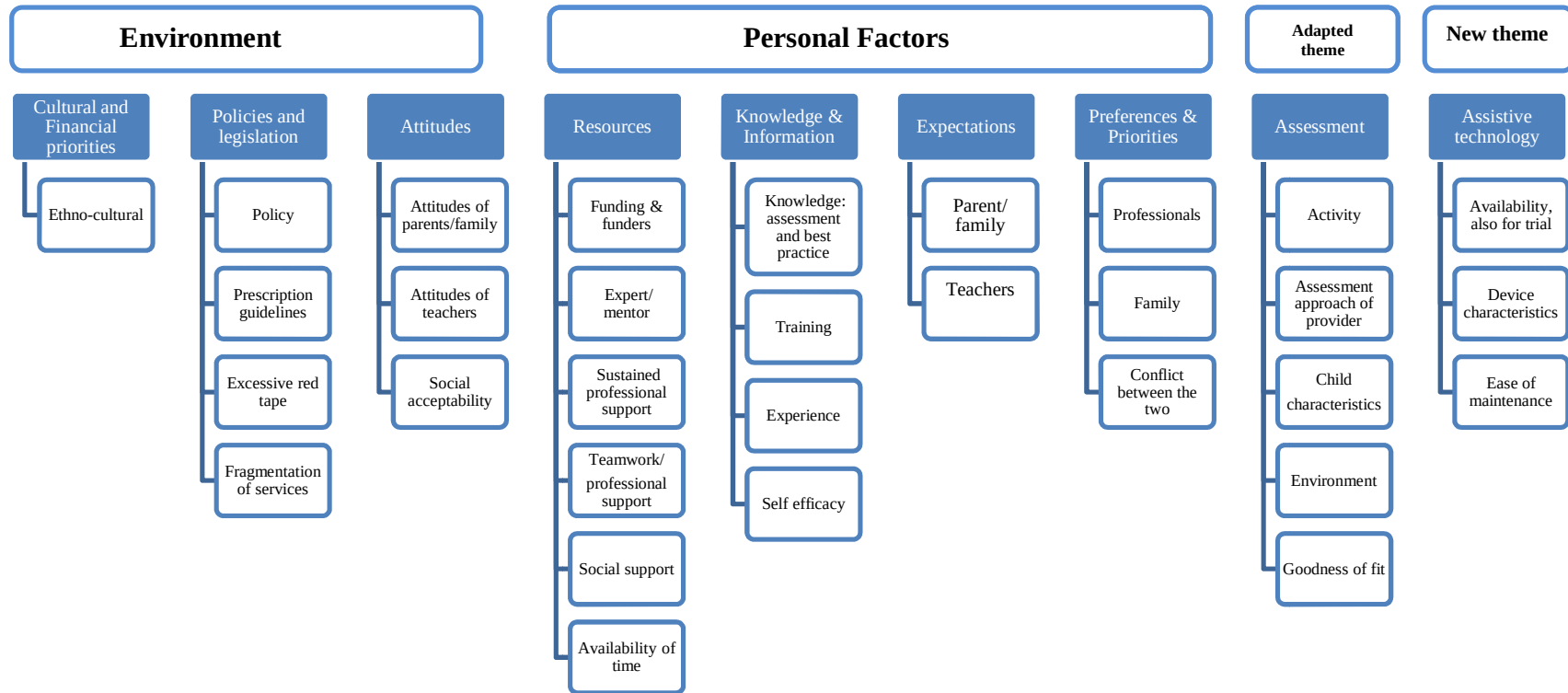


Figure 3.2. Themes and subthemes identified in systematic review as perceived by RPs to influence the provision of AT to children.

3.5.3. *Online focus groups with South African RPs*

In order to obtain a South African perspective on the factors influencing the recommendation and provision of AT and to determine whether the components of the ATD Selection Framework (Scherer et al., 2007) were contextually relevant, online focus groups with South African RPs were conducted. Data obtained from the focus groups were analysed according to the ATD Selection Framework (Scherer et al., 2007) in order to adapt and expand the framework. A paper was published in a peer-reviewed journal (van Niekerk et al., 2017) on the data obtained in the online focus groups. For the post-print version of this paper, please see Appendix B.

Although face-to-face focus groups were initially planned for this phase, it proved to be very difficult to recruit enough eligible participants. Participants reported difficulties with prior commitments, difficulties with travel arrangements and work responsibilities as reasons for their inability to attend. To overcome these difficulties expressed by possible participants, it was decided to rather conduct online focus groups. This made it possible to recruit participants throughout the country, irrespective of place of employment, working hours or prior commitments.

An experimental comparison between online and face-to-face focus groups was conducted by Underhill and Olmsted (2003). The authors found no significant difference in the quantity or quality of information gained for the two different types of groups.

Other studies have discussed the benefits of online focus groups compared to face-to-face focus groups. Online focus groups can be more convenient and comfortable for participants (Chase & Alvarez, 2000; Klein, Tellefsen, & Herskovitz, 2007) and can provide access to more diverse participants (Gaiser, 2008; Liamputtong, 2011) as the location of the participant is not a barrier to participation. Furthermore, the perceived anonymity or distance between participants

within the virtual group can reduce the differences between members that could make it easier for some to participate (Burton & Bruening, 2003). This is thought to lead to more equal participation in the virtual group, as participants may not be aware of others' perceived status (Burton & Bruening, 2003; Klein et al., 2007).

An additional benefit is that the groups can be conducted asynchronously, implying that participants do not all have to be online at the same time. This is well suited to participants with limited time (Burton & Bruening, 2003), such as the sample of experienced RPs recruited for this study. Furthermore, asynchronous focus groups allow time for reflection on the questions as well as the discussion points, possibly adding to the depth of discussion (Burton & Bruening, 2003; Gaiser, 2008). Another study (Easton, Easton, & Belch, 2003) found that the online focus group methodology generated more ideas than the face-to-face group.

Online focus groups also have the benefit of significant cost savings, as, for example, travel and transcription fees are limited. The creation of immediate transcriptions where participants can view (and immediately edit) their own contributions is also an advantage (Liamputtong, 2011).

One disadvantage of the use of online focus groups is that participation is only possible for computer-literate persons with internet access (Chase & Alvarez, 2000). For this study, however, this was not a major concern as the population recruited for participation in the groups comprised professional people who are typically computer literate and are likely to have internet access. Reliable internet access could be a problem in some rural areas within South Africa, but RPs located in those areas would also most likely not be able to attend face-to-face groups.

An additional concern raised in literature regarding online focus groups is the loss of verbal, nonverbal and para-verbal cues (Burton & Bruening, 2003), implying that the researcher

may miss some of the richness of what is being communicated (Klein et al., 2007). As the nature of the topic in this study is not of a sensitive nature, it was not expected that participants would become very emotional during the focus group and reading non-verbal cues would be less important. Participants were encouraged to use emoticons during the group to communicate their emotions. Importantly, the moderator in an online focus group should be experienced in online communications in order for the group to be successful (Chase & Alvarez, 2000). Fortunately, the researcher as well as supervisors had extensive experience in conducting online discussions for the purpose of student learning.

Confidentiality of the data gathered online is a concern, as participants in the groups will be able to copy the contributions of others without anyone having knowledge of this. This was included as a possible risk mentioned in the consent letter to participants, as suggested by Rodham and Gavin (2006). All participants were requested not to save any data to their computers.

3.5.3.1. Participants for focus groups

3.5.3.1.1. Sampling for focus groups

For the focus groups, the researcher employed purposive sampling methods. This implies that the researcher used participants that were accessible and represented certain characteristics (McMillan & Schumacher, 2006). As the characteristics required for participants made them a hard-to-find population within the context of South Africa, purposive sampling was the most viable method (Bernard & Ryan, 2010).

Selection criteria for focus group participants are detailed in Table 3.1.

Table 3.1

Selection Criteria for the Focus Group Participants

Criteria	Justification	Method of data collection
OT, PT, SLT or SLTA working in the field of AT recommendation/provision to young children (birth to 6 years) for a minimum of 3 years within South Africa.	RPs with more than 3 years of experience of recommending/providing AT to young children will have good insight into the factors influencing the provision of AT in South Africa.	Self report
Professionals should be registered at the HPCSA.	Registration at the HPCSA is a requirement to practice as a healthcare professional in South Africa.	Self report

3.5.3.1.2. *Recruitment of sample*

The researcher did attempt to include comparative numbers of the professions in the study (OT, PT, SLT and SLTA) as far as this was possible. She also attempted to recruit participants from all over the country, and invited professionals living in large metropolitan areas as well as more rural communities. Participants working within diverse contexts (e.g., schools or hospitals) were invited.

The researcher contacted several personal and work acquaintances to invite them to participate in the study. Since suitable participants were difficult to access, snowball sampling was utilised (Babbie, 2014). Invited RPs were requested to invite other RPs whom they judged to be eligible to participate in the study. Most of the invitations were sent through email, with several persons also contacted telephonically.

3.5.3.1.3. *Sample size*

According to Bernard and Ryan (2010, p. 360), 20 to 60 participants are needed to understand a “well defined cultural domain or study of lived experience”. That number is said to decrease significantly when knowledgeable participants are recruited, as was done in this study.

Weller and Romney (1988) indicate that only 10 participants are needed when their knowledge is .70 for the domain they are asked about. This implies they will attain 70% on a test for knowledge for this domain. Burton and Goldsmith (2002) indicate that 10 to 15 participants per online focus group is ideal, while Murray (1997) preferred six to eight participants.

As the researcher and her supervisors are experienced in conducting online groups for the purposes of online learning, it was decided to include eight RPs in each of the two focus groups ($N = 16$). The researcher did not wish to overburden the participants by adding too many participants to each group and also aimed to ensure personal contact and interaction between herself and every member of the group, as well as between participants. It was felt that in a larger group this would not be possible.

3.5.3.1.4. *Description of sample*

The participants included OTs ($n = 5$), PTs ($n = 3$), SLTs ($n = 4$) and SLTAs ($n = 4$), with the greatest majority of participants ($n = 13$) having a Master's degree. The participants had extensive experience in the recommendation/provision of AT to young children, with five participants having 3-5 years of experience, nine participants with 6-10 years of experience, one participant having 11-20 years' experience and another participant having 21-30 years of experience. Seven participants provided services in the Gauteng province, with six participants providing services in the Western Cape province. These two provinces are the most well-resourced provinces in South Africa. Participants mostly provided services within metropolitan areas ($n = 13$). Seven of the participants provided services at a public hospital at the time of the focus groups, with three participants providing services in private practice and another three

employed in non-government organisations. Comprehensive descriptive information of the participants in the sample can be viewed in Appendix B, pp. 302-303.

3.5.3.2. Material and equipment used during focus groups

3.5.3.2.1. Personal computers and internet access for researchers and participants

The researcher and participants required personal computers as well as internet access to be able to participate in an online focus group. This could bias the sample towards those with access. However, none of the persons that were recruited to participate in the online focus groups mentioned that they could not participate due to not having access to a computer or internet, while several indicated that they would not be able to attend a face-to-face group. Therefore it was felt that the benefit of being able to include higher numbers and more diverse participants from across the country outweighed the drawback of possible exclusion due to lack of computer/internet access.

3.5.3.2.2. Email invitation and information letter

Individuals were sent an invitation via email together with an information letter describing the study, requirements of participants and ethical considerations. Please see Appendix C for the invitation and information letter.

3.5.3.2.3. Electronic consent form and biographical questionnaire

Each participant who indicated that they would be interested in participating was sent an electronic consent form and biographical questionnaire via email before the onset of their participation in the online focus group. The purpose of this was to ensure that all participants

gave their consent before the onset of the focus groups and that they met the inclusion criteria for the study.

The online consent form and biographical questionnaire were piloted on a group of eight healthcare professionals before distribution to the focus group participants. Feedback was obtained and utilised in order to adapt the questionnaire before distributing it to participants. Please see Appendix D for the online information and consent letter and Appendix E for the online biographical questionnaire.

3.5.3.2.4. *ClickUp*

The University of Pretoria's online learning system (ClickUp) was used to host the online focus groups as it provided a secure online environment. This system utilises Blackboard Learn™ with the focus groups hosted in the discussion tool.

3.5.3.2.5. *Information sheet stipulating how to access the online forum*

An information sheet explaining how to gain access to the online forum where the focus group was to be conducted was sent to all participants. This can be viewed in Appendix F.

3.5.3.2.6. *Script for online focus groups*

A script with word-for-word instructions and explanations guiding participation in the focus groups was formulated for posting during the focus groups. This was compiled by the researcher and adapted after discussing this with an expert panel of eight RPs, to ensure that it was reasonable and that instructions were clear and understandable. The complete script can be

viewed in Appendix G, with a screenshot of the discussion threads in ClickUp included as Appendix H.

3.5.3.2.7. *Online focus group questions*

The online focus group questions were developed by the researcher to answer the research questions. All questions were open ended to encourage both a broad range of responses, as well as allow for depth of discussion. Questions together with justification for their inclusion are presented in Table 3.2. Questions were viewed and discussed by a group of eight healthcare professionals before the onset of the focus groups to ensure that questions were aligned to the research aims and were clear and understandable to the participants.

Table 3.2

Online Focus Group Questions

Question number	Question	Justification for inclusion
1	Could you please introduce yourself, share your profession and explain where you work?	This question was used as a way for participants to get to know each other during the first day of the focus group. This is an important aspect of starting the group (Terrell, 2011) and setting participants at ease.
2	Please share with us what types of AT you work with.	This question also formed part of the introduction and provides insight into the types of AT participants work with.
3	Please describe the process of how AT is provided/recommended to children birth to 6 years at your current place of work.	This question was asked in order for participants to think of the process involved in AT recommendation/provision in order to guide them towards answering Question 4.
4	What do you think are the factors that influence professionals in the provision/recommendation of AT to children birth to 6 years? Please explain.	This question was asked to answer the research question that aimed to explore the factors that influence the provision/recommendation of AT to young children.

3.5.3.2.8. *Focus group evaluation survey*

An online focus group evaluation survey was sent out via email to all participants after the completion of the focus groups. This was done predominantly to provide some indication as to the experience of the participants of the online environment during the focus groups. For a view of the online focus group evaluation survey, please see Appendix I.

The online medium poses several challenges to the creation of a discussion space where participants are able to express themselves openly. Therefore, it is believed that an overall positive evaluation from participants could indicate that the online environment was a space where they felt secure enough to be able to freely express their opinions, thereby contributing to the credibility of the data.

The potential challenges within the online focus group environment include that it may be difficult to formulate a sense of cohesion between participants and the researcher (Braun & Clarke, 2013), which may in turn influence the depth of discussion. Furthermore, nonverbal cues are not apparent within an online group (Klein et al., 2007), implying that the researcher would not be able to pick up on these communications.

The quality of the data obtained in a focus group is dependent on the skill and presence of the researcher (Braun & Clarke, 2013). Therefore, the moderator in an online focus group should be experienced in online communications and should be able to create an online space where participants feel secure and are able to express their opinions honestly (Shenton, 2004). Therefore, it becomes important for participants to evaluate the skill of the researcher in facilitating the online group.

The online focus group evaluation consisted of 15 questions and was adapted from the Community of Inquiry Survey Instrument (Draft v14) (Arbaugh et al., 2008). This was

formulated according to the Community of Inquiry Framework (COI) (Garrison, 2007) that is used in the field of online teaching to analyse the online learning community. This framework states that the online community of inquiry has three components. These are the social presence, cognitive presence and teaching presence that was adapted to be the facilitator presence for the purpose of the online focus group. Table 3.3 indicates the items included in the online focus group evaluation, as well as the domain the items are related to, according to the COI framework. Five items were related to the facilitator presence, five related to the social presence and four related to the cognitive presence of the participants in the focus groups, shown in Table 3.3. Participants were requested to indicate to what extent they agreed with all of the items, on a scale of strongly disagree; disagree; neutral; agree; and strongly agree. One open-ended question was included to enable participants to relate anything that was not particularly asked. The adapted survey was checked for face-validity by a panel of six RPs prior to sending it out to participants. Adaptations were made after recommendations from the panel.

Table 3.3

Items Included in the Online Focus Group Evaluation

Question number	Question
Facilitator presence	
1	The researcher was able to address any issues with technology experienced before or during the group.
2	The researcher provided clear instructions/guidelines on how to participate in the focus group.
3	The researcher helped to keep participants engaged and participating in productive dialogue.
4	The researcher's actions reinforced the development of a sense of belonging among participants.
5	The researcher was able to manage different “styles” in participants – providing input to both highly active and more passive participants.
Social presence	
6	Getting to know other participants gave me a sense of belonging in the group.
7	I felt comfortable interacting with other participants.
8	I felt comfortable disagreeing with other participants within the group.
9	I felt that my point of view was acknowledged by the researcher and/or other participants.
10	I felt safe to discuss my views in the discussion.
Cognitive presence	
11	The discussion piqued my curiosity.
12	I felt motivated to discuss the questions.
13	I was able to exchange information with others during the discussion.
14	I was able to reflect on the questions which enabled me to make contributions to the discussion.

3.5.3.3. Data collection during focus groups

3.5.3.3.1. Ethical considerations

Ethics approval for the whole study was granted from the Ethics Committee of the Faculty of Humanities of the University of Pretoria. Please see Appendix J for the approval letter. All participants submitted the electronic consent letter to the researcher before the onset of the focus group sessions. No participant took part in the focus groups without providing consent.

3.5.3.3.2. Settings

The focus groups were conducted over four consecutive days (Wednesday to Saturday), with participants able to enter the discussion at a time of day that suited them.

3.5.3.3.3. *Procedures*

The researcher explained the study and inclusion criteria to possible participants over email. Individuals were sent an information letter describing the study, requirements of participants and ethical considerations. If a person indicated that they would be interested in participating and met the inclusion criteria, they were sent the electronic consent form and biographical questionnaire.

Every focus group participant was sent an information sheet explaining how to gain access to the online forum where the focus group was to be conducted. All participants were given the opportunity to access the system and online forum prior to the onset of the focus group to ensure that all had access. A practice session was held over the five days prior to the discussion for participants to get experience of how the tool functioned.

The online focus group script with word-for-word instructions and explanations was utilised by the researcher to facilitate the focus groups. During the focus groups, specific questions were asked for statements that required further clarification. For Questions 3 and 4, probing questions were asked. These included, “Any examples to illustrate this?” and “Could you explain that please?”.

An online focus group evaluation survey was sent out via email to all participants after the completion of the focus groups. This was completed anonymously on Google Forms.

3.5.3.4. *Trustworthiness considerations*

In order to facilitate the trustworthiness of the qualitative data, several strategies were utilised.

3.5.3.4.1. *Credibility*

Credibility is concerned with how much the results are “congruent with real life” (Lincoln & Guba, 1985, p. 296). Strategies to address credibility that were employed in the online focus groups are shown in Table 3.4.

Table 3.4

Strategies to Address the Credibility of the Study

Strategy to address credibility	How strategy was applied in research
The use of research methods that are well established are recommended (Shenton, 2004).	The format of the online focus group is increasingly used in qualitative research studies (Burton & Bruening, 2003; Gaiser, 2008; Underhill & Olmsted, 2003). Analysis of the data gathered from the focus group was analysed through thematic analysis, which is well described in the literature (Bernard & Ryan, 2010; Braun & Clarke, 2006; Vaismoradi, Turunen, & Bondas, 2013).
Recruitment and inclusion of a wide range of individuals (Shenton, 2004), through purposive sampling (Barbour, 2001)	Within each online focus group, participants from different professional groups were included, as well as those working in different settings. This was done to increase the opinions elicited in the group.
Methods to ensure that participants are as honest as possible (Shenton, 2004)	The participants attended the online focus groups voluntarily and were provided information on the nature of the group prior to giving consent. They were ensured that they could freely share their opinions and reminded that they could excuse themselves from the group at any time. Furthermore, a focus group evaluation survey was conducted to determine the experience of the participants during the focus group. As the messages uttered in a focus group depends on the “presence and skill of the researcher” (Braun & Clarke, 2013, p. 279), it was therefore important to get feedback regarding the skill of the researcher in facilitating the focus group. The results of this are shown in Table 3.5.
Regular “debriefing” sessions for the researcher with supervisor (Shenton, 2004, p. 67)	The researcher had regular meetings with her supervisors to broaden her understanding of the data collection and analysis process.
Peer scrutiny of research project (Shenton, 2004)	The online focus group planning, data collection and data analysis was presented to supervisors as well as fellow PhD students during face-to-face discussions, as well as online discussion groups, to incorporate the opinions of and observations from others. A paper on the focus groups was submitted to a journal where it was peer-reviewed.
Member checking (Shenton, 2004)	During the focus group, the researcher asked that participants clarify their comments or to rephrase comments to make sure that the meaning would be carried over correctly. Participants were able to edit their own contributions during the course of the focus group, enabling them to communicate their messages as clearly as possible. After the focus group was conducted, the transcripts of the focus group were sent to the participants and they were provided with the opportunity to clarify any comments made.

Strategy to address credibility	How strategy was applied in research
Consensus coding (Bernard & Ryan, 2010)	The credibility of the thematic analysis of the focus groups was ensured by involving a second and occasionally a third coder in a process of consensus coding (Bernard & Ryan, 2010).
Examination of previous studies (Shenton, 2004) to ensure that the results of the current study are congruent with other results obtained on this topic, also adding to current knowledge on this topic.	This study's results were informed by a systematic review of the factors perceived by RPs to influence them in their provision of AT to young children. The results from the focus groups were integrated with this to inform the adaptation of the survey instrument for Phase 2 of this study.

The results obtained from the focus group evaluation survey can be viewed in Table 3.5.

The overall perception of the focus groups appeared to be positive, possibly indicating an environment conducive to truthful communication. In the open-ended question, one participant commented, "The group discussion was well organised and planned and was facilitated appropriately to allow for enough freedom of thought and examples, but at the same time keeping the discussion focussed."

Table 3.5

Perceptions of Participants on the Online Focus Group Environment (N = 14)

Question	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	No response
Facilitator presence						
The researcher was able to address any issues with technology experienced before or during the group.	0.00%	7.14%	0.00%	35.71%	57.14%	0.00%
The researcher provided clear instructions/guidelines on how to participate in the focus group.	0.00%	0.00%	0.00%	7.14%	92.86%	0.00%
The researcher helped to keep participants engaged and participating in productive dialogue.	0.00%	0.00%	0.00%	42.86%	57.14%	0.00%
The researcher's actions reinforced the development of a sense of belonging among participants.	0.00%	0.00%	14.29%	21.43%	64.29%	0.00%
The researcher was able to manage different "styles" in participants – providing input to both highly active and more passive participants.	0.00%	0.00%	21.43%	42.86%	35.71%	0.00%
Social presence						
Getting to know other participants gave me a sense of belonging in the group.	0.00%	0.00%	21.43%	57.14%	21.43%	0.00%
I felt comfortable interacting with other participants.	0.00%	0.00%	7.14%	64.29%	28.57%	0.00%
I felt comfortable disagreeing with other participants within the group. (n = 12)	0.00%	7.14%	14.29%	50.00%	14.29%	14.29%
I felt that my point of view was acknowledged by the researcher and/or other participants.	0.00%	0.00%	7.14%	42.86%	50.00%	0.00%
I felt safe to discuss my views in the discussion.	0.00%	0.00%	7.14%	64.29%	28.57%	0.00%
Cognitive presence						
The discussion piqued my curiosity.	0.00%	0.00%	0.00%	64.29%	35.71%	0.00%
I felt motivated to discuss the questions.	0.00%	0.00%	7.14%	57.14%	35.71%	0.00%
I was able to exchange information with others during the discussion.	0.00%	0.00%	7.14%	64.29%	28.57%	0.00%
I was able to reflect on the questions which enabled me to make contributions to the discussion.	0.00%	0.00%	0.00%	50.00%	50.00%	0.00%

3.5.3.4.2. *Transferability*

Transferability refers to “achieving a thick description” (Greener, 2013, p. 108). The strategy to increase the transferability of the study is described in Table 3.6.

Table 3.6

Strategy to Address the Transferability of the Study

Strategy to increase transferability	How strategy was applied in the research project
Providing a detailed description of the specific context, participants, setting and circumstances (Braun & Clarke, 2013) in order for the reader to make a judgement regarding the transferability of the findings to their particular context.	A detailed description was provided of the participants, their context and employment setting, as well as the circumstances of data collection.

3.5.3.4.3. *Dependability*

Dependability can be addressed by ensuring that the research process is transparent (Greener, 2013). Strategies to increase the dependability of the study are explained in Table 3.7.

Table 3.7

Strategies to Address the Dependability of the Study

Strategies to increase dependability	How strategy was applied in the research project
Provide a detailed description of the study to ensure that it can be repeated (Shenton, 2004)	Detailed descriptions of all correspondence with the participants are provided. A detailed script for use during the online focus group is provided that could be used to repeat the study.
Use of overlapping methods (Shenton, 2004).	Two focus groups were conducted, each employing the same method. The same communications, script, questions and prompts were used during both groups.

3.5.4. Data analysis

For comprehensive information on data analysis of the focus group data, please see Appendix B, pp. 269-270. Data obtained from the online focus groups were thematically analysed according to the ATD Selection Framework (Scherer et al., 2007), in a similar process as followed when analysing the data from the systematic review articles.

The existing components of the ATD Selection Framework (Scherer et al., 2007) were used as themes to guide a deductive thematic analysis process, followed by a process of inductive analysis. The same initial themes were used as in the systematic review analysis. These included three themes pertaining to the environment (cultural and financial priorities, legislation and policy, and attitudes of key others), as well as four themes pertaining to personal factors of the consumer and provider of the AT (resources, knowledge and information, expectations, and personal preferences and priorities). The eighth theme, assessment (as in the analysis of the systematic review articles) was an amalgamation of “assessment of functional ATD need” and “assessment of ATD predisposition” that occurs in the ATD Selection Framework (Scherer et al., 2007). An “other” theme was initially created for all data items that did not fit into any of the existing themes.

The inductive analysis process identified two themes additional to those that originated from the ATD Selection Framework (Scherer et al., 2007). These were assistive technology (similar as when analysing data from the articles in the systematic review), as well as decision-making, that was interpreted to be separate from the assessment theme.

Subthemes were also created inductively for all 10 of the themes that were used (eight from the original framework and two new), providing a detailed picture of factors involved in the provision of AT. Figure 3.3 illustrates the themes and subthemes identified in the online focus groups.

As was the case after analysing the systematic review articles, the conclusion was made after analysis of the focus group data that the theoretical framework used for analysis (Scherer et al., 2007) should be revised, particularly for use in a context such as South Africa where resources for AT provision are limited. Furthermore, the framework should be specifically aimed at AT recommendation and provision to young children, as that focus appears to bring additional nuance to the process.

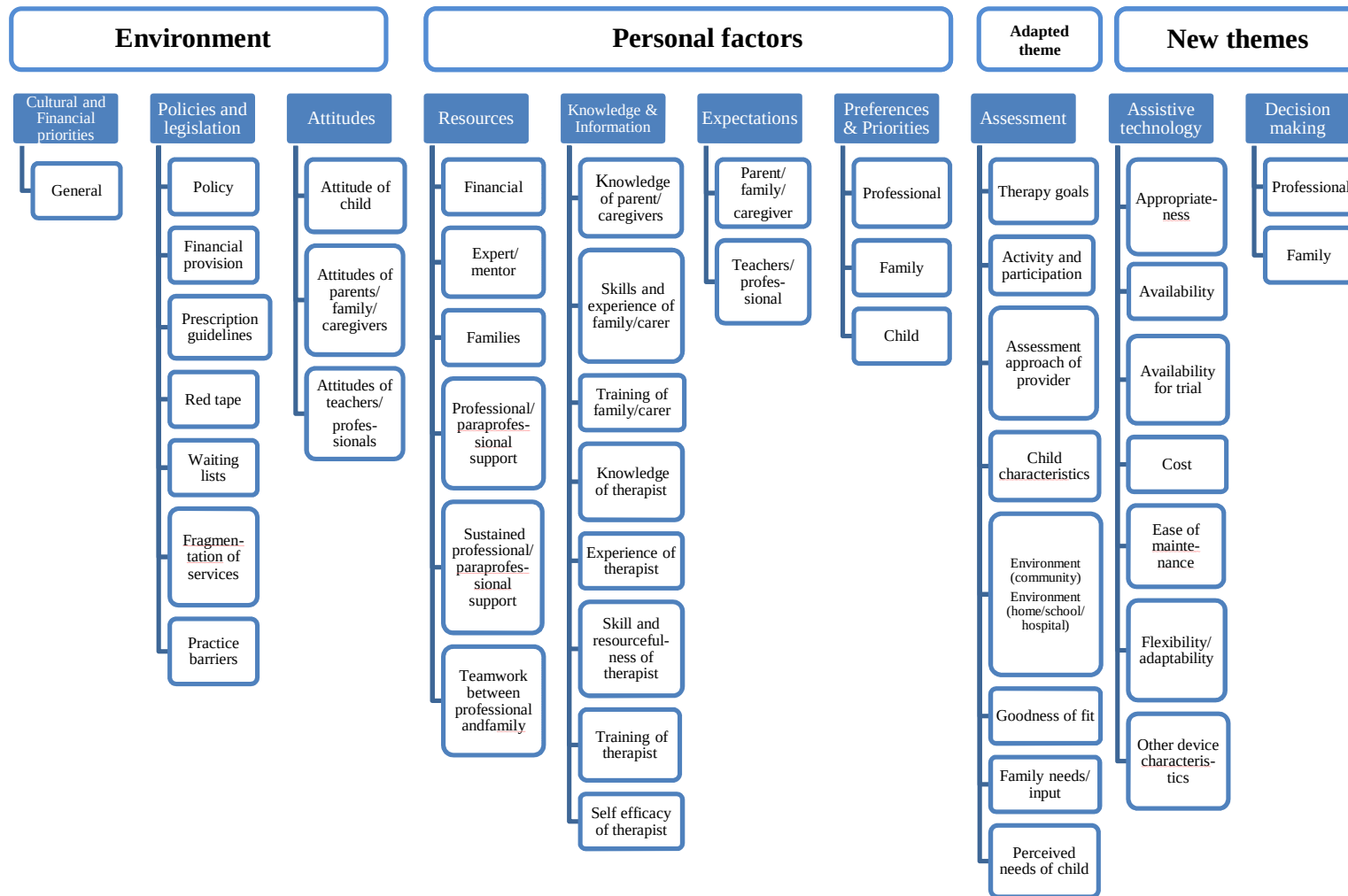


Figure 3.3. Themes and subthemes identified in the online focus groups.

3.5.5. *Adaptation of ATD Selection Framework*

To adapt the ATD Selection Framework (Scherer et al., 2007), several steps were followed. These include synthesising the results from the systematic review and the online focus groups, wording adaptations for consistency, as well as integrating similar concepts. Furthermore, synthesis with environmental components of the HAAT model (Cook & Polgar, 2008) was undertaken.

3.5.5.1. Synthesising themes and subthemes from the systematic review and focus groups

To adapt the ATD Selection Framework (Scherer et al., 2007) for use in this study, the themes and subthemes identified in both the systematic review and focus groups were synthesised with the original framework. The themes and subthemes identified in the systematic review provided information on existing published studies, while the focus group findings ensured that the South African context and AT recommendation and provision pertaining specifically to young children were reflected in the adapted framework. This provided an integrated picture of the factors influencing AT recommendation and provision as identified in the existing framework, published research studies and data obtained specifically within the context of young children in South Africa.

Figure 3.4 illustrates an integration of themes and subthemes identified during analysis of both the systematic review and the online focus group data. The two additional themes (assistive technology and decision-making) that were identified were integrated into the framework, as well as all the subthemes identified during the systematic review and focus groups. Subthemes that were included in both the systematic review analysis as well as the online focus group analysis are included in white. Subthemes that were only identified in the systematic review are indicated in green.

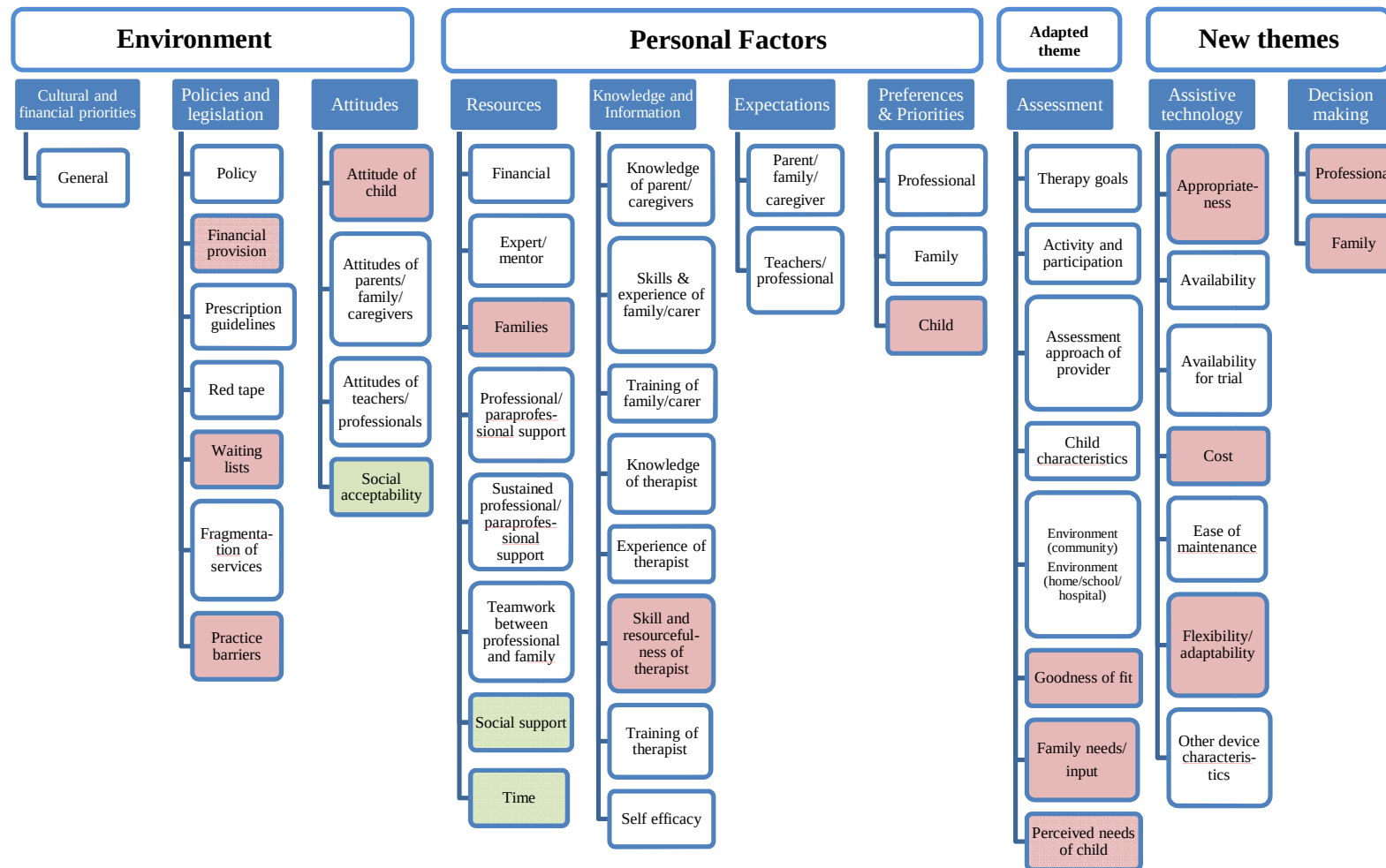


Figure 3.4. Themes and subthemes obtained from the systematic review and online focus groups synthesised.

- Subthemes identified in focus groups only
 Subthemes identified in systematic review only
- Subthemes identified in both systematic review and online focus groups

Only three of the subthemes that were identified in the systematic review were not also identified in the focus group data. These included the social acceptability of the AT, the resource of social support for the user and professional, as well as the resource of time, which were not mentioned by the RPs in the focus groups.

Several subthemes were identified in the online focus groups that were not found in the systematic review analysis. These are indicated in pink in Figure 3.4. Several of these subthemes may be (at least partially) attributed to the working context of the South African RPs. Several of the subthemes unique to the focus group data appeared to be factors that could be viewed as barriers to the provision of AT due to environmental factors (e.g., practice barriers, waiting lists, financial provision, high cost of AT). Others may be related to strategies used by local professionals to minimise these barriers and support AT provision (e.g., using families as a resource in AT provision; professionals being highly skilled, creative and resourceful; ensuring appropriateness of AT for the context). Other subthemes unique to the focus group data may have been added as these discussions were specifically aimed at information pertaining to young children (where data from the systematic review could include data pertaining to children up to the age of 18 years). An example of this was the importance attached to providing AT that was adaptable and flexible (to grow with the child).

In both the systematic review and the focus group results, it was noted that the themes and subthemes pertaining to the personal factors of the “user” of the AT should be adapted to include both the child and family.

3.5.5.2. Adaptation of wording, integration of related concepts

Several subthemes that were in essence similar between the systematic review and focus groups were minimally adapted to ensure a comprehensive and consistent framework, for

example, the consistent adaptation to “parents/family/caregivers” (not only “parents” as frequently occurring in the systematic review data). The term “professionals” was used throughout and replaced inconsistent use of “therapist” or “practitioner”.

Certain subthemes were grouped together as they were viewed as related, for example, the subthemes “ease of maintenance”, “flexibility/adaptability” and so forth were grouped together under “device characteristics”. Also, the subthemes under knowledge and information were regrouped to include aspects pertaining to the professional and the child and family separately.

Furthermore, the subthemes “waiting lists”, “red tape” and “fragmentation of services” were integrated with the subtheme “practice barriers”, as these appeared related. It was realised that both practice barriers and (other) practices were included under this subtheme. As not all practices could be viewed as barriers, the subtheme was renamed “practices and practice barriers”.

3.5.5.3. Synthesis with environmental component of the HAAT model

After synthesising the results from the systematic review and focus groups and making the wording and grouping changes, the researcher decided to reorganise the components related to the environment. The results of this process can be viewed in Figure 3.5. One reason for this was that aspects pertaining to the physical environment were included under the “assessment” theme after the integration process. These were labelled environment (community) as well as environment (home/school/hospital). However, the researcher perceived this as fragmented from the rest of the environmental themes that were all located under the first three themes, namely cultural and financial priorities, policies and legislation, as well as attitudes.

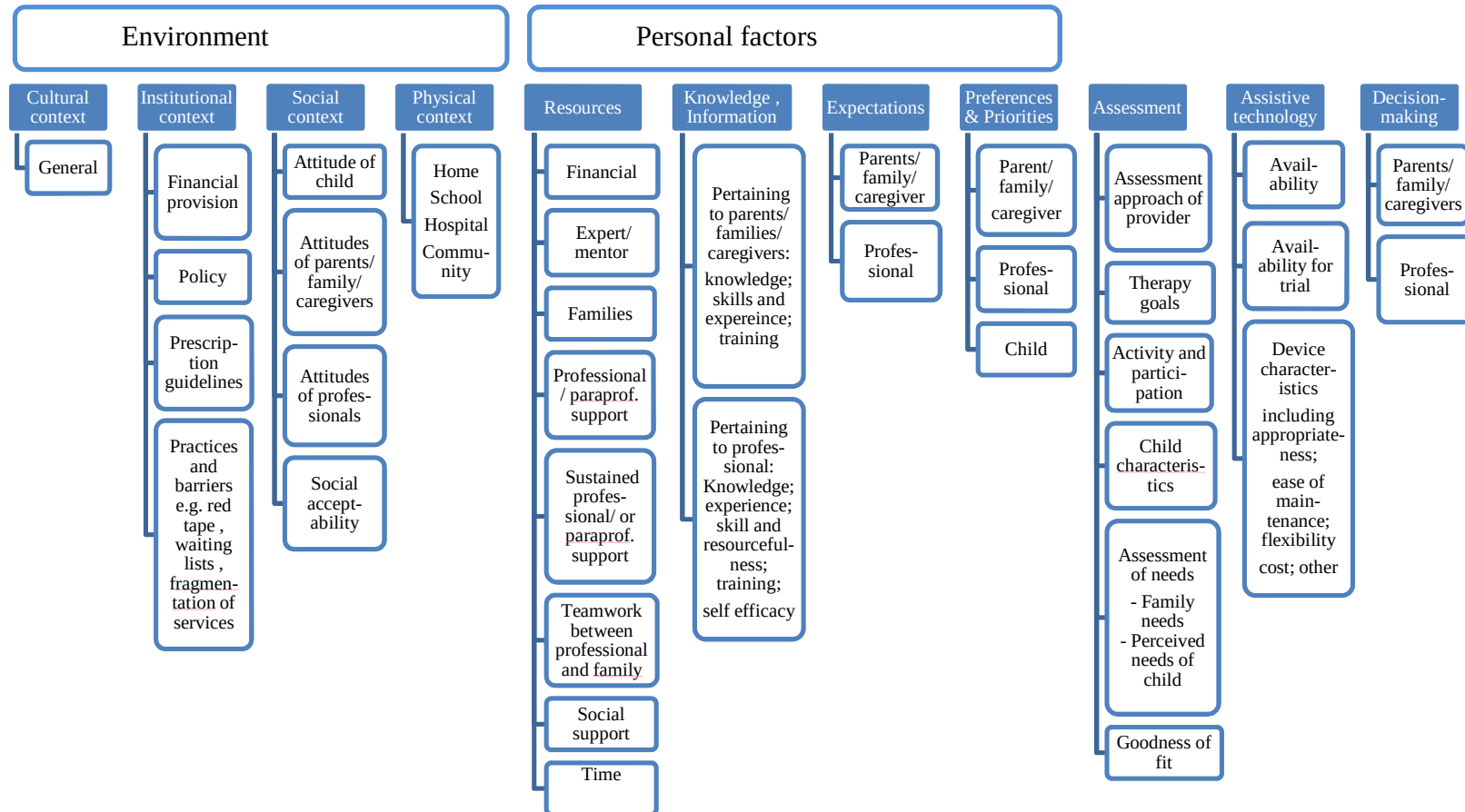


Figure 3.5. Factors as organised under the adapted ATD Selection Framework.

Furthermore, the names of the existing environmental themes (cultural and financial priorities, policies and legislation, as well as attitudes), no longer appeared comprehensive enough to adequately describe the subthemes contained under each.

The Human Activity Assistive Technology (HAAT) model (Cook & Polgar, 2008), (as described in Chapter 2) utilises a different organisational structure of factors influencing AT recommendations stemming from the environment. The structure of the environmental factors from the HAAT model includes the cultural, social, institutional and physical contexts. This structure appeared more overarching than the structure utilised within the ATD Selection Framework (Scherer et al., 2007). The cultural, social, institutional and physical contexts utilised in the HAAT model did not include aspects that were not reflected in the themes and subthemes integrated from the systematic review and focus groups. The HAAT model's structure to describe the environment was incorporated into the adapted ATD Selection Framework to replace the existing theme labels pertaining to the environment.

Therefore, all aspects previously mentioned under “cultural and financial priorities” that were related to culture were reorganised under the theme label “cultural context”.

The “attitudes” theme label was adapted to “social context”. This includes the previously used “attitudes of significant others” (including attitudes of the child, parents/family/caregivers, professionals), as well as “social acceptability” of the AT. The new label “institutional context” includes all factors previously grouped under “policies and legislation”. The new label is particularly useful in renaming this theme as it contains, for example, practice barriers that were not well reflected in the previous label. The subthemes “environment (community)” and “environment (home/school/hospital)” (pertaining to the physical environment) that were previously included under the “assessment” theme were integrated into a single subtheme,

moved out of assessment and placed under a separate theme with the other environmental factors. This theme was renamed “physical context”.

Furthermore, the subtheme “appropriateness of the device” was moved from the subtheme “characteristics of the AT” (under the AT theme), to the “goodness of fit” subtheme (under assessment), as it implies the match between the AT and the person, and not merely a characteristic of the AT.

This process was carried out in collaboration with both supervisors. The allocation of subthemes to all the new theme labels was checked by both supervisors.

3.5.5.4. Graphic representation of the adapted framework

All the themes and subthemes included in Figure 3.5 were incorporated into the adapted ATD Selection Framework. The overarching themes/supra themes of the environment and personal factors were retained as supra components of the adapted framework. All the themes became components in the new framework and all the subthemes became factors thought to influence the selection, recommendation and resulting provision of AT. A graphic representation of the adapted framework can be viewed in Figure 3.6.

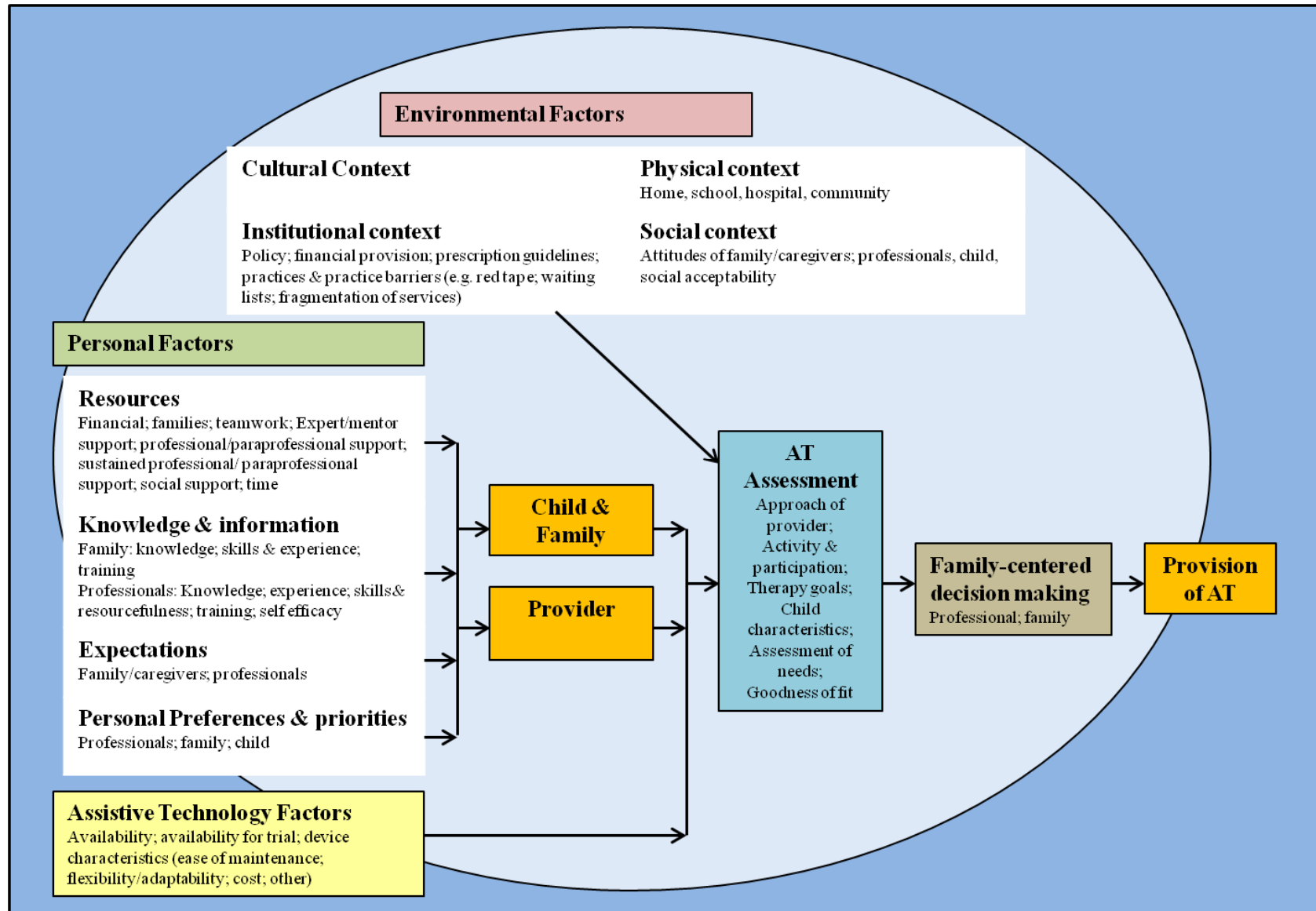


Figure 3.6. Adapted ATD Selection Framework.

In summary, the ATD Selection Framework (Scherer et al., 2007) was adapted as follows:

- The environment supra component was retained from the original framework.
The components under environment were adapted from the HAAT model (Cook & Polgar, 2008) and replaced the original ATD framework component names.
Individual factors pertaining to the environmental components were included as they were subthemes identified after analysis of the systematic review and online focus groups.
- Personal factors were retained as a supra component from the original framework.
All the components included were also present in the original ATD Selection Framework (Scherer et al., 2007). The factors (identified as subthemes in the systematic review and focus groups) were newly included. Other than the original framework that contained personal factors of the user and the provider, the adapted framework includes personal factors of the child and family, as well as the provider.
- The original framework did not include an AT component and this component with all the factors pertaining to it represents an addition to the framework. AT was identified as a new theme with its own subthemes in the systematic review and focus groups.
- The AT decision-making and device selection component was adapted from the original framework. It was replaced with two separate components (identified as themes in the focus groups). These are AT assessment and family-centred decision-making, with factors identified in the focus groups included under each.

3.5.6. Conclusion

In this chapter, the ATD Selection Framework (Scherer et al., 2007) was adapted and expanded to serve as a robust framework to be used as a starting point for the development of a measuring instrument aimed at determining the perceptions of South African RPs on the recommendation and provision of AT to young children.

As discussed in Chapter 2, the most appropriate theoretical model was identified for application in this study. A systematic review (Section 3.5.2) was conducted to identify factors from empirical data that are perceived by RPs to influence the provision of AT to children requiring AT (internationally). Following the systematic review, two online focus groups with RPs working in the field of AT with children from birth to 6 years in South Africa were conducted (Section 3.5.3) to include a South African perspective. Following this, the existing theoretical framework as identified in Chapter 2 for the selection of AT (Scherer et al., 2007) was adapted for application to young children, within the South African context (Section 3.5.5), and expanded to increase its comprehensiveness. In Phase 2, this framework will be used as a starting point for the development of a measurement instrument.

CHAPTER 4

METHODOLOGY: PHASE 2

4.1. Introduction

As discussed in the previous chapter, this study follows a sequential exploratory mixed methods design. In Chapter 3, Phase 1 of the study was described, primarily aimed at adapting the theoretical framework to be utilised in Phase 2. Phase 2 was aimed at the development of the survey instrument (to be utilised in Phase 3) and will be described in this chapter.

As discussed in Chapter 3, the study was guided by the following primary research aim: To describe the perceptions of RPs (occupational therapists, physiotherapists and speech language pathologists) regarding the factors influencing the recommendation and provision of assistive technology to young children (birth to 6 years of age) within the South African context.

In Chapter 3, it was described how the theoretical framework that would be used in the study was adapted. Therefore, the aim of Phase 2 was specifically:

To utilise the theoretical framework adapted and expanded during Phase 1, to develop a survey instrument aimed at determining the perceptions of RPs on the recommendation and provision of AT to young children in South Africa.

The aim was divided into several sub-aims:

- i. To conduct a systematic literature search to identify existing measurement instruments to measure the perceptions of RPs on the factors influencing the recommendation and provision of assistive technology to children (birth to 6 years).
- ii. To development the survey instrument by utilising both the theoretical framework adapted in Phase 1 and the existing instruments identified in the systematic search of instruments.

- iii. To conduct an expert panel review and cognitive interviews in order to develop the instrument.
- iv. To conduct a pilot study aimed at refining the survey instrument.

4.2. Design of the study

Figure 4.1 includes a graphic representation of the sequential exploratory mixed methodology of the entire study. Although Phase 2 is the focus of this chapter, the entire methodology is shown to provide context for the discussion. Phase 2 consisted of the systematic search for instruments, instrument adaptation and development, expert panel and cognitive interviews, as well as pilot study.

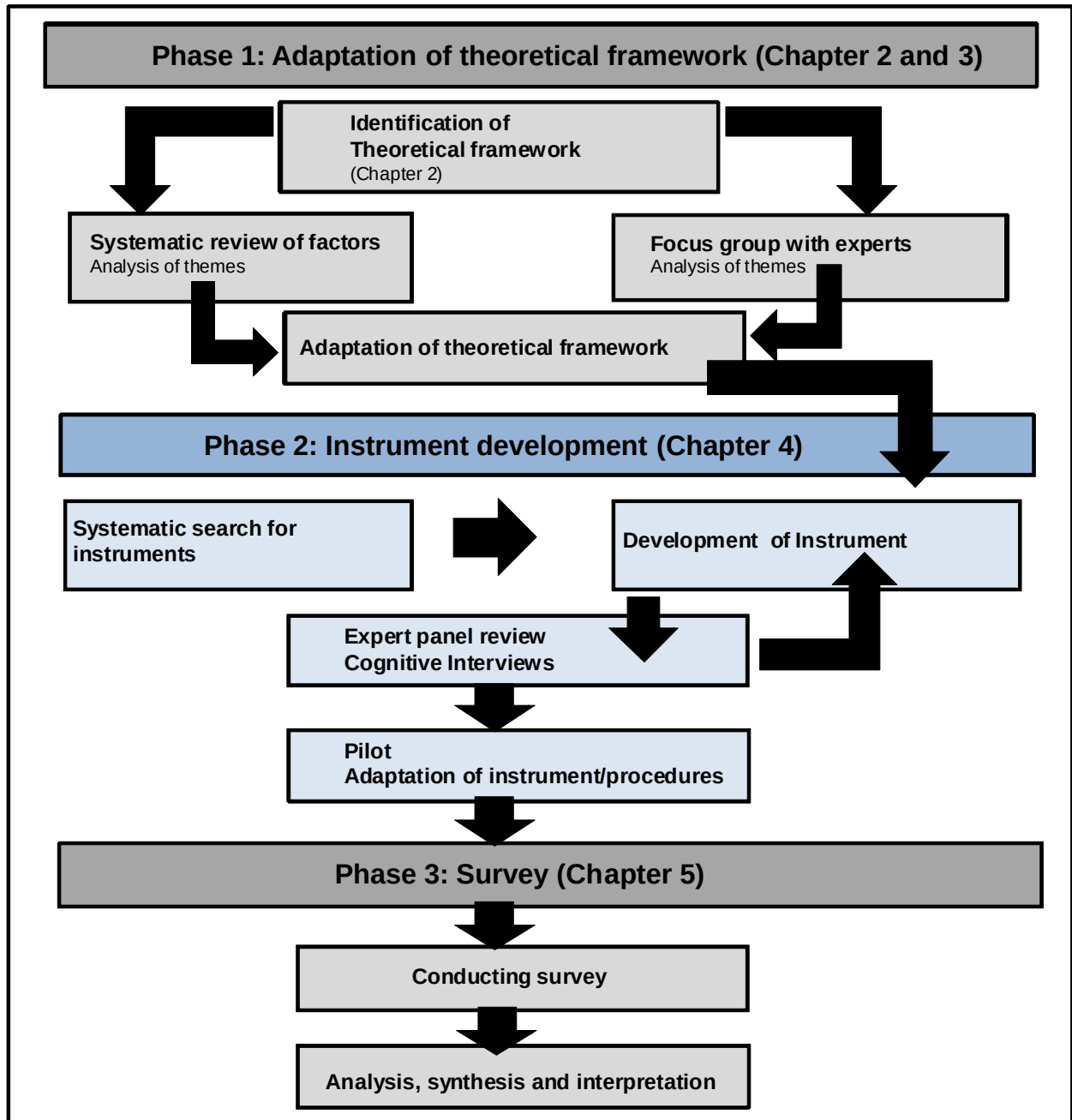


Figure 4.1. Research design (highlighting Phase 2).

4.3. Phase 2

This phase commenced with a systematic search that was conducted to identify existing instruments that measure the perceptions of RPs on the recommendation and provision of AT to

young children with disabilities (Section 4.3.1). Three suitable instruments could be identified and obtained. Items from all three instruments were selected, adapted and combined (Section 4.3.2), with reference to the adapted theoretical framework. Instrument development also included the development of new items, where items in the existing instruments did not include an aspect mentioned in the theoretical framework.

Several steps were followed to increase the validity of the instrument (Section 4.3.2.5 and Section 4.3.2.6), including the use of an expert panel and cognitive interviews to obtain feedback regarding the questionnaire. The questionnaire was piloted (Section 4.3.2.7) to obtain feedback before the distribution of the questionnaire, to be described in Chapter 5.

4.3.1. *Systematic search of instruments*

A systematic literature search was undertaken to determine whether any instruments have been utilised in previous research studies to measure the factors that influence the recommendation and provision of AT to children. The purpose of identifying published instruments was to enable the researcher to use these as a starting point for the development of the survey instrument required for Phase 3 of this study.

4.3.1.1. *Article selection process*

Figure 4.2 illustrates the article selection process. Six databases were searched, namely Humanities source (5 articles identified), Academic Search Complete (68 articles identified), CINAHL (62 articles identified), ERIC (40 articles identified), PsycINFO (70 articles identified) and Health Source: Nursing/Academic (29 articles identified).

Search terms:	* profession* OR service provider* OR clinician* OR therapist* AND Measure* OR survey OR instrument* AND assistive technolog* OR assistive device* OR adapt* equipment OR adapt* technolog* OR adapt* device* OR mobility aid OR power* mobility OR non-power* mobility OR switch OR adapt* toy* OR "Augmentative and Alternative Communicat*" OR augment* communicat* OR low technolog* AND child* OR toddler* OR infant* OR preschool* AND disab* OR disorder* OR impair* OR handicap*

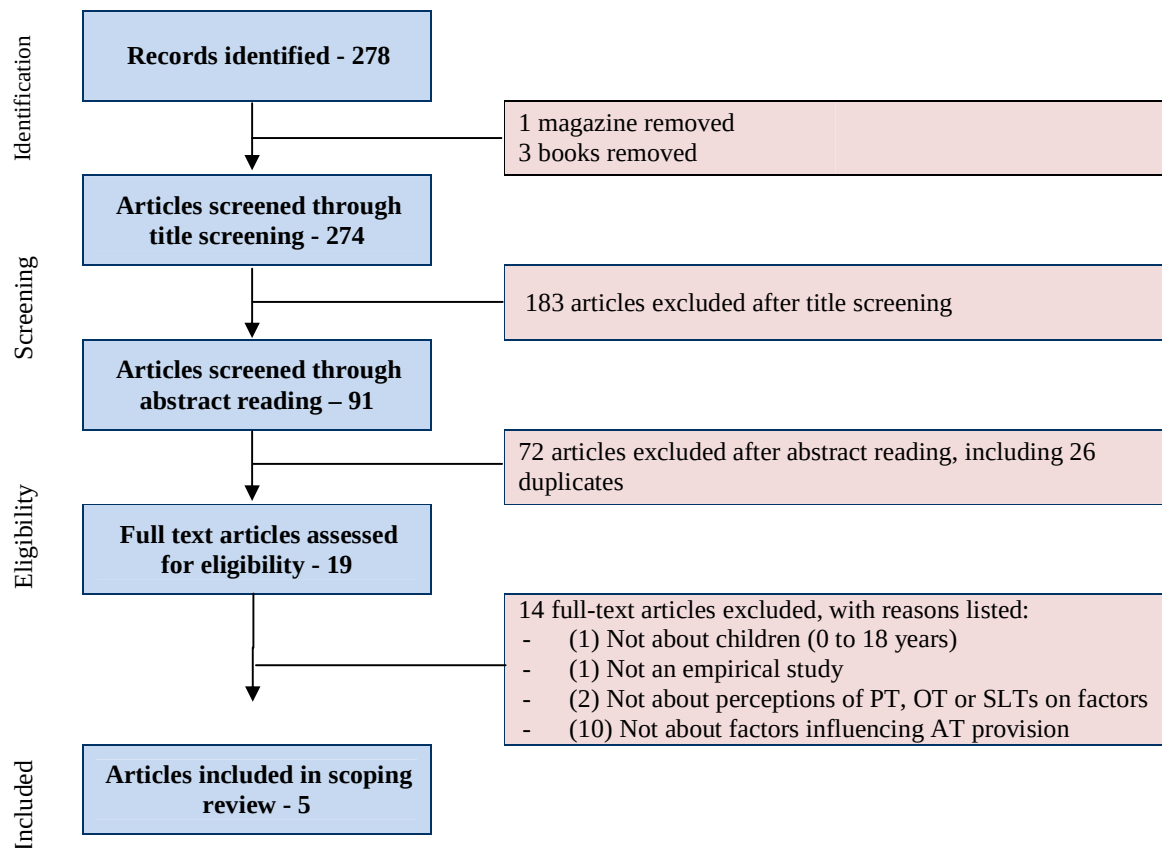


Figure 4.2. Flow diagram of the study-selection process.

Selection criteria were applied by the researcher during the screening process. Articles were only included if they were published in English (between 1990 and 2015) in a peer-

reviewed journal. Articles were included if they described a quantitative research study utilising a measurement instrument aimed at (among other aims) determining what factors are perceived by OTs, PTs or SLTs to influence them in their recommendation and provision of AT to children. The AT described in the article had to be provided to children with disability (aged between 0 and 18 years) and needed to be confined to AT typically recommended by the named professions. The researcher completed this process independently.

4.3.1.2. Included instruments

The five studies (articles) that were identified as including a measurement of the factors influencing the recommendation and provision of AT to children as perceived by RPs are detailed in Appendix K, pp. 326-327. All five studies utilised a survey methodology and collected data from either OTs, PTs, SLTs or combinations of those professional groups (some surveys also included other professions, e.g., EI providers, teachers or AT suppliers). Three of the surveys were conducted in the USA and two in Canada, implying that all instruments considered for inclusion were developed for use in well-resourced environments. Only two of the identified articles included their measurement instruments in the publication. These include the questionnaire used by Lahm and Sizemore (2002), as well as Wilcox et al. (2006). In another article (Freeman, MacKinnon, & Miller, 2004), the measurement instrument was not pertinently included but the questions and format could be clearly deduced from the article. Instruments utilised by Chmiliar (2007) as well as Reed and Kanny (1993) could not be located and these were therefore excluded.

4.3.1.3. Implications for the study

The adaptation of the ATD Selection Framework as described in Chapter 3 was aimed at providing a robust foundation for the measurement instrument to be used in later phases of the study. None of the identified instruments contained (or aimed to contain) all of the factors included in the adapted ATD Selection Framework. Therefore, none of the identified instruments could be used as is and a new instrument was needed (Greener, 2013). Items from three existing instruments could be utilised as a starting point for the development of the survey instrument utilised for this study.

4.3.2. Development of Instrument

The steps for the development of the survey instrument for use in Phase 3 of this study are set out in Figure 4.3. These steps are based on recommendations for scale development as suggested by DeVellis (2016), with additional aspects incorporated as recommended by other authors (Cox & Cox, 2008; Onwuegbuzie, Bustamante, & Nelson, 2010).

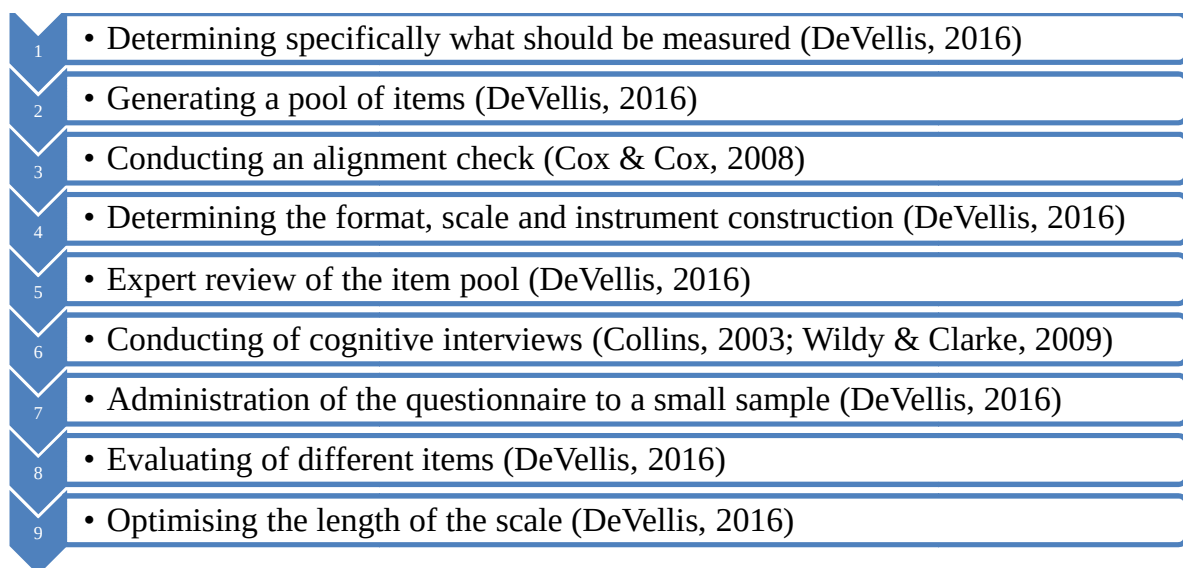


Figure 4.3. Steps in the development of the survey instrument.

The steps in instrument development were often circular in nature with input provided on one step, leading the development process back to a previous step.

The instrument was divided into two sections during development. Section 1 contained the biographical questions. Section 2 contained the questions aimed at answering the research questions of the study pertaining to the perspectives of RPs regarding the extent to which factors influence the recommendation and provision of AT to young children in the South African context.

A first version of the instrument was developed by the researcher by following the instrument development steps. Section 2 of this first version was discarded completely during development, as discussed later in this chapter. A second version of the instrument was then developed.

4.3.2.1. Determining specifically what should be measured

As Step 1 in the instrument development process, DeVellis (2016) indicates that theory should be used to clarify the constructs that are to be measured in an instrument.

For this study, the researcher identified the ATD Selection Framework (Scherer et al., 2007) as the most suitable theoretical framework. This framework was then adapted and expanded by incorporating findings from the systematic review (to include empirical data) and the focus groups (to include context-specific data), as described in Chapter 3. The instrument would be aimed at including all of the factors identified in the adapted ATD Selection Framework.

4.3.2.2. *Generating a pool of items*

As Step 2 of the survey development process, it is recommended that a large pool of items is formulated (DeVellis, 2016; Pett, Lackey, & Sullivan, 2011). DeVellis (2016) indicates that multiple items measuring the same construct are useful during the initial stage of instrument development, even though they may be eliminated in the final instrument.

The systematic search for instruments (described in Section 4.3.1) identified three measurement instruments that could be utilised in the development of the survey (Freeman et al., 2004; Lahm & Sizemore, 2002; Wilcox et al., 2006). Items from these instruments were used as a starting point for the development of the new instrument.

A new instrument was needed as none of the instruments in the three articles could be used as is. None of the instruments were comprehensive (or aimed to be) regarding the inclusion of items covering all the factors influencing AT recommendation and provision that were identified in the adapted ATD Selection Framework.

4.3.2.2.1. *Procedure followed for Section 1*

The aim of Section 1 was to gather demographical data to enable the description of the participants. The initial pool of items included 15 items from the existing measurement instruments. An additional 24 items were created by the researcher, based on the content of the theoretical framework, and added to the initial pool for Section 1. The initial pool of questions for Section 1 included 39 questions.

All initial questions in Section 1 were viewed by supervisors and also by a panel of professionals enrolled for the PhD in AAC during a online discussion. The initial pool of questions was adapted according to comments received. Of the 39 initial questions, seven

questions were deleted completely after feedback, leaving 32 questions. Some 16 items were adapted and 16 were kept the same.

4.3.2.2.2. *Procedure followed for Section 2*

Section 2 was aimed at determining the perceptions of RPs on the factors influencing the recommendation and provision of AT to young children. For this section, three question stems were initially utilised from the existing instruments. In total, 57 question items (each asked under one of the existing question stems) from the existing measurement instruments were included in the initial pool of items.

To expand the initial pool of items, 53 additional items were generated by the researcher, based on the adapted ATD Selection Framework. The total initial pool of items for Section 2, consisting of items originating from the existing studies together with the newly created items, comprised 110 items.

All initial questions for Section 2 were viewed by the research supervisors and a panel of professionals for comments. Several changes were made to the questions through this process. Of the 110 items in the initial pool, 29 were deleted, 18 were adapted and 29 were left unchanged after the revision process. A total of 81 items remained in Section 2 of the instrument.

4.3.2.3. *Conducting an alignment check*

Step 3 in the survey development process involved conducting an alignment check as recommended by Cox and Cox (2008). This was done to determine whether the included items were aligned to the theoretical components with which they were intended to align.

A list with all 81 items for Section 2 was compiled and sent to two supervisors, together with a list of definitions of all the constructs the items were constructed to ask about. The

supervisors independently allocated a component and factor of the adapted framework to every item. The researcher worked through this to identify discrepancies between the components she allocated to a question and those allocated by the supervisors.

Discrepancies were discussed with the supervisors until 100% agreement was reached. Question items were adapted where needed to make the intended meaning of the item come across more clearly.

4.3.2.4. Determining the format, scale and instrument construction

Step 4 in the development process included determining the format and scale of the instrument. According to DeVellis (2016), determining the format of measurement should be done in conjunction with the development of the items, to ensure that the items and format of measurement are compatible. The two sections of the instrument utilised different formats and scales and are therefore discussed separately.

4.3.2.4.1. Format and scale construction for Section 1

Several guidelines and procedures were followed for the selection and development of the scales to be used in Section 1. These can be viewed in Table 4.1.

Table 4.1

Guidelines and Procedures Followed During the Development of Scales for Section 1

Guidelines followed during development	Procedures followed during development
Cognisance was given to selecting a scale with equal semantic difference between the different options, as indicated by Cox and Cox (2008). Furthermore, different question formats were used, as this would make the survey interesting for participants and may increase return rate (Dillman, Smyth, & Christian, 2014). Absolutes were avoided as far as possible and all scales were used in the same direction, as not to confuse respondents. As it has been indicated that a 4-point Likert scale is adequate when measuring only one dimension (Cox & Cox, 2008; Dillman et al., 2014), this was used frequently. Although providing a “not applicable” option is not always advised (Cox & Cox, 2008), a neutral option was occasionally included, for example, in a question asking about the amount of training of participants. This was kept to the side of the scale as suggested by Cox and Cox (2008), and not placed in the middle point of the scale.	For Section 1, the 32 questions that were developed in the initial pool were discussed with the supervisors and four items were deleted to reduce the length of the questionnaire. A total of 28 items remained in Section 1. These were entered into Qualtrics, an online survey tool, to be distributed electronically to a panel of RPs enrolled for the PhD in AAC for their feedback. After making changes following feedback from the panel (leading to correction of two spelling errors and one change of wording), the questions from Section 1 were again presented to a panel of supervisors and RPs enrolled for the PhD in AAC during face-to-face discussions. During this discussion, it was recommended that seven of the suggested questions under Section 1 be deleted as they were not viewed as highly important and unnecessarily increased the length of the survey. It was suggested that three questions, pertaining predominantly to the types of AT recommended by the participants, be added.

4.3.2.4.2. Format and scale construction for Section 2

The three question stems from the existing measurement instruments, together with the 81 question items, were initially included in Section 2. The existing questions utilised various different rating scales. Together with the questions from Section 1, the questions from Section 2 were viewed electronically by a panel of RPs enrolled for the PhD in AAC, and also presented face-to-face to supervisors and RPs enrolled for their PhD. This was done to obtain feedback regarding the development of these items.

The questions and scales used in Section 2 were not well received. Participants were unsure of how to respond to questions and felt that many of the items on the scale would be rated in a similar way. For example, they mentioned that many items included would likely receive (similar) high ratings of influence or importance. Therefore, it would be very difficult to see a meaningful difference in the ratings between the different items and different participants. The

various difficulties associated with the use of rating scales (e.g., scale and response bias), as well as feedback from supervisors, peers, one participant in a cognitive interview, as well as international experts, lead the researcher to consider other methodologies for use in the design of the questions in Section 2.

A stated preference method, namely best-worst scaling, was deemed appropriate for use in Section 2. Stated preference methods may provide insight into “trade-offs” that professionals make (Ali & Ronaldson, 2012). As the selection of AT involves the professional reasoning process of the RP, a method that could assist in understanding the reasoning of the RP was appropriate.

An ordinal stated preference method (as opposed to a cardinal method) was selected, as the research was aimed at ordering the preferences of professionals without directly determining the degree to which a certain alternative is preferred above another (Ali & Ronaldson, 2012).

In a best-worst survey, participants are presented with sets of questions that all contain different combinations of a set number of attributes (in this case items based on factors that influence the provision of AT to young children, as included in the adapted ATD Selection Framework). Within every question set, the participants are asked to select the most influential (best) item, as well as the least influential (worst) item, as described by Mühlbacher et al. (2016). All items are presented in several sets and in varying positions within the sets. The difference between different questions in the best-worst experiment is only that the selection of items in every set differs. For a justification for the use of best-worst scaling, procedures followed to develop the items used in the method, and information on the design of the question sets used in this study, please see Table 4.2.

Table 4.2

Best-Worst Scaling: Justification of Use, Development of Items and Design of Question Sets

Justification for use	Development of items	Design of question sets
Best-worst scaling has the advantage that it is scale-free (Auger, Devinney, & Louviere, 2007), thereby reducing scale bias. Best-worst scaling completely eliminates differences that may occur in the way that different participants (for example those from different cultures/with different home languages) completing the survey in English may perceive a scale (Auger et al., 2007), as they are only required to select the best and worst option (extremes) from every response set. The method reduces the effect of response styles as participants cannot, for example, repeatedly select the end point of the scale (Lee, Soutar, & Louviere, 2008). Best-worst scaling could also address response bias when completing rating scales. Acquiescence bias (tendency to agree) occurs when people rate most attributes as important/influential to them on a rating scale. This leads to skewed responses that could be interpreted as high intercorrelations between different items included in the question sets (Lee et al., 2008). Another advantage of best-worst scaling is that the questions appear to be easy for participants to answer (Marley & Louviere, 2005). Furthermore, this type of measurement uses to its advantage a participant's inclination to respond more consistently to extreme options, such as best and worst (Marley & Louviere, 2005).	The 81 items that were included in Section 2 were reviewed by the researcher and supervisors. To obtain the items to be included in the best-worst survey question sets, 33 items were deleted as they were either exact duplicates or very similar to other items. Furthermore, the theoretical framework was slightly revised, making it possible to combine different factors of the theoretical framework. The number of items to be used in the question sets was therefore reduced to 48. Several wording changes were made to ensure consistency of terms, for example, the consistent use of the term professional (and not therapist) in all questions.	For the experimental design (Lee et al., 2008), a fractional factorial design was selected, as a full factorial design was not possible due to the high number of attributes (48 items based on factors in the framework) identified (Ali & Ronaldson, 2012; Mühlbacher et al., 2016). A full factorial design would include all possible combinations of attributes that would result in high numbers of questions that would take too long for participants to complete. Fractional factorial design is aimed at creating smaller and more manageable sets. Importantly, these sets should aim to ensure a balanced appearance and co appearance of attributes (items based on factors in the framework) between different question sets (Lee et al., 2008). By use of a computer programme, the most suitable design for the best-worst scale questions was determined. The 48 items were presented in 24 question sets with six items each. Each item was presented in different combinations three different times. The difference between different questions in the best-worst experiment is only that the selection of items in every set differs. The outcome of this design process is illustrated in Table 4.4.

Table 4.3 provides a list of the final 48 items, together with their item numbers.

Table 4.3

Items Numbered for Design of Best Worst Questions

Item number	Item
1.	Beliefs regarding the cause of disability held by e.g. yourself or the family
2.	Importance attributed to independence within the child's culture
3.	The family's attitude toward AT
4.	The attitudes of the professionals that will assist in the implementation of the AT
5.	The child's attitude toward AT
6.	Your own attitude toward AT
7.	The social acceptability of the recommended AT
8.	Current AT practices at the school the child attends/would like to attend
9.	Policies related to AT recommendation/provision applicable to your place of work
10.	Guidelines related to AT recommendation/provision implemented at your place of work
11.	Practice barriers related to AT recommendation, e.g. long waiting lists, excessive red tape, the fragmented nature or services
12.	Financial provision for AT, e.g. through tender policy, medical aid
13.	The characteristics of the physical environment where the child will use the AT, e.g. home, school, community
14.	Availability of electricity in the home, school and community
15.	Crime rate in the community
16.	Your knowledge and training in recommending/providing AT
17.	Your sense of confidence when recommending/providing AT
18.	Your technical expertise and experience in recommending/providing AT
19.	Your resourcefulness in recommending/providing AT solutions
20.	The family's knowledge of AT
21.	The family's skill and experience with AT
22.	The opportunity/possibility to train families on AT
23.	Availability of funds for AT, e.g. through fundraising or family funds
24.	Availability of ongoing professional/paraprofessional support for child after AT has been acquired/provided
25.	Social support, e.g. from friends or relatives available to families and children using AT
26.	Availability of a team to work with during the recommendation/provision of AT
27.	The support/opinion of your mentor in recommending/providing AT
28.	Availability of time for recommending/providing AT, including e.g. time for assessment or discussions with family
29.	The family's ability to support the implementation of the AT
30.	Expectations of the family regarding AT for a child
31.	Your expectations related to AT for a child
32.	Expectations of professionals (e.g. teachers) of AT for a child
33.	The child's preference regarding AT
34.	The family's preference regarding AT
35.	Your preference regarding AT
36.	Activities that the child should/would like to participate in
37.	The child's current abilities and skills
38.	Needs mentioned by the family
39.	Needs of the child
40.	Your therapy goals for the child

Item number	Item
41.	The match between the child and the AT
42.	Your approach to assessment, e.g. whether you do assessments at the child's home or at your place of work
43.	Cost of the AT
44.	The possibility for the AT to “grow” with the child
45.	The availability of the AT for the child to try out
46.	Characteristics of the AT, e.g. ease of maintenance, portability
47.	Materials available to make AT at your practice/department
48.	Availability of AT on tender or from AT suppliers

Table 4.4 provides details about how the design was set up, showing which items were included in every set, as well as the sequence in which they appeared. This is done by referring to the item numbers allocated in Table 4.3.

Table 4.4

Design of Best Worst Question Sets

Question set	Item (referring to item number) included per set					
	1st position	2nd position	3rd position	4th position	5th position	6th position
1	21	32	45	42	5	23
2	48	40	43	11	33	15
3	12	7	28	29	37	19
4	26	2	38	41	17	30
5	9	47	36	35	34	22
6	14	1	39	24	4	13
7	6	20	44	31	10	25
8	8	3	46	18	16	27
9	10	21	4	30	19	43
10	20	5	1	41	36	11
11	45	13	38	44	12	16
12	23	39	28	6	47	26
13	42	9	15	2	46	24
14	32	34	40	14	31	37
15	22	33	27	17	29	25
16	35	3	7	48	8	18
17	10	45	44	15	38	17
18	28	46	22	5	34	23
19	42	25	24	39	36	33
20	27	7	40	43	16	20
21	9	18	12	2	30	11
22	1	31	21	4	37	6
23	32	35	41	3	13	14
24	19	29	47	26	48	8

Note. Item numbers are provided in Table 4.3.

4.3.2.5. Expert review of the item pool

In Step 5 of the instrument development process, the 48 items (to be utilised in the best-worst questions in Section 2 of the survey) were sent electronically to an expert panel for review, as suggested by DeVellis (2016). The primary purpose of this expert review was determining the

content validity of the items (Benson & Clark, 1982) with relation to the factors of the theoretical framework.

The expert panel involved in the content validation of the instrument was a small group of five experienced RPs that were purposefully selected. Inclusion criteria for this group are detailed in Table 4.5. The expert panel all provided consent through electronic consent forms.

Table 4.5

Selection Criteria for Participants in the Expert Reviews

Criteria	Justification	Method of data collection
RP working in the field of AT recommendation and provision for a minimum of 5 years.	RPs with 5 or more years' experience would have good insight into the factors influencing the provision of AT in South Africa.	Self report

Expert panel participants were asked to provide comments on several aspects, as recommended by DeVellis (2016). The aims, procedures, results and changes to the items that were implemented based on the feedback from the expert panel are described in Table 4.6. The expert panel review form can be found in Appendix L.

Table 4.6

Expert review: Aims, Procedures, Results and Implemented Changes

Aim	Procedures	Results	Implemented changes
To determine the content validity of the instrument. This will provide some indication as to whether the items match the components of the framework.	The panel was asked to allocate a factor from the theoretical framework to every item from a drop down list on the expert panel form. The panel was given a list with all the operational definitions of the components of the framework to allocate the items.	Between the five participants, six allocations were made to components unintended by the researcher. This was discussed with the supervisors.	Wording changes were made to three different items after discussion with supervisors in instances where it was felt that the item could be reworded for greater clarity.
To maximise the content validity of the items.	The reviewers were asked to suggest any additional items for inclusion in the instrument.	None of the participants recommended that additional items should be included.	No additional items were included after the expert panel review.
To obtain feedback regarding the clarity and conciseness of the items.	Participants were requested to rate every item for clarity and conciseness on a drop down list on a scale from 1 (not at all clear); 2 (could improve on its clarity and conciseness) to 3 (clear and concise). They were also asked to comment on any of the items in the space provided.	Between the five participants rating the 48 items, 26 instances occurred where items scored a 2 for clarity and conciseness, indicating room for improvement, with several items receiving a score of 2 from multiple participants. Five wording changes were recommended. Requests were made to clarify or provide an example with three items.	Wording changes were made in a total of 12 items following feedback. Examples were added to improve clarity in three items following feedback. All the changes were discussed with supervisors.

4.3.2.6. Cognitive interviews

In Step 6 of the survey development process, cognitive interviews were conducted. It has been suggested (Moore, 2009; Ouimet, Carini, Kuh, & Bunnage, 2004) that this should be conducted after the expert panel review.

Face-to-face interviews were conducted with three professionals to explore how they would respond to the survey questions and whether they would respond in a way the researcher intended (Collins, 2003). A verbal probing approach (Collins, 2003; Wildy & Clarke, 2009) was followed by the researcher, where the researcher sat next to participants as they were completing the survey and obtained input related to various aspects of the instrument.

Selection criteria for the cognitive interview participants are indicated in Table 4.7. The participants in the cognitive interviews all provided consent through electronic consent forms.

Table 4.7

Selection Criteria for Participants in the Cognitive Interviews

Criteria	Justification	Method of data collection
RP working in the field of AT recommendation and provision to young children in South Africa for a minimum of five years.	RPs with at least five years' experience would have good insight into the factors influencing the provision of AT in South Africa.	Self report

The specific aims for the interviews, with comments made by those interviewed as well as actions taken by the researcher after each interview, are described in Table 4.8. Where necessary, adaptations to the survey were made after each interview was completed and before the next participant was interviewed. The first cognitive interview participant completed and commented on the first completed instrument. As this was discarded, the second and third participants

provided input on the final instrument. As the input obtained from the first cognitive interview was instrumental in the development of the final instrument, it is included in this discussion.

Table 4.8

Cognitive Interviews: Aims, Comments and Implemented Recommendations

Aim	Comments made during first interview	Recommendations implemented after first interview	Comments made during second interview	Recommendations implemented after second interview	Comments made during third interview	Recommendations made after third interview
To gain feedback on how participants understood the questions.	It was noted that the question in Section 1 regarding training was unclear. It contained more than one concept that could make it difficult to answer.	The question was split into four different questions regarding training.	The initial instructions and explanations in the recruitment mail were perceived as unclear. The RP indicated that she would not feel that she qualified to participate.	The wording of the initial email was changed to describe the scope of the survey in a clearer way.	Regarding the question asking participants to rank the frequency at which they recommended different types of AT, the comment was made that participants could choose the ranking as displayed in the question, leading to no response recorded.	This question was adapted and the order of the items in the question changed.
To determine whether participants could respond as intended and in a consistent way.	Comments made about several confusing questions.	Eight wording changes were made to increase the clarity of items.	No comments were made regarding this aim.	No additional recommendations were implemented.	No comments were made regarding this aim.	No additional recommendations were implemented.
To check for misunderstandings and inconsistent interpretation.	A recommendation was made to add “medical doctor” and “family” to the question related to the composition of the AT team.	The options for the “medical doctor” and “family” were added to the question asking about the composition of the AT team.	Suggestions were made to include an age range in the question asking the participants to enter their age.	The question was kept as is as the researcher preferred participants to enter their specific ages due to statistical advantages.	The participant commented that it was difficult to complete the best-worst questions. She felt as though she “was a liar” if she responded differently to different questions.	The instructions to the best-worst questions were adapted. To remind participants of the instructions, the most important ones were repeated on every screen of the survey.

Aim	Comments made during first interview	Recommendations implemented after first interview	Comments made during second interview	Recommendations implemented after second interview	Comments made during third interview	Recommendations made after third interview
To obtain feedback regarding the length of the survey.	It was noted that the survey was too long and certain questions difficult to answer	The survey was changed significantly after the first cognitive interview with the introduction of the best-worst questions.	No comments were made regarding this aim.	No additional recommendations were implemented.	No comments were made regarding this aim.	No additional recommendations were implemented.
To obtain feedback regarding the scales used.	The participant struggled to answer several of the questions in Section 2 of the first instrument constructed by the researcher. The participant experienced the intention of the question and the scales used as unclear.	The comments made by the participant in the first interview contributed to the discarding of all questions in Section 2 (using Likert scales) of the first constructed survey, in favour of best-worst questions.	The scale used when measuring confidence (in Section 1) was found to be inappropriate, as the different options did not seem to represent equal increases.	The scale used for the question asking about the confidence level of participants was adapted to the scale used in the final instrument.	No comments were made regarding this aim.	No additional recommendations were implemented.
To obtain feedback regarding the look and feel of the survey.	It was noted that the font of the questions was too small.	The font was enlarged to 12pt for all questions and response items.	It was noted that certain questions still had a very small font – the font sizes appeared inconsistent.	This was corrected in order for all questions and response items to be 12pt.	No comments were made regarding this aim.	No additional recommendations were implemented.

4.3.2.7. Pilot study

As Step 7 in the survey development process, the survey was distributed to a small sample to conduct a pilot study. As recommended by Hassan, Schattner and Mazza (2006), the pilot study aimed to test the functioning of the survey instrument, including whether data was captured correctly.

The selection criteria for participants in the pilot study are explained in Table 4.9. Although the main study was aimed at OTs, PTs, SLTs and SLTAs registered at the HPCSA and currently recommending/providing AT to young children in the South African context, the pilot instrument was also distributed to professionals who were not necessarily registered OTs, PTs, SLTs or SLTAs working with young children in South Africa (e.g., RPs working outside of South Africa were included). However, all participants were experienced in the recommendation and provision of AT. This was done to preserve the maximum number of possible participants for the main study, as suggested by Hassan et al. (2006).

Table 4.9

Selection Criteria for Participation in the Pilot

Criteria	Justification	Method of data collection
Professionals should have experience in recommendation/provision of AT (to any population).	Professionals with experience in the recommendation/provision of AT (not necessarily currently working in the field) would be able to complete the questionnaire and provide relevant feedback.	Self report

Participants were sent a personal invitation letter with a link to the online consent form and survey instrument. Eleven participants who met the selection criteria consented to participate in the pilot study. Participants could complete the survey at a time and location convenient to

them within a time frame of two weeks. Demographic information on all the participants who participated in the pilot can be viewed in Table 4.10.

Table 4.10

Demographic Details of Participants in the Pilot Study (N = 11)

Demographics of participants	n	Percentage of total
Profession		
OT	1	9.09%
SLT	2	18.18%
SLTA	3	27.27%
Other	5	45.45%
Highest qualification		
Diploma	1	9.09%
Bachelor's degree	1	9.09%
Master's degree	5	45.45%
Doctoral degree	4	36.36%
Age of participants		
21-30 years	2	18.18%
31-40 years	3	27.27%
41-50 years	4	36.36%
51-60 years	1	9.09%
Not disclosed	1	9.09%
Number of years of experience in recommending/providing AT		
0-5 years	1	9.09%
6-10 years	5	45.45%
11-15 years	3	27.27%
16-20 years	2	18.18%
Current employment setting (could select more than one option)		
AT Supplier	1	9.09%
Private practice	2	18.18%
Public school	1	9.09%
Clinic	1	9.09%
Other	6	66.66%

The aims, procedures, results and recommendations implemented after the pilot study are discussed in Table 4.11.

Table 4.11

Pilot Study: Aims, Procedures, Results and Recommendations

Aim	Procedures	Results	Recommendations
To obtain feedback regarding individual questions	Participants were asked to provide feedback regarding any of the questions in the survey.	A comment was made that the question regarding what types of AT is recommended is very broad and that it should be made more specific.	This was discussed with the researcher's supervisors. It was decided to leave this item as is, as it is not the purpose of the survey to gather detailed data on the types of AT and adding more detail here would add to the length of the survey unnecessarily.
		Regarding a question asking participants about how they would classify their decision-making, it was commented that the question was too broad and that it did not contain all aspects related to the decision-making construct.	This was discussed with the supervisors. It was decided to delete this item as it was not comprehensive and did not align well with the construct of decision-making as used in the research.
		For Item # 8 included in the best-worst questions, "school" was used to specify the context. It was suggested that this be changed to "working context" or similar to make the application wider.	This recommendation was considered, but it was decided to keep the item as is. As the survey is aimed at young children, schooling is a very important consideration applicable to most cases.
		A comment was made that two of the items included in the best-worst scale questions contained aspects related to policies and whether this was correct.	This was discussed and decided that the items would remain as is, as the two items were formulated to be related to different factors of the theoretical framework that had been checked through several processes.
		One participant was unsure whether the question asking about where services were provided was about where the patient came from or where the service was located.	The question was adapted to ask about where the service was located.
		For a question regarding availability of AT for trial, several participants were unsure if the question asked about AT to try at home or in the session.	The question was adapted to ask about availability of AT to trial in the session. An additional question was added to ask about availability for trial at home.
		For the question asking about access to AT, one participant mentioned that she was confused by the options and felt that she would not be able to answer that question accurately.	The question was adapted to a new format.
		Three participants mentioned that they did not quite understand the best-worst scale questions. One participant explained that she felt the researcher was trying to "catch" her out to determine if she was consistent in her responses.	The instructions to the best-worst scale questions were expanded and reworded to make the task clearer to participants. It was explained that the aim of the survey was to identify the most influential factors.

Aim	Procedures	Results	Recommendations
To identify potential non-response items	All questions where participants did not respond were evaluated.	A comment was made by a participant that some of the items of the best-worst scale questions would not be likely to influence her at her place of work. Therefore, she would not be likely to select them. One participant mentioned that she thought the last few pages (with best-worst questions) were repeating, as she perceived it to be asking the same thing over and over. Therefore, she may omit these questions.	This was kept as is, as it was felt that observation commented on an aspect that was part of the nature of the best-worst questions. The adapted instructions for the best-worst questions included an explanation of the number of questions and reasons why items seemed to be repeating.
To identify questions where participants unintentionally provided incorrect answers	The data were evaluated for obviously wrong or incomplete answers given.	One participant omitted their age, possibly indicating an objection to this question.	After considering several options to adapt this question (including e.g., the use of a drop down list), this question was kept as is.
To evaluate the data collection procedure	Feedback was obtained from participants regarding the functioning of the online survey.	The participants were sent a link to the survey. None of the participants experienced any difficulties in accessing the survey. They could return to it later if they were interrupted.	No changes were made to the data collection procedure.
To obtain feedback regarding using the survey on various devices and platforms	Participants were requested to provide feedback of difficulties experienced in opening the survey on different devices and platforms.	No comments were received on this.	No changes were made.
To evaluate the length of the questionnaire	Participants were asked for feedback regarding the length of the questionnaire.	One respondent commented that too many best-worst scale questions were included. A recommendation was made to include the time needed to complete the survey. One participant stated that it took her 45 minutes to complete the survey, while another completed it in 15 minutes.	As the number of questions could not be reduced due to the experimental design used, it was decided to provide more comprehensive instructions on the importance and number of the questions to the participants.
To evaluate whether the data was captured correctly through the online survey	Data obtained from the pilot was shared with a statistician who checked that all data was usable and correctly captured.	The data could be extracted from Qualtrics in the appropriate manner.	No changes were made.

4.3.2.8. Evaluate different items

Step 8 of the survey development process involved the evaluation of the different items of the survey. This was done after the consolidation of the results of the pilot study, when the different items were discussed by the researcher and supervisors. A statistician was involved in this process and the results of the pilot study were also presented to a group of 10 RPs. The outcome of these discussions is summarised in the recommendations column of Table 4.11.

4.3.2.9. Determine the optimal length for the questionnaire

Step 9 of the instrument development process entailed determining the optimal length of the survey. After obtaining the feedback from the participants in the pilot (as included in Table 4.11) and the discussion with the research supervisors and the panel of RPs, it was decided to omit three questions from Section 1 of the piloted survey. One new question was included.

4.3.3. Final instrument

The final items included in Section 1 of the survey, together with justification for their inclusion, as well as whether they were adapted from an existing instrument or created by the researcher, are provided in Table 4.12.

Table 4.12

Included Items for Section 1

Item	Justification for inclusion	Item adapted from existing instrument/created by researcher
I have read and understood the above consent form and desire of my own free will to participate in this study. o Yes o No	Informed consent required for participation.	Created by researcher
What is your profession? o Occupational Therapist o Physiotherapist o Speech Language Therapist o Speech Language Therapist and Audiologist	Required to meet inclusion criteria. Required in order for the researcher to comprehensively describe the sample.	Created by researcher
Are you registered at the HPCSA? o Yes o No	Required to meet inclusion criteria. Required in order to practice as a RP in South Africa.	Created by researcher
Do you currently recommend/provide any form of AT to children birth to 6 years within South Africa? o Yes o No	Required to meet inclusion criteria. Required in order to be knowledgeable in the factors influencing the recommendation/provision of AT to young children in South Africa.	Created by researcher
What is your age?	Required in order to comprehensively describe the sample.	Created by researcher
How many years of experience do you have in recommending/providing AT to young children (birth to 6 years)?	Required in order to comprehensively describe the sample. Furthermore, experience was identified as a factor that could influence the recommendation/provision of AT in the systematic review (van Niekerk et al., 2018) and online focus groups (van Niekerk et al., 2017). In the systematic review, several authors referred to the influence of experience on AT recommendation/provision (Lahm & Sizemore, 2002; Lindsay, 2010; Reed & Kanny, 1993; Wilcox et al., 2006).	Created by researcher

Item	Justification for inclusion	Item adapted from existing instrument/created by researcher
In which province of South Africa do you currently recommend/provide AT? If you work in more than one province, please indicate the province where you do most of your work involving recommendation/provision of AT to young children. ☐ Eastern Cape ☐ Free State ☐ Gauteng ☐ KwaZulu-Natal ☐ Limpopo ☐ Mpumalanga ☐ Northern Cape ☐ North West Province ☐ Western Cape	Required in order for the researcher to comprehensively describe the sample.	Created by researcher
Would you consider the area where you provide services to be predominantly: ☐ Urban ☐ Rural ☐ Both urban and rural	Required in order to comprehensively describe the sample. Furthermore, the nature of the setting where services are provided was identified as a factor that could influence recommendation/provision of AT in the online focus groups (van Niekerk et al., 2017), as well as other (international) literature (e.g., Keramidas & Collins, 2009). Context has been described as an important influencing factor on professional reasoning (Ryan & Hills, 2012), used by an RP when selecting AT.	Created by researcher
What is your current employment setting? If you work in more than one setting, please indicate the setting where you are most involved in recommendation/ provision of AT to young children. You can base the answers provided in this survey on experiences in this setting. ☐ AT supplier ☐ Clinic ☐ NGO ☐ Private practice ☐ Public hospital ☐ Public school ☐ Other (in case of other, click here and specify your answer)	Required in order to comprehensively describe the sample. Context has also been described as an important influencing factor on professional reasoning (Ryan & Hills, 2012), used by an RP when selecting AT.	Created by researcher

Item	Justification for inclusion	Item adapted from existing instrument/created by researcher
What types of AT do you recommend? (You can select more than one) ☐ Seating/positioning equipment (e.g., wedges, standing frames, etc.) ☐ Mobility equipment (e.g. wheelchairs, etc.) ☐ Augmentative and Alternative Communication (e.g. communication devices, paper-based communication boards, etc.) ☐ AT for activities of daily living (e.g. adapted spoons, Velcro fasteners, etc.) ☐ AT for use in the classroom context (e.g. oversized crayons, pencil grips, cuffs, etc.) ☐ Adapted toys (e.g. switch adapted toys, mobile technology with play software, etc.) ☐ Other (in case of other, click here and specify your answer)	Required in order to comprehensively describe the sample. AT is included in the HAAT model (Cook & Polgar, 2008) as one of the primary components that should be considered when selecting AT. It has also been identified as an influencing factor on the recommendation/provision of AT in the systematic review (van Niekerk et al., 2018) and online focus groups (van Niekerk et al., 2017).	Created by researcher
Please rank the following according to how often you recommend each of them, from the least recommended (1) to the most recommended (3). _____ Items that can be purchased/ordered off the shelf and used as is _____ Items that can be purchased but have to be modified/customised for the child _____ Low cost items created from scratch for a child	Required in order for the researcher to comprehensively describe the sample. This would provide information pertaining to the AT selected. AT is included in the HAAT model (Cook & Polgar, 2008) as one of the primary components that should be considered when selecting AT.	Created by researcher
Would families on your caseload have access to a variety of AT they can try out at your place of work? ☐ Yes ☐ No	Required in order for the researcher to comprehensively describe the sample. Furthermore, trial has been identified as an influencing factor on the recommendation/provision of AT in the systematic review (van Niekerk et al., 2018) and online focus groups (van Niekerk et al., 2017). In the systematic review, several authors referred to the influence of AT trial on AT recommendation/provision (Chmiliar, 2007; Reed & Kanny, 1993; Wilcox et al., 2006).	Adapted from Wilcox et al. (2006)

Item	Justification for inclusion	Item adapted from existing instrument/created by researcher
Would families on your caseload have access to a variety of AT they can try out at home? ☐ Yes ☐ No	Required in order to comprehensively describe the sample. Furthermore, trial has been identified as an influencing factor on the recommendation/provision of AT in the systematic review (van Niekerk et al., 2018) and online focus groups (van Niekerk et al., 2017). Trying AT at home may be particularly useful for young children, as service provision in natural environments (Dunst et al., 2000) such as the home have been suggested, also pertaining specifically to AT services (e.g., Moorcroft, Scarinci, & Meyer, 2018).	Adapted from Wilcox et al. (2006)
How confident are you in recommending/providing AT to young children? ☐ Not confident ☐ A little confident ☐ Somewhat confident ☐ Very confident	Required in order to comprehensively describe the sample. Furthermore, the self-efficacy of the RP has been identified as an influencing factor on the recommendation/provision of AT in the systematic review (van Niekerk et al., 2018) and online focus groups (van Niekerk et al., 2017). In the systematic review, several authors referred to the influence of self efficacy on AT selections (Chmiliar, 2007; Iacono & Cameron, 2009).	Created by researcher

Item	Justification for inclusion	Item adapted from existing instrument/created by researcher
How much training regarding AT for young children have you had in the following settings? Undergraduate studies ☐ No training ☐ Limited training ☐ Some training ☐ Extensive training ☐ Not applicable Postgraduate studies ☐ No training ☐ Limited training ☐ Some training ☐ Extensive training ☐ Not applicable Informal training (e.g. workshops) ☐ No training ☐ Limited training ☐ Some training ☐ Extensive training ☐ Not applicable Self-study (e.g. reading articles/websites) ☐ No training ☐ Limited training ☐ Some training ☐ Extensive training ☐ Not applicable	Required in order to comprehensively describe the sample. Furthermore, the knowledge and training of the RP has been identified as an influencing factor on the recommendation/provision of AT in the systematic review (van Niekerk et al., 2018) and online focus groups (van Niekerk et al., 2017). In the systematic review, several authors referred to the influence of training on AT recommendation/provision (Chmiliar, 2007; Lahm & Sizemore, 2002; Reed & Kanny, 1993; Wilcox et al., 2006).	Adapted from Wilcox et al. (2006)
How resourceful and creative do you think you are when recommending/providing AT solutions to young children? ☐ Not creative and resourceful ☐ A little creative and resourceful ☐ Somewhat creative and resourceful ☐ Very creative and resourceful	Required in order to comprehensively describe the sample. Resourcefulness of the RP was identified as a factor that could influence recommendation/provision of AT in online focus groups (van Niekerk et al., 2017).	Created by researcher

Item	Justification for inclusion	Item adapted from existing instrument/created by researcher
Do you have a mentor/mentors in the field of AT that could provide guidance or support? o Yes o No	Required in order to comprehensively describe the sample. The support of an RP has been identified as an influencing factor on the recommendation/provision of AT in the systematic review (van Niekerk et al., 2018), where several articles referred to the influence of a mentor on AT recommendation/provision (Chmiliar, 2007; Lahm & Sizemore, 2002; Lindsay, 2010).	Adapted from Lahm and Sizemore (2002)
Are you a mentor to others working in the field of AT? o Yes o No	Required in order to comprehensively describe the sample. The support of a RP has been identified as an influencing factor on the recommendation/provision of AT in the systematic review (van Niekerk et al., 2018). As mentoring was not mentioned as a factor that influences AT recommendation/provision in the online focus groups with South African RPs, information pertaining this influencing factor for the South African context was required.	Created by researcher
Do you work as part of a team when recommending/providing AT? o Yes o No	Required in order to comprehensively describe the sample. The availability of a team was identified as a factor that could influence recommendation/provision of AT in the systematic review (van Niekerk et al., 2018) and online focus groups (van Niekerk et al., 2017). Several articles identified in the systematic review referred to the influence of a team on AT recommendation/provision (Iacono & Cameron, 2009; Lahm & Sizemore, 2002; Wilcox et al., 2006).	Adapted from Lahm and Sizemore (2002)

Item	Justification for inclusion	Item adapted from existing instrument/created by researcher
Please indicate who would typically be part of your AT team (you can select more than one). ☐ Audiologist ☐ Family/caregivers of the child ☐ Medical doctor/specialist ☐ Nurse ☐ Occupational therapist ☐ Paraprofessional ☐ Physiotherapist ☐ Speech language therapist ☐ Social worker ☐ Teacher/ Educator ☐ Other (in case of other, click here and specify your answer)	Required in order for the researcher to comprehensively describe the sample.	Adapted from Wilcox et al. (2006)
Do you conduct AT assessments for children within the team? ☐ Yes ☐ No	Required in order to comprehensively describe the sample. Team assessments have been described as a valuable approach to assessment for AT (e.g., Parette, Huer, & Brotherson, 2001; Srinivasan, Mathew, & Lloyd, 2011).	Adapted from Wilcox et al. (2006)
How would you describe the typical involvement of professional team members in making decisions regarding AT for young children on your case load? ☐ No involvement ☐ Limited involvement ☐ Some involvement ☐ Extensive involvement	Required in order to comprehensively describe the sample. As the team may influence the recommendation/provision of AT to young children, their perceived involvement may prove insightful.	Created by researcher
How would you describe the typical involvement of families in your work environment in making decisions about AT for their young children? ☐ No involvement ☐ Limited involvement ☐ Some involvement ☐ Extensive involvement	Required in order to comprehensively describe the sample. Family involvement has been described as very important in the recommendation/provision of AT (e.g., Granlund, Björck-Akesson, Wilder, & Ylvén, 2008; Parette et al., 2000).	Created by researcher

Item	Justification for inclusion	Item adapted from existing instrument/created by researcher
Where do you conduct your AT assessments for children? (you can select more than one) ☐ At the clinic ☐ In the therapy department of a hospital ☐ In the therapy department of a school ☐ In private therapy rooms ☐ In the child's classroom ☐ In the child's home ☐ At a vendor's rooms/office ☐ Other (in case of other, click here and specify your answer)	Required in order to comprehensively describe the sample. Furthermore, the nature of the setting of the assessment was identified as a factor that could influence recommendation/provision of AT in the systematic review (van Niekerk et al., 2018) and online focus groups (van Niekerk et al., 2017). As reported in the systematic review, Lahm and Sizemore (2002) viewed the location of assessment as influential to AT recommendation/provision. Furthermore, context has also been described as an important influencing factor on professional reasoning (Ryan & Hills, 2012), used by an RP when selecting AT.	Adapted from Lahm and Sizemore (2002)
Which of the following best describes children (birth to age 6) on your current caseload regarding their access to assistive technology? ☐ None of the children who would benefit from AT have access to AT. ☐ Some of the children who would benefit from AT have access to AT. ☐ Most of the children who would benefit from AT have access to AT. ☐ All of the children who would benefit from AT have access to AT.	Required in order to comprehensively describe the sample pertaining to the access to AT for children on their caseload.	Adapted from Wilcox et al. (2006)

The final items, with their item numbers as included in the best-worst questions in Section 2, are included in Table 4.13. Details are provided regarding the alignment to the theoretical components and factors from the adapted ATD Selection Framework. Furthermore, information is provided on whether the item was created by the researcher (by incorporating factors from the newly adapted framework), or whether the item was adapted from an existing instrument.

Table 4.13

Items Used in Best-worst Questions with Components and Factors of Framework and Original Source

Item number	Items included in best-worst scale questions	Component of framework	Factor of framework	Item adapted from existing instrument/created by researcher
Environment				
1	Beliefs regarding the cause of disability held, for example, by yourself or the family	Cultural context	Cultural context (general)	Created by researcher based on Cook and Polgar (2008)
2	Importance attributed to independence within the child's culture	Cultural context	Cultural context (general)	Created by researcher based on Cook and Polgar (2008)
3	The family's attitude toward AT	Social context	Attitudes of parent/family/caregivers	Adapted from Wilcox, Guimond, et al. (2006)
4	The attitudes of the professionals that will assist in the implementation of the AT	Social context	Attitudes of (other) professionals	Created based on theoretical framework
5	The child's attitude toward AT	Social context	Attitudes of the child	Created based on theoretical framework
6	Your own attitude toward AT	Social context	Attitudes of the professional (themselves)	Created based on theoretical framework
7	The social acceptability of the recommended AT	Social context	Social acceptability	Created based on theoretical framework
8	Current AT practices at the school the child attends/would like to attend	Institutional context	Practices and practice barriers	Created based on theoretical framework
9	Policies related to AT recommendation/provision applicable to your workplace	Institutional context	Policy	Adapted from Wilcox, Guimond, et al. (2006)
10	Guidelines related to AT recommendation/provision implemented at your workplace	Institutional context	Guidelines	Created based on theoretical framework
11	Practice barriers related to AT recommendation, e.g. long waiting lists, excessive red tape, the fragmented nature or services	Institutional context	Practices and practice barriers	Created based on theoretical framework
12	Financial provision for AT, e.g. through tender policy, medical aid	Institutional context	Financial provision	Created based on theoretical framework
13	The characteristics of the physical environment where the child will use the AT, e.g. home, school, community	Physical context	Home/school/hospital/community	Adapted from Wilcox, Guimond, et al. (2006)
14	Availability of electricity in the home, school and community	Physical context	Home/school/hospital/community	Created based on theoretical framework

Item number	Items included in best-worst scale questions	Component of framework	Factor of framework	Item adapted from existing instrument/created by researcher
15	Crime rate in the community	Physical context	Home/school/hospital/ community	Created based on theoretical framework
Personal factors				
16	Your knowledge and training in recommending/providing AT	Knowledge and Information	Knowledge and training of professionals	Adapted from Wilcox, Guimond, et al. (2006), Lahm & Sizemore (2002)
17	Your sense of confidence when recommending/providing AT	Knowledge and Information	Self efficacy of professionals	Created based on theoretical framework
18	Your technical expertise and experience in recommending/providing AT	Knowledge and Information	Skill and experience of professionals	Adapted from Freeman et al. (2004); Wilcox, Guimond, et al. (2006)
19	Your resourcefulness in recommending/providing AT solutions	Knowledge and Information	Resourcefulness of professionals	Created based on theoretical framework
20	The family's knowledge of AT	Knowledge and Information	Knowledge of parents/family/caregivers	Created based on theoretical framework
21	The family's skill and experience with AT	Knowledge and Information	Skills and experience of parents/family/caregivers	Created based on theoretical framework
22	The opportunity/possibility to train families on AT	Knowledge and Information	Training of parents/family/caregivers	Created based on theoretical framework
23	Availability of funds for AT, e.g. through fundraising or family funds	Resources	Financial	Adapted from Freeman et al., (2004); Wilcox, Guimond, et al. (2006)
24	Availability of ongoing professional/paraprofessional support for child after AT has been acquired/provided	Resources	Professional/ paraprofessional support	Adapted from Freeman et al. (2004)
25	Social support, e.g. from friends or relatives available to families and children using AT	Resources	Social support	Created based on theoretical framework
26	Availability of a team to work with during the recommendation/provision of AT	Resources	Teamwork between professional and family	Created based on theoretical framework
27	The support/opinion of your mentor in recommending/providing AT	Resources	Expert/mentor	Adapted from Wilcox, Guimond, et al. (2006)
28	Availability of time for recommending/providing AT, e.g. time for assessment or discussions with family	Resources	Time	Created based on theoretical framework
29	The family's ability to support the implementation of the AT	Resources	Families	Created based on theoretical framework
30	Expectations of the family regarding AT for a child	Expectations	Expectations of parents/family/caregivers	Created based on theoretical framework
31	Your expectations related to AT for a child	Expectations	Expectations of the professional (themselves)	Created based on theoretical framework

Item number	Items included in best-worst scale questions	Component of framework	Factor of framework	Item adapted from existing instrument/created by researcher
32	Expectations that professionals (e.g. teachers) have of AT for a child	Expectations	Expectations of (other) professionals	Created based on theoretical framework
33	The child's preference regarding AT	Preferences & Priorities	Preference of the child	Adapted from Freeman et al. (2004)
34	The family's preference regarding AT	Preferences & Priorities	Preference of the parents/family/caregivers	Adapted from Freeman et al. (2004)
35	Your preference regarding AT	Preferences & Priorities	Preference of the professional	Adapted from Freeman et al. (2004)
Assessment				
36	Activities that the child should/would like to participate in	Assessment	Activity and participation	Created based on theoretical framework
37	The child's current abilities and skills	Assessment	Child characteristics	Created based on theoretical framework
38	Needs mentioned by the family	Assessment	Assessment of needs: Family needs	Adapted from Lahm and Sizemore (2002)
39	Needs of the child	Assessment	Assessment of needs: Perceived needs of child	Created based on theoretical framework
40	Your therapy goals for the child	Assessment	Therapy goals	Adapted from Lahm and Sizemore (2002)
41	The match between the child and the AT	Assessment	Goodness of fit	Adapted from Wilcox, Guimond, et al. (2006)
42	Your approach to assessment, e.g. where or how you do assessments	Assessment	Assessment approach of provider	Created based on theoretical framework
AT				
43	Cost of the AT	Assistive technology	Device characteristics: cost	Adapted from Freeman et al., (2004); Wilcox, Guimond, et al. (2006)
44	The possibility for the AT to “grow” with the child	Assistive technology	Device characteristics: flexibility	Created based on theoretical framework
45	The availability of the AT for the child to try out	Assistive technology	Availability for trial	Adapted from Wilcox, Guimond, et al. (2006)
46	Characteristics of the AT, e.g. ease of maintenance, portability	Assistive technology	Device characteristics: ease of maintenance, portability	Adapted from Freeman et al. (2004)
47	Materials available to make AT at your workplace	Assistive technology	Availability	Created based on theoretical framework
48	Availability of AT on tender or from AT suppliers	Assistive technology	Availability	Adapted from Freeman et al., (2004); Wilcox, Guimond, et al., (2006)

4.4. Conclusion

In this chapter, the development of the survey instrument was described. The adapted ATD Selection Framework (described in Chapter 3) was utilised extensively in the development of the survey instrument. The distribution of this survey to answer the research questions set for the study will be described in Chapter 5.

CHAPTER 5

METHODOLOGY: PHASE 3

5.1. Introduction

As discussed in Chapter 3, the study was guided by the following primary research aim:
To describe the perceptions of RPs (occupational therapists, physiotherapists and speech language pathologists) regarding the factors influencing the recommendation and provision of assistive technology to young children (birth to 6 years of age) within the South African context.

In Chapter 4, it was described how the instrument was developed that was to be used in Phase 3. Therefore, the secondary aims of Phase 3 were specifically:

- i. To distribute an online survey aimed at ordering the perceived influence of the factors that influence the recommendation and provision of AT to young children that require AT in the South African context.
- ii. To analyse, synthesise and interpret the data obtained in the survey.
- iii. To describe the influence of their years of experience on the perspectives of RPs regarding the factors influencing the recommendation and provision of AT to young children.
- iv. To inform the theoretical framework regarding factors that influence the recommendation and provision of AT to young children.

5.2. Design of the study

As discussed in the previous chapters, this study follows a sequential exploratory mixed methods design. In Chapter 3, Phase 1 was described, primarily aimed at adapting the theoretical

framework to be utilised in the development of the instrument. In Chapter 4, the instrument development was discussed (Phase 2). Chapter 5 describes Phase 3, providing details on conducting the survey. Figure 5.1 illustrates the methodology of the entire study, highlighting Phase 3 that will be discussed in this chapter.

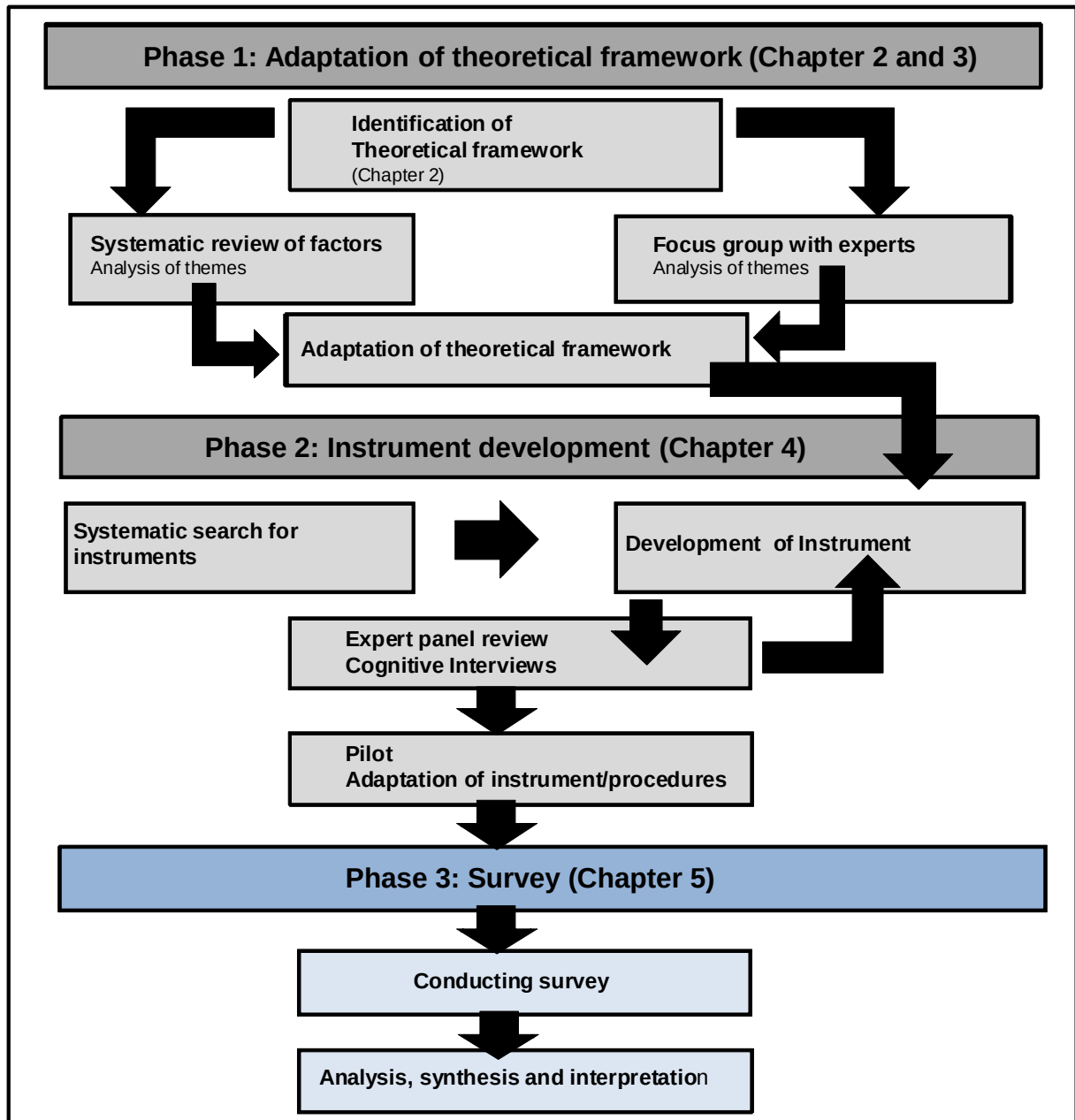


Figure 5.1. Research design (highlighting Phase 3).

5.3. Phase 3

The first aim of Phase 3, namely conducting the online survey, is described in terms of the participant selection, recruitment of participants, description of participants, the materials and equipment used, and the data collection procedures. The results and their interpretation are discussed in Chapter 6 and Chapter 7.

5.4. Conducting the online survey

This study employed an online survey method. This method was selected primarily as the researcher aimed to recruit participants working in diverse contexts and locations throughout South Africa. It was felt that the online survey method would be the most cost effective and practical method to reach these diverse professionals (Dillman et al., 2014). Furthermore, resources (in terms of finance, time and man power) were not available to do the survey in other modes, such as a paper-based or telephonic survey, over such a large geographic area with such a high number of possible participants. As accurate and updated information on the current work context and practice details of South African RPs are not available, it was not possible to select a representative sample from the large group of RPs that would meet the selection criteria. Therefore, the online survey method was suitable, as it was possible to send the recruitment letter to all RPs on the email lists (not having to select a small sample), at no additional cost.

It has, however, been reported that surveys only conducted in one mode (for example only online surveys as in this case) are not as successful (in terms of return rate) as surveys conducted in multiple modes (Dillman et al., 2014). Although it was considered to follow up the online survey with a paper-based survey sent through the postal service (only to participants that received but did not respond to the online survey), this proved to be problematic. The postal

addresses of professionals contained on the email lists were not consistently available or updated, so sending out paper-based surveys to these addresses would not reliably reach the intended recipient. There would also be a considerable financial implication.

When conducting online surveys, it is important to keep in mind that people who have internet access differ from those who do not have access, as they would typically have less education and a lower income (Dillman et al., 2014). This implies that the use of an online survey may introduce the possibility of bias in the sampling (Forsyth & Kviz, 2006). However, for this survey, participants with a professional qualification were the targeted population. Therefore, the researcher and supervisors did not expect access to the internet to influence the sample to a great extent. It was also felt that the possibility to and benefit of recruiting participants from all corners of the country via the online method would outweigh the possibility of losing participants because they were not able to access the internet.

5.4.1. *Participants*

5.4.1.1. *Selection criteria for participation in the survey*

The selection criteria for participants in the study can be viewed in Table 5.1.

Table 5.1

Selection Criteria for Participation in the Survey

Criteria	Justification	Method of data collection
OTs, PTs, SLTs and SLTAs registered at the HPCSA for independent practice.	Professionals from these disciplines can recommend AT related to their field of practice.	Self report
RPs who recommend/provide AT to children with disabilities between birth and 6 years in their current employment.	RPs not providing services to that population may not be familiar with the factors influencing the provision of AT in that population.	Self report

5.4.1.2. Recruitment of sample

The participants were recruited via email. Email addresses of all OTs, PTs, SLTs and SLTAs registered at the HPCSA were obtained from the HPCSA. Every professional on the list was sent an invitation letter, although many of these participants would not meet the selection criteria. It was not possible to send out the recruitment letters only to those that would qualify, as employment information was not available for registered professionals. In total, the survey was distributed to 14,167 prospective participants. For a breakdown of the number of email addresses per professional group, as well as number of emails that bounced, please see Table 5.2.

Table 5.2

Numbers of Email Addresses Obtained Per Profession

Professional group	Number of email addresses on list	Number of bounced emails
Occupational therapists	4,753	292
Physiotherapists	6,903	362
Speech language therapists	1,076	55
Speech language therapists and audiologists	1,435	92
Total	14,167	801

Of the 13,366 prospective participants (bounced emails deducted from initial total), 1,393 opened the survey and 1,196 responses were recorded. Furthermore, 223 prospective participants wrote a personal email to the researcher to indicate that they did not meet the selection criteria and were removed from the mailing list.

Some 338 participants were eliminated from the survey as they did not meet the selection criteria (exiting the survey within the first three questions), leaving 858 participants that started Section 1 of the survey. A total of 699 participants started with Section 2 of the survey (implying that 159 participants dropped out during completion of Section 1). In total, 474 participants completed the last question of Section 2 of the survey. A further 23 participants were

eliminated as they did not complete all of the questions of Section 2 (due to the data analysis method used for this section only participants that completed 100% of the questions in Section 2 were included). A total of 451 participants completed all the questions of Section 2 and were included in the analysis. The breakdown of responses per profession is included in Table 5.3.

Table 5.3

Number of Responses per Profession

Professional group	Number of PRs that likely received email	Number of usable responses	Percentage of RPs (from group receiving the email) who provided a usable response
Occupational therapists	4,461	222	4.98%
Physiotherapists	6,541	126	1.93%
Speech language therapists	1,021	63	6.17%
Speech language therapists and audiologists	1,343	40	2.98%

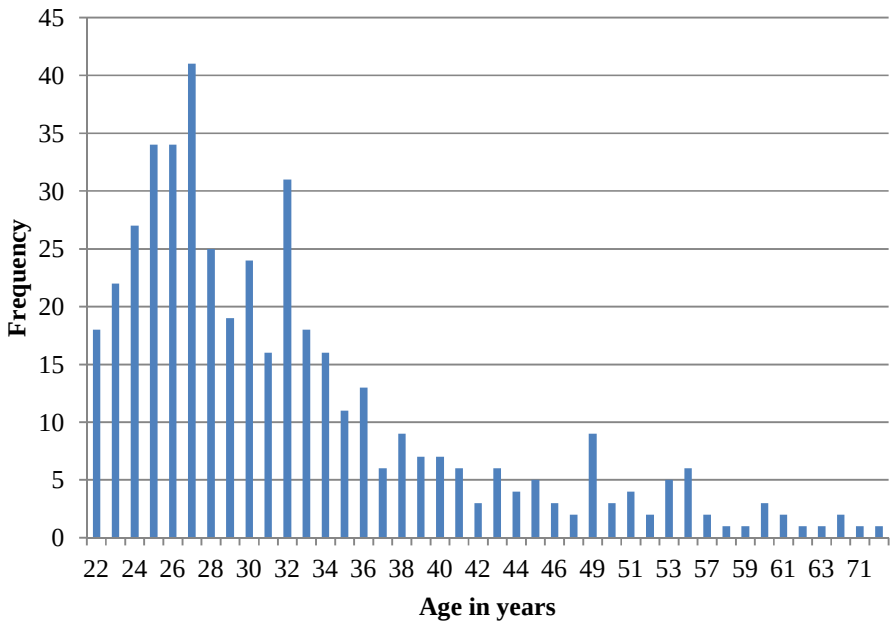
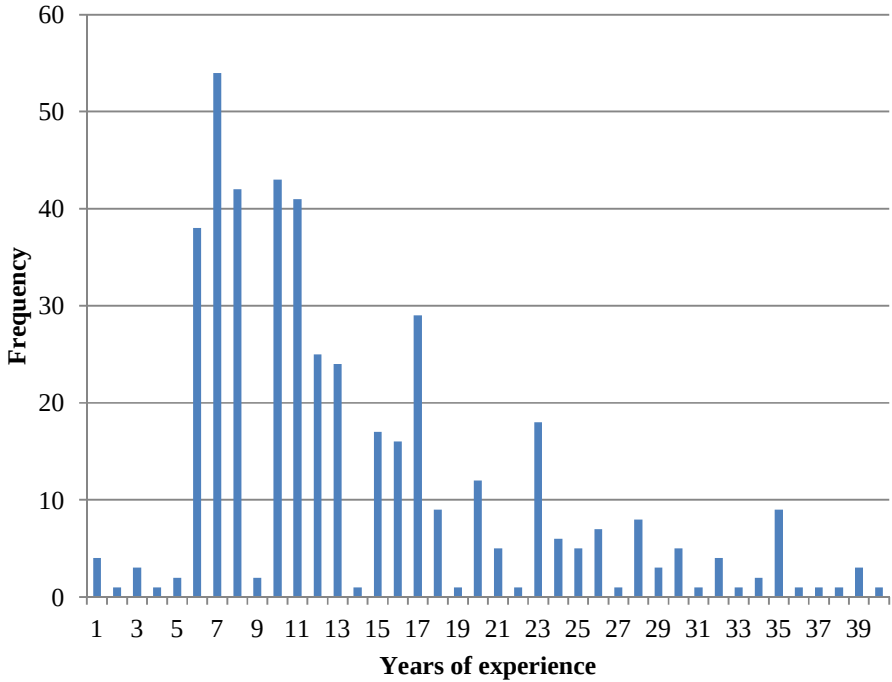
5.4.1.3. Description of Sample

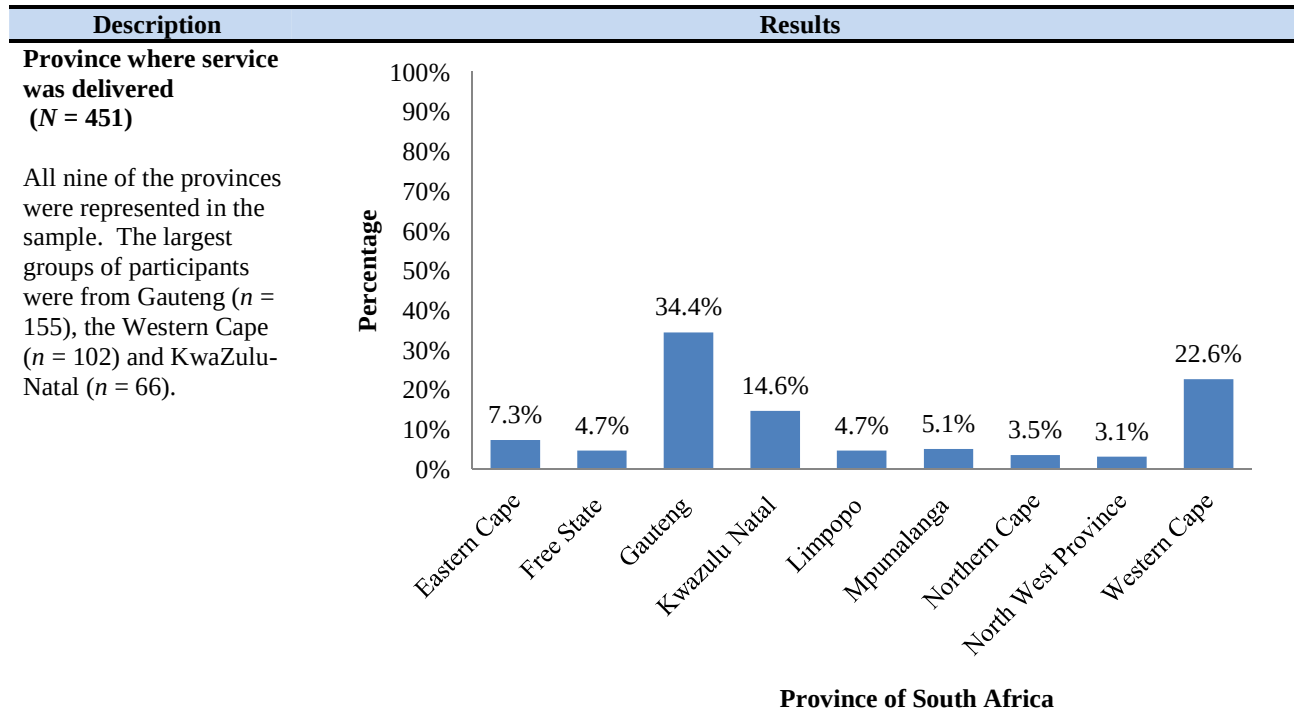
The descriptive information on all participants is provided in Table 5.4.

Table 5.4

Descriptive Information on Participants

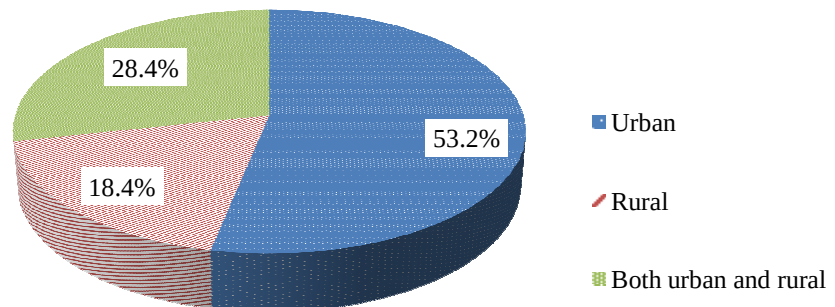
Description	Results										
Profession (N = 451) OTs were the largest group of professionals ($n = 222$), with PTs following them ($n = 126$). SLTs ($n = 63$) and SLTAs ($n = 40$) were also represented.	<table border="1"> <thead> <tr> <th>Profession</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Occupational Therapists</td> <td>49.2%</td> </tr> <tr> <td>Physiotherapists</td> <td>27.9%</td> </tr> <tr> <td>Speech Language Therapists</td> <td>14.0%</td> </tr> <tr> <td>Speech Language Therapist and Audiologists</td> <td>8.9%</td> </tr> </tbody> </table>	Profession	Percentage	Occupational Therapists	49.2%	Physiotherapists	27.9%	Speech Language Therapists	14.0%	Speech Language Therapist and Audiologists	8.9%
Profession	Percentage										
Occupational Therapists	49.2%										
Physiotherapists	27.9%										
Speech Language Therapists	14.0%										
Speech Language Therapist and Audiologists	8.9%										
Highest qualification (N = 451) The largest group of participants had a Bachelor's degree ($n = 365$), while several also had a Master's degree qualification ($n = 79$). Four participants had a diploma and three had a doctorate.	<table border="1"> <thead> <tr> <th>Highest qualification</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Diploma</td> <td>0.9%</td> </tr> <tr> <td>Bachelor's degree</td> <td>80.9%</td> </tr> <tr> <td>Master's degree</td> <td>17.5%</td> </tr> <tr> <td>Doctoral degree</td> <td>0.7%</td> </tr> </tbody> </table>	Highest qualification	Percentage	Diploma	0.9%	Bachelor's degree	80.9%	Master's degree	17.5%	Doctoral degree	0.7%
Highest qualification	Percentage										
Diploma	0.9%										
Bachelor's degree	80.9%										
Master's degree	17.5%										
Doctoral degree	0.7%										

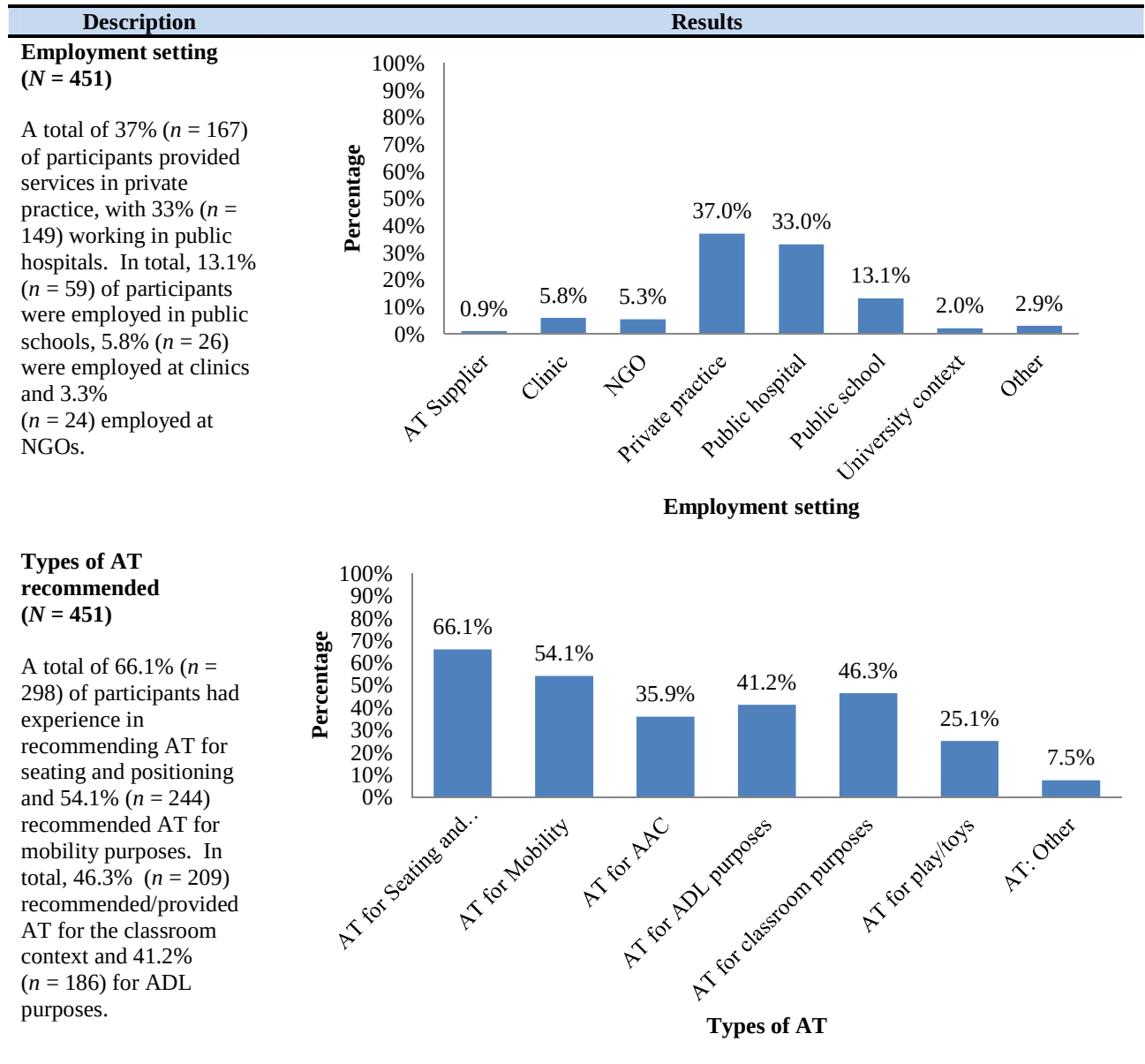
Description	Results
Age ($N = 451$) For this sample, $M = 32.49$; $SD = 9.58$, $Mdn = 30.00$ and $Range = 62$. The youngest participant was 22 years old and the oldest was 84 years old.	 Frequency Age in years
Years of experience ($N = 448$), missing, ($n = 3$) For years of experience, $M = 7.98$, $Mdn = 5.00$, $SD = 7.68$ and $Range = 41$. The minimum experience was less than 1 year and the maximum 41 years.	 Frequency Years of experience

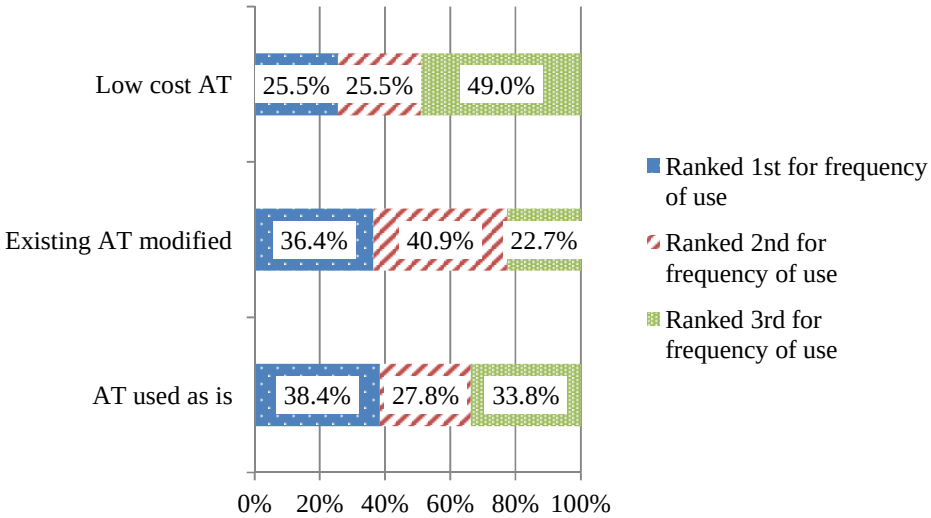
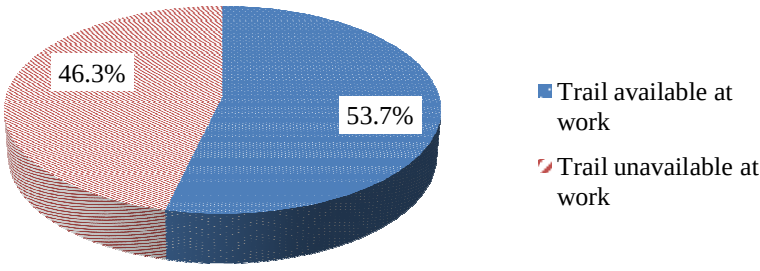
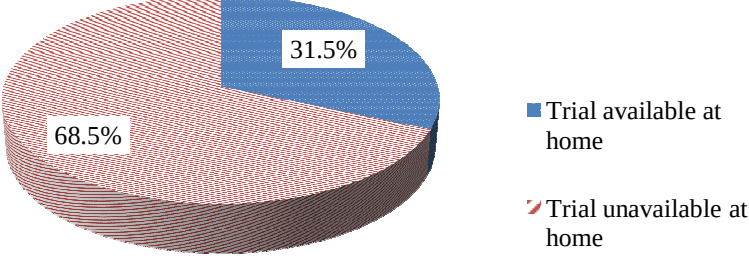


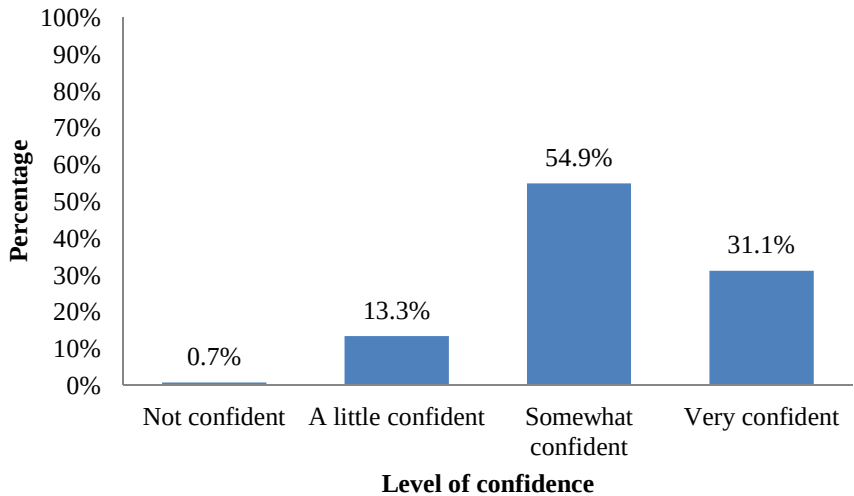
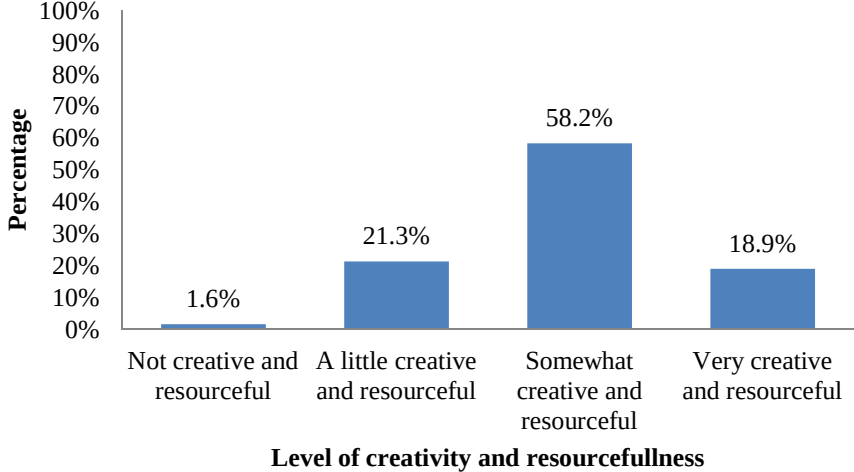
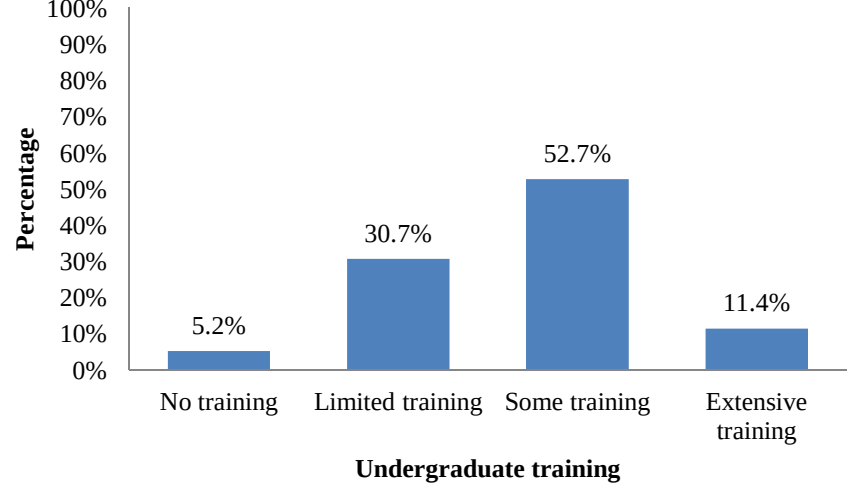
Rural/urban/both
(N = 451)

More than half of the participants provided services in urban areas ($n = 240$), with a smaller group ($n = 83$) providing services only in rural areas. A total of 28.4% ($n = 128$) provided services in both rural and urban areas.

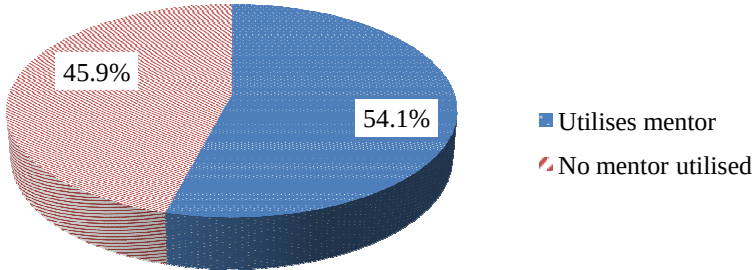
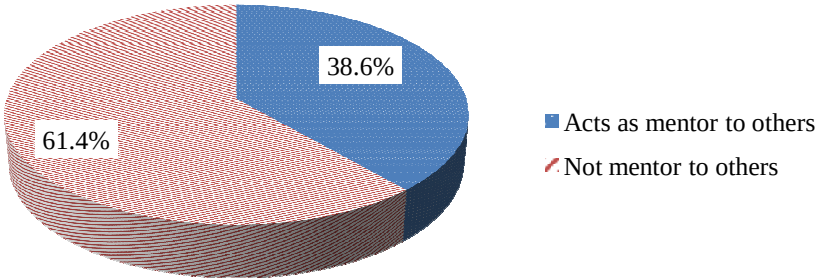
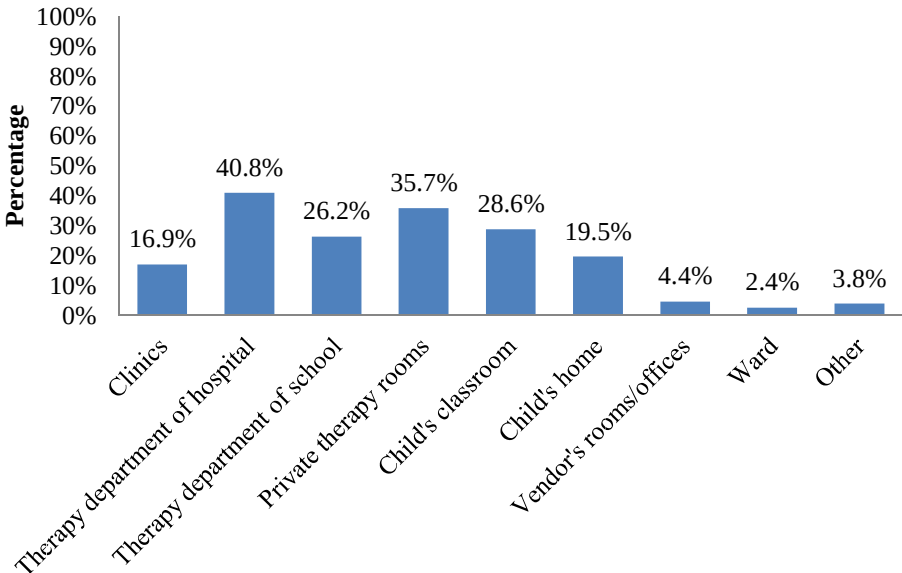


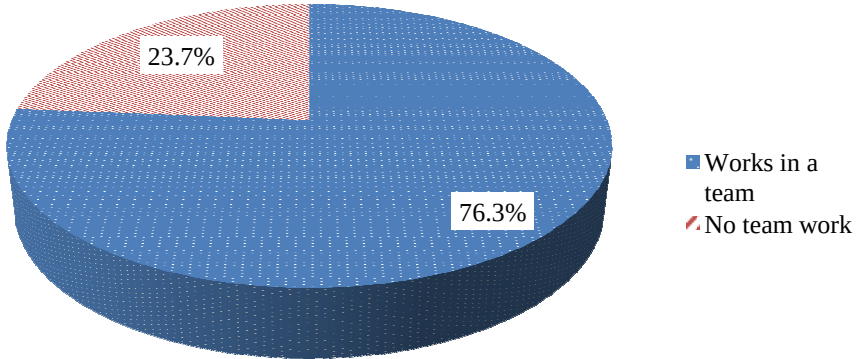
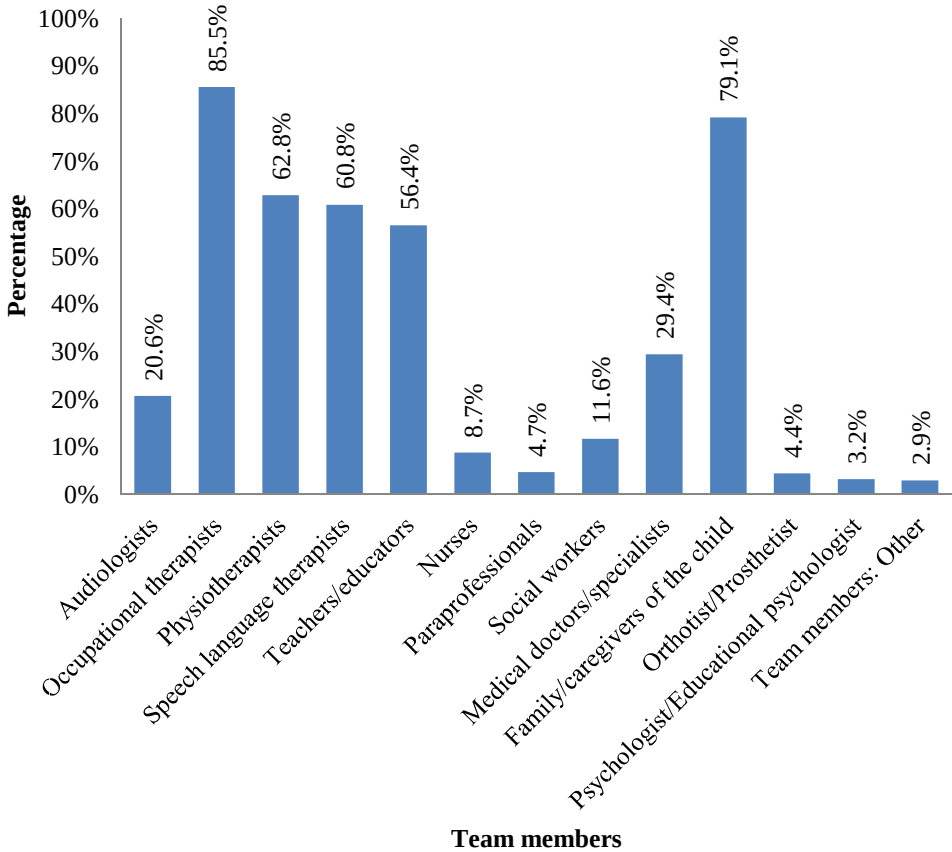


Description	Results																
Rank of frequency of recommendation (n = 449), missing (n = 2) A total of 25.5% (n = 106) of participants most frequently recommended/provided low cost AT, with 49% (n = 204) recommending/providing this type of AT least frequently. A total of 38.4% (n = 142) of participants recommend commercially available AT (used as is) most frequently, with 33.78% (n = 125) recommending this type of AT least frequently.	 <table><tr><th>AT Type</th><th>Ranked 1st for frequency of use</th><th>Ranked 2nd for frequency of use</th><th>Ranked 3rd for frequency of use</th></tr><tr><td>Low cost AT</td><td>25.5%</td><td>25.5%</td><td>49.0%</td></tr><tr><td>Existing AT modified</td><td>36.4%</td><td>40.9%</td><td>22.7%</td></tr><tr><td>AT used as is</td><td>38.4%</td><td>27.8%</td><td>33.8%</td></tr></table>	AT Type	Ranked 1st for frequency of use	Ranked 2nd for frequency of use	Ranked 3rd for frequency of use	Low cost AT	25.5%	25.5%	49.0%	Existing AT modified	36.4%	40.9%	22.7%	AT used as is	38.4%	27.8%	33.8%
AT Type	Ranked 1st for frequency of use	Ranked 2nd for frequency of use	Ranked 3rd for frequency of use														
Low cost AT	25.5%	25.5%	49.0%														
Existing AT modified	36.4%	40.9%	22.7%														
AT used as is	38.4%	27.8%	33.8%														
Trial available for AT at work (n = 447), missing (n = 4) More than half of participants (n = 240) had the option of trialling AT with a client at their place of work, while 46.3% (n = 207) of participants could not trial AT at work	 <table><tr><th>Trial Availability</th><th>Percentage</th></tr><tr><td>Trial available at work</td><td>53.7%</td></tr><tr><td>Trial unavailable at work</td><td>46.3%</td></tr></table>	Trial Availability	Percentage	Trial available at work	53.7%	Trial unavailable at work	46.3%										
Trial Availability	Percentage																
Trial available at work	53.7%																
Trial unavailable at work	46.3%																
Trial available for AT at home (n = 447), missing (n = 4) A total of 31.5% (n = 141) of participants had the opportunity to trial AT with a client at home and 68.5% (n = 306) were unable to trial AT at the client's home.	 <table><tr><th>Trial Availability</th><th>Percentage</th></tr><tr><td>Trial available at home</td><td>31.5%</td></tr><tr><td>Trial unavailable at home</td><td>68.5%</td></tr></table>	Trial Availability	Percentage	Trial available at home	31.5%	Trial unavailable at home	68.5%										
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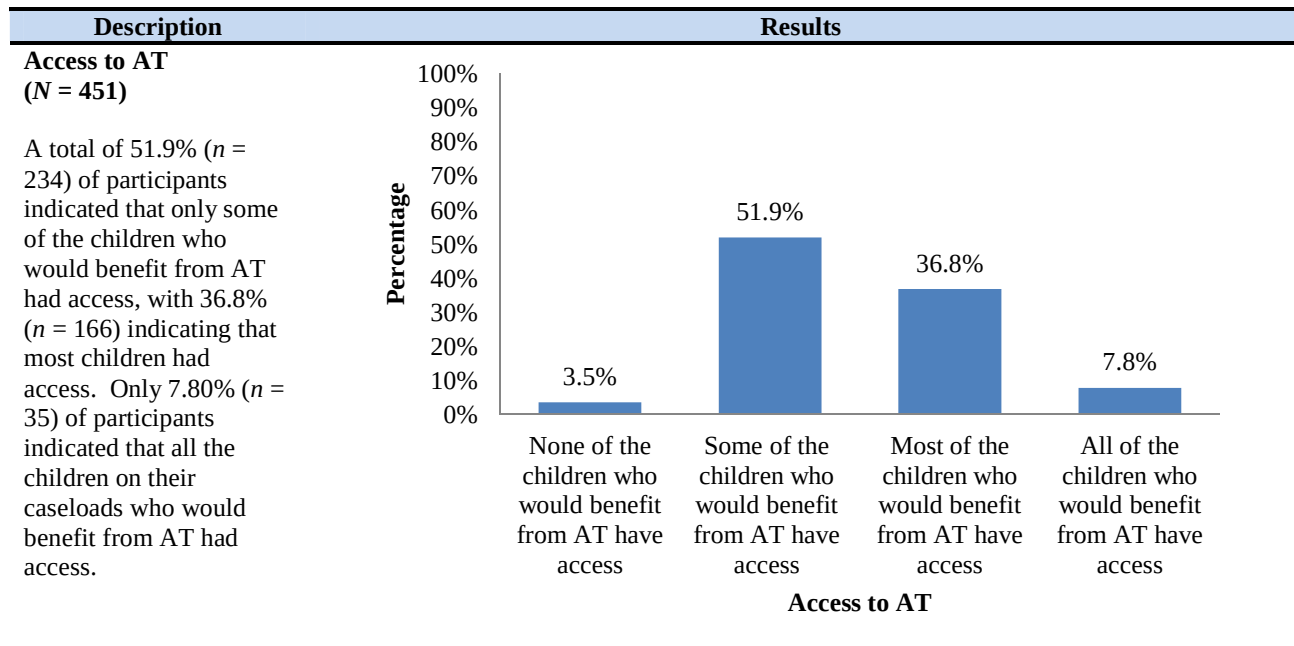
Description	Results										
Level of confidence in recommending AT ($n = 450$), missing ($n = 1$) A total of 54.9% ($n = 247$) of participants indicated that they were somewhat confident in recommending AT, with 31.1% ($n = 140$) indicating that they were very confident. A total of 13.3% ($n = 60$) participants indicated that they were a little confident in recommending AT.	 <table border="1"> <thead> <tr> <th>Level of confidence</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Not confident</td> <td>0.7%</td> </tr> <tr> <td>A little confident</td> <td>13.3%</td> </tr> <tr> <td>Somewhat confident</td> <td>54.9%</td> </tr> <tr> <td>Very confident</td> <td>31.1%</td> </tr> </tbody> </table>	Level of confidence	Percentage	Not confident	0.7%	A little confident	13.3%	Somewhat confident	54.9%	Very confident	31.1%
Level of confidence	Percentage										
Not confident	0.7%										
A little confident	13.3%										
Somewhat confident	54.9%										
Very confident	31.1%										
Level of resourcefulness and creativity ($n = 450$), missing ($n = 1$) A total of 58.2% ($n = 262$) of participants indicated that they viewed themselves as somewhat creative and resourceful, with 18.9% ($n = 85$) of participants rating themselves as very creative and resourceful when recommending/providing AT.	 <table border="1"> <thead> <tr> <th>Level of creativity and resourcefulness</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Not creative and resourceful</td> <td>1.6%</td> </tr> <tr> <td>A little creative and resourceful</td> <td>21.3%</td> </tr> <tr> <td>Somewhat creative and resourceful</td> <td>58.2%</td> </tr> <tr> <td>Very creative and resourceful</td> <td>18.9%</td> </tr> </tbody> </table>	Level of creativity and resourcefulness	Percentage	Not creative and resourceful	1.6%	A little creative and resourceful	21.3%	Somewhat creative and resourceful	58.2%	Very creative and resourceful	18.9%
Level of creativity and resourcefulness	Percentage										
Not creative and resourceful	1.6%										
A little creative and resourceful	21.3%										
Somewhat creative and resourceful	58.2%										
Very creative and resourceful	18.9%										
Undergraduate training in recommending AT ($n = 446$), missing ($n = 5$) A total of 52.7% ($n = 235$) of participants received some training during undergraduate studies, with 11.4% ($n = 51$) receiving extensive training. A total of 30.7% ($n = 137$) participants received limited training regarding AT recommendation.	 <table border="1"> <thead> <tr> <th>Undergraduate training</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>No training</td> <td>5.2%</td> </tr> <tr> <td>Limited training</td> <td>30.7%</td> </tr> <tr> <td>Some training</td> <td>52.7%</td> </tr> <tr> <td>Extensive training</td> <td>11.4%</td> </tr> </tbody> </table>	Undergraduate training	Percentage	No training	5.2%	Limited training	30.7%	Some training	52.7%	Extensive training	11.4%
Undergraduate training	Percentage										
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Extensive training	11.4%										

Description	Results										
Postgraduate training in recommending AT (n = 353) Of those participants who had completed postgraduate studies, 36.3% (n = 128) indicated that they had received some training, while 35.4% (n = 125) indicated that they had received no training in the recommendation of AT during their postgraduate training.	<table border="1"> <thead> <tr> <th>Training Level</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>No training</td> <td>35.4%</td> </tr> <tr> <td>Limited training</td> <td>11.9%</td> </tr> <tr> <td>Some training</td> <td>36.3%</td> </tr> <tr> <td>Extensive training</td> <td>16.4%</td> </tr> </tbody> </table> Postgraduate training	Training Level	Percentage	No training	35.4%	Limited training	11.9%	Some training	36.3%	Extensive training	16.4%
Training Level	Percentage										
No training	35.4%										
Limited training	11.9%										
Some training	36.3%										
Extensive training	16.4%										
Informal training (e.g., workshops etc.) (n = 442), missing (n = 9) A total of 56.1% (n = 248) of participants indicated that they had participated in some informal training, while 21.7% (n = 96) of participants had received extensive training in the recommendation of AT informally.	<table border="1"> <thead> <tr> <th>Training Level</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>No training</td> <td>6.3%</td> </tr> <tr> <td>Limited training</td> <td>15.8%</td> </tr> <tr> <td>Some training</td> <td>56.1%</td> </tr> <tr> <td>Extensive training</td> <td>21.7%</td> </tr> </tbody> </table> Informal training	Training Level	Percentage	No training	6.3%	Limited training	15.8%	Some training	56.1%	Extensive training	21.7%
Training Level	Percentage										
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Limited training	15.8%										
Some training	56.1%										
Extensive training	21.7%										
Training by use of self-study (e.g., reading web pages etc.) (n = 448), missing (n = 3) A total of 54.5% (n = 244) of participants indicated that they had done some training in the recommendation of AT by means of self-study, with 28.1% (n = 126) having done extensive self-study. Total of 15.6% (n = 70) had done limited self-study in this area.	<table border="1"> <thead> <tr> <th>Training Level</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>No training</td> <td>1.8%</td> </tr> <tr> <td>Limited training</td> <td>15.6%</td> </tr> <tr> <td>Some training</td> <td>54.5%</td> </tr> <tr> <td>Extensive training</td> <td>28.1%</td> </tr> </tbody> </table> Self study	Training Level	Percentage	No training	1.8%	Limited training	15.6%	Some training	54.5%	Extensive training	28.1%
Training Level	Percentage										
No training	1.8%										
Limited training	15.6%										
Some training	54.5%										
Extensive training	28.1%										

Description	Results
Had a mentor (<i>N</i> = 451) More than half of participants (<i>n</i> = 244) indicated that they had a mentor, with 45.9% (<i>n</i> = 207) indicating that they did not have a mentor.	 ■ Utilises mentor ■ No mentor utilised
Acts as a mentor (<i>N</i> = 451) A total of 38.6% (<i>n</i> = 174) of participants indicated that they mentored others, while 61.4% (<i>n</i> = 277) were not involved in mentoring others.	 ■ Acts as mentor to others ■ Not mentor to others
Location of assessments (<i>N</i> = 451) A total of 40.8% (<i>n</i> = 184) of participants conducted assessments in the therapy department of a hospital, with 35.7% (<i>n</i> = 161) conducting assessments in private therapy rooms. In total, 28.5% (<i>n</i> = 129) conducted assessments within a child's classroom.	 Percentage Location of assessment

Description	Results																												
Presence of team work (<i>N</i> = 451) Over three quarters of the participants (<i>n</i> = 344) indicated that they worked in a team when recommending AT to young children. A total of 23.7% (<i>n</i> = 107) of participants did not work in a team when recommending AT.	 A 3D pie chart illustrating the distribution of team work presence. The chart is divided into two segments: a large blue segment representing 'Works in a team' at 76.3%, and a smaller red segment representing 'No team work' at 23.7%. A legend to the right of the chart identifies the colors: blue for 'Works in a team' and red for 'No team work'. <table border="1"> <thead> <tr> <th>Category</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Works in a team</td> <td>76.3%</td> </tr> <tr> <td>No team work</td> <td>23.7%</td> </tr> </tbody> </table>	Category	Percentage	Works in a team	76.3%	No team work	23.7%																						
Category	Percentage																												
Works in a team	76.3%																												
No team work	23.7%																												
Team members (<i>n</i> = 344) Participants that worked in a team were asked to indicate which team members were included in the team. Occupational therapists (<i>n</i> = 294) and family/caregivers (<i>n</i> = 272) were most frequently included.	 A bar chart showing the percentage of various team members included by participants. The y-axis represents the percentage from 0% to 100%. The x-axis lists the team members. The bars are blue. The percentages are: Audiologists (20.6%), Occupational therapists (85.5%), Physiotherapists (62.8%), Speech language therapists (60.8%), Teachers/educators (56.4%), Nurses (8.7%), Paraprofessionals (4.7%), Social workers (11.6%), Medical doctors/specialists (29.4%), Family/caregivers of the child (79.1%), Orthotist/Prosthetist (4.4%), Psychologist/Educational psychologist (4.4%), and Team members: Other (2.9%). <table border="1"> <thead> <tr> <th>Team members</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Audiologists</td> <td>20.6%</td> </tr> <tr> <td>Occupational therapists</td> <td>85.5%</td> </tr> <tr> <td>Physiotherapists</td> <td>62.8%</td> </tr> <tr> <td>Speech language therapists</td> <td>60.8%</td> </tr> <tr> <td>Teachers/educators</td> <td>56.4%</td> </tr> <tr> <td>Nurses</td> <td>8.7%</td> </tr> <tr> <td>Paraprofessionals</td> <td>4.7%</td> </tr> <tr> <td>Social workers</td> <td>11.6%</td> </tr> <tr> <td>Medical doctors/specialists</td> <td>29.4%</td> </tr> <tr> <td>Family/caregivers of the child</td> <td>79.1%</td> </tr> <tr> <td>Orthotist/Prosthetist</td> <td>4.4%</td> </tr> <tr> <td>Psychologist/Educational psychologist</td> <td>4.4%</td> </tr> <tr> <td>Team members: Other</td> <td>2.9%</td> </tr> </tbody> </table>	Team members	Percentage	Audiologists	20.6%	Occupational therapists	85.5%	Physiotherapists	62.8%	Speech language therapists	60.8%	Teachers/educators	56.4%	Nurses	8.7%	Paraprofessionals	4.7%	Social workers	11.6%	Medical doctors/specialists	29.4%	Family/caregivers of the child	79.1%	Orthotist/Prosthetist	4.4%	Psychologist/Educational psychologist	4.4%	Team members: Other	2.9%
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Description	Results										
Involvement of team in AT decision-making (n = 344) A total of 49.4% (n = 170) of participants who do assessments within teams indicated that team members had some involvement in AT decision-making. A total of 30.2% (n = 104) of participants had extensive involvement from the team, with 19.5% (n = 67) having limited involvement from the team in AT decision-making.	<table><thead><tr><th>Involvement of team in AT decision-making</th><th>Percentage</th></tr></thead><tbody><tr><td>No involvement</td><td>0.9%</td></tr><tr><td>Limited involvement</td><td>19.5%</td></tr><tr><td>Some involvement</td><td>49.4%</td></tr><tr><td>Extensive involvement</td><td>30.2%</td></tr></tbody></table>	Involvement of team in AT decision-making	Percentage	No involvement	0.9%	Limited involvement	19.5%	Some involvement	49.4%	Extensive involvement	30.2%
Involvement of team in AT decision-making	Percentage										
No involvement	0.9%										
Limited involvement	19.5%										
Some involvement	49.4%										
Extensive involvement	30.2%										
Involvement of family/caregivers in AT decision-making (N = 451) A total of 47.5% (n = 214) of participants indicated that parents/caregivers had some involvement in AT decision-making, while 19.1% (n = 86) indicated that they were extensively involved. A total of 31.3% (n = 141) of participants indicated that there was limited involvement from family/caregivers in AT decision-making.	<table><thead><tr><th>Involvement of parents/caregivers in AT decision-making</th><th>Percentage</th></tr></thead><tbody><tr><td>No involvement</td><td>2.2%</td></tr><tr><td>Limited involvement</td><td>31.3%</td></tr><tr><td>Some involvement</td><td>47.5%</td></tr><tr><td>Extensive involvement</td><td>19.1%</td></tr></tbody></table>	Involvement of parents/caregivers in AT decision-making	Percentage	No involvement	2.2%	Limited involvement	31.3%	Some involvement	47.5%	Extensive involvement	19.1%
Involvement of parents/caregivers in AT decision-making	Percentage										
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5.4.2. Materials and equipment for Phase 3

5.4.2.1. Recruitment letter with survey link

All prospective participants were sent an initial recruitment letter via email that aimed to capture their attention and explain the selection criteria for participation in the study. In the same email, they were provided with the survey link that directed them to the online information letter and consent form. An adapted version of this letter was sent out via email to invite participants for a second time. Please see Appendix M for the first recruitment letter and Appendix N for the second letter.

5.4.2.2. Information letter and consent form

Once the participants clicked on the link, they were directed to an online information letter in Qualtrics (an electronic survey tool) through which they were informed of all aspects of the study. The consent form was also presented to the participants electronically. Participants

were informed about their rights regarding participation/non-participation. Participants were required to provide their consent before they could complete the survey. Please see Appendix O for the information letter and consent form as it appeared on Qualtrics.

5.4.2.3. Online survey

The questionnaire developed as described in Phase 2 of the methodology was entered into Qualtrics. Each participant answered the questionnaire on their own computer, tablet or mobile device.

Please see Table 4.12 for the final questions included in Section 1 and Table 4.13 for items included in Section 2, as well as Table 4.4 for the combinations of items included in each question. A screenshot of the first of the questions from Section 2 (best-worst questions) as they appeared in the survey can be seen in Appendix P.

5.4.2.4. Qualtrics software

Qualtrics is an online survey tool that enabled the researcher to build and distribute the online survey. It also collated the data from completed surveys. The University of Pretoria subscribes to this service.

5.4.3. Data collection procedures

5.4.3.1. Data collection

As an individualised link to the survey was distributed to potential participants via email lists, the participants were able to complete the survey at a time and location convenient for them. Participants could complete the survey on their personal computers, tablets or mobile

devices and on any computer operating system (i.e. Windows, Android and iOS). Participants could start the survey and return to it later, as Qualtrics would save their progress.

A follow-up invitation email with an individualised survey link was sent one week after the initial recruitment letter to provide participants with a reminder and additional opportunity to complete the survey. This email was only sent to participants who had not responded.

Participants who made contact with the researcher to state that they did not qualify to participate in the survey were removed from the distribution list.

5.4.3.2. *Ethical considerations*

Updated ethics permission for this study was applied for due to changes occurring since the original approval was granted. The updated approval was again granted by the Ethics Committee of the Faculty of Humanities at the University of Pretoria. This can be viewed in Appendix Q.

This study was guided by the ethical principles that govern research involving human participants (Babbie, 2014). These are discussed in the section following.

5.4.3.2.1. *Voluntary participation*

This study did not in any way force participation from any participant. Participants were informed that they had the right to leave/terminate their participation at any time.

5.4.3.2.2. *No harm to the participants*

This study entailed no risk or harm to any of the participants. It was governed by the principle of respect for persons, whereby participation was voluntary and with informed consent. The principle of beneficence was also adhered to, intending not to harm participants but ideally

bring benefit to them and their clients through increased understanding of the topic (Babbie, 2014).

5.4.3.2.3. *Informed consent*

The researcher provided all potential participants with an information letter and consent form. In this letter, the purpose of the study was explained, as was the duration and nature of the respondent's participation. A short description of the research procedures was provided. The researcher was not aware of any risks involved with participation in this study and therefore none were disclosed.

5.4.3.2.4. *Anonymity and confidentiality*

The participants were not required to enter their names into the survey. However, their responses were recorded together with their email addresses by Qualtrics on a secure server to keep record of which participants had responded or not (for purposes of sending out reminders). Therefore, participation was not completely anonymous.

The data will be kept confidentially. No identifying information will be made public in any publication, including scientific journal publications or conference presentations. Email addresses obtained from the HPCSA will be kept confidential and will not be used for any other purpose than distribution of this survey, as per agreement with the HPCSA.

All data will be kept securely for 15 years after collection at the Centre for AAC at the University of Pretoria.

5.4.4. *Data processing and analysis*

All the data obtained through the completion of the questionnaires was captured through Qualtrics, the electronic survey tool that was also used to create the survey. The data was exported from Qualtrics into an Excel spreadsheet. The data was cleaned in Excel by the researcher and imported into SPSS (a statistical analysis software programme). The researcher consulted with a statistician as well as her supervisors regarding the analysis of the data. Data analysis was completed in Excel and SPSS.

5.4.5. *Reliability and validity*

As threats to the reliability and validity of the data collection procedure were identified, several measures were taken to enhance the reliability and validity of the study.

5.4.5.1. *Coverage*

Although lack of access to the internet is a barrier to participation in an online survey, it was felt that the population targeted in this study would most likely have internet access. Furthermore, the benefit obtained from reaching additional participants throughout South Africa (that would not be reached by face-to-face surveys) was perceived to outweigh the threat posed by limited coverage due to lack of internet access. The possibility exists that the sample would be biased towards a population that is more experienced in the online medium.

5.4.5.2. *Sampling frame*

To ensure that all possible participants that could qualify to participate in the study were reached, the survey was distributed to all registered RPs from the applicable professional groups in South Africa. Many of these RPs would not meet the inclusion criteria to participate in the

study. Unfortunately, employment information of the registered RPs was not available to the researcher, implying that the sample could not be refined to include only those RPs that would qualify to participate.

5.4.5.3. *Response rates*

Online surveys typically have very low response rates (Evans & Mathur, 2005; McPeake, Bateson, & O'Neill, 2014). This may be due to various reasons, including that professionals may perceive the invitation email as junk mail, or that they may be saturated in completing surveys (Evans & Mathur, 2005). The researcher attempted to encourage participation in the online survey by offering participants entry into a lucky draw. Twenty-five participants each received a R200 gift voucher from Takealot (a South African online retailer). Participants could enter this draw by consenting to enter their email address in a space provided in the survey. Entries into the draw were randomly picked from all entries and vouchers were distributed to these email addresses after the survey was closed.

Additionally, not all the email addresses on the lists were necessarily the current address of the professionals targeted for the study, and the possibility exists that SPAM filters could block the emails from reaching the inboxes of RPs targeted by the recruitment letters (Wiersma, 2013). However, as the HPCSA is the official body responsible for the registration of healthcare professionals in South Africa, it is believed that they would have the most updated list available.

Furthermore, the survey was designed to be assessable for a person opening it on any device. As people are unlikely to re-open an opened email later on a laptop or computer, it was designed to be compatible with the device of choice. Also, people are more likely to complete a survey if it is portable (such as on a mobile device) (Evans & Mathur, 2005).

The time required to complete the survey was included in the information letter, ensuring that participants were aware of what would be expected once they opened the survey. This has been suggested as strategy by Evans and Mathur (2005) to address the non-completion of online surveys.

It has also been suggested that a link to the survey should be embedded in the invitation letter to the survey, as was done in this study. According the Evans and Mathur (2005), this contributes to ease of completion and may increase the response rates to online surveys.

To encourage participants that were completing the survey to complete all items, the survey was set up to cue participants when they had omitted an answer to a question. This could increase the comprehensive completion of the survey. Also, a progress bar was displayed at the top of each page indicating how far along in the survey the participant was.

5.4.5.4. Controlling access to the survey

As it could potentially be quite difficult to control access to the survey, the survey was set up so that each participant who received it could only complete it once. A unique link was sent to each participant, implying that they could not distribute it to several people to complete.

5.5. Conclusion

This chapter discussed and justified the methodology used to investigate the aims set out for Phase 3 of this study. The chapter discussed the selection of the online survey method, as well as the participants that completed the survey, materials and equipment, data collection procedures and data processing and analysis. Ethical issues as well as issues related to reliability and validity of the results were also considered. In the next chapter, the results of the survey will be discussed.

CHAPTER 6

RESULTS

6.1. Introduction

This chapter presents the results of Phase 3 of this study. The study was aimed at describing the perceptions of RPs (occupational therapists, physiotherapists and speech language therapists) on the factors influencing the recommendation and provision of assistive technology to young children (birth to 6 years of age) within the South African context. Phase 3 was specifically aimed at conducting a survey with RPs.

The results of the survey were analysed in two different but complementary ways. Firstly, the results for the entire sample were analysed to determine the order of items that represent factors that influence the recommendation and provision of AT. The order of items indicated to be both the most influential as well as the least influential were calculated.

Hereafter, individual participant scores were calculated for all of the items that were selected as most influential. The differences between different subgroups of the sample were determined to enable a more in-depth understanding of certain aspects that were hypothesised to influence a professional's reasoning regarding what influences AT recommendation and provision.

As it has been established that experience influences professional reasoning (Boyt Schell, 2009; Unsworth, 2001) as well as AT selection (e.g., Thistle & Wilkinson, 2015; Griffiths & Price, 2011) the groups were divided according to aspects pertaining to the experience of the participants in recommending and providing AT to young children. The differences between groups of participants that had less than 3 years of experience were compared to those with 3 or more years of experience. The subgroup with less than 3 years of experience would likely

comprise novice and beginner professionals (Boyt Schell, 2009), with the subgroup with 3 or more years of experience being competent, proficient and expert RPs. Furthermore, the sample was divided into subgroups that would enable an exploration of differences between professionals with less than 10 years of experience and those with 10 or more years of experience. Professionals with more than 10 years of experience have been described as experts (Boyt Schell, 2009).

6.2. Results of the best-worst questions (Section 2 of the survey)

The results were obtained by adding the number of times each item was selected as most influential or as least influential, as well as calculating how many times an item was not selected at all, by all participants across the entire sample. Only participants who answered all of the best-worst questions were included in the sample ($N = 451$).

As each item occurred in the best-worst questions of the survey a total of three times, each participant could select it a maximum of three times as either most or least influential, or not select it at all. Appendix R indicates the frequency counts obtained per item for selections as most influential and least influential, as well as a count of how many times each item was not selected as either most or least influential, across all participants.

6.2.1. Results ranked according to items selected as most influential

Figure 6.1 illustrates the results in terms of percentages (where 100% represents all possible selections across participants) that each item was selected as most influential, least influential and not selected at all. The results are ordered according to those selected as most influential by the entire sample. The results show that all items were selected as most influential (albeit only a limited percentage of times).

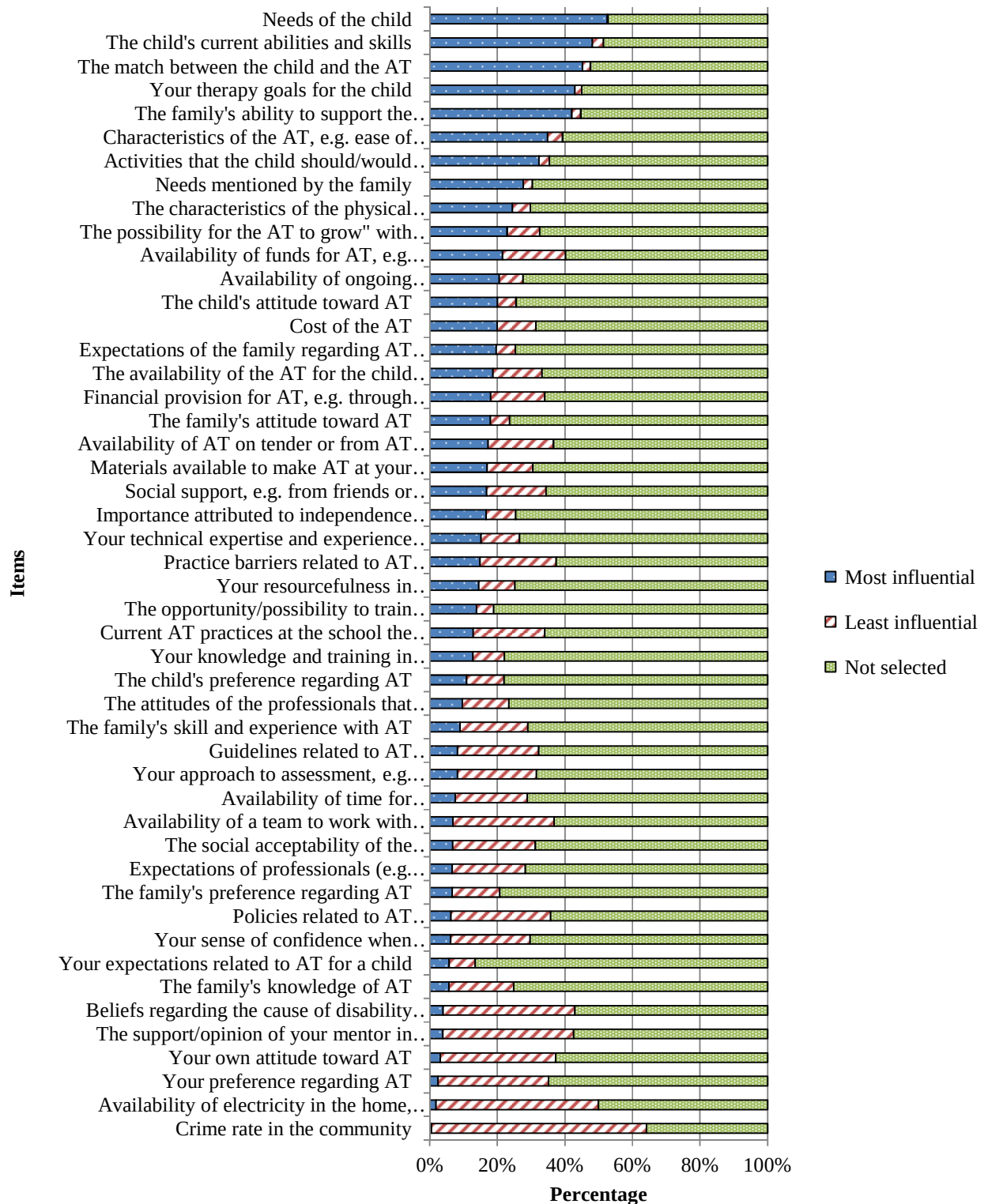


Figure 6.1. Ranking of items according to those selected as most influential (N = 451).

In Table 6.1, the results are again ordered according to those items selected as most influential on the recommendation and provision of AT. In this table, the component and factor of the theoretical framework where each item originated from is also indicated. Results will be reported on according to the components of the framework.

Table 6.1

Items Ranked According to those Selected as Most Influential with Corresponding Component and Factor from Adapted ATD Selection Framework

Rank	Item	Item number	Component of theoretical framework	Factors of the theoretical framework
1	Needs of the child	39	Assessment	Assessment of needs: perceived needs of child
2	The child's current abilities and skills	37	Assessment	Child characteristics
3	The match between the child and the AT	41	Assessment	Goodness of fit
4	Your therapy goals for the child	40	Assessment	Therapy goals
5	The family's ability to support the implementation of the AT	29	Resources	Families
6	Characteristics of the AT, e.g. ease of maintenance, portability	46	AT	Device characteristics: ease of maintenance, portability
7	Activities that the child should/would like to participate in	36	Assessment	Activity and participation
8	Needs mentioned by the family	38	Assessment	Assessment of needs: family needs
9	The characteristics of the physical environment where the child will use the AT, e.g. home, school, community	13	Physical context	Home/school/hospital/community
10	The possibility for the AT to "grow with the child"	44	AT	Device characteristics: flexibility
11	Availability of funds for AT, e.g. through fundraising or family funds	23	Resources	Financial
12	Availability of ongoing professional/paraprofessional support for child after AT has been acquired/provided	24	Resources	Professional/paraprofessional support
13	The child's attitude toward AT	5	Social context	Attitudes of the child
14	Cost of the AT	43	AT	Device characteristics: cost
15	Expectations of the family regarding AT for a child	30	Expectations	Expectations of parents/family/caregivers
16	The availability of the AT for the child to try out	45	AT	Availability for trial
17	Financial provision for AT, e.g. through tender policy, medical aid	12	Institutional context	Financial provision

Rank	Item	Item number	Component of theoretical framework	Factors of the theoretical framework
18	The family's attitude toward AT	3	Social context	Attitudes of parent/family/caregivers
19	Availability of AT on tender or from AT suppliers	48	AT	Availability
20	Materials available to make AT at your practice/department	47	AT	Availability
21	Social support, e.g. from friends or relatives available to families and children using AT	25	Resources	Social support
22	Importance attributed to independence within the child's culture	2	Cultural context	Cultural context (general)
23	Your technical expertise and experience in recommending/providing AT	18	Knowledge and Information	Skill and experience of professionals
24	Practice barriers related to AT recommendation, e.g. long waiting lists, excessive red tape, the fragmented nature of services	11	Institutional context	Practices and practice barriers
25	Your resourcefulness in recommending/providing AT solutions	19	Knowledge and Information	Resourcefulness of professionals
26	The opportunity/possibility to train families on AT	22	Knowledge and Information	Training of parents/family/caregivers
27	Current AT practices at the school the child attends/would like to attend	8	Institutional context	Practices and practice barriers
28	Your knowledge and training in recommending/providing AT	16	Knowledge and Information	Knowledge and training of professionals
29	The child's preference regarding AT	33	Preference	Preference of the child
30	The attitudes of the professionals that will assist in the implementation of the AT	4	Social context	Attitudes of (other) professionals
31	The family's skill and experience with AT	21	Knowledge and Information	Skills and experience of parents/family/caregivers
32	Guidelines related to AT recommendation/provision implemented at your place of work	10	Institutional context	Guidelines
33	Your approach to assessment, e.g. whether you do assessments at the child's home or at your place of work	42	Assessment	Assessment approach of provider
34	Availability of time for recommending/providing AT, including e.g. time for assessment or discussions with family	28	Resources	Time
35	Availability of a team to work with during the recommendation/provision of AT	26	Resources	Teamwork between professional and family
36	The social acceptability of the recommended AT	7	Social context	Social acceptability
37	Expectations of professionals (e.g. teachers) of AT for a child	32	Expectations	Expectations of (other) professionals
38	The family's preference regarding AT	34	Preference	Preference of the parents/family/caregivers

Rank	Item	Item number	Component of theoretical framework	Factors of the theoretical framework
39	Policies related to AT recommendation/provision applicable to your place of work	9	Institutional context	Policy
40	Your sense of confidence when recommending/providing AT	17	Knowledge and Information	Self efficacy of professionals
41	Your expectations related to AT for a child	31	Expectations	Expectations of the professional (themselves)
42	The family's knowledge of AT	20	Knowledge and Information	Knowledge of parents/family/caregivers
43	Beliefs regarding the cause of disability held by e.g. yourself or the family	1	Cultural context	Cultural context (general)
44	The support/opinion of your mentor in recommending/providing AT	27	Resources	Expert/ mentor
45	Your own attitude toward AT	6	Social context	Attitudes of the professional (themselves)
46	Your preference regarding AT	35	Preference	Preference of the professional
47	Availability of electricity in the home, school and community	14	Physical context	Home/school/hospital/community
48	Crime rate in the community	15	Physical context	Home/school/hospital/community

 Environmental factors
  Personal factors
  Assistive technology factors
  Assessment

6.2.1.1. Items related to the environment

Overall, items related to the environment were not ranked very highly, with only one of the 15 items related to the environment ranked as one of the top 10 most influential, with an additional three environmental items in the top 20 of the ranked items.

Relating to the cultural context, the *importance attributed to independence within the child's culture* was ranked as 22nd most influential, with *beliefs regarding the cause of disability held, for example, by the RP or the family*, ranked in position 43.

Items related to the social context included *the child's attitude toward AT* in the highest position (13th), with *the family's attitude toward AT* ranked in 18th position overall. *The attitudes of the professionals that will assist in the implementation of the AT* was ranked to be the 30th most influential overall, with *the social acceptability of the recommended AT* ranked to be in 36th position. The RP's *own attitude toward AT* was ranked 45th overall.

Regarding the institutional context, *financial provision for AT, e.g. through tender policy, medical aid* was ranked to be the 17th most influential, with *practice barriers related to AT recommendation* in position 24. The *current AT practices at the school the child attends/would like to attend* (27th position) was followed by *guidelines related to AT recommendation/provision implemented at your place of work* in the 32nd position and *policies related to AT recommendation/provision applicable to your place of work* in the 39th position.

One item pertaining to the physical environment was ranked in the top 10 most influential items, with *the characteristics of the physical environment where the child will use the AT* ranked as 9th most influential overall. The other items related to the physical environment were ranked in the last two positions, with *availability of electricity in the home, school and community* ranked 47th and *crime rate in the community* ranked in 48th position overall.

6.2.1.2. Items related to personal factors of the child, family and the professional

Regarding the ranking of items pertaining to resources, the most influential resource was *the family's ability to support the implementation of the AT* (ranked in position 5).

This was followed by the *availability of funds for AT, e.g. through fundraising or family funds* (11th position) and *the availability of ongoing professional/paraprofessional support for the child after AT has been acquired/provided* (12th position). *Social support, e.g., from friends or relatives available to families and children using AT*, was ranked in 21st position.

Professionals ranked the *availability of time for recommending/providing AT, including e.g. time for assessment or discussions with family* in 34th position, while *the availability of a team to work with during the recommendation/provision of AT* was ranked in 35th position. *The support/opinion of your mentor in recommending/providing AT* was thought to be the item

related to the resource component that was least influential on the recommendation/provision of AT (44th position).

Regarding the knowledge and information items, RPs ranked their *technical expertise and experience in recommending/providing AT* (23th position) as more influential on their recommendations and provision of AT than *their resourcefulness in recommending/providing AT solutions* (25th position). This was followed by *the opportunity/possibility to train families on AT* (26th position), as well as their own *knowledge and training in recommending/providing AT* (28th position). *The family's skill and experience with AT* was ranked in position 31, with RP's own sense of *confidence when recommending/providing AT* ranked in 40th position. *The family's knowledge of AT* was ranked in the lowest position pertaining to the knowledge and information component (42nd position).

Regarding the items related to preferences, the RPs ranked *the child's preference regarding AT* as the most influential preference (29th position), with the family's preference regarding AT ranked in 38th position. The *preference of the professional regarding AT* was ranked in 46th position.

Items related to expectations were ranked with *expectations of the family regarding AT for a child* ranked as most influential expectation (15th position overall). The *expectations of professionals (e.g., teachers) of AT for a child* was ranked in the 37th position, while the *professional's own expectations related to AT for a child* was ranked in the 41st position.

6.2.1.3. Items related to assistive technology

Two items pertaining to the assistive technology were included in the top 10 items, namely *characteristics of the AT, e.g. ease of maintenance, portability* (6th position) and *the possibility for the AT to “grow with the child”* (ranked in 10th position). All the other items

related to AT were ranked within the top 20 positions. The *cost of the AT* (14th position), was followed by *the availability of the AT for the child to try out*, which was ranked in 16th position. The *availability of AT on tender or from AT suppliers* was ranked in 19th position and *materials available to make AT at your practice/department* in 20th position in terms of their influence on the recommendation/provision of AT to young children in the South African context.

6.2.1.4. Items related to assessment

Aspects pertaining to assessment generally appear to be ranked relatively highly, with six of the top 10 ranked items belonging to that component. Those include *the needs of the child* (as perceived by the participant) (ranked in 1st position); *the child's current abilities and skills* (2nd position); *the match between the child and the AT* (3rd position); the participant's *therapy goals for the child* (4th position); *activities that the child should/would like to participate in* (ranked as 7th), and *needs mentioned by the family* (8th position).

The only item related to assessment that was not ranked within the top 10 in the ranking order was the RP's own *approach to assessment, e.g. whether they do assessments at the child's home or at their place of work*, which was ranked in 33rd position.

6.2.2. Results ranked according to items selected as least influential

Figure 6.2 illustrates the results in terms of percentages that each item was selected as most influential, least influential and not selected at all. The results are ranked according to those selected as least influential by the entire group. Contrary to what may be expected, the items selected as least influential are not the complete inverse of those selected as the most influential, although clear similarities can be observed.

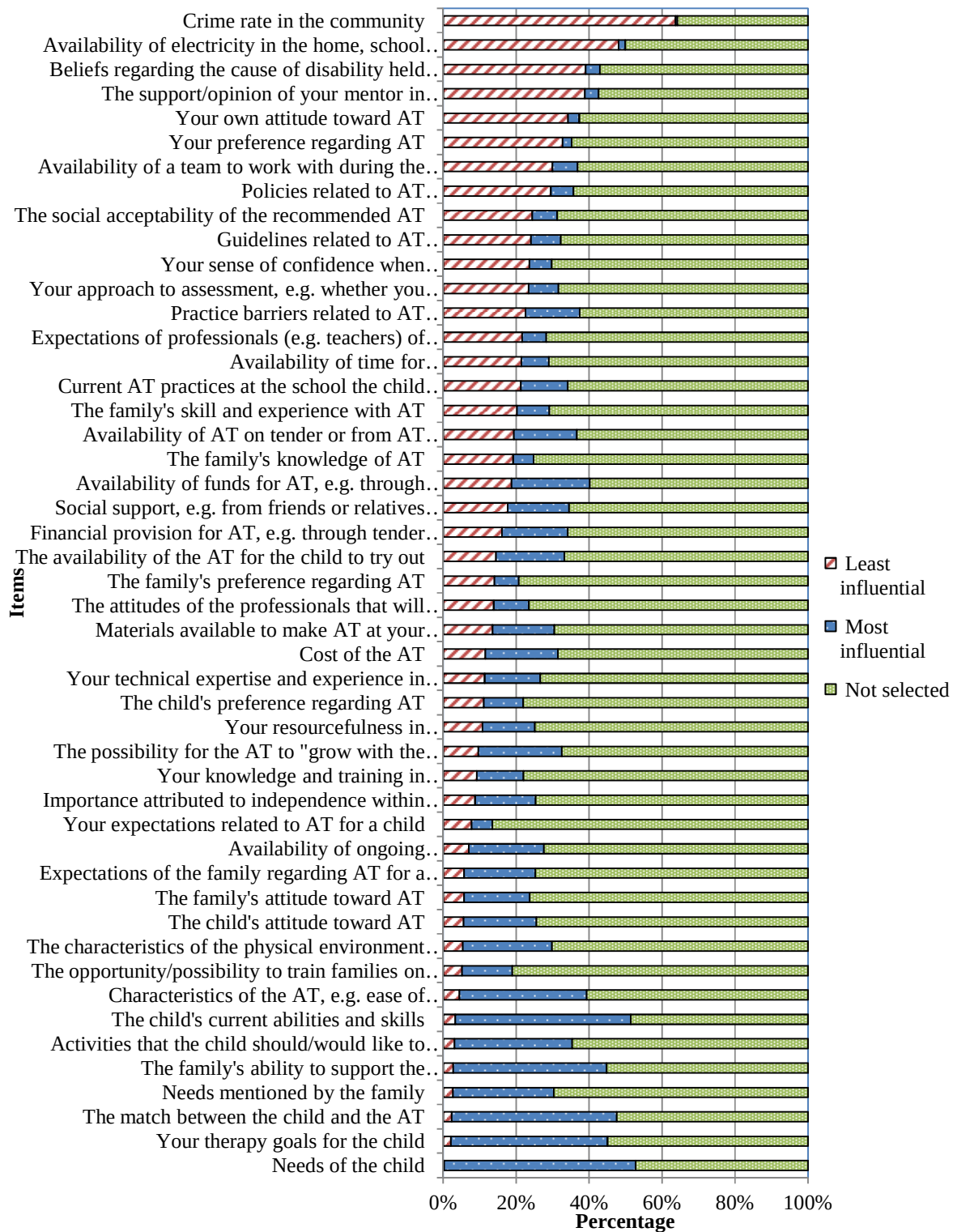


Figure 6.2. Ranking of items according to those selected at least influential (N = 451).

In Table 6.2 the results are ranked according to those items selected as least influential on the recommendation and provision of AT. In this table, the component and factor of the theoretical framework where each item was organised is also indicated. In the interest of space, as well as the fact that subsequent analyses will focus only on the responses of participants pertaining to the most influential aspect of the best-worst survey, only the top 10 items that were selected as least important will be reported on.

Table 6.2

Items Ranked According to those Selected as Least Influential with Corresponding Component and Factor from Adapted ATD Selection Framework

Rank	Item	Item number	Component of theoretical framework	Factor of theoretical framework
1	Crime rate in the community	15	Physical context	Home/school/hospital/community
2	Availability of electricity in the home, school and community	14	Physical context	Home/school/hospital/community
3	Beliefs regarding the cause of disability held by e.g. yourself or the family	1	Cultural context	Cultural context (general)
4	The support/opinion of your mentor in recommending/providing AT	27	Resources	Expert/ mentor
5	Your own attitude toward AT	6	Social context	Attitudes of the professional (themselves)
6	Your preference regarding AT	35	Preference	Preference of the professional
7	Availability of a team to work with during the recommendation/provision of AT	26	Resources	Teamwork between professional and family
8	Policies related to AT recommendation/provision applicable to your place of work	9	Institutional context	Policy
9	The social acceptability of the recommended AT	7	Social context	Social acceptability
10	Guidelines related to AT recommendation/provision implemented at your place of work	10	Institutional context	Guidelines
11	Your sense of confidence when recommending/providing AT	17	Knowledge and Information	Self efficacy of professionals
12	Your approach to assessment, e.g. whether you do assessments at the child's home or at your place of work	42	Assessment	Assessment approach of provider

Rank	Item	Item number	Component of theoretical framework	Factor of theoretical framework
13	Practice barriers related to AT recommendation, e.g. long waiting lists, excessive red tape, the fragmented nature of services	11	Institutional context	Practices and practice barriers
14	Expectations of professionals (e.g. teachers) of AT for a child	32	Expectations	Expectations of (other) professionals
15	Availability of time for recommending/providing AT, including e.g. time for assessment or discussions with family	28	Resources	Time
16	Current AT practices at the school the child attends/ would like to attend	8	Institutional context	Practices and practice barriers
17	The family's skill and experience with AT	21	Knowledge and Information	Skills and experience of parents/family/caregivers
18	Availability of AT on tender or from AT suppliers	48	AT	Availability
19	The family's knowledge of AT	20	Knowledge and Information	Knowledge of parents/family/caregivers
20	Availability of funds for AT, e.g. through fundraising or family funds	23	Resources	Financial
21	Social support, e.g. from friends or relatives available to families and children using AT	25	Resources	Social support
22	Financial provision for AT, e.g. through tender policy, medical aid	12	Institutional context	Financial provision
23	The availability of the AT for the child to try out	45	AT	Availability for trial
24	The family's preference regarding AT	34	Preference	Preference of the parents/family/caregivers
25	The attitudes of the professionals that will assist in the implementation of the AT	4	Social context	Attitudes of (other) professionals
26	Materials available to make AT at your practice/department	47	AT	Availability
27	Cost of the AT	43	AT	Device characteristics: cost
28	Your technical expertise and experience in recommending/providing AT	18	Knowledge and Information	Skill and experience of professionals
29	The child's preference regarding AT	33	Preference	Preference of the child
30	Your resourcefulness in recommending/providing AT solutions	19	Knowledge and Information	Resourcefulness of professionals
31	The possibility for the AT to "grow with the child"	44	AT	Device characteristics: flexibility
32	Your knowledge and training in recommending/providing AT	16	Knowledge and Information	Knowledge and training of professionals
33	Importance attributed to independence within the child's culture	2	Cultural context	Cultural context (general)

Rank	Item	Item number	Component of theoretical framework	Factor of theoretical framework
34	Your expectations related to AT for a child	31	Expectations	Expectations of the professional (themselves)
35	Availability of ongoing professional/paraprofessional support for child after AT has been acquired/provided	24	Resources	Professional/paraprofessional support
36	The family's attitude toward AT	3	Social context	Attitudes of parent/family/caregivers
37	Expectations of the family regarding AT for a child	30	Expectations	Expectations of parents/family/caregivers
38	The child's attitude toward AT	5	Social context	Attitudes of the child
39	The characteristics of the physical environment where the child will use the AT, e.g. home, school, community	13	Physical context	Home/school/hospital/community
40	The opportunity/possibility to train families on AT	22	Knowledge and Information: AT	Training of parents/family/caregivers
41	Characteristics of the AT, e.g. ease of maintenance, portability	46	AT	Device characteristics: ease of maintenance, portability
42	The child's current abilities and skills	37	Assessment	Child characteristics
43	Activities that the child should/would like to participate in	36	Assessment	Activity and participation
44	The family's ability to support the implementation of the AT	29	Resources	Families
45	Needs mentioned by the family	38	Assessment	Assessment of needs: Family needs
46	The match between the child and the AT	41	Assessment	Goodness of fit
47	Your therapy goals for the child	40	Assessment	Therapy goals
48	Needs of the child	39	Assessment	Assessment of needs: Perceived needs of child

 Environmental factors
  Personal factors
  Assistive technology factors
  Assessment

The discussion of the top 10 items ranked as least influential will be structured according to the components of the theoretical framework to which they are aligned.

Aspects pertaining to the environment generally appear to be thought of as having limited influence, with six of the top 10 ranked items belonging to that component. Pertaining to the physical context, items included in the top 10 include *crime rate in the community* (1st position) and *availability of electricity in the home* (ranked in 2nd position). *Beliefs regarding the cause of*

disability held by the participant or the family (ranked in 3rd position) comes from the cultural context component. Regarding the social context *the participant's own attitude toward AT* (5th position) and *the social acceptability of the recommended AT* (9th position) were included in the top ten. Items pertaining to the institutional context include *policies related to AT recommendation/ provision* (8th position) and *guidelines related to AT recommendation/ provision* (10th position).

Regarding personal factors and specifically resources, *the support/opinion of their mentor in recommending/providing AT* (4th position) and *availability of a team to work with during the recommendation/provision of AT* (7th position) were included in the 10 items ranked as least influential. Regarding preferences, the *participant's preference regarding AT* was ranked as 6th least influential.

There were no items pertaining to the components of assessment or assistive technology in the top 10 least influential items.

6.3. Differences between groups

As the researcher was particularly interested in determining the aspects that were most influential to AT recommendation and provision (in this thesis), it was decided to focus the remaining discussion only on the results from the selections of most influential as obtained in the best-worst survey results. As every item was presented a total of three times across different questions, each item could be selected a maximum of three times and minimum of zero times (as most influential) by each participant. Therefore, the selections per item could be added to determine the total number of selections of each item per participant. As a result, means per item across the entire sample could be calculated. The means were required to determine whether any significant differences per item occurred between different groups of participants.

The completion of the best-worst survey questions required professional reasoning from the participants in this study, as they had to weigh up the influence of different factors on their AT recommendations in order to answer the questions. Several aspects, including experience, have been determined to influence professional reasoning. The effect of these influences on professionals may have important consequences to the recommendation and provision of AT for young children in South Africa.

6.3.1. *Differences between factors according to professional's years of experience*

It has been established in literature that professional reasoning continues to develop as professionals gain more experience (Boyt Schell, 2009; Schell & Cervero, 1993; Unsworth, 2001). Therefore, the participants were divided into groups pertaining to their years of experience, to explore the influence of their years of experience on their perspectives on the factors influencing the recommendation and provision of AT to young children in South Africa.

Firstly, professionals with less than 3 years of experience have been described as novices (0 to < 1 year of experience) and advanced beginners (> 1 year and < 3 years of experience). These professionals are described in the literature to use different professional reasoning skills than professionals with 3 or more years of experience (Boyt Schell, 2009; Schell & Cervero, 1993; Unsworth, 2001).

Therefore, the hypotheses were:

H₀ (Null hypothesis): There would be no significant difference in the perceived influence of the factors influencing AT recommendation and provision between the professionals with less than 3 years of experience and those with 3 or more years of experience.

H_1 (Alternative hypothesis): There would be a significant difference in the perceived influence of the factors influencing AT recommendation and provision between the professionals with less than 3 years of experience and those with 3 or more years of experience.

Furthermore, professionals with 10 or more years of experience have been described as experts in the field. The change towards becoming an expert has been attributed to changes in professional reasoning abilities (Boyt Schell, 2009; Schell & Cervero, 1993; Unsworth, 2001). The researcher was interested to see how this would reflect in the perceived influence of the different factors influencing the recommendation and provision of AT for young children.

Therefore, it was hypothesised that:

H_0 (null hypothesis): There would be no significant difference in the perceived influence of the factors influencing AT recommendation and provision between the professionals with 10 or more years of experience and those with less than 10 years of experience.

H_1 (alternative hypothesis): There would be a significant difference in the perceived influence of the factors influencing AT recommendation and provision between the professionals with 10 or more years of experience and those with less than 10 years of experience.

6.3.1.1. Differences between professionals providing services for 3 or more years to those with less than 3 years of experience

As significant differences in perspectives were found between RPs who have less than 3 years of experience and those with 3 or more years of experience, the alternative hypothesis was accepted. In the interest of space, only the seven items where results between the two groups showed significant differences will be presented and discussed. This will be done according to the components of the adapted theoretical framework. For a view of the results for items where significant differences between the groups were found, please see Table 6.3.

Table 6.3

Independent Samples Test Comparing Professionals Providing Services for 3 or More Years (n = 346) to Those with Less Than 3 Years' Experience (n = 103)

Item number	Item	Theoretical component	Levene's Test for Equality of Variances		t-test for Equality of Means						
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
										Lower	Upper
6	The participant's own attitude toward AT	Social context	19.730	.000*** ^a	-3.100	377.037	.002**	-.081	.026	-.132	-.030
11	Practice barriers related to AT recommendation	Institutional context	4.764	.030* ^a	2.165	157.374	.032*	.190	.088	.017	.364
13	The characteristics of the physical environment where the child will use the AT, e.g. home, school, community	Physical context	.701	.403	2.573	447	.010*	.243	.094	.057	.429
25	Social support, e.g. from friends or relatives available to families and children using AT	Resources	3.153	.076	1.979	447	.048*	.153	.077	.001	.305
35	Participant's preference regarding AT	Preferences	11.825	.001*** ^a	-2.336	344.908	.020*	-.058	.025	-.106	-.009
40	Participant's therapy goals for the child	Assessment	4.149	.042* ^a	-2.487	178.702	.014*	-.293	.118	-.526	-.061
47	Materials available to make AT at your practice/department	AT	34.167	.000*** ^a	3.836	132.807	.000***	.393	.102	.190	.595

Note: ^aWhen the result of Levene's test is significant at $p \leq .05$, the assumption of homogeneity has been violated and therefore equal variances are not assumed. When Levene's test is not significant with $p \geq .05$, the variances are roughly equal. When equal variances are not assumed, analysis takes into account the Satterthwaite (1946) adjustment for the degrees of freedom and the Cochran and Cox (1957) adjustment for the standard error of the estimate.

* $p < .05$. ** $p < .01$. *** $p < .001$.

6.3.1.1.1. *Environmental factors*

On average, participants with less than 3 years of experience perceived *their own attitude toward AT (social context)* as significantly less influential ($M = 0.03$, $SD = 0.169$) compared to how participants with 3 or more years of experience perceived the influence of their attitude ($M = 0.11$, $SD = 0.372$). This difference is significant ($p = .005$).

The two groups differed significantly regarding *practice barriers related to AT recommendation (institutional context)* ($p = .032$). Participants with less than 3 years' experience perceived the influence of practice barriers as more influential ($M = 0.59$, $SD = 0.798$) than did those with 3 or more years of experience ($M = 0.40$, $SD = 0.737$).

On average, participants with less than 3 years' experience, perceived the influence of *the characteristics of the physical environment where the child will use the AT, e.g. home, school, community (physical context)* as more influential ($M = 0.92$, $SD = 0.860$) than did those with 3 or more years of experience ($M = 0.68$, $SD = 0.836$). This difference was significant with $p = .010$.

6.3.1.1.2. *Personal factors*

The two groups differed significantly ($p = .048$) in the perceived influence of *social support, e.g. from friends or relatives available to families and children using AT (resources)*. Participants with less than 3 years of experience experienced this to be more influential to their AT recommendations/provision ($M = 0.62$, $SD = 0.756$) than did those with 3 or more years of experience ($M = 0.47$, $SD = 0.668$).

On average, participants with less than 3 years of experience perceived the influence of *their preference regarding AT (preferences)* as less influential ($M = 0.03$, $SD = 0.169$) on their AT

recommendations and provision than did those RPs with 3 or more years of experience ($M = 0.09$, $SD = 0.338$). This difference is significant ($p = .020$).

6.3.1.1.3. *Assessment factors*

The two groups differed significantly ($p = .014$) in how they perceived the influence of *their therapy goals for the child*. Participants with less than 3 years' experience perceived this to be significantly less influential ($M = 1.07$, $SD = 1.031$) than did those with 3 or more years of experience ($M = 1.36$, $SD = 1.114$).

6.3.1.1.4. *Assistive technology factors*

Participants with less than 3 years' experience perceived the influence of *materials available to make AT at your practice/department* as more influential ($M = 0.81$, $SD = 0.971$) on their AT recommendations/provision than did those with 3 or more years of experience ($M = 0.41$, $SD = 0.677$). The difference between the two groups is significant ($p < .001$).

6.3.1.2. *Differences between professionals providing services for 10 years or longer to those with less than 10 years' experience*

As significant differences in perspectives were found between professionals who have less than 10 years' experience and those with 10 or more years of experience, the alternative hypothesis was accepted. In the interest of space, only those items where results between the two groups have shown significant differences will be discussed. This will be done according to the components of the adapted theoretical framework. For a view of results showing significant differences between different items, please see Table 6.4.

Table 6.4

Independent Samples Test Comparing Professionals Providing Services for Less Than 10 Years (n = 315) to those with 10 Years or Longer of Experience (n = 134)

Item number	Item	Theoretical component	Levene's Test for Equality of Variances		t-test for Equality of Means						
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
										Lower	Upper
2	Importance attributed to independence within the child's culture	Cultural context	12.131	.001* ¹	2.583	302.734	.010*	.187	.072	.044	.329
4	The attitudes of the professionals that will assist in the implementation of AT	Social context	12.719	.000* ¹	-2.528	228.880	.012*	-.162	.064	-.288	-.036
13	The characteristics of the physical environment where the child will use the AT, e.g. home, school, community	Physical context	1.674	.196	2.261	447	.024*	.197	.087	.026	.368
18	Participant's technical expertise and experience in recommending/providing AT	Knowledge & Information: Professionals	14.755	.000* ¹	-2.115	204.216	.036*	-.175	.083	-.337	-.012
24	Availability of ongoing professional/paraprofessional support for child after AT has been acquired/provided	Resources	.072	.788	-2.357	447	.019*	-.202	.086	-.371	-.034
36	Activities that the child should/would like to participate in	Assessment	2.528	.113	-2.022	447	.044*	-.186	.092	-.367	-.005
40	Participant's therapy goals for the child	Assessment	.474	.492	-2.794	447	.005**	-.315	.113	-.536	-.093
47	Materials available to make AT at your practice/department	AT	25.439	.000* ¹	3.880	334.399	.000***	.271	.070	.133	.408
48	Availability of AT on tender or from AT suppliers	AT	17.722	.000* ¹	3.068	319.230	.002**	.233	.076	.084	.383

Note: ¹When the result of Levene's test is significant at $p \leq 0.05$, the assumption of homogeneity has been violated and therefore equal variances are not assumed. When Levene's test is not significant with $p \geq 0.05$, the variances are roughly equal. When equal variances are not assumed, analysis takes into account the Satterthwaite (1946) adjustment for the degrees of freedom and the Cochran and Cox (1957) adjustment for the standard error of the estimate.

* $p < .05$. ** $p < .01$. *** $p < .001$.

6.3.1.2.1. *Environmental factors*

On average, participants with less than 10 years of experience indicated that the *importance attributed to independence within the child's culture (cultural context)* was more influential ($M = 0.55$, $SD = 0.798$) on their AT recommendations/provision than participants with 10 or more years of experience perceived this factor to be ($M = 0.37$, $SD = 0.655$). This difference was significant, with $p = .010$.

The two groups differed significantly ($p = .012$) in how they perceived the influence of *the attitudes of the professionals that will assist in the implementation of the AT (social context)*. Participants with less than 10 years' experience perceived the influence of this factor as less influential ($M = 0.24$, $SD = 0.575$) than did those with 10 or more years of experience ($M = 0.40$, $SD = 0.639$).

On average, participants with less than 10 years of experience indicated that *the characteristics of the physical environment where the child will use the AT, e.g. home, school, community (physical context)* were more influential ($M = 0.74$, $SD = 0.939$) to their AT recommendations/provision than did those with 10 or more years of experience ($M = 0.60$, $SD = 0.777$). This difference is significant ($p = 0.024$).

6.3.1.2.2. *Personal factors*

The two groups differed significantly ($p = 0.036$) in how they perceived the influence of their *technical expertise and experience in recommending/providing AT (knowledge and information: professionals)*. RPs with less than 10 years of experience perceived this as less influential ($M = 0.40$, $SD = 0.662$) on their AT recommendations/provision than did those with 10 or more years of experience ($M = 0.57$, $SD = 0.853$).

On average, participants with less than 10 years of experience indicated that the *availability of ongoing professional/paraprofessional support for a child after AT has been acquired/provided (resources)* was less influential ($M = 0.56$, $SD = 0.829$) on their AT recommendations/provision than did those with 10 or more years of experience ($M = 0.76$; $SD = 0.842$). This difference is significant ($p = .019$).

6.3.1.2.3. Assessment factors

The two groups differed significantly ($p = .044$) on how they perceived the influence of the *activities that the child should/would like to participate in*. Participants with less than 10 years of experience, indicated that activities that the child wanted to participate in were less influential ($M = 0.91$, $SD = 0.866$) than did those with 10 or more years of experience ($M = 1.10$; $SD = 0.949$).

Participants with less than 10 years of experience perceived the influence of their *therapy goals for the child* as less influential ($M = 1.20$; $SD = 1.089$) than did those with 10 or more years of experience ($M = 1.519$; $SD = 1.102$). The difference between the two groups is significant ($p = .005$).

6.3.1.2.4. Assistive technology factors

On average, participants with less than 10 years of experience indicated that the *materials available to make AT at your practice/department* was more influential ($M = 0.58$; $SD = 0.819$) than did those with 10 or more years of experience ($M = 0.31$; $SD = 0.606$). This difference is significant ($p < .001$).

Participants with less than 10 years of experience perceived the influence of the *availability of AT on tender or from AT suppliers* as more influential ($M = 0.58$, $SD = 0.868$) than did those with 10 or more years of experience ($M = 0.35$; $SD = 0.675$). The difference between the two groups is significant ($p = 0.002$).

6.4. Conclusion

This chapter presented the results obtained from the best-worst survey conducted as part of Phase 3 of this study. Every item in the survey represents a factor of the adapted ATD Selection Framework.

The rank order for the items perceived as most influential on AT recommendation and provision to young children in the South African context was presented. Furthermore, the rank order of items perceived to be least influential was presented.

In addition, the differences between groups of professionals that have various years of experience were presented. These results indicate statistical differences in how these groups perceive the influence of different factors on their AT recommendation and provision.

CHAPTER 7

DISCUSSION

7.1. Introduction

This chapter will discuss the results of this study. This mixed-method study was aimed at describing the perspectives of RPs on the factors influencing the provision and recommendation of assistive technology to young children (birth to 6 years of age) within the South African context.

Phase 1 of the study was aimed at the adaptation and expansion of the ATD Selection Framework (Scherer et al., 2007). The results of this phase were presented in Chapter 3, as it was pertinent to the development of the survey instrument (Phase 2), that was described in Chapter 4. The survey that was conducted in Phase 3 of the study (discussed in Chapter 5), utilised the instrument developed in Phase 2. Therefore, the results of Phase 1 (which resulted in the adapted framework) are inherently integrated within the results of the survey (discussed in Chapter 6). This chapter, therefore, aims to discuss the results of Phase 3 of this study. Due to the nature of the study, however, the results of the first phase will be incorporated into this discussion. The results will be discussed in terms of the components of the adapted ATD Selection Framework.

7.2. Theoretical framework

Through the synthesis of the original ATD Selection Framework (Scherer et al., 2007), the systematic review data, and the online focus group data, the researcher was able to adapt and expand the original theoretical framework. This was discussed in Chapter 3. The adapted ATD Selection Framework can be viewed in Figure 7.1.

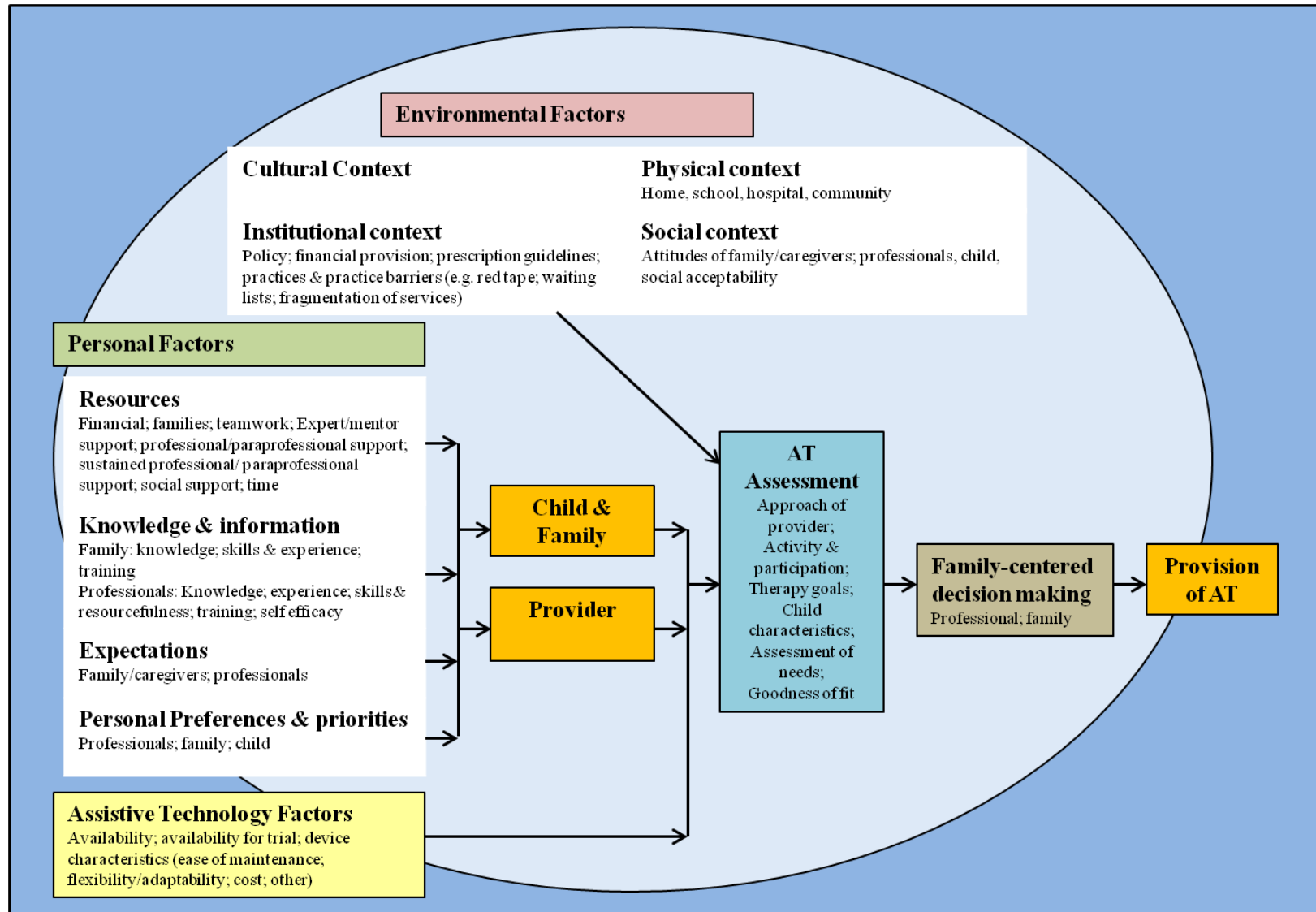


Figure 7.1. Adapted ATD Selection Framework.

The adapted framework was utilised to develop the survey instrument used in Phase 3. The items included in the best-worst scale questions within the survey were all based on factors included in the adapted ATD Selection Framework.

The results obtained from the best-worst questions of the survey speak to the validity of the adapted framework to a certain extent. Across participants, all the items representing the different factors included in the framework were selected as both most influential and least influential at least a few times. Even items perceived as least influential by the majority of participants were selected as most influential by other participants. Also, even items receiving a high percentage of selections as most influential were selected as least influential by other participants.

The fact that the same item could be selected as both most influential and least influential speaks to the complexity of the recommendation and provision of AT. Furthermore, it leads one to explore possible influencing factors that could lead RPs to such different perspectives regarding the recommendation and provision of AT to young children.

The selection of AT, that guides the recommendation and provision of AT, has been described as a complex professional reasoning task. Professional reasoning has been found to be influenced by an RP's experience, as well as the context in which they provide services.

This chapter will explore how RPs perceive the influence of different factors that influence the provision and recommendation of AT to young children in South Africa. The influence of the level of experience of the recommending RP will be incorporated into the discussion. The components of the adapted ATD Selection Framework will be used to provide structure to the discussion.

7.3. Environmental factors influencing the recommendation and selection of AT

Generally, items pertaining to the environment were not ranked as highly influential by RPs. This is interesting particularly within a context with limited resources and a culturally diverse population, where environmental factors are often understood to influence AT provision considerably (e.g., Borg et al., 2009; Eide & Øderud, 2009; Matter et al., 2017).

7.3.1. Physical context

The characteristics of the physical environment where the child will use the AT was ranked as the most influential item related to the physical context and the most influential environmental item overall. Cook and Polgar (2008, p. 40) have stated that the physical context may be the “...easiest of the environmental components to understand”. This may be due to the concrete nature of the physical context, possibly making its influence observable to professionals. Interestingly, other aspects related to the physical context within homes and communities (*the availability of electricity and the crime rate in the community*) were considered least influential of all items. Although these were identified as influential factors by South African RPs in the focus groups, they were not selected as highly influential when compared to other factors.

Participants with less than 3 years’ experience perceived *the characteristics of the physical environment where the child will use the AT* as significantly more influential than their more experienced colleagues. In addition to this, this factor was perceived as significantly more influential to RPs with less than 10 years of experience, than by those who had 10 or more years of experience. The consideration of this environmental factor likely requires high levels of pragmatic reasoning (that involves the ability to negotiate the practice context and the personal context of the intervention) (Boyt Schell, 2009), that may still be developing in less experienced

RPs. The RPs with more experience may find these factors less influential on the recommendation of AT as they are better able to manage their influence than less experienced RPs. Furthermore, more experienced RPs may be better able to solve problems and overcome barriers in the environment (Unsworth, 2001).

7.3.2. *Cultural context*

The importance attributed to *independence within the child's culture* was ranked as more influential than *beliefs regarding the cause of disability* that was perceived as having less influence (ranked in position 43). This is interesting, since different members of the population may not all share similar views on the cause of disability. As beliefs regarding the cause of disability have been shown to influence South African rehabilitation services (Wegner & Rhoda, 2015), the development of increased cultural awareness and competence in RPs may be encouraged (Campinha-Bacote, 2002; Saha, Beach, & Cooper, 2008).

The *importance attributed to independence within the child's culture* was perceived as significantly less influential by RPs with 10 or more years of experience than to those with less experience. Experts are said to approach intervention from a perspective based on cues generated by the client, rather than approaching it from preconceived ideas/plans (Unsworth, 2001). Therefore, it may be possible that highly experienced RPs perceive the influence of the importance (generally) attributed to independence within the child's culture, as less influential, as they focus more on determining what the individual client and family's perceptions are on the topic, rather than being influenced by generalisations.

7.3.3. *Institutional context*

Although financial provision has been described as having a significant impact on the availability of AT in contexts with limited resources (e.g., World Health Organisation & United States Agency for International Development, 2011), the RPs in this study identified several other factors that they considered as being more influential. This may be partially attributed to increased availability of AT within the public health sector through the implementation of the tender (Department of Health, 2015a). Furthermore, this may be reflective of the participants in this study, as 37% of participants in the survey were employed in private practice, where more resources are typically available.

Participants with less than 3 years of experience perceived the *practice barriers related to AT recommendation* as significantly more influential than their more experienced colleagues. Negotiating practice barriers may require high levels of pragmatic reasoning that continues to develop in RPs as they gain more experience. More experienced RPs may find practice barriers less influential on their recommendation of AT as they are able to better manage the influence of different challenges pertaining to the environment than less experienced RPs (Boyt Schell, 2009).

RPs filling community service positions in the year following the completion of their undergraduate studies may find it particularly difficult to cope with the complex task of selecting AT for young children. As they are inexperienced and often placed in rural settings (Ned et al., 2017), they may find it difficult to navigate all the challenges associated with providing health and rehabilitation services in these areas (Samuels et al., 2012; Vergunst et al., 2017). Strategies to support these inexperienced RPs to make good recommendations regarding AT should be explored.

7.3.4. *Social context*

The child's attitude toward AT was ranked the highest of all the items related to the social context, followed by *the family's attitude toward AT*. This acknowledges the important influence of attitudes of both the child and family (Baxter, Enderby, Judge, & Evans, 2012; Copley & Ziviani, 2005; Goldbart & Marshall, 2004; Wilcox et al., 2006) as perceived by the RPs.

The factor of the attitude of the child was not identified in the systematic review aimed at identifying factors influencing AT provision to children (see Figure 3.2). However, it was identified as an influence in the online focus groups by South African RPs (see Figure 3.3). The inclusion of this factor in the adapted framework was confirmed by the survey results.

The attitudes of the professionals that will assist in the implementation of the AT were ranked to be higher than the influence of RP's *own attitude toward AT*. This indicates awareness from professionals that attitudes of those who will assist after the AT has been provided may be an important barrier or facilitator to AT implementation (Copley & Ziviani, 2004; Hutinger, Bell, Daytner, & Johanson, 2006).

Although certain factors related to the environment (factors within the physical, cultural and institutional contexts) were less important to RPs with 10 or more years of experience than to RPs with less experience, the more experienced RPs perceived the influence of the *attitudes of the professionals that will assist in the implementation of the AT* as significantly more influential than those with less than 10 years' experience. This may point to a focus on the long-term implementation of AT recommended by the more experienced RPs.

RPs ranked the influence of their own attitude towards AT as the least influential in this component and very low in the overall ranking. This is interesting as the philosophical beliefs about AT held by RPs have been described as influencing the recommendations made (Lahm & Sizemore, 2002). Furthermore, professionals' beliefs have been described as contributing to the

underutilisation of AT with young children (Sullivan & Lewis, 2000), for example, when professionals believe that prerequisite skills are necessary before a child can benefit from AT (Cress & Marvin, 2003; Ronski & Sevcik, 2005). Furthermore, this may indicate that RPs are typically not fully aware of the impact of their own attitudes on their recommendations. In particular, RPs with less than 3 years of experience indicated that their *own attitude toward AT* (social context), was significantly less influential on the recommendation and provision of AT than those with 3 or more years of experience. This may be explained by considering that RPs' ability to perform pragmatic reasoning, where they incorporate aspects of the practice context as well as their personal context (such as their attitudes) into the process, continues to develop as they become more experienced.

Studies focusing on attitudes towards AT seem to have looked mostly at professionals (e.g., Clarke et al., 2007; Copley & Ziviani, 2004; Huting, Bell, Daytner, & Johanson, 2006; Parette, Quesenberry, & Blum, 2010) or families (e.g., Iacono & Cameron, 2009; Wilcox, Guimond, et al., 2006) involved in this process. Although the child's attitude towards AT was ranked as more influential than that of the family or professionals involved, their influence may need to be better understood by future research.

7.4. Personal factors influencing the recommendation and selection of AT

The results pertaining to the perceived influence of the personal factors of the RP, support the rationale to include the personal factors of the professional providing services into an AT selection framework, as done in the ATD Selection Framework (Scherer et al., 2007) and adapted ATD Selection Framework.

7.4.1. Resources

Regarding the ranking of factors pertaining to resources, RPs ranked the influence of *the family's ability to support the implementation of the AT* as higher than any other resource, including financial resources. Although somewhat unexpected given the resource-limited nature of the environment where AT services are provided, this speaks to the perceived importance of family support. The important role of the family was also identified as a recurring theme in the focus groups with South African RPs, with participants indicating that they utilised the family as a resource. Although access to financial resources is clearly required to ensure access to AT, it appears as though a family-centred approach (Judge & Parette, 1998; Parette & Brotherson, 2004; Parette et al., 2000) is followed where family involvement is strongly encouraged and family strengths may be utilised as resources, as suggested by Rapport, McWilliam and Smith (2004). Interestingly, participants with less than 3 years of experience indicated that *social support, for example, from friends or relatives available to families and children using AT (resources)*, was more influential than those with 3 or more years of experience. This may be attributed to the increased focus in recent years on the systemic nature of development (Samuels et al., 2012) and the application of a family-centred and strengths-based approach.

RPs with 10 or more years of experience perceived the influence of the *availability of ongoing professional/ paraprofessional support for child after AT has been acquired/provided* as significantly more influential than those with less than 10 years' experience. As noted when discussing the experts' perspectives on the *attitudes of the professionals that will assist in the implementation of the AT (social context)*, highly experienced RPs appear to be focused on the long-term implementation of the AT. They also appear to be aware of the importance of persons within the context that will be providing support during (long-term) AT implementation.

The relatively low ranking of the influence of the team (35th position) is unexpected, as the importance of the team in AT decision-making (e.g., Bailey, Stoner, Parette, & Angell, 2006; Chmiliar, 2007; Copley & Ziviani, 2005; Judge, 2002; Judge & Parette, 1998) and when providing services to young children (e.g., King et al., 2009) is well described in the literature. Even though 76.30% of participants stated that they work in teams when recommending AT, participants did not perceive the team to be highly influential on their recommendation and provision of AT. This leads to questions regarding the nature and functioning of the teams of which professionals are a part. The development of collaborative transdisciplinary teams that utilise a resource-based approach and which are participation focused have been recommended for use in the South African context (Samuels et al., 2012; Uys & Samuels, 2010), as it is thought that these teams will maximally utilise the resources in the context. The utilisation of transdisciplinary teams that employ a resource-based and participation-focused approach may hold promise as a strategy to increase the involvement of families (who are viewed as a resource) and multiple professional role players in AT decision-making.

The support/opinion of a mentor in recommending/providing AT was ranked as least influential of all the resources. Although 54.10% of participants stated that they have a mentor and 38.58% stated that they act as mentors, participants did not view mentorship as highly influential on their AT recommendations. The use of mentorship or supervision programmes is strongly encouraged in the literature (Gilkerson, 2004; Shahmoon-Shanok, 2009). Within these programmes, expert RPs can assist more inexperienced RPs to gain skills in professional reasoning (Schell & Cervero, 1993), specifically regarding AT selection. Reflection on practice (Fowler, 2016; Rix & Paige-Smith, 2011) has been described as a valuable strategy, particularly

for inexperienced professionals. This could assist in the development of professional reasoning skills and the improvement in recommendations regarding AT.

7.4.2. Knowledge and information

RPs acknowledged the importance of their *technical expertise and experience in recommending/providing AT*, by ranking this item as the most influential pertaining to knowledge and information. This is not surprising, as the influence of experience on professional competence is well documented (e.g., Boyt Schell, 2009; Levett-Jones et al., 2010; Norman, 2005). Copley et al. (2010, p. 330) described the personal experiences of RPs as having “the biggest influence on their practice decisions”. Furthermore, RPs with 10 or more years of experience perceived the influence of *their technical expertise and experience in recommending/providing AT* as more influential than those with less than 10 years’ experience. It appears as though professionals increasingly recognise the importance of their own contributions as they become more experienced.

Although the professional's skill and experience has been described as highly important to the recommendation and provision of AT (e.g Wilcox, Guimond, et al., 2006) and certain authors have explored the influence of experience on specific aspects of AT selection (e.g., Thistle & Wilkinson, 2015), our understanding of how experience influences an RP’s recommendations regarding AT for young children is not comprehensive.

Another factor pertaining to the professional themselves was *their resourcefulness in recommending/providing AT solutions*, which was ranked second for this component (ranked higher than their own knowledge and training as well as their confidence in their skills). This is interesting, as the creativity and resourcefulness of the professionals were not identified as an influential factor in the international literature (see Figure 3.2). However, this emerged as a

strong theme in the online focus groups (see Figure 3.3) where numerous participants referred to the important influence of their own creativity and resourcefulness. This was described almost as a coping strategy to address challenges brought about by working in contexts with limited resources. Participant 16 (from the focus groups) explained it well: “... wanting to reach the best possible outcome will make you seek solutions where you are only facing obstacles or lack of resources – [that] instils creativity in making your own devices” (Niekerk et al., 2017).

Regarding the family's knowledge and information, *the opportunity to train families on AT* was ranked higher than *the existing knowledge of the family*. This may also indicate a problem-solving approach in the RPs – although families may have limited existing knowledge in AT, RPs could train families to have the knowledge they require. This has been described as a valuable strategy in the literature, for example, when training communication partners in using AAC (e.g., Anderson, Balandin, & Stancliffe, 2016; Kent-Walsh & McNaughton, 2005). In this manner, a possible knowledge barrier may be eliminated.

7.4.3. Preferences

Regarding the items related to preferences, the RPs ranked *the child's preference regarding AT* higher than the family or the professional's preference regarding AT. This aligns well with the ranking of the items pertaining to the social context, where the child's attitude was ranked as most influential. The preference of the child was not identified in the systematic review as a factor that could influence AT recommendation and provision, but was identified in the online focus groups. Child preference regarding AT selection has been described as important in other literature (Calhoun et al., 2013; Johnson et al., 2017; Thistle & Wilkinson, 2015), with Schlosser & Koul (2015, p. 301) stating that preference could become a “critical data-based consideration” when deciding between different AAC options. Professionals should

aim to purposefully assess and include the perspectives of children in goal setting regarding AT selection (De Jonge & McDonald, 2010).

RPs with less than 3 years of experience indicated that their *preference regarding AT* was less influential on the recommendation and provision of AT than those with more than 3 years of experience. As discussed, RPs with less than 3 years of experience also indicated that their *own attitude toward AT* (social context), was significantly less influential on the recommendation and provision of AT than those with more than 3 years of experience. These results may support the observation that inexperienced RPs appear to be less aware of their own influence on the AT selection process. They have also had limited time to develop strong preferences.

As RPs continuously develop their ability to use pragmatic reasoning, they learn to incorporate and acknowledge the influence of their personal context (such as their preferences) in their practice (Boyt Schell, 2009).

7.4.4. Expectations

Expectations of the family was perceived to be the most influential of the factors related to expectations, followed by *expectations of professionals* and lastly the *RP's own expectations for the AT*. This follows a similar pattern as observed both within the social context (regarding attitudes of different persons) as well as preferences (regarding the preferences of different persons) where items pertaining to the influence of the family were ranked highest, followed by items regarding other professionals and lastly, items related to the RPs themselves. This again points to the perceived influence of the family on the recommendation and provision of AT. The expectations of the child were not included as a factor in the theoretical framework (and therefore in the survey instrument), as it was not identified in the systematic review or in the online focus groups.

7.5. Factors related to assistive technology

The relatively high ranking of all the items pertaining to assistive technology (all six items were within the top 20 ranked items in terms of their perceived influence), supports the inclusion of this component into the adapted ATD Selection Framework (Figure 3.6). This component is also included in other frequently used frameworks pertaining to AT selection (Cook & Polgar, 2008; Scherer, 1998).

The perceived high influence of the *characteristics of the AT*, e.g. *ease of maintenance*, *portability*, as well as *the possibility for the AT to “grow with the child”* should increasingly be a focus of AT manufacturers. Within a context with limited resources, this is particularly important, as AT has to be used as long as possible, and within as many activities and contexts as possible.

Participants ranked the availability of the AT for the child to try out in 16th position overall. Only 54.70% of participants had AT available for trial at work, while 31.50% had the option to trial AT at clients' homes. This may indicate that RPs perceive AT trial to be influential, even though it is not necessarily available. Increasing the availability of AT for trial may be a valuable strategy to increase the quality of recommendations made by professionals. This strategy has been suggested by various authors, for example, recommending the trial of mobility devices (e.g., Calhoun et al., 2013; Livingstone & Paleg, 2014).

RPs with more than 3 years of experience perceived the *materials available to make AT at your practice/department* as less influential than RPs with less than 3 years of experience. In addition to this, RPs with 10 or more years of experience also indicated that *materials available to make AT at your practice/department* were less influential compared to those RPs with less than 10 years of experience. The consideration of the materials available to make AT requires high levels of pragmatic reasoning (involving the negotiating of the practice and personal context

of the RP), that continues to develop in the RP as they gain experience (Boyt Schell, 2009). RPs seem to perceive the influence of this factor as less and less as they are able to manage the influence of practice considerations better as they gain experience. It appears as though the influence of practical aspects is reduced as experience increases.

RPs with 10 or more years of experience indicated that the *availability of AT on tender or from AT suppliers (assistive technology)* was less influential compared to those RPs with less experience. This again may be attributed to the fact that more experienced RPs are better able to navigate the challenges of the environment.

7.6. Factors related to assessment

The high ranks given to six of the seven items related to assessment reflect the role of the assessment process as the culmination and integration point of many factors influencing AT recommendation and provision.

The needs of the child was ranked in top position. This corresponds well with other studies that have looked at factors influencing intervention decisions with children (e.g., Copley, Nelson, Turpin, Underwood, & Flanigan, 2008; Feder, Majnemer, & Synnes, 2000), where the needs of the child were identified as “paramount” (Copley et al., 2010, p. 322). A focus on the needs of the child enables the RP to gather important information that they will utilise during the professional reasoning process.

RPs with less than 3 years of experience indicated that their *therapy goals for the child* were less influential on the recommendation and provision of AT than those with more than 3 years of experience. Furthermore, RPs with more than 10 years of experience indicated that they perceived *their therapy goals for the child* as more influential than did those with less than 10 years of experience. This indicates that the more experienced the RP, the more they appear to

perceive their therapy goals as influential on AT provision. Once again, this illustrates that RPs appear to increasingly value their own influence on the AT selection process as they gain experience.

RPs with 10 or more years of experience indicated that *activities that the child should/would like to participate in* was more influential than did those with less than 10 years' experience. This may reflect the increased competence of the expert RP in utilising narrative reasoning skills, where the perspective of the client is considered when providing services (Boyt Schell, 2009). Although the expert recognises the importance of their goals for therapy, they also acknowledge the influence of the child and family's life story. It has been observed that expert RPs are able to provide more flexible and client-centred services than less experienced RRs (Unsworth, 2001). As experts rely on automatic practices, they are able to focus on the child's unique needs (Copley et al., 2010).

The only factor related to assessment that was not ranked within the top 10 in the ranking order was the RP's own *approach to assessment*, which was ranked only in the 33rd position. This strengthens the impression that RPs generally do not fully appreciate their own influence in AT recommendation and provision. In addition to this, the typical approach to AT assessment appears to be haphazard and very dependent on the skill, experience (e.g., Wright, Casey, & Porter-Armstrong, 2010) and intuition (e.g., McFadd & Wilkinson, 2010) of the RP conducting the assessment. In a study by Friederich et al. (2010), only 10 of 29 participants stated that they use a theoretical framework when selecting AT. Furthermore, only one AT specific framework (the HAAT model) was used, while the other frameworks were discipline specific.

Assessment for AT has been identified as a challenge by several authors (e.g., Copley & Ziviani, 2004; Friederich et al., 2010). Assessment tools, when available, are often self-made

and not specifically suited to young children. No mention was made of assessment tools in the systematic review articles or in the online focus groups, which resulted in assessment tools not even included as a separate factor in the adapted ATD Selection Framework. A haphazard approach to AT assessment may create challenges for RPs, particularly for the novice RP (with limited experience, skill and intuition), that may be tasked with recommending AT (often in challenging contexts) without the procedural guidance provided when using a structured assessment tool.

The encouragement of a more structured approach towards assessment, for example, through the use of comprehensive assessment forms, could provide guidance regarding AT assessment. This could assist particularly inexperienced RPs as it could allow them to follow a procedural guide for assessment. The Matching AT and Child (MATCH) assessment (de Jonge & McDonald, 2010; Scherer & Craddock, 2002) is available to purchase online and is an example of a tool that has been validated for use with children. This was developed based on the Matching Person and Technology Model (Scherer, 1998).

7.7. Implications of discussion

The discussion of results has highlighted several important aspects regarding the perceived influence of various factors in AT recommendation and provision. All the factors included in the adapted ATD Selection Framework were perceived by RPs to influence the recommendation and provision of AT to young children in South Africa to a certain extent. This may serve to validate the inclusion of the different factors in the adapted ATD Selection Framework.

In certain instances, differences could be observed in how RPs perceived the influence of the different factors on their AT recommendations. These differences may be attributed to each

RP's unique professional reasoning regarding the selection of AT. As professional reasoning is known to be influenced by the level of experience of an RP (Boyt Schell, 2009), a discussion was undertaken on how differences in experience may influence the perspectives of RPs regarding AT recommendation and provision.

The South African context presents RPs with numerous challenges to consider when recommending and providing AT for young children. Negotiating limited financial and human resources (van Rensburg, 2014), dealing with several practice barriers including fragmented service delivery to families and children (Samuels et al., 2012), collaborating with families from diverse cultures and languages (Kathard & Pillay, 2013), as well as coping with the effects of poverty on children and families (Samuels et al., 2012), are among the issues faced. Compulsory community service has increased access to services in rural areas (Ned et al., 2017), but often younger and less experienced RPs are required to provide services, such as AT provision, to these rural communities.

The discussion highlighted certain changes in perspective that occur when RPs gain experience. As the level of experience increased, RPs appeared to perceive the influence of factors within the environment as less influential, while they appeared to be increasingly aware of the influence they personally had over AT recommendation and provision.

Although aspects from the environment, such as those posed by limited resources, have been viewed as barriers to effective reasoning (Schell & Cervero, 1993), more experienced RPs appear to be less influenced by these barriers than less experienced RPs. They are skilled in pragmatic reasoning and view personal and practice considerations not as barriers, but merely as part of the reasoning process (Schell & Cervero, 1993). Experts are said to be more accepting towards the challenges to intervention (Unsworth, 2001) and are more in tune with the influence

they personally have on services. Furthermore, experts appeared focused on the long-term utilisation of AT, implying that resources could be better used. Novice RPs, on the other hand, have been described as often recommending more equipment than needed, as they want to cover all bases in order to provide a perfect solution (Robertson, 2012). They may find it challenging to balance their theoretical ideals with the realities of the context and the influences of the client (Robertson, 2012).

Strategies to utilise the expertise of expert professionals may be key in addressing the challenges experienced within different contexts. Mentorship or reflective supervision has been suggested as a useful strategy (Shahmoon-Shanok, 2009) for experienced RPs to assist in the professional development of their less experienced colleagues. The aim of the supervisory/mentorship relationship is to facilitate reflection (Fowler, 2016). During this process of reflection, inexperienced RPs can gain awareness of their own influence on the services they provide (Jayatilleke & Mackie, 2013; Ryan & Hills, 2012). RPs are encouraged to consider their own knowledge, competencies and preferences and develop their therapeutic use of self (Heffron, Ivins, & Weston, 2005), also when involved in AT recommendation and provision.

It has been recommended that a reflective tool be used in the reflection process (Fowler, 2016). Atkinson and Nixon-Cave (2011) utilised the ICF (World Health Organisation, 2001) as a framework to guide the process of mentoring and facilitating reflection on decision-making practices with PTs at one institution. It is suggested that the adapted ATD Selection Framework be used as the basis of a professional reasoning and reflection tool, particularly aimed at facilitating reflection on AT selection. As the adaptation of this framework was aimed at establishing a comprehensive framework for the recommendation and provision of AT for young children, this could be used to stimulate reflection from RPs on factors to be considered in this

process. This could be useful for novice therapists as well as experts, as experts could utilise the tool to guide mentoring sessions with less experienced professionals.

As haphazard AT assessment has been identified as a challenge to AT selection (Copley & Ziviani, 2005), the possibility to utilise more structured assessments was identified as important. This could prove to be particularly useful for inexperienced RPs (often required to work in the most challenging contexts), as they require a procedural and structured approach to guide their professional reasoning (Robertson, 2012). The adapted ATD Selection Framework may be utilised to guide the development of such assessment tools, specifically for use when recommending and providing AT for young children.

As good reasoning abilities have been described as an essential component of professional competence (Banning, 2008), it is important that undergraduate training be focused on educating students in the skills required for professional reasoning (Brookfield, 2008). Although a central aspect of the training of RPs should be the accumulation of knowledge, students should be aware that the application of their knowledge will be different in different contexts (Norman, 2005), as good practice is specific to a context (Fish & Higgs, 2008). In other words, students should be educated in AT selection frameworks, such as the framework adapted in this study, but importantly, they should have the skills to determine the appropriateness and application of the framework to their specific context.

Furthermore, RPs should be trained so that they are prepared to adapt and change their reasoning regarding AT selection to best negotiate the challenges within their context (Fish & Higgs, 2008). As this is challenging, particularly for inexperienced RPs, reflection on these aspects should be facilitated.

CHAPTER 8

CONCLUSION

8.1. Introduction

The main aim of this study was to determine the factors that are perceived by RPs to influence the recommendation and provision of AT for young children in South Africa. Chapter 8 provides a summary of the results and conclusions reached in this study. Furthermore, the chapter discusses the implications of the study. In addition to this, a critical evaluation discusses the strengths and limitations of this study. The chapter concludes with a discussion on recommendations for future research.

8.2. Summary of the findings

This study was aimed at determining the factors that are perceived by RPs to influence the recommendation and provision of AT to young children in South Africa and to determine the perceived extent of the influence of these factors. A sequential exploratory mixed-methods design was used to comprehensively address the aim of the study. This was completed in three phases.

In Phase 1, an existing theoretical framework was selected that could be used as a starting point for this study. This framework, the ATD Selection Framework (Scherer et al., 2007), was chosen as it was developed specifically for use with AT. Furthermore, it was the only AT specific framework that pertinently included the influence of the RPs themselves on the AT selection process. The main components of this framework include the environment, personal factors of the user of the AT as well as the provider of the AT, together with the ATD decision-making and device selection component.

In Phase 1, this framework was adapted and expanded by synthesising data obtained from two additional sources. Firstly, a systematic review of studies investigating factors influencing the recommendation and provision of AT to children was conducted. Based on the data from the systematic review, the ATD decision-making and device selection component was adapted to assessment, and the component “assistive technology” was included in the adapted theoretical framework. Several individual factors influencing the recommendation and provision of AT were identified under each existing component. Secondly, online focus groups with South African RPs were conducted to determine the factors perceived to influence the recommendation and provision of AT to young children in South Africa. Again, assistive technology was identified as additional component of the framework, together with family-centred decision-making that was separated from the assessment component. Several individual factors influencing the recommendation and provision of AT were identified. The findings from the systematic review and online focus groups were synthesised in order to adapt and expand the ATD Selection Framework.

To determine the extent to which different factors are perceived to influence the recommendation and provision of AT to young children, a survey instrument was developed in Phase 2 of the study. The items of the best-worst survey reflected the factors identified as part of the adapted ATD Selection Framework.

In Phase 3, the survey was conducted. Analysis of the best-worst survey enabled the researcher to present a rank order of items perceived by RPs to be most influential, as well as least influential on the recommendation and provision of AT to young children in South Africa. In addition to this, the researcher discussed the differences in perspectives regarding the influence of certain factors between RPs with different levels of experience.

8.3. Implications for practice

The adaptation and expansion of the ATD Selection Framework was an attempt at producing an empirically supported theoretical framework to guide RPs in their recommendation and provision of AT for young children. Although this was specifically adapted for use with young children in a context with limited resources, its relevance may be to a wider audience.

The adapted ATD Selection Framework could be utilised in various ways. Firstly, it could be used to train new RPs in the selection of AT to children. As this framework aimed to be comprehensive regarding factors influencing AT recommendation and provision, it could be utilised to train students on the different factors they have to consider and incorporate in their AT assessment and professional reasoning process. Secondly, practicing RPs (particularly inexperienced RPs), could utilise the adapted framework to serve as guide to their AT selection practices. As inexperienced RPs benefit from having procedural guidelines, the framework could prove helpful regarding factors to consider when recommending and providing AT. Thirdly, the adapted framework could be used by experienced RPs in a supervisory or mentorship role to guide reflection and discussion regarding AT selection with more inexperienced RPs.

The study also highlighted the important role of the RP in the AT provision process. RPs should be encouraged to take increased ownership of their important influence in this process. As professional reasoning is influenced by various factors pertaining to the RP as well as the context in which they work, reflective practice should be encouraged. When reflecting, RPs should consider how their own knowledge, competencies, preferences and so forth influence them, in order to increase their personal awareness (Ryan & Hills, 2012). This will enhance their professional reasoning within their specific context. Furthermore, it may enable them to utilise their experience and resourcefulness to overcome the difficulties presented within the context.

As experienced RPs appear to be less influenced by aspects pertaining to the environment (e.g., practice barriers), these RPs should be involved in the training and professional development of inexperienced RPs. This could guide inexperienced RPs to view challenges (such as limited resources) not as barriers, but merely as part of the practice context that should be considered in the AT provision process. The pertinent example of how this could be implemented is through a process of mentoring that may be encouraged in the workplace. Additionally, the experienced RP's focus on the long-term implementation of the AT, as opposed to providing a "perfect" short-term solution, may further guide inexperienced RPs in making well-considered, family-centred recommendations that make the best use of available resources.

As professional reasoning is influenced by and dependent on contextual factors, RPs should be trained and prepared for AT selection within different practice contexts. Their training should guide them to consider a wide variety of factors that may influence the AT provision process. They should also be trained to reflect on their reasoning process in order to reach the best possible outcome for the children and families they serve.

8.4. Evaluation of the study

8.4.1. *Strengths of the study*

The sequential exploratory mixed-method methodology of the study enabled the researcher to investigate the research problem using both qualitative and quantitative methods sequentially, adding to the depth of the results that could be obtained. Firstly, a comprehensive and in-depth understanding of the factors influencing AT recommendation and provision was obtained in the qualitative phase (Phase 1) of the study. This enabled the development of the survey instrument based on factors specific to the context where the participants provide services

(South Africa) and to the specific client group in question (young children). Secondly, the quantitative phase of the study (Phase 3) enabled the researcher to indicate the extent to which the different factors identified in the qualitative phase were perceived to influence RPs within the South African context. Furthermore, additional depth in answering the research question could be provided by including a discussion on how different levels of experience of the recommending RP could influence the perceived influence of the identified factors on the AT provision process.

The adaptation and expansion of the theoretical framework conducted in Phase 1 of this study constitutes a major strength. This illustrates how different sources of data can be integrated with theory, resulting in a framework that is supported by empirical data. This framework in turn can highlight the need to conduct further studies to clarify the relationships between identified factors and AT provision.

The use of the best-worst questions in the survey was a novel approach as it has not been used often in the field of rehabilitation. The use of this method enabled the researcher to calculate a rank order of a high number of different items reflecting factors perceived to influence AT recommendation and provision. The fact that the best-worst questions could be integrated into an online survey enabled the researcher to obtain the rank order from a relatively large sample of RPs, working in diverse contexts across South Africa. Obtaining a rank of different influencing factors, based on data obtained from such a large sample located in such diverse settings, would not have been possible or practical utilising any other methodology.

The researcher was able to analyse the data obtained from the survey inferentially, in order to describe differences in how groups of RPs with various levels of experience perceived the influence of different factors on their AT recommendations and provision. This study

provides some insight (through the discussion of specific examples) into how the level of experience of the recommending RP may influence their perspectives.

8.4.2. *Limitations of the study*

The instrument utilised for the survey was not comprehensively validated. Although the different items utilised in the best-worst questions corresponded to the adapted ATD Selection Framework, this framework was not comprehensively validated, possibly influencing the validity of the survey instrument.

An additional shortcoming identified in the survey instrument was that it did not include any question on AT assessment tools used by participants. As no formal assessments were discussed in the systematic review articles and none were mentioned by professionals in the online focus groups, it was assumed that RPs do not use AT assessment tools with young children. However, it could have been useful to gather information on this aspect as it forms part of the recommendations from the study.

Regarding the distribution sample for the survey, it was a limitation that detailed information was not available regarding the employment of the RPs that received the recruitment emails. Therefore, it was impossible for the researcher to target only those RPs that would qualify to participate in the study (those recommending AT to young children in their current employment). As the exact number of RPs that would qualify to participate in the study is not known, the specific return rate for the survey is unknown. Furthermore, the fact that the email list did not appear to be updated was a limitation, as the researcher could not be certain that all RPs who provide AT services to young children in South Africa within their current employment received the recruitment emails.

Although the South African context can be described as generally having limited resources available for rehabilitation services (Sherry, 2015), 37% of participants in the survey were employed in private practice, where more resources are typically available. Therefore, the results of this study may not be reflective of a resource-limited environment.

8.5. Recommendations for future research

Firstly, it is recommended that the adapted ATD Selection Framework could be validated further, particularly pertaining to the organisation of the components and the different factors pertaining to each, as depicted within the framework. One suggested methodology for this could be by use of a focus group of experts that could discuss their perspectives on the adapted framework and possibly inform adaptations particularly regarding the organisation of the components of the framework.

It was beyond the scope of this study to include additional analysis of the best-worst survey results. However, these results could be further analysed in terms of the possible influence of, for example, the type of AT recommended and the working contexts of RPs on their perspectives regarding factors influencing AT provision.

It is recommended that the adapted ATD Selection Framework could be developed as a professional reasoning and reflection tool that could then be used as a framework to guide the professional reasoning and mentoring process. This tool should be validated and the perceived benefits as experienced by users could be determined.

Furthermore, the adapted ATD Selection Framework could be utilised to develop assessment tools to guide RPs in the recommendation and provision of AT for young children. The use of a comprehensive procedural assessment could assist particularly the inexperienced RP

to comprehensively consider all aspects that are perceived to influence the selection of AT.

Assessments based on the framework should be validated for use.

When working in a country with relatively limited resources, it is often assumed that the availability of financial resources influences AT provision to a great extent. In order to investigate whether RPs perceive the influence of factors pertaining to AT recommendation and provision differently in very well-resourced contexts, it is suggested that the survey be conducted with RPs employed in such contexts. Differences (if any) can then be determined between how South African RPs perceive the influence of the different factors compared to RPs in very well-resourced contexts. This may provide insight into the influence of different contexts on the professional reasoning of RPs when selecting, recommending and providing AT for young children.

8.6. Conclusion/Summary

The current chapter presented the conclusion regarding the results of this study. The most pertinent contributions of the findings were presented. Implications of the results were included and the strengths and limitations of the study were presented. Lastly, recommendations were made on how future research studies could expand the work undertaken in this study aimed at determining the factors perceived to influence the recommendation and provision of AT to young children in the South African context.

REFERENCES

- African Child Policy Forum. (2011). *Children with disabilities in South Africa: The hidden reality*. Retrieved from http://uhambofoundation.org.za/new_wp/wp-content/uploads/2016/06/2011-ACPF-Children-with-disabilities-in-South-Africa-The-hidden-reality.pdf
- Alant, E. (2005). AAC technology for development. In E. Alant & L. L. Lloyd (Eds.), *Augmentative and Alternative Communication and severe disabilities: Beyond Poverty* (pp. 192–220). London: Whurr Publishers.
- Ali, S., & Ronaldson, S. (2012). Ordinal preference elicitation methods in health economics and health services research: Using discrete choice experiments and ranking methods. *British Medical Bulletin*, 103(1), 21–44. doi.org/10.1093/bmb/lds020
- Anaby, D., Hand, C., Bradley, L., Direzze, B., Forhan, M., Digiacomo, A., & Law, M. (2013). The effect of the environment on participation of children and youth with disabilities: A scoping review. *Disability and Rehabilitation*, 35(19), 1589–1598. doi.org/10.3109/09638288.2012.748840
- Anderson, K. L., Balandin, S., & Stancliffe, R. J. (2016). “It’s got to be more than that”. Parents and speech-language pathologists discuss training content for families with a new speech generating device. *Disability and Rehabilitation: Assistive Technology*, 11(5), 375–384. doi.org/10.3109/17483107.2014.967314

- Arbaugh, B., Cleveland-Innes, M., Diaz, S., Garrison, D. R., Ice, P., Richardson, J., ... Swan, K. (2008). Community of inquiry survey instrument (draft v14). Retrieved from <http://communitiesofinquiry.com/methodology>
- Arthanat, S., Wu, Y. W. B., Bauer, S. M., Lenker, J. A., & Nochajski, S. M. (2009). Development of the usability scale for assistive technology-wheeled mobility: A preliminary psychometric evaluation. *Technology and Disability, 21*(3), 79–95. doi.org/10.3233/TAD-2009-0275
- Atkinson, H. L., & Nixon-Cave, K. (2011). A tool for clinical reasoning and reflection using the International Classification of Functioning, Disability and Health (ICF) framework and Patient Management Model. *Phys Ther, 91*(3), 416–430. doi.org/10.2522/ptj.20090226
- Auger, P., Devinney, T. M., & Louviere, J. J. (2007). Using best-worst scaling methodology to investigate consumer ethical beliefs across countries. *Journal of Business Ethics, 70*(3), 299–326. doi.org/10.1007/s10551-006-9112-7
- Babbie, E. (2014). *The Basics of Social Research* (6th ed.). Belmont: Cengage Learning.
- Bailey, R. L., Parette, H. P., Stoner, J. B., Angell, M. E., & Carroll, K. (2006). Family Members' Perceptions of Augmentative and Alternative Communication Device Use. *Language, Speech & Hearing Services in Schools, 37*(January), 50–60.
- Bailey, R., Stoner, J. B., Parette Jr, H. P., & Angell, M. E. (2006). AAC team perceptions: Augmentative and alternative communication device use. *Education and Training in Developmental Disabilities, 41*(2), 139–154. Retrieved from <http://www.jstor.org/stable/23880176>

- Bailey, R. W. (1996). *Human performance engineering* (3rd ed.). Upper Saddle River, New York: Prentice Hall.
- Banning, M. (2008). Clinical reasoning and its application to nursing: Concepts and research studies. *Nurse Education in Practice*, 8(3), 177–183. doi.org/10.1016/j.nepr.2007.06.004
- Barbour, R. S. (2001). Checklists for improving rigour in qualitative research: a case of the tail wagging the dog? *British Medical Journal*, 322(7294), 1115–1117.
- Baxter, S., Enderby, P., Judge, S., & Evans, P. (2012). Barriers and facilitators to use of high technology augmentative and alternative communication devices: a systematic review and qualitative synthesis. *International Journal of Language & Communication Disorders*, 47(2), 115–129. doi.org/10.1111/j.1460-6984.2011.00090.x
- Benner, P. (1984). *From novice to expert*. Menlo Park, CA: Addison-Wesley.
- Benson, J., & Clark, F. (1982). A guide for instrument development and validation. *The American Journal of Occupational Therapy*, 36(12), 789–800.
- Bernard, H. R., & Ryan, G. W. (2010). *Analyzing qualitative data Systematic approaches*. Thousand Oaks, California: SAGE Publications.
- Bernd, T., Van Der Pijl, D., & De Witte, L. P. (2009). Existing models and instruments for the selection of assistive technology in rehabilitation practice. *Scandinavian Journal of Occupational Therapy*, 16(3), 146–58. doi.org/10.1080/11038120802449362

- Borg, J., Larsson, S., & Östergren, P. O. (2011). The right to assistive technology: for whom, for what, and by whom? *Disability & Society*, 26(2), 151–167.
doi.org/10.1080/09687599.2011.543862
- Borg, J., Larsson, S., Östergren, P. O., Rahman, A. S. M. A., Bari, N., & Khan, A. H. M. N. (2012). User involvement in service delivery predicts outcomes of assistive technology use: A cross-sectional study in Bangladesh. *BMC Health Services Research*, 12, 330.
doi.org/10.1186/1472-6963-12-330
- Borg, J., Lindström, A., & Larsson, S. (2009). Assistive technology in developing countries: national and international responsibilities to implement the Convention on the Rights of Persons with Disabilities. *Lancet*, 374(9704), 1863–5. [doi.org/10.1016/S0140-6736\(09\)61872-9](https://doi.org/10.1016/S0140-6736(09)61872-9)
- Boyt Schell, B. (2009). Professional reasoning in practice. In E. Blesedell Crepeau, E. Cohn, & B. Boyt Schell (Eds.), *Willard & Spackman's Occupational Therapy* (11th Ed., pp. 314–327). Baltimore: Wolters Kluwer Health/Lippincott Williams & Wilkins.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. doi.org/10.1191/1478088706qp063oa
- Braun, V., & Clarke, V. (2013). *Successful Qualitative Research: A Practical Guide for Beginners*. London: SAGE.
- Brookfield, S. (2008). Clinical reasoning and generic thinking skills. In J. Higgs, M. Jones, S. Loftus, & N. Christensen (Eds.), *Clinical reasoning in the health professions* (3rd ed, pp. 65–86). Philadelphia: Elsevier Ltd.

- Burton, L. J., & Bruening, J. E. (2003). Technology and method intersect in the online focus Group. *Quest*, 55(4), 315–327. doi.org/10.1080/00336297.2003.10491807
- Burton, L. J., & Goldsmith, D. (2002). *The medium is the message: Using online focus groups to study online learning*. Association of Institutional Research. Retrieved from <https://files.eric.ed.gov/fulltext/ED482243.pdf>
- Calhoun, C. L., Schottler, J., & Vogel, L. C. (2013). Recommendations for mobility in children with spinal cord injury. *Topics in Spinal Cord Injury Rehabilitation*, 19(2), 142–51. doi.org/10.1310/sci1902-142
- Campbell, P. H., Milbourne, S., Dugan, L. M., & Wilcox, M. J. (2006). A review of evidence on practices for teaching young children to use assistive technology devices. *Topics in Early Childhood Special Education*, 26(1), 3–13. doi.org/10.1177/02711214060260010101
- Campbell, P. H., Milbourne, S., & Wilcox, M. J. (2008). Adaptation interventions to promote participation in natural settings. *Infants & Young Children*, 21(2), 94–106. doi.org/10.1097/01.IYC.0000314481.16464.75
- Campinha-Bacote, J. (2002). The process of cultural competence in the delivery of healthcare services: A model of care. *Journal of Transcultural Nursing*, 13(3), 181–184. doi.org/10.1177/10459602013003003
- Chapparo, C., & Ranka, J. (2008). Clinical reasoning in occupational therapy. In J. Higgs, M. Jones, S. Loftus, & N. Christensen (Eds.), *Clinical reasoning in the health professions* (3rd ed, pp. 265–277). Philadelphia: Elsevier Ltd.

- Chase, L., & Alvarez, J. (2000). Internet research: The role of the focus group. *Library & Information Science Research*, 22(4), 357–369. doi.org/10.1016/S0740-8188(00)00050-5
- Children's Act, No 38 of 2005 (2005). Retrieved from <https://www.gov.za/sites/default/files/a38-05.pdf>
- Chmiliar, L. (2007). Perspectives on assistive technology: What teachers, health professionals, and speech and language pathologists have to say. *Developmental Disabilities Bulletin*, 35(1), 1–17.
- Clark, F., Ennevor, B. L., & Richardson, P. L. (1996). A grounded theory of techniques for occupational storytelling and occupational story making. In R. Zemke & F. Clark (Eds.), *Occupational science: The evolving discipline* (pp. 373–392). Philadelphia: F.A. Davis.
- Clarke, M. T., Donlan, C., Lister, C., Wright, J., Newton, C., & Cherguit, J. (2007). The provision of communication aids to children in England: An analysis of applications to the communication aids project. *Child: Care, Health and Development*, 33(5), 569–575. doi.org/10.1111/j.1365-2214.2006.00712.x
- Cochran, W. G., & Cox, G. M. (1957). *Experimental Designs*. New York: John Wiley & Sons.
- Collins, D. (2003). Pretesting survey instruments: An overview of cognitive methods. *Quality of Life Research*, 12(3), 229–238. doi.org/10.1023/A:1023254226592
- Cook, A. M., & Polgar, J. M. (2008). *Cook & Hussey's Assistive Technologies* (3rd ed.). St. Louis, Missouri: Mosby Elsevier.

- Coovadia, H., Jewkes, R., Barron, P., Sanders, D., & McIntyre, D. (2009). The health and health system of South Africa: historical roots of current public health challenges. *The Lancet*, 374, 817–834. doi.org/10.1016/S0140-6736(09)60951-X
- Copley, J., Bennett, S., & Turpin, M. (2010). Decision making for occupation-centered practice with children. In S. Rodger (Ed.), *Occupation-Centered Practice with Children: A practical guide for occupational therapists* (pp. 320–341). New York: Wiley-Blackwell.
- Copley, J., Nelson, A., Turpin, M., Underwood, K., & Flanigan, K. (2008). Factors influencing therapists' interventions for children with learning difficulties. *Canadian Journal of Occupational Therapy*, 75(2), 105–113. doi.org/10.1177/000841740807500206
- Copley, J., & Ziviani, J. (2004). Barriers to the use of assistive technology for children with multiple disabilities. *Occupational Therapy International*, 11(4), 229–243. doi.org/10.1002/oti.213
- Copley, J., & Ziviani, J. (2005). Assistive technology assessment and planning for children with multiple disabilities in educational settings. *British Journal of Occupational Therapy*, 68(12), 559–566.
- Cox, J., & Cox, K. B. (2008). *Your opinion, please! How to build the best questionnaires in the field of education* (2nd ed.). Thousand Oaks, California: SAGE Publications.
- Creighton, D., Dijkers, M., Bennett, N., & Brown, K. (1995). Reasoning and the art of therapy of spinal cord injury. *American Journal of Occupational Therapy*, 49, 311–317.

- Cress, C. J., & Marvin, C. (2003). Common Questions about AAC Services in Early Intervention. *Augmentative and Alternative Communication*, 19(4), 254–272.
doi.org/10.1080/07434610310001598242
- Creswell, J. W., & Clark, V. L. P. (2011). *Designing and Conducting Mixed Methods Research* (2nd ed.). Los Angeles: SAGE Publications.
- Daly, J., Willis, K., Small, R., Green, J., Welch, N., Kealy, M., & Hughes, E. (2007). A hierarchy of evidence for assessing qualitative health research. *Journal of Clinical Epidemiology*, 60(1), 43–49. doi.org/10.1016/j.jclinepi.2006.03.014
- De Jonge, D., & McDonald, R. (2010). Enabling children's occupations and participation using assistive technology. In S. Rodgers (Ed.), *Occupation-centered practice with children: A practical guide for occupational therapists* (pp. 298–319). Hoboken, New Jersey: John Wiley & Sons.
- Department of Health. (n.d.). *Standardisation of provision of assistive devices in South Africa: A guideline for use in the public sector*. Retrieved from
http://www.ruralrehab.co.za/uploads/3/0/9/0/3090989/standardisation_of_provision_of_assistive_devices_in_south_.pdf
- Department of Health. (2015a). *Contract circular: Supply and delivery of rehabilitation consumables* (GT/GDH/22/2015). Johannesburg, South Africa: Author.
- Department of Health. (2015b). *Framework and strategy for disability and rehabilitation services in South Africa 2015-2020*. Retrieved from ilifalabantwana.co.za/wp-content/uploads/2016/07/Framework-25-may_1_3.docx

- Department of Social Development. (2009). *Integrated national strategy on support services to children with disabilities*. Retrieved from www.hsrc.ac.za/en/research-data/mtree-doc/1672
- Department of Social Development. (2015). *White paper on the rights of persons with disabilities*. Retrieved from <http://www.governmentpublications.lib.uct.ac.za/news/white-paper-rights-persons-disabilities>
- Desideri, L., Roentgen, U., Hoogerwerf, E. J., & De Witte, L. (2013). Recommending assistive technology (AT) for children with multiple disabilities: A systematic review and qualitative synthesis of models and instruments for AT professionals. *Technology and Disability*, 25(1), 3–13. doi.org/10.3233/TAD-130366
- DeVellis, R. F. (2016). *Scale development: Theory and applications* (4th ed.). London: SAGE Publications.
- Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode surveys: The tailored design method*. Hoboken, New Jersey: John Wiley & Sons.
- Dreyfus, H. L., & Dreyfus, S. E. (1986). *Mind over machine: The power of human intuition and expertise in the era of the computer*. New York: Free Press.
- Dugan, L. M., Campbell, P. H., & Wilcox, M. J. (2006). Making decisions about assistive technology with infants and toddlers. *Topics in Early Childhood Special Education*. doi.org/10.1177/02711214060260010301

- Dunst, C. J., Hamby, D., Trivette, C., Raab, M., & Bruder, M. B. (2000). Everyday family and community life and children's naturally occurring learning opportunities. *Journal of Early Intervention*, 23(3), 151–164.
- Dunst, C. J., Trivette, C. M., Hamby, D. W., & Simkus, A. (2013). Systematic review of studies promoting the use of assistive technology devices by young children with disabilities. *Practical Evaluation Reports*, 5(1), 1–32. Retrieved from http://www.practicalevaluation.org/reports/CPE_Report_Vol5No1.pdf
- Easton, G., Easton, A., & Belch, M. (2003). An experimental investigation of electronic focus groups. *Information & Management*, 40(8), 717–727. doi.org/10.1016/S0378-7206(02)00098-8
- Eide, A. H., & Ingstad, B. (2013). Disability and poverty – Reflections on research experiences in Africa and beyond. *African Journal of Disability*, 2(1), 1–7. doi.org/10.4102/ajod.v2i1.31
- Eide, A. H., & Øderud, T. (2009). Assistive technology in low-income countries. In M. MacLachlan & L. Swartz (Eds.), *Disability & international development: Towards inclusive global health* (pp. 149–160). New York: Springer.
- Emmett, T. (2005). Disability and poverty. In E. Alant & L. L. Lloyd (Eds.), *Augmentative and alternative communication and severe disabilities: Beyond poverty* (pp. 68–94). London: Whurr Publishers.
- Evans, J. R., & Mathur, A. (2005). The value of online surveys. *Internet Research*, 15(2), 195–219. doi.org/10.1108/10662240510590360

- Feder, K., Majnemer, A., & Synnes, A. (2000). Handwriting: Current trends in occupational therapy practice. *Canadian Journal of Occupational Therapy*, 67(3), 197–204.
doi.org/10.1177/000841740006700313
- Federici, S., Corradi, F., Meloni, F., Borsci, S., Mele, M. L., de Sylva, S. D., & Scherer, M. J. (2014). A person-centered assistive technology service delivery model: a framework for device selection and assignment. *Life Span and Disability*, 17(2), 175–198.
- Fish, D., & Higgs, J. (2008). The context for clinical decision making in the 21st century. In J. Higgs, M. Jones, S. Loftus, & N. Christensen (Eds.), *Clinical reasoning in the health professions* (3rd ed., pp. 19–30). Philadelphia: Elsevier Ltd.
- Fleming, J. L., Sawyer, L. B., & Campbell, P. H. (2010). Early intervention providers' perspectives about implementing participation-based practices. *Topics in Early Childhood Special Education*, 30(4), 233–244. doi.org/10.1177/0271121410371986
- Fleming, M. H. (1991). The therapist with the three-track mind. *The American Journal of Occupational Therapy*, 45(11), 1007–1014. doi.org/10.5014/ajot.45.11.1007
- Forsyth, K., & Kviz, F. J. (2006). Survey research design. In G. Kielhofner (Ed.), *Research in Occupational Therapy: Methods of Inquiry for Enhancing Practice* (pp. 91–109). Philadelphia: F.A. Davis.
- Fowler, J. (2016). Reflection in practice. Part 2: What is reflection? *International Journal of Therapy and Rehabilitation*, 23(12), 604–605.

- Freeman, A. R., MacKinnon, J. R., & Miller, L. T. (2004). Assistive technology and handwriting problems: What do occupational therapists recommend? *Canadian Journal Of Occupational Therapy*, 71(3), 150–160. doi.org/10.1177/000841740407100305
- Friederich, A., Bernd, T., & De Witte, L. (2010). Methods for the selection of assistive technology in neurological rehabilitation practice. *Scandinavian Journal of Occupational Therapy*, 17(4), 308–318. doi.org/10.3109/11038120903377082
- Gaiser, T. J. (2008). Online focus groups. In N. G. Fielding, R. M. Lee, & G. Blank (Eds.), *The SAGE Handbook of Online Research Methods* (pp. 290–306). London: SAGE Publications.
- Garrison, D. R. (2007). Online community of inquiry review: Social, cognitive, and teaching presence issues. *Journal of Asynchronous Learning Networks*, 11(1), 61–72. doi.org/10.1128/JB.05513-11
- Giesbrecht, E. (2013). Application of the human activity assistive technology model for occupational therapy research. *Australian Occupational Therapy Journal*, 60(4), 230–240. doi.org/10.1111/1440-1630.12054
- Gilkerson, L. (2004). Irving B. Harris Distinguished Lecture: Reflective supervision in infant-family programs: Adding clinical process to nonclinical settings. *Infant Mental Health Journal*, 25(5), 424–439. doi.org/10.1002/imhj.20017
- Glennen, S., & DeCoste, D. C. (1997). *The Handbook of Augmentative and Alternative Communication*. San Diego: Singular Publishing Group.

- Goldbart, J., & Marshall, J. (2004). "Pushes and Pulls" on the parents of children who use AAC. *AAC: Augmentative and Alternative Communication*, 20(4), 194–208.
doi.org/10.1080/07434610400010960
- Granlund, M., Björck-Akesson, E., Wilder, J., & Ylvén, R. (2008). AAC interventions for children in a family environment: Implementing evidence in practice. *Augmentative and Alternative Communication*, 24(3), 207–219. doi.org/10.1080/08990220802387935
- Greener, I. (2013). *Designing Social Research: A Guide for the Bewildered*. London: SAGE Publications Ltd.
- Griffiths, T., & Price, K. (2011). A proposed framework for decision making for assistive communication technology support: Many perspectives, but one common goal. *Journal of Assistive Technologies*, 5(4), 242–248. doi.org/10.1108/17549451111190641
- Guerette, P., Furumasu, J., & Tefft, D. (2013). The positive effects of early powered mobility on children's psychosocial and play skills. *Assistive Technology: The Official Journal of RESNA*, 25(1), 39–48. doi.org/10.1080/10400435.2012.685824
- Hall, K., & Lake, L. (2012). Introducing children count. In K. Hall, I. Woolard, L. Lake, & C. Smith (Eds.), *South African Child Gauge 2012*. Cape Town: Children's Institute, University of Cape Town.
- Harrison, D. (2009). An overview of health and health care in South Africa 1994 – 2010: Priorities , progress and prospects for new gains. Retrieved from <http://www.doh.gov.za/docs/reports/2010/overview1994-2010.pdf>

- Hassan, Z. A., Schattner, P., & Mazza, D. (2006). Doing a pilot study: Why is it essential? *Malaysian Family Physician*, 1(2), 70–73.
- Heffron, M. C., Ivins, B., & Weston, D. R. (2005). Finding an authentic voice—Use of self. *Infants & Young Children*, 18(4), 323–336. doi.org/10.1097/00001163-200510000-00008
- Henderson, S., Skelton, H., & Rosenbaum, P. (2008). Assistive devices for children with functional impairments: Impact on child and caregiver function. *Developmental Medicine and Child Neurology*, 50(2), 89–98. doi.org/10.1111/j.1469-8749.2007.02021.x
- Hutinger, P. L., Bell, C., Daytner, G., & Johanson, J. (2006). Establishing and maintaining an early childhood emergent literacy technology curriculum. *Journal of Special Education Technology*, 21(4), 39–54. doi.org/10.1177/016264340602100405
- Iacono, T., & Cameron, M. (2009). Australian speech-language pathologists' perceptions and experiences of augmentative and alternative communication in early childhood intervention. *Augmentative and Alternative Communication*, 25(4), 236–249. doi.org/10.3109/07434610903322151
- Individuals with Disabilities Education Act of 2004 (2004). Pub. L. No.108-446, 118 Stat. 2647. Retrieved from http://www.parentcenterhub.org/wp-content/uploads/repo_items/PL108-446.pdf
- Jayatilleke, N., & Mackie, A. (2013). Reflection as part of continuous professional development for public health professionals: A literature review. *Journal of Public Health*, 35(2), 308–312. doi.org/10.1093/pubmed/fds083

- Johnson, E., Bornman, J., & Tönsing, K. (2017). Model for vocabulary selection of sensitive topics: An example from pain-related vocabulary. *Seminars in Speech and Language*, 38(4), 276–285. doi.org/10.1055/s-0037-1604275
- Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, 1(2), 112–133. doi.org/10.1177/1558689806298224
- Judge, S. (2002). Family-centered assistive technology assessment and intervention practices for early intervention. *Infants & Young Children*, 15(1), 60–68. doi.org/10.1097/00001163-200207000-00009
- Judge, S., Floyd, K., & Wood-Fields, C. (2010). Creating a technology-rich learning environment for infants and toddlers with disabilities. *Infants & Young Children*, 23(2), 84–92. doi.org/10.1097/IYC.0b013e3181d29b14
- Judge, S., & Parette, H. P. (1998). Family-centered assistive technology decision making. *The Transdisciplinary Journal*, 8(2), 185–205.
- Kathard, H., Pascoe, M., Ramma, L., Jordaan, H., Moonsamy, S., Wium, A.-M., ... Khan, N. (2011). How can speech-language therapists and audiologists enhance language and literacy outcomes in South Africa? (And why we urgently need to). *South African Journal of Communication Disorders*, 58, 59–71. doi.org/10.4102/sajcd.v58i2.27
- Kathard, H., & Pillay, M. (2013). Promoting change through political consciousness: A South African speech-language pathology response to the World Report on Disability. *International Journal of Speech-Language Pathology*, 15(1), 84–89.

- Kent-Walsh, J., & McNaughton, D. (2005). Communication partner instruction in AAC: Present practices and future directions. *Augmentative and Alternative Communication*, 21(3), 195–204. doi.org/10.1080/07434610400006646
- Keramidas, C. G., & Collins, B. C. (2009). Assistive technology use with the birth to three population: A rural perspective. *Rural Special Education Quarterly*, 28(1), 38–48.
- King, G., Strachan, D., Tucker, M., Duwyn, B., Desserud, S., & Shillington, M. (2009). The application of a transdisciplinary model for early intervention services. *Infants & Young Children*, 22(3), 211–223. doi.org/10.1097/IYC.0b013e3181abe1c3
- Klein, E. E., Tellefsen, T., & Herskovitz, P. J. (2007). The use of group support systems in focus groups: Information technology meets qualitative research. *Computers in Human Behavior*, 23(5), 2113–2132. doi.org/10.1016/j.chb.2006.02.007
- Kling, A., Campbell, P. H., & Wilcox, J. (2010). Young children with physical disabilities. *Infants & Young Children*, 23(3), 169–183. doi.org/10.1097/IYC.0b013e3181e1a873
- Krefting, L. H., & Krefting, D. V. (1991). Cultural influences on performance. In C. Christiansen & C. Baum (Eds.), *Occupational therapy*. Thorofare, New York: SLACK.
- Lahm, E. A., & Sizemore, L. (2002). Factors that influence technology decision making. *Journal of Special Education Technology*, 17(1), 15–26.
- Lane, S. J., & Mistrett, S. G. (1996). Play and assistive technology issues for infants and young children with disabilities: A preliminary examination. *Focus on Autism and Other Developmental Disabilities*, 11(2), 96–104. doi.org/10.1177/108835769601100205

- Lee, J. A., Soutar, G., & Louviere, J. (2008). The best-worst scaling approach: An alternative to Schwartz's values survey. *Journal of Personality Assessment*, 90(4), 335–347.
doi.org/10.1080/00223890802107925
- Lenker, J. A., & Paquet, V. L. (2003). A review of conceptual models for assistive technology outcomes research and practice. *Assistive Technology: The Official Journal of RESNA*, 15(1), 1–15. doi.org/10.1080/10400435.2003.10131885
- Levett-Jones, T., Hoffman, K., Dempsey, J., Jeong, S. Y. S., Noble, D., Norton, C. A., ... Hickey, N. (2010). The “five rights” of clinical reasoning: An educational model to enhance nursing students' ability to identify and manage clinically “at risk” patients. *Nurse Education Today*, 30(6), 515–520. doi.org/10.1016/j.nedt.2009.10.020
- Liamputtong, P. (2011). *Focus Group Methodology: Principles and Practice*. London: SAGE Publications Ltd.
- Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., ... Moher, D. (2009). The PRISMA Statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: Explanation and elaboration. *Annals of Internal Medicine*, 151(4), 65–94. doi.org/10.7326/0003-4819-151-4-200908180-00136
- 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), 204–16. doi.org/10.1080/07434610701553635

- Light, J., Drager, K., & Nemser, J. G. (2004). Enhancing the appeal of AAC technologies for young children: Lessons from the toy manufacturers. *Augmentative and Alternative Communication*, 20(3), 137–149. doi.org/10.1080/07434610410001699735
- Light, J., Page, R., Curran, J., & Pitkin, L. (2007). Children's ideas for the design of AAC assistive technologies for young children with complex communication needs. *Augmentative and Alternative Communication*, 23(4), 274–287. doi.org/10.1080/07434610701390475
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry*. Beverly Hills, California: SAGE Publications.
- Lindsay, S. (2010). Perceptions of health care workers prescribing augmentative and alternative communication devices to children. *Disability and Rehabilitation. Assistive Technology*, 5(3), 209–222. doi.org/10.3109/17483101003718195
- Livingstone, R., & Paleg, G. (2014). Practice considerations for the introduction and use of power mobility for children. *Developmental Medicine and Child Neurology*, 56(3), 210–221. doi.org/10.1111/dmcn.12245
- Lloyd-Smith, W. (1997). Evidence-based practice and occupational therapy. *The British Journal of Occupational Therapy*, 60(11), 474–478. doi.org/10.1177/030802269706001103
- Long, T. M., & Perry, D. F. (2008). Pediatric physical therapists' perceptions of their training in assistive technology. *Physical Therapy*, 88(5), 629–39. doi.org/10.2522/ptj.20060356

- Long, T. M., Woolverton, M., Perry, D. F., & Thomas, M. J. (2007). Training needs of pediatric occupational therapists in assistive technology. *American Journal of Occupational Therapy*, 61(3), 345–354. doi.org/10.5014/ajot.61.3.345
- Maillacheruvu, P., & Mcduff, E. (2014). South Africa's return to primary care: The struggles and strides of the primary health care system. *The Journal of Global Health*, 1–11. Retrieved from <https://www.ghjournal.org/south-africas-return-to-primary-care-the-struggles-and-strides-of-the-primary-health-care-system/>
- Marley, A. A. J., & Louviere, J. J. (2005). Some probabilistic models of best, worst, and best-worst choices. *Journal of Mathematical Psychology*, 49(6), 464–480. doi.org/10.1016/j.jmp.2005.05.003
- Martin, J. K., Martin, L. G., Stumbo, N. J., & Morrill, J. H. (2011). The impact of consumer involvement on satisfaction with and use of assistive technology. *Disability and Rehabilitation: Assistive Technology*, 6(3), 225–242. doi.org/10.3109/17483107.2010.522685
- Matter, R., Harniss, M., Oderud, T., Borg, J., & Eide, A. H. (2017). Assistive technology in resource-limited environments: a scoping review. *Disability and Rehabilitation: Assistive Technology*, 12(2), 105–114. doi.org/10.1080/17483107.2016.1188170
- Mattingly, C., & Fleming, M. H. (1994). Interactive reasoning: Collaborating with the person. In C. Mattingly & M. H. Fleming (Eds.), *Clinical reasoning: Forms of inquiry in a therapeutic practice* (pp. 178–196). Philadelphia: F.A. Davis.

- McDonald, R. L., Surtees, R., & Wirz, S. (2007). A comparative exploration of the thoughts of parents and therapists regarding seating equipment for children with multiple and complex needs. *Disability and Rehabilitation: Assistive Technology*, 2(6), 319–325.
doi.org/10.1080/17483100701456053
- McFadd, E., & Wilkinson, K. (2010). Qualitative analysis of decision making by speech-language pathologists in the design of aided visual displays. *Augmentative and Alternative Communication*, 26(2), 136–147. doi.org/10.3109/07434618.2010.481089
- McMillan, J. H., & Schumacher, S. (2006). *Research in Education: Evidence-based Inquiry* (6th ed.). Boston: Pearson/Allyn and Bacon.
- McPeake, J., Bateson, M., & O'Neill, A. (2014). Electronic surveys: How to maximize success. *Nurse Researcher*, 21(3), 24–26. doi.org/10.7748/nr2014.01.21.3.24.e1205
- Mental Health Care Act, No 17 of 2002 (2002). Retrieved from
<https://www.gov.za/documents/mental-health-care-act>
- Moorcroft, A., Scarinci, N., & Meyer, C. (2018). A systematic review of the barriers and facilitators to the provision and use of low-tech and unaided AAC systems for people with complex communication needs and their families. *Disability and Rehabilitation: Assistive Technology*. Advanced online publication. doi.org/10.1080/17483107.2018.1499135
- Moore, M. L. (2009). Developing the preceptorship evaluation survey: a multifaceted approach including cognitive interviews. *Journal for Nurses in Staff Development*, 25(5), 249–253.
doi.org/10.1097/NND.0b013e3181ae2eba

- Mühlbacher, A. C., Zweifel, P., Kaczynski, A., & Johnson, F. R. (2016). Experimental measurement of preferences in health care using best-worst scaling (BWS): theoretical and statistical issues. *Health Economics Review*, 6(1), 5. doi.org/10.1186/s13561-015-0077-z
- Murray, P. J. (1997). Using virtual focus groups in qualitative research. *Qualitative Health Research*, 7(4), 542–549. doi.org/10.1177/104973239700700408
- National Health Act, No 61 of 2003 (2003). doi.org/102GOU/B
- Ned, L., Cloete, L., & Mji, G. (2017). The experiences and challenges faced by rehabilitation community service therapists within the South African primary healthcare health system. *African Journal of Disability*, 6(0), 1–11. doi.org/10.4102/ajod.v6i0.311
- Neille, J., & Penn, C. (2015). Beyond physical access: A qualitative analysis into the barriers to policy implementation and service provision experienced by persons with disabilities living in a rural context. *Rural Remote Health*, 15(3), 1–15.
- Nicolson, A., Moir, A., & Millstead, J. (2012). Impact of assistive technology on family caregivers of children with physical disabilities: a systematic review. *Disability and Rehabilitation. Assistive Technology*, 7(5), 345–349. doi.org/10.3109/17483107.2012.667194
- Norman, G. (2005). Research in clinical reasoning: Past history and current trends. *Medical Education*, 39(4), 418–427. doi.org/10.1111/j.1365-2929.2005.02127.x

- Onwuegbuzie, A. J., Bustamante, R. M., & Nelson, J. A. (2010). Mixed research as a tool for developing quantitative instruments. *Journal of Mixed Methods Research*, 4(1), 56–78.
doi.org/10.1177/1558689809355805
- Orton, M. (2008). Factors that may be considered by occupational therapists during the assessment of clients for assistive technology and whether it permeates through to the eventual prescription. *Journal of Assistive Technologies*, 2(1), 11–22.
doi.org/10.1108/17549450200800003
- Østensjø, S., Carlberg, E. B., & Vøllestad, N. K. (2005). The use and impact of assistive devices and other environmental modifications on everyday activities and care in young children with cerebral palsy. *Disability and Rehabilitation*, 27(14), 849–861.
doi.org/10.1080/09638280400018619
- Ouimet, J. A., Carini, R. M., Kuh, G. D., & Bunnage, J. C. (2004). Using focus groups to establish the validity and reliability of a college student survey. *Research in Higher Education*, 45(3), 233–250.
- Parette, H. P., & Brotherson, M. J. (2004). Family-centered and culturally responsive assistive technology decision making. *Infants & Young Children*, 17(4), 355–367.
doi.org/10.1097/00001163-200410000-00008
- Parette, H. P., Huer, M. B., & Brotherson, M. J. (2001). Related service personnel perceptions of team AAC decision-making across cultures. *Education and Training in Mental Retardation and Developmental Disabilities*, 36(1), 69–82.

- Parette, H. P., Quesenberry, A. C., & Blum, C. (2010). Missing the boat with technology usage in early childhood settings: A 21st century view of developmentally appropriate practice. *Early Childhood Education Journal*, 37(5), 335–343. doi.org/10.1007/s10643-009-0352-x
- Parette, P., Vanbiervliet, A., & Hourcade, J. (2000). Family-centered decision-making in assistive technology. *Journal of Special Education Technology*, 15(1), 45–55.
- Pett, M., Lackey, N., & Sullivan, J. (2011). *Making sense of factor analysis*. London: SAGE Publications, Inc.
- Pluye, P., Robert, E., Cargo, M., & Bartlett, G. (2011). Proposal: A mixed methods appraisal tool for systematic mixed studies reviews. Retrieved from [http://mixedmethodsappraisaltoolpublic.pbworks.com/w/file/84371689/MMAT 2011 criteria and tutorial 2011-06-29updated2014.08.21.pdf](http://mixedmethodsappraisaltoolpublic.pbworks.com/w/file/84371689/MMAT%2011%20criteria%20and%20tutorial%202011-06-29updated2014.08.21.pdf)
- Promotion of Equality and Prevention of Unfair Discrimination Act, No 4 of 2000 (2000). Retrieved from www.justice.gov.za/legislation/acts/2000-004.pdf
- Rapport, M. J. K., McWilliam, R. A., & Smith, B. J. (2004). Practices across disciplines in early intervention. *Infants & Young Children*, 17(1), 32–44.
- Reed, B. G., & Kanny, E. M. (1993). The use of computers in school system practice by occupational therapists. *Physical and Occupational Therapy in Pediatrics*, 13(4), 37–55.
- Rix, J., & Paige-Smith, A. (2011). Exploring barriers to reflection and learning - developing a perspective lens. *Journal of Research in Special Educational Needs*, 11(1), 30–41. doi.org/10.1111/j.1471-3802.2010.01185.x

- Robertson, L. (2012). The novice therapist. In L. Robertson (Ed.), *Clinical reasoning in Occupational therapy:Controversies in Practice* (pp. 77–92). Blackwell Publishing Ltd.
- Rodham, K., & Gavin, J. (2006). The ethics of using the internet to collect qualitative research data. *Research Ethics Review*, 2(3), 92–97. doi.org/10.1177/174701610600200303
- Rogers, J. C. (1983). Clinical reasoning:The ethics, science and art. *American Journal of Occupational Therapy*, 37, 601–616.
- Rogers, J. C., & Holm, M. B. (1991). Occupational therapy diagnostic reasoning: A component of clinical reasoning. *The American Journal of Occupational Therapy*, 45(11), 1045–1053. doi.org/doi:10.5014/ajot.45.11.1045
- Romski, M., & Sevcik, R. A. (2005). Augmentative communication and early intervention. *Infants & Young Children*, 18(3), 174–185. https://doi.org/10.1097/00001163-200507000-00002
- Ryan, S., & Hills, C. (2012). Context and how it influences our professional thinking. In L. Robertson (Ed.), *Clinical reasoning in Occupational therapy:Controversies in practice* (pp. 63–92). Hoboken, New Jersey: Blackwell Publishing Ltd.
- Sadao, K., & Robinson, N. B. (2010). *Assistive technology for young children: creating inclusive learning environments*. Baltimore: Paul H. Brookes Publishing Company.
- Saha, S., Beach, M. C., & Cooper, L. A. (2008). Patient centeredness, cultural competence and healthcare quality. *Journal of the National Medical Association*, 100(11), 1275–1285. doi.org/10.1016/S0027-9684(15)31505-4

- Samuels, A., Slemming, W., & Balton, S. (2012). Early childhood intervention in South Africa in relation to the developmental systems model. *Infants & Young Children*, 25(4), 334–345.
doi.org/10.1097/IYC.0b013e3182673e12
- Satterthwaite, F. W. (1946). An approximate distribution of estimates of variance components. *Biometrics Bulletin*, 2, 110–114.
- Sawyer, L. B. E., & Campbell, P. H. (2009). Beliefs about participation-pased practices in early intervention. *Journal of Early Intervention*, 31(4), 326–343.
doi.org/10.1177/1053815109351536
- Schell, B. A., & Cervero, R. M. (1993). Clinical reasoning in occupational therapy: An integrative review. *The American Journal of Occupational Therapy*, 47(3), 605–610.
doi.org/10.5014/ajot.47.7.605
- Scherer, M. (1998). *Matching person and technology*. New York: Institute for Matching Person and Technology.
- Scherer, M. J., & Craddock, G. (2002). Matching person & technology (MPT) assessment process. *Technology & Disability*, 14(3), 125–131.
- Scherer, M. J., Craddock, G., & Mackeogh, T. (2011). The relationship of personal factors and subjective well-being to the use of assistive technology devices. *Disability and Rehabilitation*, 33(10), 811–7. doi.org/10.3109/09638288.2010.511418

- Scherer, M. J., McAnaney, D., & Sax, C. (2006). Opportunity is possibility; performance is action: Measuring participation. *Disability and Rehabilitation*, 28(23), 1467–1471. doi.org/10.1080/09638280600925910
- Scherer, M. J., Sax, C., Vanbiervliet, A., Cushman, L. A., & Scherer, J. V. (2005). Predictors of assistive technology use: The importance of personal and psychosocial factors. *Disability and Rehabilitation*, 27(21), 1321–1331. doi.org/10.1080/09638280500164800
- Scherer, M., Jutai, J., Fuhrer, M., Demers, L., & Deruyter, F. (2007). A framework for modelling the selection of assistive technology devices (ATDs). *Disability and Rehabilitation: Assistive Technology*, 2(1), 1–8. doi.org/10.1080/17483100600845414
- Schlosser, R. W., & Koul, R. K. (2015). Speech output technologies in interventions for individuals with autism spectrum disorders: A scoping review. *Augmentative and Alternative Communication*, 31(4), 285–309. doi.org/10.3109/07434618.2015.1063689
- Schlosser, R. W., & Raghavendra, P. (2004). Evidence-Based Practice in Augmentative and Alternative Communication. *Augmentative and Alternative Communication*, 20(1), 1–21. doi.org/10.1080/07434610310001621083
- Shahmoon-Shanok, R. (2009). What is reflective supervision? In S. S. Heller & L. Gilkerson (Eds.), *A Practical Guide to Reflective Supervision* (pp. 7–23). Washington: Zero to Three.
- Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, 22(2), 63–75. doi.org/10.3233/EFI-2004-22201

- Sherry, K. (2015). Disability and rehabilitation: Essential considerations for equitable, accessible and poverty reducing healthcare in South Africa. In A. Padarath, J. King, & R. English (Eds.), *South African Health Review 2014/2015* (pp. 89–100). Durban: Health Systems Trust. Retrieved from: <http://www.hst.org.za/publications/south-african-health-review-2014/15>
- Slater, D. Y., & Cohn, E. S. (1991). Staff development through analysis of practice. *American Journal of Occupational Therapy*, 45, 1038–1044.
- Srinivasan, S., Mathew, S. N., & Lloyd, L. L. (2011). Insights into communication intervention and AAC in South India: A mixed-methods study. *Communication Disorders Quarterly*, 32(4), 232–246. doi.org/10.1177/1525740109354775
- Statistics South Africa. (2015). *Statistical release P0318. General household survey*. Pretoria. Retrieved from <http://www.statssa.gov.za/publications/P0318/P03182015.pdf>
- Strong, J., Gilbert, J., Cassidy, S., & Bennett, S. (1995). Expert clinicians and student view on clinical reasoning in occupational therapy. *British Journal of Occupational Therapy*, 58, 119–123.
- Sullivan, M., & Lewis, M. (2000). Assistive technology for the very young: Creating responsive environments. *Infants and Young Children*, 12(4), 34–52. doi.org/10.1097/00001163-200012040-00009
- Terrell, S. R. (2011). Face-to-face in writing: My first attempt at conducting a text-based online focus group. *The Qualitative Report*, 16(6), 286–291. Retrieved from <https://nsuworks.nova.edu/tqr/vol16/iss1/19>

- The Constitution of the Republic of South Africa, Act 108 of 1996 (1996). Retrieved from <https://www.gov.za/sites/default/files/Act108of1996s.pdf>
- Thistle, J. J., & Wilkinson, K. M. (2015). Building evidence-based practice in AAC display design for young children: Current practices and future directions. *Augmentative and Alternative Communication*, 31(2), 124–136. doi.org/10.3109/07434618.2015.1035798
- Tomlinson, M., Swartz, L., Officer, A., Chan, K. Y., Rudan, I., & Saxena, S. (2009). Research priorities for health of people with disabilities: An expert opinion exercise. *Lancet*, 374(9704), 1857–62. doi.org/10.1016/S0140-6736(09)61910-3
- Underhill, C., & Olmsted, M. G. (2003). An experimental comparison of computer-mediated and face-to-face focus groups. *Social Science Computer Review*, 21(4), 506–512. doi.org/10.1177/0894439303256541
- United Nations. (1989). *Convention on the rights of the child*. Retrieved from <http://www.ohchr.org/Documents/ProfessionalInterest/crc.pdf>
- United Nations. (2006). *Convention on the rights of persons with disabilities*. Retrieved from <http://www.un.org/disabilities/>
- United Nations International Childrens Emergency Fund, Department of Social Development, & Department of Women Children and People with Disability. (2012). *Children with disabilities in South Africa. A situational analysis 2001-2011*. Retrieved from http://www.unicef.org/southafrica/SAF_resources_sitandisability.pdf

- Unsworth, C. A. (2001). The clinical reasoning of novice and expert occupational therapists. *Scandinavian Journal of Occupational Therapy*, 8(4), 163–173.
doi.org/10.1080/110381201317166522
- Uys, K., & Samuels, A. (2010). Early childhood intervention in South Africa: Minimising the impact of disabilities. In V. Alers & R. Crouch (Eds.), *Occupational therapy: An African perspective* (pp. 206–231). Johannesburg, South Africa: Sarah Shorten Publishers.
- Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing and Health Sciences*, 15(3), 398–405. <https://doi.org/10.1111/nhs.12048>
- van Niekerk, K., Dada, S., & Tönsing, K. (2017). Influences on selection of assistive technology for young children in South Africa: perspectives from rehabilitation professionals. *Disability and Rehabilitation*. Advanced online publication.
doi.org/10.1080/09638288.2017.1416500
- van Niekerk, K., Dada, S., Tönsing, K., & Boshoff, K. (2018). Factors perceived by rehabilitation professionals to influence the provision of assistive technology to children: A systematic review. *Physical and Occupational Therapy in Pediatrics*, 38(2), 168–189.
doi.org/10.1080/01942638.2017.1337661
- Van Niekerk, K., & Tönsing, K. (2015). Eye gaze technology: A South African perspective. *Disability and Rehabilitation: Assistive Technology*, 10(4).
doi.org/10.3109/17483107.2014.974222

- van Rensburg, H. C. J. (2014). South Africa's protracted struggle for equal distribution and equitable access - still not there. *Human Resources for Health*, 12(1), 1–16.
doi.org/10.1186/1478-4491-12-26
- Vergunst, R., Swartz, L., Hem, K. G., Eide, A. H., Mannan, H., MacLachlan, M., ... Schneider, M. (2017). Access to health care for persons with disabilities in rural South Africa. *BMC Health Services Research*, 17(741), 1–8. doi.org/10.1186/s12913-017-2674-5
- Wegner, L., & Rhoda, A. (2015). The influence of cultural beliefs on the utilisation of rehabilitation services in a rural South African context: Therapists' perspective. *African Journal of Disability*, 4(1), 1–8. doi.org/10.4102/ajod.v4i1.128
- Weintraub Moore, H., & Wilcox, M. J. (2006). Characteristics of early intervention practitioners and their confidence in the use of assistive technology. *Topics in Early Childhood Special Education*, 26, 15–23. doi.org/10.1177/02711214060260010201
- Weller, S. C., & Romney, A. K. (1988). *Systematic data collection*. Newbury Park, CA: SAGE Publications.
- Wiersma, W. (2013). The validity of surveys: Online and offline. *Oxford Internet Institute*, 18(3), 321–340. Retrieved from http://wybowiersma.net/pub/essays/Wiersma,Wybo,The_validity_of_surveys_online_and_offline.pdf
- Wilcox, M. J., Dugan, L. M., Campbell, P. H., & Guimond, A. (2006). Recommended practices and parent perspectives regarding AT use in early intervention. *Journal of Special Education Technology*, 21(4), 7–16. doi.org/10.1177/016264340602100402

- Wilcox, M. J., Guimond, A., Campbell, P. H., & Weintraub Moore, H. (2006). Provider perspectives on the use of assistive technology for infants and toddlers with disabilities. *Topics in Early Childhood Special Education*, 26(1), 33–49.
doi.org/10.1177/02711214060260010401
- Wildy, H., & Clarke, S. (2009). Using cognitive interviews to pilot an international survey of principal preparation: A Western Australian perspective. *Educational Assessment, Evaluation and Accountability*, 21(2), 105–117. doi.org/10.1007/s11092-009-9073-3
- World Health Organisation. (2001). *International Classification of Functioning*. Geneva: Author.
- World Health Organisation. (2011). *World Report on Disability 2011*. Retrieved from http://www.who.int/disabilities/world_report/2011/report.pdf
- World Health Organisation, & United Nations International Children’s Emergency Fund. (2015). *Assistive technology for children with disabilities: Creating opportunities for education, inclusion and participation*. Retrieved from <https://www.unicef.org/disabilities/files/Assistive-Tech-Web.pdf>
- World Health Organisation, & United States Agency for International Development. (2011). *Joint position paper on the provision of mobility devices in less resourced settings*. Retrieved from http://www.who.int/disabilities/publications/technology/jpp_final.pdf
- Wright, C., Casey, J., & Porter-Armstrong, A. (2010). Establishing best practice in seating assessment for children with physical disabilities using qualitative methodologies. *Disability and Rehabilitation. Assistive Technology*, 5(1), 34–47.
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APPENDICES

Appendix A

Post-print of Article Published on the Systematic Review

Please note: This is the post print version of the following article

Karin van Niekerk*¹, Shakila Dada¹, Kerstin Tönsing¹ & Kobie Boshoff² (2017). Factors Perceived by Rehabilitation Professionals to Influence the Provision of Assistive Technology to Children: A Systematic Review, Physical & Occupational Therapy in Pediatrics, DOI: 10.1080/01942638.2017.1337661

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Adherence to ethical standards

The ethical board of the University of Pretoria approved the study.

Abstract

Background

The use of Assistive Technology (AT) by children with disabilities has been associated with significant development and improvement in outcomes within all spheres of life. However, AT is often underutilised. Appropriate selection of AT by rehabilitation professionals could improve the satisfaction of the user and their family with their AT.

Data sources

A systematic search identified six studies that investigate the factors that occupational therapists, physiotherapists, as well as speech and language pathologists perceive to influence their provision of AT to children.

Study appraisal

Two qualitative and four quantitative articles were identified. Both article types were appraised using the Mixed Methods Appraisal tool (Pluye, Robert, Cargo, & Bartlett, 2011).

Synthesis method

A process of deductive thematic analysis by using themes from the Assistive Technology Device Selection Framework (Scherer, Jutai, Fuhrer, Demers, & Deruyter, 2007), was followed by inductive thematic analysis to uncover subthemes. Data from all six articles are synthesised to provide a view of factors that are perceived to influence AT selection.

Implications of findings

Within a family-centered perspective, both family and child expectations and preferences should be considered. Professionals should consider the influence of their own preferences and knowledge on the AT they recommend.

Key words:

assistive technology, children with disabilities, rehabilitation professionals.

Factors Perceived by Rehabilitation Professionals to Influence the Provision of Assistive Technology: A Systematic Review

The term Assistive Technology (AT) has been defined as "any item, piece of equipment or product system, whether acquired commercially off the shelf, modified, or customised, that is used to increase, maintain or improve the functional capabilities of a child with a disability" (*Individuals with Disabilities Education Act*, 2004). AT is often recommended by rehabilitation professionals after a process of carefully matching the abilities of a person, the capabilities of the AT as well as the characteristics of the environment (Cook & Polgar, 2008).

Children with disabilities experience a multitude of barriers to participation in activities. This may be due to barriers related to their disability, or those imposed by their environment (King et al., 2009; King, Shields, Imms, Black, & Arden, 2013; Mihaylov, Jarvis, Colver, & Beresford, 2004; Raghavendra, Virgo, Olsson, Connell, & Lane, 2011). The resulting limited participation in, for example, education, play, and family life denies them of countless opportunities for learning and development and inhibits their integration into society.

The use of AT by children with disabilities has been associated with development and improvement (in the domains of motor, communication, social, cognitive, adaptive behaviour, literacy and engagement) in outcomes within all spheres of life (Dunst, Trivette, Hamby, & Simkus, 2013). It has been suggested that AT can be used to overcome some of the barriers that may be experienced by a child with a disability, thereby facilitating participation and learning (Henderson, Skelton, & Rosenbaum, 2008; Schoonover, Argabrite Grove, & Smith, 2013).

Despite the benefits documented, various authors have indicated that AT is underutilised by children with disability (Dugan, Campbell, & Wilcox, 2006; Kling,

Campbell, & Wilcox, 2010). Various reasons have been suggested for this (Bailey, Parette, Stoner, Angell, & Carroll, 2006; Parette, Vanbiervliet, & Hourcade, 2000), including the perceived unwillingness of parents to use the devices in their homes, funding issues, as well as the abandonment of provided devices (Judge, 2002) by the child and family.

While abandonment of assistive technology devices (ATD) clearly contribute to the underutilisation of AT, eventual utilisation of AT can also be influenced by factors that occur before the AT is even procured. According to Scherer, Jutai, Fuhrer, Demers and Deruyter (2007) the process that occurs before the procurement of an ATD is the selection process.

Careful selection of appropriate AT is important in ensuring cost-effectiveness and efficacy in the process (Bernd, Van Der Pijl, & De Witte, 2009; Friederich, Bernd, & De Witte, 2010). Appropriate selection could ensure the satisfaction of the AT user and their family and could limit difficulties and disappointment with AT during the implementation process.

Despite the clear importance of the selection process, this aspect has not received adequate attention in the literature. Not much is known about the reasoning of professionals regarding their selection practices (Friederich et al., 2010) or factors that influence this process, particularly when selecting AT for children. This has clear implications for evidence-based practises in this field.

In a review by Bernd et al. (2009), three models were identified from the literature to be "specific to AT and suitable for selection process" (p. 154). These are the Human Activity Assistive Technology (HAAT) model (Cook & Polgar, 2008), the Matching Person and Technology Model (Scherer, 1998), as well as the ATD Selection framework (Scherer et al., 2007).

The HAAT model (Cook & Polgar, 2008) indicates that AT selection is influenced by four main components - these being the human using the AT, the activity where AT is required, the assistive technology, as well as contextual factors. The Matching Person and Technology Model (Scherer, 1998), is reportedly the most widely published model regarding selection of AT (Bernd et al., 2009) and focuses on matching the abilities and perspectives of the AT consumer with specific AT within the particular environment.

The ATD Selection Framework (Scherer et al., 2007) focuses particularly on aspects of AT provision that influence the process before the AT is procured. It is the only one of the three models that pertinently indicates the influence of the professional in the AT selection process. As professionals are typically intimately involved in AT selection, it could be expected that they would influence this process to a certain extent. This can be illustrated, for example by studies that call for the expansion and improvement of training for professionals regarding AT (Copley & Ziviani, 2004; Long & Perry, 2008; Long, Woolverton, Perry, & Thomas, 2007; Wilcox, Guimond, Campbell, & Weintraub Moore, 2006). Since the current study aimed to identify a broad array of factors from published literature that was reported to influence AT selection as perceived by professionals, the ATD Selection Framework was deemed as the most appropriate analysis framework for the current study.

According to the authors (Scherer et al., 2007), the ADT Selection Framework was conceptualised after reviewing available literature and utilises a consumer-centered approach, characterised by joint decision making between the consumer of the AT and the provider. Although the framework suggests that the consumer refers only to the single person using the AT, this understanding can be broadened when the framework is applied to children, to include both child and family. Family-centered intervention and

specifically, family-centred AT decision making has been described as best practise (Judge, 2002; Parette & Brotherson, 2004; Parette et al., 2000) and therefore the family is as much a consumer of the AT as the child.

In the ATD Selection Framework (Scherer et al., 2007), the authors indicate that two broad categories of factors (environmental and personal) as well as the interplay between them, influence the ATD decision making and selection process. Within the ATD Selection Framework, environmental factors (including cultural and financial priorities, legislation and policies as well as the attitudes of key others) form the backdrop to ATD selection, influencing the entire selection process. The framework acknowledges that personal factors of the consumer as well as the provider influence the selection of AT within a particular environment. Personal factors (pertaining to the child and family as well as the provider) include the resources at their disposal (e.g. financial), their knowledge and information, their expectations as well as their personal preferences and priorities. Personal factors (influenced by the particular environmental factors) are brought to the ATD decision making and device selection process (based on assessments of the objective and subjective needs of the consumer and provider) and contribute to the eventual procurement and provision of a device.

In order to better understand the factors that influence professionals in their provision of AT, the authors undertook a review of literature. This review focussed on factors influencing the selection of the AT. The aim of the systematic review was therefore to identify factors uncovered in published research studies as perceived by occupational therapists (OT), physiotherapists (PT) as well as speech language pathologists (SLP) to influence their provision of assistive technology (AT) to children with disabilities.

Method

Search

A librarian was consulted in the selection of databases and development of the search terms. The searched databases comprised of CINAHL, PsycINFO, ERIC, Medline, Academic Search Complete, Health Source: Nursing/Academic Edition, African Wide Information, Humanities Source (all accessed through EBSCO HOST), as well as IEEEExplore, as these cover content related to allied health professions and/or assistive technology.

Search terms included variations of words describing the population that was targeted in the search. These included variations of *professional*, as well as *child with a disability*. Variations of the term *assistive technology* were also included. Specific types of AT (those typically recommended by OT, SLP or PT) were included as alternatives (for example mobility device or augmentative and alternative communication device) as authors frequently use these specific terms in papers rather than using the more generic term assistive technology (for example Lindsay, 2010).

The specific search terms as used on EBSCO HOST searches were (*profession* OR service provider* OR clinician* OR therapist**) AND (*assistive technolog* OR assistive device* OR adapt* equipment OR adapt* technolog* OR adapt* device* OR mobility aid OR power* mobility OR non-power* mobility OR switch OR adapt* toy* OR "Augmentative and Alternative Communicat*" OR augment* communicat* OR low technolog**) AND (*child* OR toddler* OR infant* OR preschool**) AND (*disab* OR disorder* OR impair* OR handicap**)

There were 805 articles identified by means of the database searches.

In addition to these searches, hand searches were undertaken by going through the reference lists of identified articles. Nineteen (19) additional articles were identified in this manner.

Eligibility Criteria

In order to limit the articles to only the relevant ones, selection criteria were applied by the reviewers during the screening process. Articles were only included if they 1) were published in English between 1990 and 2014 within a peer reviewed journal; 2) described a research study (qualitative, quantitative or mixed-method); 3) aimed (amongst other aims) to determine what factors are perceived by OTs, PTs or SLPs to influence them in their provision of AT to children. The AT described in the article had to be 4) limited to that generally recommended by the named professions; and 5) had to be provided to children (aged between 0 and 18 years) with a disability.

As only research studies were included, all review articles, theoretical articles, conference presentations and expert opinion articles were excluded. Case studies with one participant were also excluded. Articles were excluded when data obtained from other professions (for example teachers) were analysed and discussed together with data obtained from the included professionals. If results were discussed separately for the different professional groups (for example Wilcox, Guimond, Campbell, & Weintraub Moore, 2006), the studies were included. Articles discussing specifically cochlear implants or hearing aids were excluded, as these particular forms of AT do not fall within the professional scope of the named professionals.

Study Selection

After the articles were identified through the database and hand searches, duplicates were removed and the remaining 496 articles were reviewed. The articles

were independently screened by two reviewers on title level. The first author was involved in screening all the articles, with one of the co-authors reviewing each article independently as well. At this point, where reviewers did not agree on the selection of a particular article, the article was included.

The remaining articles were independently reviewed on abstract level by the first author and one of the co-authors. Inter-rater agreement (as described by Schlosser & Koul, 2015) on the abstract level was calculated to be 95%. When reviewers did not agree on the selection of the article, the article was included in the next phase of the review.

A total of 64 articles remained and were assessed for eligibility on full text level. The same process was followed, with the first author reviewing all the articles and co-authors each blindly reviewing a third of the papers. Inter-rater agreement on full text level was calculated at 84%. When two reviewers did not agree on whether an article should be included, the authors discussed this, and asked a third reviewer to review the paper as well. Results were then discussed, until agreement was reached. A total of 58 articles were excluded after review of the full text. The reasons for exclusion of articles were that articles included professionals other than OT, PT or SLP in the data analysis (n=5); did not focus specifically on AT (n=10); were not limited to children (n=3); did not focus on factors influencing professionals in AT provision (n=27); or the article was not an empirical study/ was a case study with a single participant (n=13). Six articles were identified through this process to be included in the final review. The PRISMA diagram indicating the different phases of the review as recommended by Liberati et al. (2009) is illustrated in Figure 1.

Insert Figure 1 about here.

Quality Appraisals

The Lloyd-Smith hierarchy (Lloyd-Smith, 1997) was developed within a rehabilitation field (occupational therapy) and was used to categorise the quantitative studies. Level 1a on this hierarchy indicates that a study is a meta-analysis of randomised control trials, Level 1b points to one individual randomised controlled study. Level 2a indicates that a study is a well-designed, non-randomised controlled study, with Level 2b pointing to a well-designed quasi-experimental study. Level 3 indicates that a study is non-experimental descriptive. Studies on Level 4 of the Lloyd-Smith hierarchy would be respectable opinions and provide the lowest level of evidence.

The hierarchy proposed by Daly et al., (2007) is one of the few appraisal tools that allow qualitative studies to be hierarchically appraised for the level of evidence provided (a process that is typically only applied to quantitative studies). It was used in this review in order to have a method of appraising the qualitative studies in a similar way as the quantitative studies. The hierarchy categorises qualitative studies into one of four broad levels, Level 1 (Generalizable studies), Level 2 (conceptual studies), Level 3 (descriptive studies) and Level 4 (single case studies), indicating a decreased likelihood to produce good evidence (Daly et al., 2007).

As the Mixed Methods Appraisal Tool (MMAT, 2011) (Pluye, Robert, Cargo, & Bartlett, 2011) has been found useful to concomitantly appraise the quality of qualitative and quantitative studies in a mixed study review (Pace et al., 2012), it was used to appraise all articles. This tool has two subsections (for qualitative and quantitative studies), each with four items posing questions regarding the methods of the included studies. The qualitative subsection of the MMAT was completed and scored for the qualitative studies and the quantitative descriptive subsection of the tool was completed for the remaining four (quantitative) studies. Scores were calculated by dividing the

number of criteria an article met, by four and multiplying by a hundred. Therefore, when one criterion is met, the score is 25%, when all four are met, the score would be 100%.

The first author completed an appraisal of all 6 articles, with two of the co-authors each rating 3 articles independently. The results of the appraisals were discussed until consensus (100% agreement) was reached.

Data Synthesis

A mixed methods synthesis was undertaken in order to synthesise qualitative and quantitative data gathered from the six articles. A convergent design with qualitative synthesis (only) of all study types (Pluye & Hong, 2014) was deemed most appropriate for this study's purpose. According to this method, the result of both the qualitative and quantitative articles was converted into qualitative data, namely themes.

Thematic analysis has been described as a synthesis method that is very adaptable and that can be used with diverse evidence types (Dixon-woods, Agarwal, Jones, Young, & Sutton, 2005). A thematic analysis of the results was conducted in two phases. The first phase was a deductive thematic analysis based on the ATD Selection Framework. Every factor identified in the ATD Selection Framework (Scherer et al., 2007) was used as a theme for this analysis. Each factor was operationalized for the purpose of this review with definitions included in a coding manual for use during the analysis process. This is available as Appendix A. Two components of the ATD Selection Framework (assessment of functional AT need and assessment of functional AT disposition) (Scherer et al., 2007) were combined into an "Assessment " category, as it proved to be challenging to distinguish between the two separate categories during analysis. Themes from the framework therefore included (1) Cultural and financial priorities, (2) Legislation and policy, (3) Attitudes of key others, (4) Resources (family, friends, significant others, financial), (5) Knowledge and information, (6) Expectations, (7)

Personal preferences and priorities, and (8) Assessment. It should further be noted that, as indicated in the original framework, Themes 1-3 related to environmental factors, and Themes 4-7 to personal factors (of the provider and consumer). During this phase of coding, a theme was created for data items that did not seem to fit into any of the existing eight themes, initially named "other".

As the authors were interested only in the factors identified in the primary studies (and not the extent to which a certain factor influenced AT provision), the measurement instruments (when available) was analysed according to the themes within the quantitative articles. If the measurement instrument was not available, the results section of the paper was analysed (also only according to the themes). For the qualitative papers, thematic analysis was done for the results section of the paper. The first author analysed all the papers according to the themes, with one co-author checking the analysis to ensure consistency. Items where the authors did not agree were discussed until 100% agreement could be reached.

After this initial deductive analysis, all the data items across the different articles were collated under each of the themes. A process of inductive analysis (second phase) followed in order to further delineate the theme termed 'other' and also to identify subthemes within each of the identified themes. This inductive analysis was conducted by the first three authors during a joint meeting. Authors agreed that all items grouped under the theme 'other' were related to assistive technology, and therefore this was identified as a theme. Together with the themes from Phase 1, this amounted to nine themes. Items under each of the themes were discussed and grouped by the first three authors, resulting in the identification of a total of 31 subthemes.

Results

Study Characteristics

A summary of the final 6 articles can be found in Table 1. Two of the articles reported on qualitative studies involving inductive data analysis of data collected during interviews with their participants. Four of the six articles reported on quantitative surveys. All of the studies were conducted in developed countries, with three conducted in the USA, two in Canada and one in Australia. Two of the studies focused only on augmentative and alternative communication, one focused on computers, while three looked at general AT.

Critical Appraisal Results

All of the quantitative studies were categorised to be on level 3 (non-experimental descriptive studies) of the Lloyd-Smith hierarchy (Lloyd-Smith, 1997) and both qualitative studies were categorised on level 3 (descriptive studies) of the hierarchy proposed by Daly et al. (2007).

Insert table 1 around here

The appraisal of the qualitative articles using the Mixed Methods Appraisal tool (MMAT, 2011) (Pluye, Robert, Cargo, & Bartlett, 2011), is shown in Table 2. The summary of the appraisal of the quantitative articles is shown in Table 3.

Insert tables 2 and 3 around here

The qualitative studies each met two of the four criteria set in the MMAT. The studies did include relevant sources of data as well as appropriate data analysis. However, neither of the qualitative studies provided appropriate consideration for how their findings related to the particular context that was studied, or how the findings related to the influence of the researchers themselves. Regarding the quantitative appraisal, the studies met between one and three of the four criteria set in the quantitative part of the

MMAT. A concern identified across all four quantitative studies was the appropriateness of the measurement instrument. Although studies differed in the rigour with which validity and reliability of the survey instruments were determined, none met the high standards set by the appraisal tool. This could negatively influence the quality of the results obtained in the studies.

Data Synthesis

In Tables 4, 5, 6 and 7 the results of the data synthesis are provided. The tables provide each theme as operationalized from the ATD Selection Framework (Scherer et al., 2007) as well as subthemes identified by inductive thematic analysis. Studies mentioning each subtheme are also specified. The additional theme identified during thematic analysis (Assistive technology), together with its subthemes are also included.

Environmental factors (Including themes 1 to 3). The cultural and financial priorities from the environment (theme 1) (interpreted as influences from the macro systemic environment) were only mentioned by participants in the study by Lindsay (2010). Environmental factors relating specifically to legislation and policy (theme 2) were also mentioned in this article and one quantitative article (Wilcox et al., 2006). The attitudes of key others toward the AT (theme 3) was mentioned in three articles (Iacono & Cameron, 2009; Lindsay, 2010; Wilcox et al., 2006). This would indicate that participants in the remaining quantitative articles were not asked about attitudes of key others as influencing AT..

Insert table 4 around here

Personal factors (Including themes 4 to 7). Tables 5 and 6 show the themes and subthemes unpacking the personal factors of the child, family and provider that influence ATD selection. Resources (Table 5) pertaining to family, friends and significant others (theme 4), as well as financial resources were discussed in all the papers. The resource of

time, for example time required to teach families to use a device (Iacono & Cameron, 2009), was identified as an subtheme. This implies that rehabilitation professionals consider the time it will take them to teach AT during the selection process.

Insert table 5 around here

The knowledge theme (theme 5) included subthemes of training, experience and knowledge specifically of AT assessment and best practice, which were each mentioned in four of the six articles. This would imply, for example, that how long a professional has been working in the field of AT (Lahm & Sizemore, 2002) or their training on AT (Chmiliar, 2007) would influence the AT that they select. The perceptions of professionals regarding their own skill levels (self-efficacy) was identified as a subtheme. The implication of this would be that professionals' confidence in their own skills influence the AT they recommend. The theme of expectations (theme 6) did not include many items, with only a few noted between the different articles - particularly related to the expectation of families and teachers. In the article by Wilcox et al. (2006) it was indicated, for example, that a parent's expectations of a child could influence the likeliness of AT being listed on a child's Individualised Family Service Plan. Although the expectations of families and teachers were perceived to influence the provision of AT to children, the expectations of the child themselves were not mentioned in the qualitative articles or asked about in the quantitative articles. Personal preferences and priorities (theme 7) of both the provider as well as the family were mentioned (n=3), while the two qualitative articles referred to conflict and tension between what parents would like for their child, and what the providers are able/willing to recommend. The preferences of the child (in addition to their expectations) were not mentioned, which could have implications for the acceptance of the AT by the child themselves.

Insert table 6 around here

Assessment (theme 8). Table 7 unpacks the theme of assessment, with the subthemes created by the authors, including assessment of the child characteristics, (for example diagnosis) mentioned in four of the articles. The subtheme of physical environment (demands of the environment as well as the environment of assessment), activity, as well as goodness of fit between device and the child and family in need of the device, was each mentioned twice. This illustrates that rehabilitation professionals do consider aspects regarding assessment when recommending AT.

Assistive technology (theme 9). Although the ATD Selection Framework (Scherer et al., 2007) does not describe the assistive technology itself as something to be considered separately, this theme was added during the process of thematic analysis as items referring to this theme did not fit elsewhere. Firstly, it was mentioned that the characteristics of the device itself influenced its provision, for example, whether it was easy to set up or portable (for example in Reed & Kanny, 1993). The availability of the AT for trial was mentioned in three of the articles, with ease of maintenance of the AT mentioned once. Therefore the AT itself and whether it is available for trial will influence the recommendation by a rehabilitation professional.

Insert table 7 around here

Discussion

Both qualitative and quantitative data were synthesised in this review. These data types complemented each other in both broadening and deepening the understanding of this topic.

By synthesising data from empirical studies according to the ATD Selection Framework (Scherer et al., 2007) both the existing theoretical framework as well as the data available from empirical studies on this topic can be better understood, and gaps in

the theoretical and the empirical knowledge base can be highlighted to guide further developments in this field.

On the one hand, the identification of the additional theme (AT) could indicate the need to expand and revise the theoretical framework. The identification of subthemes could facilitate a more detailed understanding of the different components of the framework. Each subtheme can be viewed as a factor influencing the selection of AT by rehabilitation professionals.

On the other hand, the data synthesis has also made it possible to identify gaps in the empirical knowledge base that should be addressed in future studies. For example, the review highlighted the relatively infrequent mention of macro systemic and cultural factors particularly in the quantitative articles, although the influence of these factors form an integral component of the ATD Selection Framework (Scherer et al., 2007), and have also been described in other theoretical models, for example the Human Activity Assistive Technology (HAAT) model (Cook & Polgar, 2008) . Therefore, more studies should investigate the influence of these factors on AT selection.

Overall, it seems that a closer articulation of theoretical and empirical knowledge bases is desirable when studying AT provision. Empirical studies should pertinently set out to test the models that have been developed, and this information in turn should feed into the process of adjusting and updating the models developed.

As family-centered help giving practices(Dunst, Trivette, & Hamby, 2007) and family-centered AT decision making (Judge & Parette, 1998; Parette et al., 2000; Parette & Scherer, 2004) have been described as best practice when providing intervention to children it is important to view not only the child, but the family as the consumer of recommended AT. From a family-centered perspective, it is to be expected that the family's expectations and preferences should be considered in the AT selection

process, as was reflected in the data. However, through the synthesis of the data, it became clear that the perspective and expectations of the child in need of the AT was not frequently mentioned as a factor influencing AT provision. While it is positive that the perspectives of the family are considered, the opinion of the child him-/herself should not be forgotten, as this could contribute to their satisfaction and ultimate utilisation of the AT. Rehabilitation professionals should focus on ensuring children's participation in the AT selection process as far as possible.

Furthermore, the review highlighted the important role the personal factors pertaining to the professional him-/herself play in the AT selection process. Training on topics related to AT can increase knowledge in this field and could improve the ability and confidence of rehabilitation professionals in recommending AT. Professionals should consider also how their own preferences regarding technology and specifically AT, could influence the children and families to whom they provide services.

This review has several limitations. First, very few relevant studies were identified. It is possible that by including additional data bases, more articles could have been identified. Second, the studies that were identified employed descriptive methodologies that are regarded as presenting a lower level of evidence. They also had methodological shortcomings that further reduced the quality of the information that could be gleaned from them. These limitations preclude strong recommendations for practice emerging from this review but also highlight the urgent need for well-designed studies employing methodologies that produce a higher level of evidence regarding factors that influence professionals in their selection of AT.

The review highlights that a multitude of factors can influence AT selection and provision, including environmental factors and factors related to the key role players in this process (child, family, and rehabilitation professionals). By becoming aware of these

factors, rehabilitation professionals can identify and possibly also address some of the barriers to appropriate AT selection and provision for young children, in order to maximise their participation.

Declaration of interest

The authors report no conflict of interest.

References

- Bailey, R. L., Parette, H. P., Stoner, J. B., Angell, M. E., & Carroll, K. (2006). Family Members' Perceptions of Augmentative and Alternative Communication Device Use. *Language, Speech & Hearing Services in Schools, 37*(January), 50–60.
- Bernd, T., Van Der Pijl, D., & De Witte, L. P. (2009). Existing models and instruments for the selection of assistive technology in rehabilitation practice. *Scandinavian Journal of Occupational Therapy, 16*(3), 146–58.
<https://doi.org/10.1080/11038120802449362>
- Chmiliar, L. (2007). Perspectives on assistive technology : What teachers , health professionals , and speech and language pathologists have to say. *Developmental Disabilities Bulletin, 35*(1), 1–17.
- Cook, A. M., & Polgar, J. M. (2008). *Cook & Hussey's Assistive Technologies* (3rd ed.). St. Louis, Missouri: Mosby Elsevier.
- Copley, J., & Ziviani, J. (2004). Barriers to the use of assistive technology for children with multiple disabilities. *Occupational Therapy International, 11*(4), 229–243.
<https://doi.org/10.1002/oti.213>
- Daly, J., Willis, K., Small, R., Green, J., Welch, N., Kealy, M., & Hughes, E. (2007). A hierarchy of evidence for assessing qualitative health research. *Journal of Clinical Epidemiology, 60*(1), 43–49. <https://doi.org/10.1016/j.jclinepi.2006.03.014>
- Dixon-woods, M., Agarwal, S., Jones, D., Young, B., & Sutton, A. (2005). Synthesising qualitative and quantitative evidence : a review of possible methods. *Journal of Health Services Research & Policy, 10*(1), 45–53.
- Dugan, L. M., Campbell, P. H., & Wilcox, M. J. (2006). Making Decisions About Assistive Technology With Infants and Toddlers. *Topics in Early Childhood Special Education. https://doi.org/10.1177/02711214060260010301*

- Dunst, C. J., Trivette, C. M., & Hamby, D. W. (2007). Meta-analysis of family-centered helping practices research. *Mental Retardation and Developmental Disabilities Research Reviews*, 13(4), 370–378.
- Dunst, C. J., Trivette, C. M., Hamby, D. W., & Simkus, A. (2013). Systematic review of studies promoting the use of assistive technology devices by young children with disabilities. *Practical Evaluation Reports*, 5(1), 1–32. Retrieved from http://www.practicalevaluation.org/reports/CPE_Report_Vol5No1.pdf
- Friederich, A., Bernd, T., & De Witte, L. (2010). Methods for the selection of assistive technology in neurological rehabilitation practice. *Scandinavian Journal of Occupational Therapy*, 17(4), 308–318.
<https://doi.org/10.3109/11038120903377082>
- Henderson, S., Skelton, H., & Rosenbaum, P. (2008). Assistive devices for children with functional impairments: Impact on child and caregiver function. *Developmental Medicine and Child Neurology*, 50(2), 89–98. <https://doi.org/10.1111/j.1469-8749.2007.02021.x>
- Iacono, T., & Cameron, M. (2009). Australian speech-language pathologists' perceptions and experiences of augmentative and alternative communication in early childhood intervention. *Augmentative and Alternative Communication*, 25(4), 236–249.
<https://doi.org/10.3109/07434610903322151>
- Individuals with Disabilities Education Act (2004). United States Congress. Retrieved from http://www.parentcenterhub.org/wp-content/uploads/repo_items/PL108-446.pdf
- Judge, S. (2002). Family-Centered Assistive Technology Assessment and Intervention Practices for Early Intervention. *Infants & Young Children*, 15(1), 60–68.
<https://doi.org/10.1097/00001163-200207000-00009>

- Judge, S. L., & Parette, H. P. (1998). Family-Centered Assistive Technology Decision Making. *The Transdisciplinary Journal*, 8(2), 185–205.
- King, G., Lawm, M., King, S., Rosenbaum, P., Kertoy, M. K., & Young, N. L. (2009). A Conceptual Model of the Factors Affecting the Recreation and Leisure Participation of Children with Disabilities. *Physical & Occupational Therapy in Pediatrics*, 23(1), 63–90. Retrieved from http://informahealthcare.com/doi/abs/10.1080/J006v23n01_05
- King, M., Shields, N., Imms, C., Black, M., & Ardern, C. (2013). Participation of children with intellectual disability compared with typically developing children. *Research in Developmental Disabilities*, 34(5), 1854–1862. <https://doi.org/10.1016/j.ridd.2013.02.029>
- Kling, A., Campbell, P. H., & Wilcox, J. (2010). Young Children with Physical Disabilities. Caregiver perspectives about assistive technology. *Infants and Young Children*, 23(3), 169–183.
- Lahm, E. A., & Sizemore, L. (2002). Factors that influence technology decision making. *Journal of Special Education Technology*, 17(1), 15–26.
- Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., ... Moher, D. (2009). The PRISMA Statement for Reporting Systematic Reviews and Meta-Analyses of Studies That Evaluate Health Care Interventions: Explanation and ElaborationPRISMA: Explanation and Elaboration. *Annals of Internal Medicine*, 151(4), W-65. Retrieved from <http://dx.doi.org/10.7326/0003-4819-151-4-200908180-00136>
- Lindsay, S. (2010). Perceptions of health care workers prescribing augmentative and alternative communication devices to children. *Disability and Rehabilitation. Assistive Technology*, 5(3), 209–222. <https://doi.org/10.3109/17483101003718195>

- Lloyd-Smith, W. (1997). Evidence-Based Practice and Occupational Therapy. *The British Journal of Occupational Therapy*, 60(11), 474–478.
<https://doi.org/10.1177/030802269706001103>
- Long, T. M., & Perry, D. F. (2008). Pediatric physical therapists' perceptions of their training in assistive technology. *Physical Therapy*, 88(5), 629–39.
<https://doi.org/10.2522/ptj.20060356>
- Long, T. M., Woolverton, M., Perry, D. F., & Thomas, M. J. (2007). Training needs of pediatric occupational therapists in assistive technology. *American Journal of Occupational Therapy*, 61(3), 345–354.
- Mihaylov, S. I., Jarvis, S. N., Colver, A. F., & Beresford, B. (2004). Identification and description of environmental factors that influence participation of children with cerebral palsy. *Developmental Medicine and Child Neurology*, 46(5), 299–304.
<https://doi.org/10.1111/j.1469-8749.2004.tb00489.x>
- Pace, R., Pluye, P., Bartlett, G., Macaulay, A. C., Salsberg, J., Jagosh, J., & Seller, R. (2012). Testing the reliability and efficiency of the pilot Mixed Methods Appraisal Tool (MMAT) for systematic mixed studies review. *International Journal of Nursing Studies*, 49(1), 47–53. <https://doi.org/10.1016/j.ijnurstu.2011.07.002>
- Parette, H. P., & Brotherson, M. J. (2004). Family-centered and Culturally Responsive Assistive Technology Decision Making. *Infants & Young Children*, 17(4), 355–367.
<https://doi.org/10.1097/00001163-200410000-00008>
- Parette, P., & Scherer, M. (2004). Assistive Technology Use and Stigma. *Education and Training in Developmental Disabilities*, 39(3), 217–226.
<https://doi.org/10.2307/23880164>
- Parette, P., Vanbiervliet, A., & Hourcade, J. (2000). Family-centered decision-making in

- assistive technology. *Journal of Special Education Technology*, 15(1), 45–55.
- Pluye, P., & Hong, Q. N. (2014). Combining the Power of Stories and the Power of Numbers: Mixed Methods Research and Mixed Studies Reviews. *Annual Review of Public Health*, 35(1), 29–45. <https://doi.org/10.1146/annurev-publhealth-032013-182440>
- Pluye, P., Robert, E., Cargo, M., & Bartlett, G. (2011). Proposal: A mixed methods appraisal tool for systematic mixed studies reviews. *Montréal: McGill University*, (Part I), 1–8. Retrieved from http://mixedmethodsappraisaltoolpublic.pbworks.com/w/file/84371689/MMAT2011_criteria_and_tutorial_2011-06-29updated2014.08.21.pdf
- Raghavendra, P., Virgo, R., Olsson, C., Connell, T., & Lane, A. E. (2011). Activity participation of children with complex communication needs, physical disabilities and typically-developing peers. *Developmental Neurorehabilitation*, 14(3), 145. <https://doi.org/10.3109/17518423.2011.568994>
- Reed, B. G., & Kanny, E. M. (1993). The use of computers in school system practice by occupational therapists. *Physical and Occupational Therapy in Pediatrics*, 13(4), 37–55.
- Scherer, M. (1998). *Matching person and technology*. New York: Institute for Matching Person and Technology.
- Scherer, M., Jutai, J., Fuhrer, M., Demers, L., & Deruyter, F. (2007). A framework for modelling the selection of assistive technology devices (ATDs). *Disability and Rehabilitation: Assistive Technology*, 2(1), 1–8.
- Schlosser, R. W., & Koul, R. K. (2015). Speech output technologies in interventions for individuals with autism spectrum disorders: a scoping review. *Augmentative and Alternative Communication, Early Onli*(January), 1–25.

<https://doi.org/10.3109/07434618.2015.1063689>

Schoonover, J., Argabrite Grove, R. E., & Smith, Y. (2013). Influencing participation through assistive technology. In J. Case-Smith & J. C. O'Brien (Eds.), *Occupational therapy for children* (Sixth Ed, pp. 583–619). Maryland Heights, Missouri: Mosby Elsevier.

Wilcox, M. J., Guimond, A., Campbell, P. H., & Weintraub Moore, H. (2006). Provider Perspectives on the Use of Assistive Technology for Infants and Toddlers With Disabilities. *Topics in Early Childhood Special Education*, 26(1), 33–49.

<https://doi.org/10.1177/02711214060260010401>

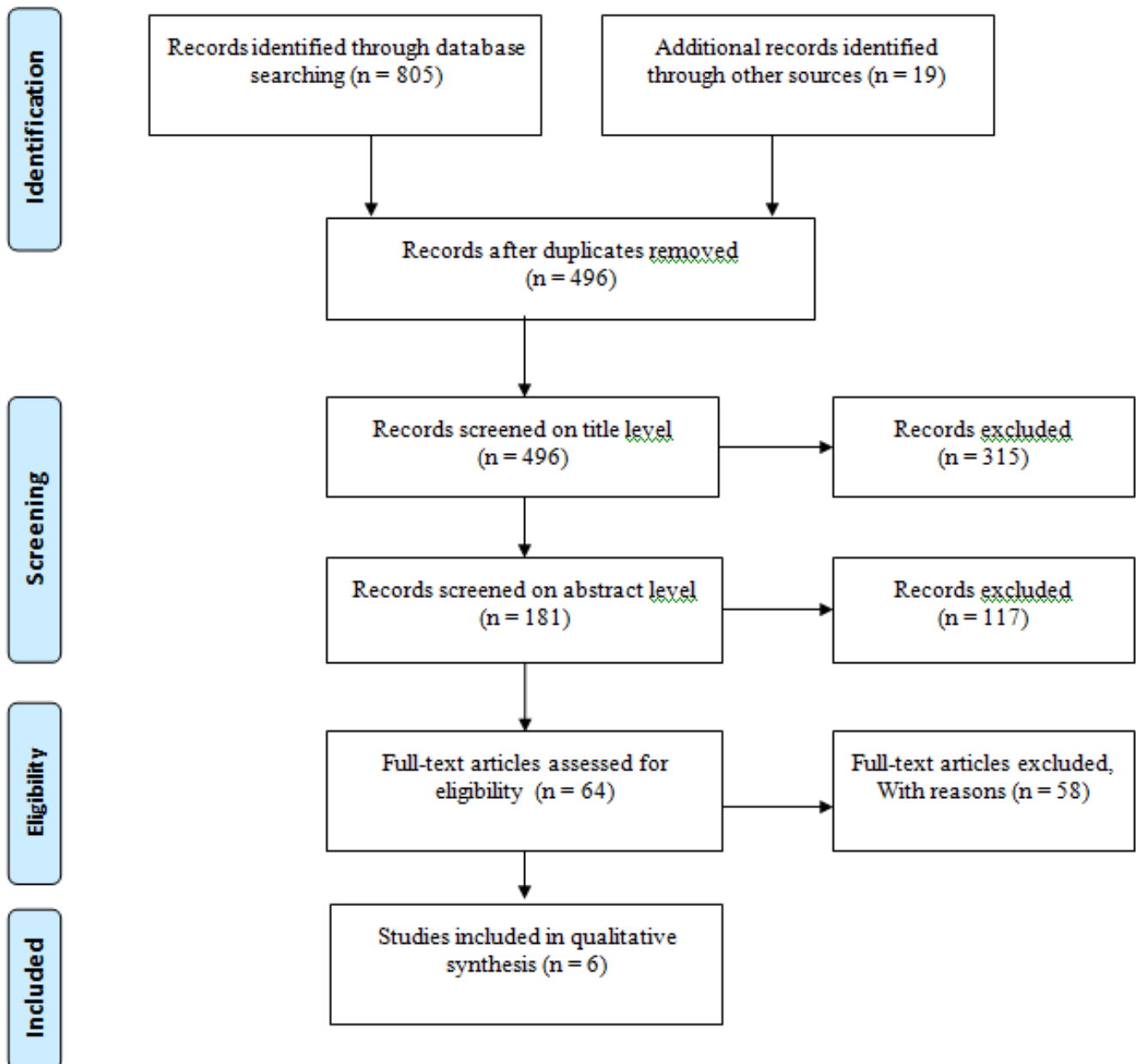


Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) flow diagram for studies included in the review. Format developed by Liberati et al. (2009)

Table 1

Summary of included articles

Author	Aim of study	Sample	Setting	Type of AT	Methods	Summary of results
Chmiliar (2007)	Determining levels of, and satisfaction with, training in AT; funders of AT; Barriers associated with AT; Importance and availability of support strategies	Teachers (n = 129), SLP (n = 32), Health professionals (OT or PT according to the article) (n = 87)	Province of Alberta, Canada	General AT	Quantitative: Survey Different surveys distributed to each professional group - teachers, health professionals, and SLPs	Data presented from the SLP group was analysed. 6% of SLPs indicated that they felt very proficient in aspects related to AT, and only 6% were very satisfied with their skills related to AT. The percentage of time a specific support was rated as significant by the SLPs: Funding (81%); Time to set up AT (78%); Availability of training (75%); Access to expert support (72%) Availability of equipment (73%)
Iacono & Cameron (2009)	Exploring the knowledge, perceptions of SLPs about AAC, evidence-based practice, and barriers to AAC practice.	SLP (n=14)	SLPs that provide early childhood intervention services in Victoria, Australia	AAC	Qualitative: On-site group interview (n=6), Teleconference group interview (n=5) Individual phone interviews (n=2) Individual on-site interview (n=1)	Six main themes were generated through a process of inductive thematic analysis. These included perceptions of the use of AAC, best practice, the role of the family, barriers to implementation of AAC, clinical struggles as well as clinical experience. Each of the themes has at least one subtheme.
Lahm & Sizemore (2002)	To determine the approaches that professionals take in arriving at decisions about AT. Specific questions: Determining the	Service providers employed in the Kentucky First Steps Programme, serving children 0 to 3years.	All participants were providers employed by the Kentucky First Steps Programme in Kentucky, USA.	General AT	Quantitative: Survey	The level of training of all of the participants was reported. Several issues and perceived barriers were reported per discipline. As example 100% of OTs indicated that family/client demands were extremely important, with 66% of SLPs finding it extremely important, 17%

Author	Aim of study	Sample	Setting	Type of AT	Methods	Summary of results
	amount of AT training; How AT decisions were made; Issues in AT service delivery; Perceived barriers.	Total (n=15); OT (n=1) SLP (n=6) Educator (n=2) AT supplier (n=4) AT practitioner (n=2)				indicating that it is of moderate importance and 17% stating it is of little importance.
Lindsay (2010)	Exploring the challenges that health care providers experience in prescribing AT to children with disabilities.	SLP (n=7) OT (n=7)	Children's Rehabilitation Hospital in Ontario, Canada.	AAC	Qualitative: Individual interviews	Three main themes were generated through inductive thematic analysis. These included the barriers (including technical, social and political), the personal philosophy of technology, as well as recommendations made regarding improving the prescription process.
Reed & Kanny (1993)	Determining the application of computer technology in assessment and intervention; OT's perceptions regarding advantages, disadvantages of computer technology for children; Perceived barriers to using technology in interventions; Training needs in this area.	OT (n=78)	OTs employed within the public school system. Washington State, USA.	Computer technology applications	Quantitative: Survey	The study reported OTs' use of computer technology with children on their caseload: 75.6% of OTs used it with 1-25% of children on their caseload, 16.7% (26-50% of caseload); 2.6% (51-75% of caseload) and 1.3% (76-100% of caseload). Article reports on specific factors considered when deciding to use computers, including their own familiarity with the AT (69%), and previous use with a child with a specific diagnosis (84%). Characteristics of the AT, such as portability (44%) and availability for trail (51%) were mentioned as changes needed to enable OTs to use computers more often.

Author	Aim of study	Sample	Setting	Type of AT	Methods	Summary of results
Wilcox et al. (2006)	Determining Early Intervention (EI) provider perspectives on AT use in their EI practices; Beliefs and factors that may influence EI providers' decision-making about AT; Perceived access to resources that support AT use; Differences in stated aims in terms of specific disciplines or the amount of training about AT that EI providers report receiving.	n= 922 from selected states n= 45 responded to web recruitment notices from 20 additional states Total (n=967) OT(n=189) PT(n=187) SLP(n=214) Child development specialist/teacher (n=284) Other (n=93)	EI providers in representative sample from USA. Selected states: West/ Southwest (California, Arizona, Texas), Northwest (Oregon), Midwest (Kansas, Illinois, Michigan, Missouri), South/ Southeast (Georgia, Louisiana), and Northeast (Pennsylvania, Massachusetts)	General AT	Quantitative: Survey	Results discussed extensively. Indication given of AT use, as well as provider definitions of low and high technology. Provider beliefs about AT were reported. One example is that SLPs are more likely than other disciplines to agree that young children should have certain skills before they are able to use AT. Providers rated the importance of different factors in the AT recommendation process. These were reported per discipline. The respondents reported their access to resources: A lot (23,6%); Some (48%); Only a few (25.3%); No resources (2.3%) Several analyses were conducted e.g. regarding the belief and provider discipline.

Table 2

Appraisal of Qualitative Articles

Author and year	Design and level of evidence ^a	Qualitative appraisal ^b				Total score
		Relevance of sources of data	Relevance of analysis of data	Appropriate consideration of how findings relate to context	Appropriate consideration of how findings relate to researchers influence	
Iacono & Cameron(2009)	Descriptive qualitative Level 3	1	1	0	0	2(50%)
Lindsay(2010)	Descriptive qualitative Level 3	1	1	0	0	2(50%)

Note. 1=present, 0=absent. Percentages calculated by dividing the number of criteria an article met, by four and multiplying by a hundred. Therefore, when one criterion is met, the score is 25%, when all four are met, the score would be 100%.

^aAccording to hierarchy of Daly et al., (2007). ^bThe qualitative subsection of the Mixed Methods Appraisal tool (MMAT, 2011) (Pluye, Robert, Cargo, & Bartlett, 2011) was used for qualitative appraisal.

Table 3

Appraisal of Quantitative Articles

Author and year	Design and level of evidence ^a	Quantitative descriptive appraisal ^b				Total score
		Relevance of sampling strategy	Representativeness of sample	Appropriateness of measurement instrument (validity, clear origin, etc.)	Acceptability of response rate (60% or above)	
Chmiliar (2007)	Non experimental descriptive Level 3	1	1	0	0	2 (50%)
Lahm & Sizamore (2002)	Non experimental descriptive Level 3	0	0	0	1	1 (25%)
Reed & Kanny (1993)	Non experimental descriptive Level 3	1	1	0	1	3 (75%)
Wilcox et al.(2006)	Non experimental descriptive Level 3	1	1	0	0	2 (50%)

Note. 1=present, 0=absent. Percentages calculated by dividing the number of criteria an article met, by four and multiplying by a hundred. Therefore, when one criterion is met, the score is 25%, when all four are met, the score would be 100%.

^aAccording to hierarchy of Lloyd-Smith (1997). ^bThe quantitative subsection of the Mixed Methods Appraisal tool (MMAT, 2011) (Pluye, Robert, Cargo, & Bartlett, 2011) was used for quantitative appraisal.

Table 4

Identification of Three Themes and Respective Subthemes related to Environmental Factors in the Selected Studies

	Cultural and financial priorities (theme 1)	Legislation and policy (theme 2)				Attitudes of key others (theme 3)		
	Ethno-cultural factors	Policy	Prescription guidelines	Fragmentation between departments	Excessive red tape	Attitudes of parents & family	Attitude of teachers	Social acceptability
Iacono & Cameron (2009)	-	-	-	-	-	✓	-	-
Lindsay (2010)	✓	✓	✓	✓	✓	-	✓	✓
Chmiliar (2007)	-	-	-	-	-	-	-	-
Lahm & Sizamore (2002)	-	-	-	-	-	-	-	-
Reed & Kanny (1993)	-	-	-	-	-	-	-	-
Wilcox et al (2006)	-	✓	-	-	✓	✓	-	-

Table 5

Identification of the Theme Resources and Respective Subthemes in the Selected Studies

	Resources (theme 4)					
	Funding and funders	Availability of time	Expert/mentor support	Teamwork/support from co-workers	Social support	Sustained professional support
Iacono & Cameron (2009)	-	✓	-	✓	-	-
Lindsay (2010)	✓	✓	✓	-	✓	✓
Chmiliar (2007)	✓	✓	✓	-	✓	-
Lahm & Sizamore (2002)	✓	-	✓	✓	-	-
Reed & Kanny (1993)	✓	✓	-	-	-	-
Wilcox et al (2006)	✓	-	-	✓	-	✓

Table 6

Identification of the Themes Knowledge, Expectations and Personal Preferences and Priorities and related Subthemes in the Selected Studies

	Knowledge & information (theme 5)				Expectations (theme 6)		Personal preferences & priorities (theme 7)		
	Experience	Training	Knowledge of AT assessment	Self-efficacy	Expectations of parents/ family	Expectations of teachers	Preferences of professionals	Preferences of family	Conflict between the two
Iacono & Cameron (2009)	-	-	✓	✓	✓	-	-	-	✓
Lindsay (2010)	✓	-	-	-	✓	✓	✓	✓	✓
Chmiliar (2007)	-	✓	-	✓	-	-	-	-	-
Lahm & Sizamore (2002)	✓	✓	✓	-	-	-	✓	✓	-
Reed & Kanny (1993)	✓	✓	✓	-	-	-	-	-	-
Wilcox et al (2006)	✓	✓	✓	-	✓	-	✓	✓	-

Table 7

Identification of the Themes Assessment and Assistive Technology and related Subthemes in the Selected Studies

	Assessment (theme 8)					Assistive technology (theme 9)		
	Assessment of child characteristics	Assessment approach of the provider	Environment	Activity	Goodness of fit between device and user	Device characteristics	Availability of AT, also for trial	Ease of maintenance
Iacono & Cameron (2009)	✓	✓	-	-	-	-	-	-
Lindsay (2010)	✓	-	-	-	✓	✓	-	✓
Chmiliar (2007)	-	-	-	-	-	-	✓	-
Lahm & Sizamore (2002)	✓	-	✓	✓	-	-	-	-
Reed & Kanny (1993)	-	-	-	-	-	✓	✓	-
Wilcox et al (2006)	✓	✓	✓	✓	✓	-	✓	-

Note: The theme "Assessment" was a combination of "assessment of functional ATD need" and "assessment of functional ATD disposition" as specified in the ATD Selection framework(Scherer, Jutai, Fuhrer, Demers, & Deruyter, 2007, p. 4)

The theme Assistive Technology did not originate from the ATD Selection Framework (Scherer, et al., 2007). It was generated during thematic analysis.

Appendix 2

Definitions of themes for deductive thematic analysis with examples from text

Theory driven theme	Definition	Examples of coding from text
Theme 1: Cultural & Financial priorities	Factors important to a specific culture or within a specific financial climate/society. Factors on a macro level. Cultural aspects refer to "specific patterns of behaviours and values (such as the provision of care) that are shared among members of a designated group and are distinguishable from those of other groups. Culture includes, but is not limited to, geographic origin, language, traditions, values, religion, food preferences, communication, education, and lifestyle" (Scherer, Jutai, Fuhrer, Demers, & Deruyter, 2007, p.4).	"Ethno-cultural" factors are reported to influence use of AAC (Lindsay, 2010)
Theme 2: Legislation & Policy	Any mention of legislation (laws)/ policy. Mention of red tape or bureaucracy.	Participants required to rate the importance of specific factors on a five-point scale (Question 5h): "Red tape or excessive requirements associated with using assistive technology for infants and toddlers" (Wilcox, Guimond, Campbell, & Weintraub Moore, 2006, p. 37)
Theme 3: Attitudes of key others	Attitudes of others – including family, stakeholders, team members Attitude has been defined as having three parts, namely cognitive (thoughts and ideas), affective (feelings and emotions) and behavioural (overt behaviours/behavioural intentions) regarding a specific object - in this case AT (Triandis, 1971).	"Attitudes towards the implementation of AAC" as well as "how negative attitudes were addressed" were subthemes identified (Iacono & Cameron, 2009, p. 240)
Theme 4: Resources (Family & Friends & significant others; Financial)	Resources available through family/friends, including team members, mentors, technicians. This includes finances available to pay for AT, from consumer, government, medical aid, funders etc. Any mention of time taken to assess/teach AT to family was included as a resource.	"Do you work with others that are the same discipline as yourself when making decisions about AT" (Lahm & Sizemore, 2002, p. 26).
Theme 5: Knowledge and information	Knowledge & information regarding AT – including experience. Self efficacy was added here and refers to a person's belief in his/her ability to successfully complete actions in any given domain (Bandura, 1995).	SLPs were required to rate their satisfaction with their "current skills and knowledge" (Chmiliar, 2007).

Theory driven theme	Definition	Examples of coding from text
Theme 6: Expectations	Consumers & providers bring expectations to the process that are internal and external. They carry the expectations of their culture, parents, spouses, employers, peers, and society in general".(Scherer et al., 2007, p.5).	Participants requested to indicate on a 5 point scale how likely they are to list AT on a IFSP (Question 4f) when "There is a change in the parent's expectations for the child"(Wilcox et al., 2006, p. 37).
Theme 7: Personal preferences and priorities	"Beyond the expectations placed on consumers from external sources are expectations they place on themselves due to prior history with ATDs, their particular level of motivation, judgment, and outlook, and many other factors that serve to combine in a way defining each of us as unique individuals. These influences include personality and temperament characteristics (such as degree of self-determination and self-confidence, anxiety and depressed mood) serve to determine our preferences and priorities" (Scherer et al., 2007, p.6)	The SLPs indicated that "the priority that communication takes compared to the other health problems" to the family will influence the use of AAC (Lindsay, 2010, p.214).
Theme 8: Assessment	This theme was created by combining two components of the ATD Selection Framework (assessment of functional AT need and functional AT disposition) (Scherer et al., 2007), as it proved to be very challenging to distinguish between these two separately. All aspects influencing the actual face-to-face assessment included here e.g. environmental demands, e.g. terrain: client characteristics & diagnosis, aspects related to feature matching.	Rating of the importance to AT decision making of the "demands of environment" and "client diagnosis" (Lahm & Sizemore, 2002, p.26).
Theme 9: Assistive technology	Including all issues that are considered that pertains primary to the AT itself. Also including the availability of AT for trials.	Reasons for not using computers with clients included : "...lack of access to this equipment in the typical treatment areas..."(Reed & Kanny, 1993).

Appendix B

Post-print of Article Published on the Online Focus Groups

Please note: This is the post print version of the following article

Karin van Niekerk*¹, Shakila Dada¹ & Kerstin Tönsing¹ (2017). Influences on selection of assistive technology for young children in South Africa: Perspectives from rehabilitation professionals, *Disability and Rehabilitation*, DOI: 10.1080/09638288.2017.1416500

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Adherence to ethical standards

The ethical board of the University of Pretoria approved the study.

Influences on selection of assistive technology for young children in South Africa: Perspectives from rehabilitation professionals

Abstract: Selection of assistive technology for young children is a complex process. Within a context with limited resources, such as South Africa, research is needed to determine the factors influencing the assistive technology selection process, as these could ultimately either facilitate or hinder the availability and accessibility of affordable, adaptable, acceptable and high quality assistive technology for this age group.

Method: Two asynchronous online focus groups were conducted with sixteen rehabilitation professionals to identify the factors they perceived to influence the selection and provision of assistive technology to young children within the South African context.

Data analysis: A process of deductive thematic analysis was followed by inductive analysis of the data. Components of the Assistive Technology Device Selection Framework were used as themes to guide the deductive analysis, followed by inductive analysis to create subthemes.

Discussion: The important role of the professional was highlighted in negotiating all the factors to consider in the assistive technology selection and provision process. Adaptation of the assistive technology selection framework is suggested in order to facilitate application to low resourced contexts, such as South Africa.

Keywords: assistive technology; young children; low resourced context; rehabilitation professional; selection, online focus group.

Implications for Rehabilitation

- Assistive technology selection is a complex process with factors pertaining to the users (child and family) of the assistive technology, as well as the rehabilitation professional recommending the assistive technology influencing the process.

- Although it may be an important factor, the availability of financial resources to purchase assistive technology is not the only determining factor in providing appropriate assistive technology to young children in contexts with limited resources.
- Formalised support, such as reflective supervision or mentorship programmes should be facilitated and utilised by recommending professionals.
- Home and school visits during assessment ensure a good match between assistive technology and users within the particular context.
- Facilitating the availability of assistive technology for trial during assessment and/or for a period afterwards will increase the likelihood that appropriate recommendations for assistive technology are made.

Introduction

Although the benefits of assistive technology (AT) for young children and their families have been well described (1–5), AT continues to be underutilised by this population (6,7). Although several reasons can be proposed for this, the appropriate selection of AT can play an important role. Appropriate selection of AT is believed to have a positive influence on user-satisfaction and could contribute favourably to long term use of AT (8). Furthermore, it has been suggested that appropriate selection can improve the cost effectiveness of AT (8).

With the profound unmet need for rehabilitation (including AT) services in less resourced environments (9), appropriate AT selection becomes particularly important, as limited resources have to be optimised in order to improve and optimise AT service delivery. Endeavours to support and expand AT service provision within resource-limited contexts should aim to address the availability, accessibility, affordability, adaptability, acceptability and quality of AT provided (10,11).

AT selection is a complex process (12) that has been described by several authors. Scherer et al. (13) depicted this in the AT Device Selection Framework. This framework illustrates that environmental factors (including, for example, cultural and financial priorities, as well as policies and legislation) together with personal factors of the AT user and provider (for example their knowledge and expectations) interact to influence the AT decision-making and selection process. When AT is recommended to young children, family-centred decision making regarding the selection of AT has long been regarded as best practice (14,15). This implies that both the child and family are the users of the AT, and that both should be involved in thoughtfully and purposefully selecting AT that will meet their needs and purposes within their context.

A limited number of empirical studies have looked into the factors that influence the provision/recommendation of AT to children. A recent systematic review aimed specifically at identifying studies focussed on determining factors influencing AT selection or provision to children (16) included only six articles. This review synthesised the factors influencing AT selection for children identified in the articles by categorising these factors based on the AT Device Selection Framework (13). This included aspects pertaining to the environment, the user/s of the AT, the professional involved in recommending the AT, as well as factors pertaining to the AT itself. It is interesting to note that all six articles identified in the systematic review originated from well-resourced settings, including the United States of America, Canada and Australia. Although the factors identified in well resourced environments may likely be very applicable in contexts with limited resources, limited research evidence is available to support this.

It is estimated that only 5 - 15% of people requiring AT within low and middle income countries have access to it (17). One might easily imagine that the availability of

financial resources from individual users or governments to acquire devices constitutes the major difference between the less resourced and well resourced contexts. However, this is a gross simplification of matters, which may lead to, for example, donations of expensive yet inappropriate AT to low resourced environments, without cognisance of, for example, the training, professional support or maintenance required to utilise AT (18). Contextual factors could pervasively influence what AT (if any) is selected and provided to a particular child. Consider, for example, the influence of context on the selection of appropriate AAC (Augmentative and Alternative Communication) technology for a young child who does not have electricity at home, and whose parents may not be literate. The importance of context is reflected in the AT Device Selection framework (13), where context is shown to form the backdrop of all AT selection.

Children within the South African context may be exposed to several risk factors to child development, which may contribute to the high levels of disability within the country. It is estimated that 11.2% of South Africans children may have a disability (19). The quadruple burden of disease (20,21) that affect children in South Africa includes aspects of maternal and neonatal healthcare, the high prevalence of HIV and TB, high levels of trauma and violence (resulting, for example, in stabbings and mental illness) as well as non-communicable diseases (such as stroke and amputation). These aspects may all influence a child's development by directly impacting on the child's own body (such as having cerebral palsy after an injury at birth) or in a more indirect way, by influencing the care giving environment in which they grow up (for example if they are orphaned due to losing both parents to HIV). In addition to these risks, approximately 63% of children in South Africa live in poor households (22). With the link between poverty and disability widely understood (21,23), it is clear that poverty is another risk factor for disability for children in South Africa.

South Africa currently has two systems of healthcare delivery where young children and families typically access AT – the public and the private healthcare system. Although the possibility exists that children (birth to 6 years) could access AT through the education system, this system focuses mostly on children from approximately 6 years of age (when schooling becomes compulsory). Obtaining AT may also be possible through private funding or non-government organisations.

The public healthcare system provides all citizens access to free primary healthcare within communities. All additional healthcare services are available to all citizens with services billed based on the income of the user. Since 1994, free (comprehensive) healthcare services are provided to all pregnant women and children under 6 years that access public healthcare services (24). This includes access to certain AT, including communication devices and wheelchairs. AT to facilitate the participation of children with disability is typically selected by an occupational therapist, speech-language therapist (who may or may not be dually qualified in audiology as well), or physiotherapist from a list of available options that are on the National Tender for AT. The National Tender document includes a list of AT options from which therapists employed within the public health sector can make a selection, within the budgetary allowances set by their hospital/clinic.

Although free healthcare services are available to children under 6 years, well resourced families tend to prefer to access the private health care sector, due to the challenges (including, for example limited numbers of health workers providing services in overburdened health facilities) associated with the public health care system (25). These families are typically covered by medical aids (medical insurance). In 2015, 17.5% of the entire population (of 54.4 million people), were covered to a certain extent by a medical aid (26). This percentage was higher in the more affluent provinces

of Gauteng (27.7%) and the Western Cape (24.2%), as well as in all metropolitan areas (26.4%), including the capital city of Tswane (previously Pretoria, 33%). Within the private healthcare sector, rehabilitation professionals, teachers, AT suppliers or parents may select AT that they deem appropriate for use. AT is then ordered from a specific supplier directly. Selected AT may or may not be covered by medical aid benefits, depending on the AT and the specific medical aid option, implying that persons utilising this service are often required to pay for their AT in addition to their medical aid contribution (18).

Although the majority of citizens access the public healthcare service (over 80% of the population of 54.4 million) (26), the majority of healthcare professionals provide services within the private healthcare environment. In an effort to increase the number of healthcare professionals employed in the public sector (particularly in rural areas), all graduating healthcare professionals, including occupational therapists, speech-language therapists (with or without dual qualification in audiology), and physiotherapists have since the early 2000's been required to complete one year of compulsory community service in the public sector after completing their degree training. Although this has led to a marked increase in the numbers of rehabilitation professionals employed in the public sector (24), the distribution remains disproportionate. In 2010, for example, 82.5% of registered physiotherapists and 76.1% of registered occupational therapists provided services in the private health sector, leaving only 17.5% of physiotherapists (1009 therapists) and 23.9% of occupational therapists (838 therapists) employed in the public sector (25), providing services to a population of several million.

Although the numbers of professionals in the public sector have increased, so-called "community-service therapists" are often given the difficult task of providing appropriate AT in under resourced rural areas that may have inadequate infrastructure to

provide comprehensive AT services. Newly trained, with limited work experience, this poses a challenging task. To complicate matters further, therapists providing services are often from different language or cultural groups and economic background than their clients (27).

Furthermore, the South African context is characterised by many families that do not necessarily consist of the nuclear family unit which tends to be more typical in many Western contexts. Many children live in households comprising of extended families, with 86% of South African children living in households with two or more adults (28). Furthermore, it is estimated that 23% of South African children do not live with either of their biological parents (28). Some of these children are orphans, but most (8 out of 10) are cared for by relatives (such as a grandmother), even though they have (at least) one living parent (28). In addition, even when a biological parent does live in the same household, he/she may not be the main caregiver (29). Furthermore, 1711 000 adults within South Africa have reportedly received no formal schooling, with over 5 million adults leaving school at some stage during their primary school education (Grade 7) (26). This has clear implications for the literacy levels of adults, many of whom may be taking care of children. Family-centred AT selection requires the cognisance of these family factors and involving all relevant role players and decision-makers within the (extended) family and possibly also the community (30). From the above discussion, it is clear that there are many factors that may influence and complicate AT selection and provision to young children with disabilities in the South African context.

Therefore, this study aimed to determine the factors perceived by occupational therapists, physiotherapists and speech-language therapists (with or without dual

qualification in audiology) to influence the provision/selection of AT to young children in the South African context.

Methods

Design

Ethics approval for the study was obtained from the relevant university. Two asynchronous online focus groups were conducted, each with eight participants. Online focus groups were preferred over face-to-face groups as it was convenient and comfortable for participants (31,32) and provided access to diverse participants (33,34) in diverse geographic locations throughout South Africa.

Asynchronous online focus groups (where participants do not all have to be online at the same time) were selected over synchronous online groups (where participants are online together at the same time for a shorter time period) as these are well suited to participants with limited time (35). Another significant advantage of asynchronous focus groups is that it allows time for reflection on the questions as well as the discussion points, possibly adding to the depth of discussion (33,35).

Participant selection

Participants were required to: i) be qualified as an occupational therapist, physiotherapist or speech-language therapist (with or without dual qualification in audiology); ii) be registered at the Health Professions Council of South Africa; iii) be fluent in English; iv) have at least three years of experience in the recommendation/provision of AT to children between 0 and 6 years of age; and v) have reliable internet access (due to the online focus group method selected).

The researchers employed purposive sampling methods. The researchers attempted to recruit participants from all over the country, with professionals living in

large metropolitan areas as well as rural communities invited to participate. Participants working in different contexts, for example both private and public health care settings, as well as educational settings and non-government organisations were invited. This was done to increase the opinions and diverse perspectives in the group. The first author sent out email invitations to personal and work acquaintances as well as staff members at several universities and requested them to invite/nominate persons that may be eligible to participate in the study by forwarding the information to them. The invitation explained the eligibility criteria and details of the study, as well as an invitation to contact the first author if there was an interest to participate and/or find out more. Sixteen professionals contacted the first author and expressed an interest to participate in the study. They were sent an electronic information letter describing the broader study and procedures for the online focus groups, together with a consent form and a short biographical questionnaire. Sixteen participants submitted the signed consent form, agreeing to participate in the study. They also submitted the biographical questionnaire. Both were submitted electronically to the researcher using Google Forms.

A description of the participants can be viewed in Table 1. The majority of participants (81,3%) had a Masters degree. A large percentage of participants provided services in the provinces of Gauteng (43,8%) and the Western Cape (37,5%) and specially within the metropolitan areas of those provinces.

Insert Table 1 about here

Procedures

The participants were given the option of two dates for the focus group discussions, with the researcher attempting to include (as far as possible) a diversity of professions in every group. The two focus groups were each conducted over four consecutive days

(Wednesday to Saturday). Each group had eight participants, with the first group including two occupational therapists, one physiotherapist, two speech-language therapists and three speech-language therapists and audiologists. The second online focus group included three occupational therapists, two physiotherapists, two speech-language therapists and one speech-language therapist and audiologist. The online focus groups took place within the discussion tool of ClickUP, the online learning system of the University of Pretoria. This system utilises Blackboard Learn™. In order to access this system, every participant required a unique login, which provided secure access (only to members of the group as well as researchers) to the discussion. In preparation of the online focus groups, every participant was sent an information sheet explaining how they could gain access to the online forum where the focus group was to be conducted. To ensure that all had access, all participants were given the opportunity to access and respond to an ice breaker practice question on the online forum any time during the 5 days before the onset of each focus group.

A script with word for word instructions and explanations was formulated for use by the researcher for posting during the focus groups. It was used unchanged for both focus groups. This explained that the first author would post two questions on the first day of the focus group, and two questions on the second day. The group discussion remained open for four days. Participants were requested to contribute to questions as often as they were able, preferably answering every question at least once during the four days. Participants were encouraged to share their views and experiences as openly as possible, even if they differed from those of another participant. Furthermore, they were encouraged to respond to each other's contributions and use "emoticons" such as ☺ for happy to communicate their feelings during the focus group. As emotional expression from participants is often lost in the online environment, the use of

emoticons can be used to substitute non-verbal and para-verbal communication that may assist in conveying meaning (35,36). The participants were able to enter the discussion and respond to the questions posted by the first author at a time of day that suited them.

The four online focus group questions developed by the authors (provided in Table 2) were reviewed by a panel of eight rehabilitation professionals working in the field of AT before the onset of the groups as recommended by Krueger and Casey (37). After feedback the questions were adapted and the sequence of the questions was determined.

Insert Table 2 about here

Credibility

All participants were ensured at the start of the sessions that there were no right or wrong answers and that they could share their opinions freely. They were also ensured that they could withdraw from the session at any time. During the focus groups, the researcher asked follow up questions within the discussion for instances where a participant's response required further clarification or if added detail would contribute to the discussion. If necessary, probing questions were asked. These included variations of “Any examples to illustrate this?” or “Could you explain that please?”. In order to facilitate the involvement of the group, the researcher also asked for responses from the other group members, for example, whether anyone had a similar experience or could relate to the comments made. Participants were able to edit their own contributions during the course of the focus group, enabling them to communicate their messages as clearly as possible.

Furthermore, certain characteristics of the online asynchronous focus group may encourage truthfulness in participants (32). It has been proposed that participants are more likely to be truthful in online communication when using a medium that is

asynchronous (as opposed to synchronous) and that is easily/automatically recorded, as is the case in asynchronous online focus groups (38).

Data analysis

The transcripts of both focus groups were created from the online discussions. All participant names were replaced by numbers. Transcripts were sent out to the all participants that were encouraged to check the correctness and were given the opportunity to clarify any of their statements if they wished to do so. Three participants from each focus group responded to the invitation to check the transcripts. One change was made to the transcript, with a participant wishing to clarify/reword one of her own contributions. The transcripts were entered into qualitative data analysis software Atlas.ti™, which was used to manage the process of data analysis.

A process of deductive(theoretical) thematic analysis, utilising a pre-existing coding framework (39), was followed by inductive analysis of the data to create subthemes based on patterns occurring in the data (39). In the first (deductive) phase, the components of the AT Device Selection Framework (13) were used as themes. The first three themes were derived from the environmental factors specified within the framework. These include (i) cultural and financial priorities, (ii) policies and legislation as well as (iii) attitudes. Four themes were derived from the personal factors pertaining to the provider of the AT as well as the consumer, as specified in the framework. These include (iv) resources, (v) knowledge and information, (vi) expectations and (vii) preferences and priorities. The theme (viii) assessment was an amalgamation of two separate components of the AT Device Selection framework (Assessment of functional AT Device need, as well as Assessment of AT Device predisposition), as these were difficult to separate during analysis. Operational definitions were created for these themes and can be viewed in Table 3. Segments of

text were allocated to a theme, and occasionally, one segment could have more than one theme allocated to it. A category for (ix)"other" was created, where all data items were placed that did not fit into any of the excising themes. After the first author deductively analysed all the data according to the nine themes, the second author checked the analysis. If disagreement occurred, this was discussed until agreement was reached. Thereafter, the second (inductive) phase of data analysis could begin. During this process, all of the data items that were in the "other" category, were analysed inductively. The theme (x)"AT" was created during this process. Furthermore, the theme (xi)"decision making" was conceptualised as separate from the pre-existing "assessment" theme, although it is presented as part of assessment in the AT Device Selection framework (13). This brought the total number of themes to ten, as the "other" theme was eliminated during this process. Subthemes were created through inductive analysis under all ten themes. Again, the second author checked the analysis done by the first author. Agreement was reached over the new themes and subthemes, as well as analysis of items. After this process, the first author worked through both transcripts again ensuring that all items were coded consistently, also considering the newly created themes. The third author checked the complete analysis. All disagreements were discussed until agreement was reached.

Results

All the themes and subthemes identified are shown in Table 3. Operational definitions of the themes are provided together with an example to illustrate the meaning of every subtheme. Examples from every theme will be discussed.

Insert Table 3 around here

Cultural and financial priorities

Cultural and financial priorities refer to factors that influence AT selection on a macro level within a specific society. Financial priorities could include, for example the economic climate in the country at a specific time.

Scherer et al. (12,p.4) specify that cultural priorities refer to "specific patterns of behaviours and values (such as the provision of care) that are shared among members of a designated group and are distinguishable from those of other groups. Culture includes, but is not limited to, geographic origin, language, traditions, values, religion, food preferences, communication, education, and lifestyle". Within the African context this could include, for example the stigmatisation and marginalisation of people with disabilities (40), or beliefs about the etiology of disability (41).

Participants did not discuss the influence of cultural and financial priorities (as conceptualised on a macro/societal level) on their AT selection in depth. A number of participants did mention that the availability of finances was very important to their selections and that limited funds restricted the available AT options. However, most of the contributions were interpreted to be more focussed either on the influence of financial provision through specific existing policies and legislation (theme: policies and legislation, subtheme: financial provision), or on the immediate availability of or access to funds, that was analysed to be a resource (theme: resources, subtheme: financial). Cultural factors on the macro level were not discussed.

Policies and legislation

This theme included any items that mentioned aspects related to legislation, policy, guidelines (for example from a therapy department), or any barriers to practice related to policies and legislation. The participants discussed policy, financial provision (by

policy/legislation), prescription guidelines, red tape, waiting lists, fragmentation barriers and other practice barriers.

Different policies govern AT provision in different settings. Several participants employed in the public sector mentioned the national tender for AT, which stipulates what could be provided at public institutions. AT selection in the public health sector is limited to AT that is stipulated in the tender, bearing in mind budget constraints.

The landscape for the provision of AT appears to be changing within the South African context. Some participants mentioned that financial provision in their environment has increased, while in other environments financial provision was cut. Participant 14 (occupational therapist employed by the public health system) noted, "as X [her place of work] is a tertiary hospital we have been having a lot of budget cuts to allow base/district hospitals more budget for AT issuing". Participant 7 (speech-language therapist employed by public health system), however, had seen an increase in their budget: "We, and other government institutions in Y [province], have recently been given funding to purchase High Tech devices...". Clearly, financial provision has a direct influence on the types of AT provided. Participant 2 (speech-language therapist and audiologist with experience in the public health system) noted, "I mainly used low technology AT (AAC) due to a lack of resources (high technology devices) being on tender, however this recently changed." (According to Cook and Polgar (42,p.7), low technology refers to AT that is "inexpensive, simple to make and easy to obtain"; while Glennen and DeCoste (43,p.379) state that high technology refers to "sophisticated, usually programmable types of equipment"). Furthermore, the differing budgetary allocations as well as priorities at different levels of the health service also influences the AT that will be available. Participant 8 (speech-language therapist employed by public health system) mentioned, "At a PHC [Primary Health Care] level

in Y [province] we were given a budget for low tech AT only, and so unfortunately don't use high tech".

In the private health care setting, medical aids may be requested for payment of AT, as described by Participant 1 (occupational therapist employed by AT vendor)

If the client is purchasing the device through his medical aid, the client will submit the request for the device, usually with a motivation letter. The medical aid will accept or decline the request and inform the client how much they are willing to contribute. The medical aid either pays the client or X [supplier] directly.

An attempt has been made by one province to utilise an electronic monitoring system across hospitals to capture the details of patients as well as details regarding AT issued to them. This aims to keep better track of issued AT. Participant 14 (occupational therapist employed by the public health system) indicated that there have been some difficulties in implementation:

The system has only been running for a month or two so it is still very new. There are challenges that some hospitals do not have internet or intranet access, which is a major problem in making sure it is used effectively.

The fragmented nature of services provided to children was discussed by several participants. Participant 11, an occupational therapist working in private practice, noted that the service delivery model, particularly in private practice, could be limiting the selection of AT due to the limited teamwork between professionals.

I would also like to add that the fragmentation or lack of communication between therapists, of different disciplines working with the same child, in the private sector. Therapists working in isolation within their field and therefore the adaptation is not carried over into other areas of the child's functioning to ensure success of the AT...Within the general private practice setting, most medical professionals are working in a medical model. Each only addressing our area of

focus and then referring onto another professional to address other areas of function with little or no communication after the initial referral.

Furthermore, therapists mentioned that it is policy to discontinue therapeutic services at public institutions to children older than 6 years. Participant 7 noted:

Speech [speech therapy] and OT [occupational therapy] have a protocol where we see patients until Grade R [preparatory year before formal schooling commences, children typically aged 6 years]. There are exceptions as many patients are waiting for placement in special needs schools so [we] would accommodate them. The aim is that learners going into Grade 1 [first year of formal schooling] with specific language, communication and /or learning needs are supported in the school. The reality however is that many schools are not inclusive nor do they have remedial support available.

Unfortunately, the practice of discharging children from therapeutic services when they are older than 6 years of age, leads to the fragmentation of services. Therapists may be unsure whether the child will receive any intervention later on, which could influence the AT that is selected for them. As Participant 6 (speech-language therapist and audiologist providing services at a public hospital) explains:

In the government sector, children that we see for AAC services (0-6 years) have to be referred to the Department of Education for continued therapy once they turn 6 years of age. This is a factor that we have to consider before we issue an AAC device. It is important that a child has access to continued ST [speech therapy] services once going to school as their AAC system will need to be monitored and continuously updated as their communication needs change. Before we issue a device, we have to consider whether this child will be entering a mainstream or a special-needs school and whether there will be a speech therapist at the school to carry on with the AAC therapy.

Despite policies that should ensure that provision of AT is at least comparable in different public settings, this does not appear to be the case, as provision of AT appears

to be quite inconsistent. It appeared that (presumably due to different budgetary allowances) different hospitals/clinics, even within the same geographical area, were able to provide different AT to users, even though, in theory, they had access to similar AT through the tender.

Sometimes, the availability of AT appears to be in the hands of dedicated individuals. Participant 1 (occupational therapist, employed by AT vendor) explained:

For example, some OT [occupational therapy] HOD's [head of departments] work well with (read: follow-up very regularly and hound) their procurement officers and manage to ensure that their store rooms are consistently full of a range of devices of different sizes. This enables them to issue at the point of assessment in many cases which is wonderful! A few hospitals have even managed to start issuing a chair AND another therapeutic device to children such as side positioners or back positioners, although this is rare. On the other end of the scale we hear about hospitals and clinics where there is a waiting list that is many months and clients long, who have absolutely no stock of devices and have to wait until a delivery arrives. There is such a vast difference in how individual procurement officers/buyers/therapists interact in each health setting that it results in very big differences in what is available, waiting lists etc.

More rural areas may find it especially difficult to ensure stock of devices, ensure good maintenance, access to spares, and so on. Participant 3 (occupational therapist employed within the public health system) explained why her (remote) district never seemed to receive the AT they ordered:

For example... the X province had a centralized assistive device store, from which all devices for the province, were distributed and which was located in B. When a batch of wheelchairs were due for delivery, the delivery truck got as far as Z [approximately 135km from Participant 3's district] and simply off loaded all of the devices, citing that they were tired of driving as the reason for not covering all the sites as required. The devices were then issued by the staff located in that specific district and never reached our clients at all.

Attitudes

Several participants mentioned that the attitudes of significant people within the environment were important to the selection of AT, particularly the acceptance of the disability and the AT by the family and child themselves. Participant 13 (speech-language therapist employed by public school system) wrote:

Acceptance can be very individual. It includes accepting your child with disabilities with the further acceptance of AT that is involved, but also with the learner itself. It is not a rule but smaller kids can be very accepting of their circumstances while the next one has a burning need to walk for example and would not accept anything that might hamper it in their eyes.

Resources

As might have been expected, "resources" was one of the themes that were discussed frequently in the focus groups. Not only financial resources, but aspects pertaining to human resources, such as time were described. Participants mentioned families as a resource, as well as professional/paraprofessional support, the sustained support from professionals/paraprofessionals, teamwork between the family and professionals as well as support from an expert/mentor.

Participants mentioned the importance of access to financial resources to the provision of AT, particularly when high tech AT could be considered. Participant 13 (speech-language therapist employed by the public school system) stated "I think the biggest influence is availability of resources (money) to provide AT for anyone in need". However, participants did not seem to stagnate under the influence of the limited funds on their selections, but rather had a strengths-based perspective characterised by creative problem solving. Participant 5 (physiotherapist employed by the public school system) noted

As a school, we strongly rely on government funding and donations, and when this is not available, we often 'make do' or become resourceful ;)

Professionals in the focus groups repeatedly referred to the families as a resource in the AT provision process. Professionals utilised the strengths of the family to a certain extent, for example to help address the shortage of financial resources, or availability of AT.

Participant 15 (speech-language therapist employed at a non-government organisation) mentioned that

... money often determines what AT gets implemented for us. The children I see mostly come from families that cannot afford AT but we have been surprised to see that some families will go to the extent of fundraising enough money for eye gaze AAC devices etc.

Several participants referred to the importance of having access to different professional sources of support when providing AT. This should include rehabilitation professionals, as well as paraprofessional support. Participant 9 (occupational therapist employed by public health system) explained her ambitions: "Another wish in my bag is to have a part-time handyman to make all of these great ideas [for custom AT]! haha". Input from an experienced therapist as mentor was also mentioned as influencing provision of AT, although this did not appear to be a frequently used strategy. Several participants spoke of the importance of professionals working together in a team. Participant 1 wrote:

Collaboration with the child, his family, therapists, teachers and others that interact with him is so important... This ensures that the device that the child receives is appropriate, useful and that it assists the family instead of burdening them.

Furthermore, it was mentioned as important to consider whether a client and his/her

family would have access to sustained professionals support after the AT was obtained. Participant 4 (speech-language therapist and audiologist employed in the public health system) mentioned that "Most of these children receive rehabilitation services once a month due to financial constraints as well as lack of human resources in public institutions". In the public health sector, services are often only provided until the child reaches 6 years of age but are then no longer available. Therefore, children may be dependent on their school to provide the services they need.

Knowledge & information

Participants discussed knowledge and information pertaining to themselves, as well as the child and family.

The knowledge of the parent/family could have a restricting or facilitating effect on AT recommendations. Participant 15 (speech-language therapist employed at a non-government organisation) mentioned that she perceived that parents were not knowledgeable on the benefits of AT (particularly regarding AAC use) and that they sometimes believed myths.

I sometimes feel like parents accept the ATs that assist their child physically but when it comes to communication they feel like it may be giving up or restricting their child from speaking again.

She explained one case where the parent "was concerned that the child would become lazy and not learn to talk [if they were to use AAC]".

Prior experience of the family or caregivers with AT was identified as helpful, but less experience and skill could limit the selection of AT to simpler devices that are easier to use and maintain. Participant 6 (speech-language therapist and audiologist employed by the public health system) shared her experience after providing a donated iPad™ to a

child with communication difficulties:

In hind sight, we probably should have issued him with a slightly simpler device that his mother could have helped him with (his mother was not very literate/tech-savvy). This is now something that we have to consider before issuing a device.

It was clearly stated that the knowledge of therapists will influence the selection of AT.

Training was mentioned as one method to increase knowledge. Participant 9 (occupational therapist), also referring to the influence of the fragmentation of services on AT provision, stated:

I do think that in terms of other types [of] hi-tech AT we in health do not necessarily keep up with what is going on in schools. We are not aware maybe of the fact that children will have access to systems with switches, so we don't actually know if there is anything that we can do to prepare the children for that.

Participant 14 (occupational therapist employed by the public health system) mentioned that the community service therapists employed by government (frequently in rural areas) the year after completing their training, did not have the knowledge or experience to cope with the challenges of providing appropriate AT within the resource limited environment. She wrote:

Another factor is the knowledge of therapists in rural areas on what is available and effective. There are still quite a few hospitals in X with only comm serves [community service therapists] providing OT [occupational therapy] or speech services. Their knowledge and experience on what AT is available, and how to make or adjust items to reduce costs is limited due to experience and exposure.

Participant 9 added:

... I remember from my own comm serve [community service] days that the rural areas often rely on comm serves only. Young therapists simply do not have a lot of

experience. It takes a while to get your head around the concept of meeting both the child, family and therapeutic needs with the limited resources available.

As much as factors such as lack of knowledge, and limited training and experience could hamper the provision of appropriate AT, the resourcefulness and skill of therapists in providing appropriate AT were highlighted throughout the discussions. Many commented on their (sometimes forced) resourcefulness as well as the creativity required to perform their task. Participant 3 (occupational therapist employed within the public health system) wrote:

Our devices (other than the actual wheelchair...if they come in the size that you ordered) are predominantly hand (and home) made and therefore low-tech, and, more often than not, either hijacked from the pharmacy (boxes), my house or 'modified' general household objects – creativity has become one of our fortes :-).

Referring to simple forms of AT, Participant 16 (physiotherapist, employed in the public health system) noted "... I would not recommend that or purchase, I just do...- that's South Africa". She added that

... wanting to reach the best possible outcome will make you seek solutions where you are only facing obstacles or lack of resources - [that] instils creativity in making your own devices.

Participant 3 (occupational therapist employed within the public health system) mentioned how she accessed resources outside of her work context in order to realise her plans

... having access to a husband/dad/family member that is able to weld or do woodwork broadens the amount of 'out of the box' thinking that one is able to apply when trying to manufacture or adapt AT devices.

Expectations

The expectation of the family, as well as professionals involved with the family, were mentioned to have an impact on what was recommended. Parents having very high expectations of their child might feel that their child does not require a particular form of AT. Interestingly, one participant mentioned that parents could have very low expectations of the service. This could lead them to accept any AT offered, even though it may not be the most appropriate. Participant 3 stated:

This said, I suspect that the long waiting lists and limited variety of devices available result in many of our clients being so thankful for anything (much like the idea of ‘beggars can’t be choosers’), that they’ve probably never even considered the potential of something better being available elsewhere.

Preferences and priorities

The preferences of the professionals, the family and the child were mentioned as influencing AT recommendation. Participant 16 referred to the importance of having choices "I think it is also important to emphasise that the users (children and parents) can and should have choices".

Assessment

Regarding the actual AT assessment, it was clear that the assessment approach of the professional played a key role in the entire process. Several practitioners, particularly those employed in the private sector, indicated a more multi-disciplinary approach to assessment, with therapists conducting their assessments without the input from other professionals, although the family was reported to be incorporated in the process.

Several participants, particularly those employed in the public health/education sectors indicated that they have a more collaborative approach towards the assessment, with

several indicating that they conduct assessments together with other professionals, with parents also playing a prominent role. Participant 4 described their approach at a tertiary public hospital: "We aim to provide family-centered services, that strongly considers the needs and environmental context of families".

Obtaining information on the needs of the family as part of the assessment was highlighted as important. Participant 10 (physiotherapist with experience in several working contexts) wrote:

We will also discuss any suggestions our team might have re AT based on the parents goals, needs or long term management. It is my experience that it is essential to establish caregiver requirements if AT is to be used effectively.

She continued that this was needed in order to "ease the strain on the caregiver, facilitate the relationship [with the child]". None of the participants reported asking the children regarding their needs directly - most referred to their perceived needs of the child.

Furthermore, the majority of therapists tended to have a functional approach to the assessment for selection of AT for young children. Several indicated that activities of typical children could be used as a guide. Participant 9 provided a clear example:

I have to keep developmental stage in mind, because even children with severe disabilities grow up in some way. One obvious example will be to start thinking about standing frames for some children by about 12 -15 months, because standing is important for both postural and skeletal development and is a good alternative functional position at that age.

As could be expected, the environment where the AT would be used was frequently described as a consideration during the selection process. Participants explained aspects related to the immediate home/school/hospital environment, as well as the broader

community environment where AT would be used. As example, Participant 6 (speech-language therapist and audiologist employed by the public health system) explained: "... some patients do not have electricity at home, which might influence the issuing of devices that require regular charging (such as tablets/ipads)".

Therapists explained that home or school visits were frequently used to ensure a good match between the child and the AT. Occasionally, therapists were disappointed by non-use of devices, only to find out that they had not considered the environment of the child comprehensively. Participant 5 (physiotherapist employed by the public school system) provided a clear example:

Another point which should be considered is the amount of space available within the child's home. A colleague and I were shocked to find that a standing frame which had been sent home for the holidays, was kept outside the home of the child, because of a lack of space being available inside the home.

In addition to the immediate physical environment, therapists also have to consider the environment where the child is expected to participate - even if this will only be sometime in the future. Participant 9 provided an interesting example

I have noticed by the speech therapist that works with me that the type of communication systems that is used in the schools that the children may end up going to mainly determines what she implements early on. For instance, even though a certain child with autism may do very well with using signs, she needs to push him to use PECS [Picture Exchange Communication System], because the schools in the area only use PECS [Picture Exchange Communication System].

Furthermore, the wider community factors were also mentioned, indicating the need to also incorporate community assessment into the AT selection process. For example, the safety of the child and the AT is an important consideration within certain communities. Participant 15 added: "Another point is the risk of expensive AT being stolen. Although

I don't like this to limit a child, in South Africa this is an obvious threat". Participant 8 (speech-language therapist employed by public health system) explained her solution: "Low tech AT works well in the setting as the children are able to take their files, visual schedules, or adapted games home without fear of them being damaged or stolen".

AT

The AT itself appeared to be a very important consideration for therapists and it was frequently discussed. Several subthemes were identified, as shown in Table 3.

Participant 3 (occupational therapist employed within the public health system) summed up the importance of the availability of AT by stating:

One of the greatest driving factors of AT provision / recommendation for me is probably the availability of the device. Although one might be aware of a more suitable option, we often end up being limited to what is available / what can be made.

Within the South African context, different AT may be available depending on the specific healthcare system and institution (for example hospital or clinic) that a child accesses. Several inconsistencies were identified, that seemed to be dictated by the budgets and priorities of the different institutions, as well as the skill and motivation of staff. Institutions also appeared to have different procurement procedures, with some seemingly ordering AT yearly and others more frequently. The procurement procedure would determine the stock of AT at a particular institution at a specific time, which would dictate whether a particular piece of AT could be provided immediately and what the possible waiting time (if any) would be. Those that cannot be issued with the AT required, are placed on a waiting list.

When stock of devices or financial resources are limited, or a child is on a waiting list for AT therapists use whatever they have available to assist. Participant 5 (physiotherapist employed by the public school system) mentioned

While waiting on chairs, we try and seat our learners as best we can, with the equipment that we have. With learners who have outgrown their chairs, we would sometimes seat them in a bigger chair and then add lateral supports to provide the stability they need, or 'mix and match' footrests etc.

Participants mentioned numerous examples of readily available scrap materials, household objects, cardboard etc. that they utilise to create or adapt AT. Applied paper technology (APT) is used to create adapted chairs or standing frames, as the cardboard, paper and glue needed for this process is relatively cheap and readily available.

Physical location appears to influence the availability of AT and sometimes even of basic supplies - Participant 3 (occupational therapist employed within the public health system) noted

I think... living in an area which is quite isolated, limits access to various materials etc. So for example if a child needs a seating insert or positioner, that would be best if made out of high density sponge...due to where we live and the shops which are available, I am unable to access the correct materials without physically driving 100km in order to access them, so the child may end up with something made of a lower density sponge /pieced together packaging materials / APT device instead."

The availability to trial AT before purchase was identified as an important factor by several participants. Within the South African context, this is not always possible due to limited availability of AT, although several therapists indicated that they do manage to have a trial before purchase/provision. Certain institutions have started implementing trial periods of AT use, where the AT is only issued to the child after it has been found to be appropriate after trial. If the issuing hospital has a large stock of devices, it may

be able to swop out a device if it is found unsuitable after trial. Participant 6, employed at a public institution implementing extended trials before issuing AT stated:

It [having a trial] also takes a lot of the pressure off the therapist who is recommending the device. Sometimes, we are not always 100% sure if the patient will do best on a 4-grid or a 9-grid [communication device]. It's only until you've really given it a chance in therapy that you know. The devices are expensive and one feels a lot of pressure to make sure that the devices we issue meet the needs of the child.

Within the multi-cultural South African context, several comments emphasising the importance of cultural appropriateness of the AT were made. During the discussions, this was applied particularly to AAC and selected symbols and languages. Available symbols (e.g. from existing symbol libraries) are often not culturally appropriate and therefore the AT should have the option of being adapted to the local context.

Participant 12 (speech-language therapist and audiologist in private practice) indicated as an example that she "might need to replace [the symbol of] Santa with Father Christmas, and [the symbol of] van with taxi". Participant 4 (speech-language therapist and audiologist employed within the public health system) indicated that ensuring the cultural appropriateness of the AT was a consultative process

Therefore we consult the family members on the appropriateness of the pictures (type of pictures as well as daily activities of living). Sometimes we have to get pictures from the internet to depict for similar bathroom environment. For example, we may have to combine a bucket with water and a child washing themselves next to it. We also ask the parent if the pictures would be easily identifiable by other family members.

In a context where most clients are not English first language speakers, having access to mostly English communication devices/voices becomes a significant factor to consider when selecting AT. Participant 4 (speech-language therapist and audiologist, providing

services at a public hospital to children from multiple language groups) summed it up by stating that "The device should also be congruent with the language preference of the child and family".

The cost of the AT was another consideration mentioned. Participant 15 stated: "We are somewhat limited by the cost of devices which makes high-tech devices difficult for us to access". Low cost materials are often selected, even though they may take long to make. Participant 8 described the benefits:

Although, it takes time to make low tech communication files they are relatively cheap and copies can then be made available and kept at home and at school, or the file [could be] transported between the two without fear of theft.

The discussion introduced the idea that the flexibility and adaptability of the AT was an important aspect to consider for a young child, particularly within a context with limited resources. Participant 10 (physiotherapist with experience in multiple contexts) explained: "I am in favour of low cost equipment or equipment that can "grow" with the child. Especially in these early years where the child's requirements will change fairly rapidly". Participant 12 (speech-language therapist and audiologist in private practice) indicated that size matters: "When it comes to size, is it portable or huge ... will it fit in a school bag if he/she is in nursery or crèche".

Low technology options were preferred by some as they were cheaper and proved to be quite adaptable. Participant 7 (speech-language therapist, employed by public health system) stated: "We found that Low tech AAC have been a bit more easier to manage, control and is more flexible in addressing the changing needs...".

Decision making

Three subthemes were identified under decision making, describing the professional as

the primary decision maker, the family as the primary decision maker, and a collaborative and joint decision making process with responsibility being shared between the family and professionals. Participant 4 (speech-language therapist and audiologist, employed within the public health system) explained her approach

Once an appropriate device is selected together with the family member, the device is then trialled with the child for several sessions.

Discussion

The data illustrated the complexity of factors that have an influence on the selection and provision of AT to young children within South Africa. As indicated by the AT Device Selection framework (13), this process is multifaceted and should incorporate environmental factors as well as personal factors (pertaining to the child and family, as well as the professional) into the assessment and AT decision making process.

Regarding factors within the broader environmental context, it appeared as though participants were very cognisant of the important influence of this on the selection of AT, particularly relating to policies and legislation, also mentioning several barriers to practice related to these aspects. Extensive examples were provided of how these factors can dictate particularly the availability, accessibility and affordability of appropriate AT to families and children. In public health settings, the inconsistency of services between different settings was highlighted. Consistent policy implementation in all parts of the country will ensure a consistent AT service. Addressing the fragmentation of AT services, also described by Visagie et al. (44), can ensure that best use is made of available resources. Importantly, children and families should not experience a disruption in services during transitions, ensuring seamless intervention as

recommended as principle for services to all young children (45). For example, transition planning should be initiated when children move between the public health system to the education system when they reach school going age. Where fragmentation in service is created due to professionals not working in teams with other professionals, professionals should aim to increase their collaboration with others, as teamwork has been described as best practice (14,46,47) when recommending AT to young children.

Interestingly, the participants did not much discuss the broader cultural aspects that influence provision of AT. Professionals seemed to focus their attention on the level of the family (their specific preferences), but not in terms of the wider cultural backdrop in which AT provision takes place. Culture was mentioned when relating to the appropriateness of specific devices for a specific child from a specific cultural and language group (for example AAC devices and the symbols used). Continued efforts to increase cultural competence can assist rehabilitation professionals to continue to grow in their understanding of how the culture of the children and families they serve influences the selection and eventual use of AT.

In alignment with a strength-based perspective, participants indicated that they viewed the strengths of the family as a resource in the process of AT provision, particularly in obtaining access to funding. The skill and experience of the family/caregivers can also be utilised as a strength when AT is being selected. Unfortunately, family/caregivers may not necessarily be skilled within a country with a considerable part of the adult population not literate or technologically skilled. Families may require extensive training and sustained professional support after the provision of AT to enable them to utilise it. The availability of such training and support may be particularly important when provision of more complex technology is considered. Providing parents with information dispelling myths regarding AT may also be

indicated. Low technology and low cost options may be simpler and could be more appropriate, if they are able to fulfil the same purpose as high technology options.

Regarding the knowledge and experience, skills and training of therapists, the participants indicated the importance of keeping up to date with new developments in the field. This may have become particularly difficult in recent times with the expansion of technology. Close collaborations between AT vendors and rehabilitation professionals will allow vendors to provide guidance to professionals regarding specific products and their provision and use within the South African context. Furthermore, opportunities for formal training could be created by individual professionals/institutions/vendors that are experienced in the context to address the need of professionals to expand their knowledge on AT and AT selection. Facilitating opportunities for rehabilitation professionals to expand their knowledge in the field of AT is vitally important (48–51) and could contribute to greater feelings of self efficacy in recommending professionals (52).

Formalised methods of support, such as reflective supervision or mentorship programmes could be utilised, particularly by young therapists entering this challenging field. Such practices are described as essential to ensure evidence-based practices when providing services to young children (53–55). As the importance of creativity and resourcefulness of therapists were highlighted during the discussion, these traits could be nurtured in a reflective supervision relationship in order to facilitate creative solutions to complex challenges. Creativity and resourcefulness could be encouraged by managers and trainers, by providing, for example, support in the form of technicians, or training in creating low cost AT solutions.

This study has also suggested the importance of factors related directly to the AT that could be used to expand the AT Device Selection model. AT itself is

considered in other models for AT selection (54, 55). The characteristics of AT itself appears to be highly important when making recommendations to children with disabilities in resource limited environments such as South Africa where reasonably basic aspects such as access to electricity to charge AT or finances to replace batteries become important considerations. It is important to continue to look at ways to lower the costs related to AT and to ensure that available AT is not only appropriate, but relevant to the specific context (57). Low technology options (often self made and low cost), should not necessarily be viewed as inferior to high technology (and often more expensive) options (58,59). Furthermore, locally produced AT products (when available) may be a cost-effective alternative. Research efforts are required to support therapists in their selection decisions of low cost options, to ensure that they are based on evidence-based practises, for example Bastable et al. (60) .

Effective practices, such as the availability of AT for trial during assessment, or the use of AT for a trial period should be widely incorporated, as recommended in the literature (61,62) . In this regard the establishment of AT libraries by vendors or perhaps large hospitals/training institutions may be explored, in order to provide families the option to trial a piece of AT. This initiative has been started but has great potential for growth.

Regarding assessment, the use of home and school visits are very important in ensuring a good match is made between AT and child within the particular family context. Home visits become particularly important in a context where professionals themselves may not be familiar with, for example, the home environment of a child as it may differ significantly from what is familiar to them. This practice may provide the professional with the opportunity to observe the child performing in their natural

environment (15,51) and has been suggested as a way to facilitate the expansion of cultural competence (63).

Furthermore, the importance of family-centered AT decision making was described, particularly to ensure the appropriateness of the AT, as well as the practicality of use. This, however, does not mean families need to make the decisions regarding AT on their own, but implies that the process occurs within a team that is able to support the family in their decision. Importantly, a broad definition of family should be applied, with biological parents, grandparents, siblings and other caregivers included.

Particularly in light of the import role of the family in the AT selection and decision making process, a limitation of this study is that it only focussed on the perspectives of professionals. This may be addressed in future studies in order to gain insight into the perspectives of families involved in this process.

Conclusions

The findings from this study illustrate the complexity of the AT selection process and could be used to expand the AT Device Selection Framework (13) for application to low resourced environments. Multiple factors play a role in the AT selection process that all have to be integrated and weighed up by the recommending rehabilitation professional. A considerable amount of clinical reasoning is required to ensure an appropriate match between the child and family (as users), and AT required for optimal functioning within a specific environment - all within a low resourced setting.

Professionals responding to this challenge by incorporating firstly established best practices for working with young children, and complementing this with their own creativity and resourcefulness are able to work towards solutions to provide appropriate AT to young children in low resourced environments.

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Declaration of interest

The authors report no conflicts of interest.

References

1. Dunst CJ, Trivette CM, Hamby DW, Simkus A. Systematic review of studies promoting the use of assistive technology devices by young children with disabilities. *Pract Eval Reports* [Internet]. 2013 [cited 2014 Jun 18];5(1):1–32. Available from:
http://www.practicalevaluation.org/reports/CPE_Report_Vol5No1.pdf
2. Tefft D, Guerette P, Furumasu J. The impact of early powered mobility on parental stress, negative emotions, and family social interactions. *Phys Occup Ther Pediatr*. 2011;31(1):4–15.
3. Guerette P, Furumasu J, Tefft D. The positive effects of early powered mobility on children's psychosocial and play skills. *Assist Technol Off J RESNA*. 2013;25(1):39–48.
4. Kling A, Campbell PH, Wilcox J. Young Children with Physical Disabilities. Caregiver perspectives about assistive technology. *Infants Young Child*. 2010;23(3):169–83.
5. Schoonover J, Argabrite Grove RE, Smith Y. Influencing participation through assistive technology. In: Case-Smith J, O'Brien JC, editors. *Occupational therapy for children*. Sixth Ed. Maryland Heights, Missouri: Mosby Elsevier; 2013. p. 583–619.
6. Judge S, Floyd K, Wood-Fields C. Creating a technology-rich learning environment for infants and toddlers with disabilities. *Infants Young Child*. 2010;23(2):84–92.
7. Wilcox MJ, Guimond A, Campbell PH, Weintraub Moore H. Provider Perspectives on the Use of Assistive Technology for Infants and Toddlers With Disabilities. *Topics Early Child Spec Educ*. 2006;26(1):33–49.

8. Friederich A, Bernd T, De Witte L. Methods for the selection of assistive technology in neurological rehabilitation practice. *Scand J Occup Ther*. 2010;17(4):308–18.
9. World Health Organization. Rehabilitation 2030: A call for action. Meeting report [Internet]. 2017. Available from:
http://www.who.int/disabilities/care/Rehab2030MeetingReport_plain_text_version.pdf
10. World Health Organisation, UNICEF. Assistive Technology for Children with Disabilities: Creating Opportunities for Education, Inclusion and Participation A discussion paper. 2015.
11. World Health Organization, USAID. Joint position paper on the provision of mobility devices in less resourced settings. 2011.
12. Bernd T, Van Der Pijl D, De Witte LP. Existing models and instruments for the selection of assistive technology in rehabilitation practice. *Scand J Occup Ther*. 2009;16(3):146–58.
13. Scherer M, Jutai J, Fuhrer M, Demers L, Deruyter F. A framework for modelling the selection of assistive technology devices (ATDs). *Disabil Rehabil Assist Technol*. 2007;2(1):1–8.
14. Judge SL, Parette HP. Family-Centered Assistive Technology Decision Making. *transdisciplinary J*. 1998;8(2):185–205.
15. Parette HP, Brotherson MJ. Family-centered and Culturally Responsive Assistive Technology Decision Making. *Infants Young Child*. 2004;17(4):355–67.

16. van Niekerk K, Dada S, Tönsing K, Boshoff K. Factors Perceived by Rehabilitation Professionals to Influence the Provision of Assistive Technology to Children: A Systematic Review. *Phys Occup Ther Pediatr*. 2017;2638(September):1–22.
17. Eide AH, Øderud T. Assistive technology in Low-Income Countries. In: MacLachlan M, Swartz L, editors. *Disability & international development: towards inclusive global health*. New York: Springer; 2009. p. 149–60.
18. van Niekerk K, Tönsing K. Eye gaze technology: a South African perspective. *Disabil Rehabil Assist Technol*. 2015;10(4):340–6.
19. United Nations International Childrens Emergency Fund, Department of Social Development, Department of Women Children and People with disability. *Children with disabilities in South Africa. A situational analysis 2001-2011* [Internet]. Pretoria; 2012 [cited 2014 Nov 12]. Available from: http://www.unicef.org/southafrica/SAF_resources_sitandisability.pdf
20. Kathard H, Pillay M. Promoting change through political conciousness: A South African speech language pathology response to the World Report on Disability. *Int J Speech Lang Pathol*. 2013;15(1):84–9.
21. Sherry K. Disability and Rehabilitation: Essential considerations for equitable, accessible and poverty reducing healthcare in South Africa. In: Padarath A, King J, English R, editors. *South African Health Review 2014/2015* [Internet]. Durban: Health Systems Trust; 2015. p. 89–100. Available from: url: <http://www.hst.org.za/publications/south-african-health-review-2014/15>
22. Hall K, Woolard I, Lake L, Smith C. *ChildGauge*. 2012.

23. Emmett T. Disability and poverty. In: Alant E, Lloyd LL, editors. *Augmentative and alternative communication and severe disabilities: Beyond poverty*. London, United Kingdom: Whurr; 2005. p. 68–94.
24. Harrison D. An Overview of Health and Health care in South Africa 1994 – 2010 : Priorities , Progress and Prospects for New Gains [Internet]. 2009 [cited 2015 Aug 15]. p. 1–40. Available from:
<http://www.doh.gov.za/docs/reports/2010/overview1994-2010.pdf>
25. van Rensburg HCJ. South Africa’s protracted struggle for equal distribution and equitable access - still not there. *Hum Resour Health*. 2014;12(1):1–16.
26. Statistics South Africa. Statistical release P0318 [Internet]. General Household Survey. Pretoria; 2015 [cited 2017 Jan 1]. p. 1–186. Available from:
<http://www.statssa.gov.za/publications/P0318/P03182015.pdf>
27. Kathard H, Pascoe M, Ramma L, Jordaan H, Moonsamy S, Wium A-M, et al. How can speech-language therapists and audiologists enhance language and literacy outcomes in South Africa? (And why we urgently need to). *South African J Commun Disord*. 2011;58:59–71.
28. Hall K, Wright G. In brief: A profile of children living in South Africa, using the National Income Dynamics Study. 2011.
29. Samuels AE. The coparenting arrangements and relationship quality of teenage mothers and their coparents : a reflexive case study of a low-income community. University of Pretoria; 2013.
30. Alant E. Support-based AAC intervention. In: Alant E, Lloyd LL, editors. *Augmentative and alternative communication and severe disabilities: beyond poverty*. London: Whurr Publishers; 2005. p. 155–91.

31. Chase L, Alvarez J. Internet Research: The Role of the Focus Group. *Libr Inf Sci Res.* 2000;22(4):357–69.
32. Klein EE, Tellefsen T, Herskovitz PJ. The use of group support systems in focus groups: Information technology meets qualitative research. *Comput Human Behav.* 2007;23(5):2113–32.
33. Gaiser TJ. Online focus groups. In: Fielding NG, Lee RM, Blank G, editors. *The SAGE Handbook of Online Research Methods*. London: SAGE Publications; 2008. p. 290–306.
34. Liamputtong P. *Focus Group Methodology: Principles and Practice*. London: SAGE Publications Ltd; 2011.
35. Burton LJ, Bruening JE. Technology and Method Intersect in the Online Focus Group. *Quest.* 2003;55(4):315–27.
36. Terrell SR. Face-to-face in writing: My first attempt at conducting a text-based online focus group. *Qual Rep.* 2011;16(6):286–91.
37. Krueger RA, Casey J. *Successful focus groups: practical guidelines for research*. Thousand Oaks, CA: Sage; 2009.
38. Hancock JT, Thom-Santelli J, Ritchie T, Hall K. Deception and Design : The Impact of Communication Technology on Lying Behavior. *Media.* 2004;6(1):129–34.
39. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol.* 2006;3(May 2015):77–101.
40. Ndlovu H. African Beliefs Concerning People with Disabilities: Implications for Theological Education. *J Disabil Relig.* 2016;20(1–2):29–39.

41. Wegner L, Rhoda A. The influence of cultural beliefs on the utilisation of rehabilitation services in a rural South African context: Therapists' perspective. *African J Disabil.* 2015;4(1):1–8.
42. Cook AM, Polgar JM. *Cook & Hussey's Assistive Technologies.* 3rd ed. St. Louis, Missouri: Mosby Elsevier; 2008.
43. Glennen S, DeCoste DC. *The Handbook of Augmentative and Alternative Communication.* San Diego: Singular Publishing Group; 1997.
44. Visagie S, Eide AH, Mannan H, Schneider M, Swartz L, Mji G, et al. A description of assistive technology sources, services and outcomes of use in a number of African settings. *Disabil Rehabil Assist Technol.* 2016;0(0):1–8.
45. Guralnick MJ. International Perspectives on Early Intervention: A Search for Common Ground. *J Early Interv.* 2008;30(October 2007):90–101.
46. Rapport MJK, McWilliam RA, Smith BJ. Practices across disciplines in early intervention. *Infants Young Child.* 2004;17(1):32–44.
47. Cowan DM, Khan Y. Assistive technology for children with complex disabilities. *Curr Paediatr.* 2005;15(3):207–12.
48. Baxter S, Enderby P, Judge S, Evans P. Barriers and facilitators to use of high technology augmentative and alternative communication devices: a systematic review and qualitative synthesis. *Int J Lang Commun Disord.* 2012;47(2):115–29.
49. Long TM, Woolverton M, Perry DF, Thomas MJ. Training needs of pediatric occupational therapists in assistive technology. *Am J Occup Ther.* 2007;61(3):345–54.
50. Long TM, Perry DF. Pediatric physical therapists' perceptions of their training in assistive technology. *Phys Ther.* 2008;88(5):629–39.

51. Copley J, Ziviani J. Barriers to the use of assistive technology for children with multiple disabilities. *Occup Ther Int*. 2004;11(4):229–43.
52. Weintraub Moore H, Wilcox MJ. Characteristics of Early Intervention Practitioners and Their Confidence in the Use of Assistive Technology. *Topics Early Child Spec Educ*. 2006;26:15–23.
53. Gilkerson L, Irving B, Harris Distinguished Lecture: Reflective supervision in infant-family programs: Adding clinical process to nonclinical settings. *Infant Ment Health J*. 2004;25(5):424–39.
54. Shahmoon-Shanok R. What is reflective supervision? In: Heller SS, Gilkerson L, editors. *A Practical Guide to Reflective Supervision*. Washington: Zero to Three; 2009. p. 7–23.
55. Wesley PW, Buysse V. Communities of Practice Expanding Professional Roles. Vol. 21, *Topics in Early Childhood Special Education*. 2001. p. 114–23.
56. Scherer M. Matching person and technology. New York: Institute for Matching Person and Technology; 1998.
57. Alant E. AAC technology for development. In: Alant E, Lloyd LL, editors. *Augmentative and Alternative Communication and severe disabilities: Beyond Poverty*. London; 2005. p. 192–220.
58. Tönsing KM. Supporting the production of graphic symbol combinations by children with limited speech: a comparison of two AAC systems. *J Dev Phys Disabil*. 2016;28(1):5–29.
59. Gevarter C, O'Reilly MF, Rojeski L, Sammarco N, Lang R, Lancioni GE, et al. Comparing communication systems for individuals with developmental disabilities: A review of single-case research studies. *Res Dev Disabil*. 2013;34(12):4415–32.

60. Bastable K, Dada S, Uys CJE. The Effect of a Non-Powered, Self-Initiated Mobility Program on the Engagement of Young Children with Severe Mobility Limitations in the South African Context. *Phys Occup Ther Pediatr*. 2016;36(3):272–91.
61. Long T, Huang L, Woodbridge M, Woolverton M, Minkel J. Integrating assistive technology into an outcome driven model of service delivery. *Infants Young Child*. 2003;16(4):272–83.
62. Campbell PH, Milbourne S, Wilcox MJ. Adaptation interventions to promote participation in natural settings. *Infants Young Child*. 2008;21(2):94–106.
63. Wray EL, Mortenson PA. Cultural competence in occupational therapists working in early intervention therapy programs. *Can J Occup Ther*. 2011;78(3):180–6.
64. Triandis HC. *Attitude and attitude change*. New York: Wiley; 1971.
65. Bandura A. *Self-efficacy in changing societies*. Cambridge: Cambridge University Press; 1995.

Table 1

Demographic details of participants (N=16)

Demographics	n	Percentage of total
Profession		
Occupational therapist	5	31.25%
Physiotherapist	3	18.75%
Speech-language therapist	4	25%
Speech-language therapist and audiologist	4	25%
Highest qualification		
Bachelors degree	2	12.5%
Masters degree	13	81.25%
Doctoral degree	1	6.25%
Number of years of experience in recommending/providing AT to children birth to 6 years		
3-5 years	5	31.25%
6-10 years	9	56.25%
11-20 years	1	6.25%
21-30 years	1	6.25%
Province of South Africa where service is provided		
Free State	1	6.25%
Gauteng	7	43.75%
Kwazulu Natal	1	6.25%
North West province	1	6.25%
Western Cape	6	37.5%
Area where service is provided		
City	13	81.25%

Demographics	n	Percentage of total
Non metropolitan areas	2	12.5%
Both	1	6.25%
Current employment setting (could select more than one option)		
Private Practice	3	18.75%
Pubic hospital	7	43.75%
Public School	2	12.5%
Non government organisation	3	18.75%
Clinic	1	6.25%
Other	2	12.5%
Setting in which AT was provided/recommended (previously and/or currently) to children birth to 6 years (could select more than one option)		
Private Practice	4	25.00%
Pubic hospital	9	56.25%
Public School	4	25.00%
Non government organisation	3	18.75%
Clinic	1	6.25%
Other	2	12.5%

Table 2

Online focus group questions

Question number	Question
1	Could you please introduce yourself, share your profession and explain where you work.
2	Please share with us what types of AT you work with?
3	Please describe the process of how AT is provided/recommended to children birth to 6 years at your current place of work.
4	What do you think are the factors that influence professionals in the provision/recommendation of AT to children birth to six years? Please explain.

Table 3

Identified themes, subthemes and examples as discussed by participants

Themes	Subthemes	Instances identified	Examples of issues discussed by participants
Cultural & financial priorities Factors that play a role within a specific culture or financial climate/society. Refers to aspects on a macro level.	General	3	Socioeconomic factors mentioned as barrier to the use of particularly high technology AT.
Policies & legislation Any mention of aspects related to legislation, policy, guidelines, or issues mentioned related to policies or legislation.	Policy	31	National Tender stipulates what AT can be provided.
	Financial provision	14	Medical aids can be requested to contribute to AT costs for private clients.
	Prescription guidelines	7	Often no formal guidelines are followed.
	Red tape	5	Extensive paperwork may be required to enable access to expensive devices.
	Waiting lists	6	Children have to wait so long that they might outgrow the device before they receive it.
	Fragmentation of services	12	Fragmentation e.g. between services when transitioning between hospital-based and school-based services.
	Practice barriers	10	Rural hospitals may not have similar access to AT than hospitals in urban areas.
Attitudes Attitudes of people in the	Attitudes of parents/ family/ caregivers	20	Acceptance of disability and acceptance of AT.

Themes	Subthemes	Instances identified	Examples of issues discussed by participants
environment, e.g. – family, stakeholders, team members. Attitudes are defined as having three parts- cognitive (thoughts and ideas), behavioural (behaviours/behavioural intentions) and affective (feelings and emotions) (64) regarding AT.	Attitudes of teachers/other professionals	16	Passion to improve the outcomes for children will drive professionals to find solutions.
	Attitude of child	5	Child should see the need for the AT - that creates a positive attitude towards it.
Resources All available resources. Financial resources to pay for/provide AT included e.g., from family, government, medical aid, funders etc. Human resources including support from e.g. family/friends, team members, mentors, technicians, availability of time as resource.	Financial	25	Finances viewed as the most important resource to consider.
	Families	18	Families asked to adapt items themselves, asked to use their current technology to assist their child.
	Professional/paraprofessional support	22	A pre-evaluation questionnaire is filled out prior to an assessment for AAC at specialised clinic by the current service providers knowledgeable about the child and family.
	Sustained professional/paraprofessional support	11	Follow-up sessions are not regular, therefore certain AT sent home with child as soon as possible to ensure that it is available to the family.
	Teamwork between professionals and family	20	Collaboration between families and professionals viewed as a resource.
	Expert/ mentor	7	Booking of joint appointments with experienced (mentor) and inexperienced therapists conducted to increase skill in therapist.
	Time	7	Children typically receive intervention once a month (even when severely disabled). Therefore, limited time to consider AT.
Knowledge & Information All aspects related to knowledge and	Pertaining to the family/caregivers: - Knowledge	6	Belief in myths around AT could limit interest in AT.

Themes	Subthemes	Instances identified	Examples of issues discussed by participants
information regarding AT, pertaining to both the professional and the users (child and family) was identified. Self efficacy refers to a person's (in this case the professional's) belief in their own ability to complete an action successfully in any particular domain (65), in this case their confidence in their own abilities regarding AT selection.	- Skills & experience	5	Prior experience with AT facilitates the AT provision process.
	- Training	17	Communication boards made and modified after training with parents.
	Pertaining to the professional:		
	- Knowledge	7	Knowledge on high technology AT will determine whether a therapist would recommend it.
	- Experience	10	Inexperienced therapists find the challenges overwhelming.
	- Skill & resourcefulness	32	Experienced therapists able to utilise their creativity to create solutions.
	- Training	4	AT selected often depends on where (which university) a therapist received her training.
	- Self efficacy	3	Confidence in their skills determine whether therapist recommend complex AT independently.
Expectations			
The child and family (users) as well as professionals bring internal and external expectations to the process. These include for example the expectations of their culture, peers, and society in general(13).	Parent/ family/caregiver	5	Parent may have attitude that child should be grateful for what they have received, even if it is not suitable.
	Teachers/other professionals	3	Perceptions from professionals that children are "too" disabled to benefit from a device.
Preferences & Priorities			
Determined by "prior history with AT Devices, their particular level of motivation, judgment, and outlook, and many other factors that serve to	Professional	7	Preferences of nurses considered in selection of AAC for use in medical wards with patient unable to speak.
	Family	3	Family should be given choices and to indicate their preference

Themes	Subthemes	Instances identified	Examples of issues discussed by participants
combine in a way defining each of us as unique individuals. These influences include personality and temperament characteristics...[that] serve to determine our preferences and priorities" (3, p.6)	Child	3	Use of parent's cell phone could be considered for AT purposes as children are very motivated to access it.
Assessment Aspects influencing the actual AT assessment included here e.g. the environment where the AT will be used, client characteristics and diagnosis, needs expressed by the family during assessment etc. The assessment theme incorporates two components (assessment of functional AT need and functional AT disposition) of the AT Device Selection Framework (13) .	Assessment approach of provider	13	Family-centered services reported.
	Activity & participation	25	Focus on AT that could facilitate participation in routines.
	Therapy goals	5	AT can be withdrawn as child expands their skill.
	Environment		
	- home/school/ hospital	19	Assessment of physical environment.
	- Community	12	Concerns for safety within the community (high crime rate).
	Child characteristics	31	Assessment of e.g. physical or intellectual abilities.
	Assessment of needs		
	- Family needs	16	Parent interviews used to determine needs of the family.
	- Perceived needs of child	10	Perceived need of the child for safety and not getting hurt.
Assistive technology All factors pertaining to the AT itself, e.g. its characteristics and availability.	Goodness of fit	8	Appropriateness of AT considering all factors.
	Availability	43	The AT tender and stock at hospitals determine availability. Therapists use whatever they have available, including low cost items and second hand devices.
	Availability for trial	21	Large public hospitals may have AAC devices available for trial.
	Device characteristics		

Themes	Subthemes	Instances identified	Examples of issues discussed by participants
	- Appropriateness	7	Cultural appropriateness, particularly pertaining to AAC including language appropriateness of AAC devices.
	- Ease of maintenance	7	Physical location could impact on ease of maintenance.
	- Flexibility/ adaptability	5	AT should be flexible to changing needs. AT should "grow" with the child, e.g. positioning and seating devices.
	- Cost	5	Low cost AT preferred, high cost limits availability of AT.
	- Other device characteristics	10	Portability, acceptable appearance, comfort.
	Decision making		
	Descriptions of how AT decision making takes place.		
	Professional (as only decision maker)	3	Within the acute hospital acute care setting, making decisions about communication board vocabulary without family involvement (families may not be accessible/available).
	Family (as only decision maker)	4	Families asked to make the decision regarding AT selection - participant mentioned that they sometimes do not end up making it.
	Collaborative decision between professional and family	2	Process of AT decision making described as a team effort between the professional and family.

Appendix C

Invitation and Information Letter for Participants in the Online Focus Groups



Faculty of Humanities

LETTER OF INVITATION

1 October 2016

RE: Invitation to participate in a research study as part of an online focus group

Dear Sir/Madam

My name is Karin van Niekerk, and I am a PhD student at the Centre for Augmentative and Alternative Communication, University of Pretoria.

I would like to invite you, as an individual working in the field of early intervention and assistive Technology (AT) to participate in an online focus group. This forms part of a larger research study entitled "Perceptions of health care professionals on the factors influencing the provision of Assistive Technology (AT) to young children (from birth to 6 years) in the South African context".

Rationale for the study

As you are well aware, the use of AT by children with disabilities can be associated with significant development and improvement in outcomes within all spheres of life. However, despite the many benefits of the use of AT with young children, it seems to be underutilised in South Africa (as in many parts of the world). Multiple factors seem to have an influence on the provision of AT for young children with disabilities.

As AT is generally recommended by health care professionals (such as speech language therapists, physiotherapists and occupational therapists), I would like to investigate their perceptions on factors that could influence the provision/recommendation of AT. The AT I am interested in could be complex or as simple as an adapted crayon.

What are the objectives of this study?

The main objective is to determine the perceptions of health care professionals on the factors influencing the provision/recommendation of AT to young children (from birth to 6 years) within the South African context. During the main study I plan to conduct a survey with health care professionals throughout South Africa. However, prior to conducting the survey, I would like to conduct several online focus groups with experienced professionals. This will enable me to gain a better understanding of the factors influencing AT provision and assist me in the development of my survey instrument.

The procedures of the online focus group

Approximately 6 to 8 people will participate in an online focus group, conducted in a secured online environment (Blackboard). The online focus group will take place over four consecutive days (Wednesday to Saturday). The discussions will take place asynchronously, implying that all the participants will not be required to be online at the same time of the day. Participants will be able to enter the focus group at any time during the four days of the discussion and are requested to answer each of the four questions posted during the group at least once.

Centre for Augmentative and Alternative
Communication, Room 2-36, Com path
Building, Lynnwood Road
University of Pretoria, Private Bag X20
Hatfield 0028, South Africa
Tel +27 (0)12 420 2001
Fax +27 (0) 86 5100841
Email saak@up.ac.za
www.caac.up.ac.za

Fakulteit Geesteswetenskappe
Lefapha la Bomotheo

The researcher will post questions asking the participants about their own experience and perceptions regarding the provision/recommendation of AT to young children. Participants will have the opportunity to type their responses to the questions posed by the researcher and also to post comments on the responses of other participants. The online forum will be opened a few days before the onset of the group to allow participants to test their access to the forum. It will be closed immediately after the four days have passed. Detailed instructions on accessing the online forum as well as procedures for participation will be communicated to participants.

Confidentiality

Several steps will be taken to protect the confidentiality of the information you provide in the focus group, as well as your identity. The discussions will be downloaded from the online forum by the researcher directly after the completion of the focus group, with names of individual participants replaced by participant numbers. This will be done in order to ensure that no identifying information is retained in the data. The data from the focus group will be kept safely, and the information will only be viewed by the PhD student and supervisors. Your name will not be mentioned in any publication or presentation. The data obtained will be securely stored for the purposes of research and archiving for a period of 15 years at the Centre for Augmentative and Alternative Communication, University of Pretoria. The online forum will be erased.

Risks and possible disadvantages to participants

All participants in the focus group will be requested to keep information shared in the group confidential. However, the researcher does not have control over the actions of the participants. Therefore, a risk exists that participants could share information obtained during the group. As all participants in the group are professional persons familiar with the importance of ethical behaviour, this is thought to be a small risk.

Research results

In general terms, the results from this study will be reported in oral and written form that may be presented in manuscripts submitted for publication in scientific journals, or oral and/or poster presentations at scientific meetings, seminars, and/or conferences. If you wish to receive a copy of the results of the study, you may contact the researcher at the telephone number given below.

Participants' rights

Your participation in this research is completely voluntary and you are free to withdraw from the study at any time.

Your participation in this study will be greatly appreciated. If you agree to participate, kindly let the researcher know by email/phone. You will be sent an electronic consent form together with a short electronic biographical questionnaire. Thank you for your time and consideration in this matter.

If you have any questions concerning the research study, please call me at 083 268 6221 or e-mail me at karin.vanniekerk@up.ac.za.

Sincerely,



Karin van Niekerk

(PhD student)



Prof. Shakila Dada

(Supervisor)

Appendix D

Online Information and Consent Letter for Participation in the Online Focus Groups

Participation in online focus group

Informed Consent

Thank you for your interest in participating in this study. You have received a letter explaining this study as well as how it fits into the bigger study I am undertaking.

As communicated to you, approximately 6 to 8 people will participate in an online focus group, conducted in a secured online environment. The online focus group will take place over four consecutive days. The discussions will take place asynchronously, implying that all the participants will not be required to be online at the same time of the day. You will be able to enter the focus group at a time of day that suits you.

Two questions will be posted on the first day of the focus group and two questions on the second day. Participants are encouraged to contribute to questions as often as they are able over the four days. It is recommended that participants answer all the questions at least once.

The researcher will post questions asking the participants about their own experience and perceptions regarding the provision/recommendation of AT to young children. Participants will have the opportunity to type their responses to the questions posed by the researcher and also to post comments on the responses of other participants. The online forum will be opened a few days before the onset of the group to allow participants to test their access to the forum. It will be closed immediately after the four days have passed. Detailed instructions on accessing the online forum will be communicated to participants.

Several steps will be taken to protect the confidentiality of the information participants provide in the focus group, as well as their identity. The discussions will be downloaded from the online forum by the researcher directly after the completion of the focus group, with names of individual participants replaced by participant numbers. This will be done in order to ensure that no identifying information is retained in the data. The data from the focus group will be kept safely, and the information will only be viewed by the PhD student and supervisors. Participant names will not be mentioned in any publication or presentation. The data obtained will be securely stored for the purposes of research and archiving for a period of 15 years at the Centre for Augmentative and Alternative Communication, University of Pretoria. The online forum will be erased.

All participants in the focus group will be requested to keep information shared in the group confidential. However, the researcher does not have control over the actions of the participants. Therefore, a risk exists that participants could share information obtained during the group. As all participants in the group are professional persons familiar with the importance of ethical behaviour, this is thought to be a small risk.

In general terms, the results from this study will be reported in oral and written form that may be presented in manuscripts submitted for publication in scientific journals, or oral and/or poster presentations at scientific meetings, seminars, and/or conferences. If you wish to receive a copy of the results of the study, you may contact the researcher at 083 268 6221 or email at karin.vanniekerk@up.ac.za.

Your participation in this research is completely voluntary and you are free to withdraw from the study at any time.

Your participation in this study will be greatly appreciated.

After considering all the information provided on the study, please indicate whether you provide consent to participate in the online focus group:

☐ I consent to participate in this study

☐ I do not consent to participate in this study

NEXT

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Appendix E

Online Biographical Questionnaire for Online Focus Groups

Participation in online focus group

***Required**

Biographical information

Please complete the following checklist:

Please enter your name: *

Your answer

What is your profession? *

☐ Occupational Therapist

☐ Physiotherapist

☐ Speech Language Therapist

☐ Speech Language Therapist and Audiologist

Are you registered at the Health Professions Council of South Africa? *

☐ Yes

☐ No

What is your highest qualification? *

☐ Diploma

☐ Bachelors Degree

☐ Masters Degree

☐ Doctoral Degree

How many years of experience do you have in recommending/providing assistive technology (AT) to children birth to 6 years? *

Your answer

In which province of South Africa do you currently provide/recommend AT? *

- ☐ Eastern Cape
- ☐ Free State
- ☐ Gauteng
- ☐ Kwazulu Natal
- ☐ Limpopo
- ☐ Mpumalanga
- ☐ Northern Cape
- ☐ North West Province
- ☐ Western Cape

In which city/town do you recommend/provide AT? *

Your answer

What is your current employment setting? (You can select more than one) *

- ☐ Private practice
- ☐ Public hospital
- ☐ Public School
- ☐ NGO
- ☐ Clinic
- ☐ Other:

In which settings have you had experience in providing/recommending AT to children birth to 6 years? (You can select more than one) *

- ☐ Private practice
- ☐ Public hospital
- ☐ Public School
- ☐ NGO
- ☐ Clinic
- ☐ Other:

**Thank you for completing this short biographical checklist.
Looking forward to seeing you in the focus group soon!**

BACK

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Appendix F

Information Sheet Describing Access to the Online Forum for Focus Groups

Accessing the online focus group: UP Alumni (the process to obtain a password etc. differs slightly for participants that are not UP alumni)

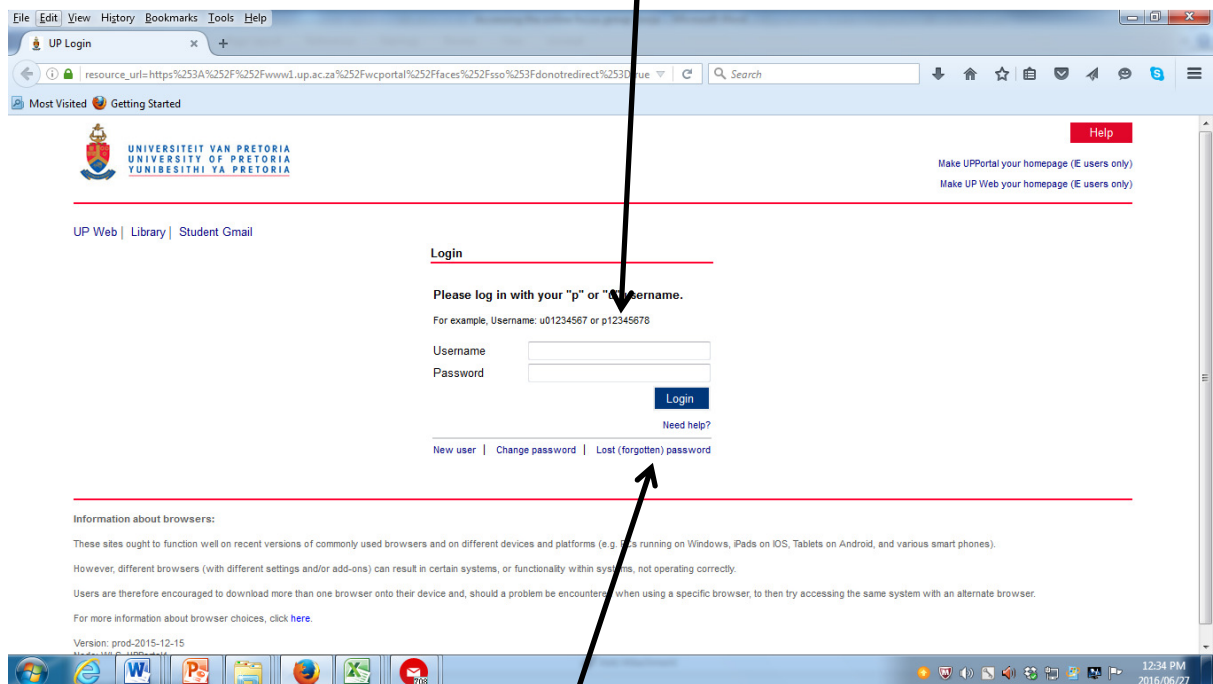
Go to <http://clickup.up.ac.za>

Username: Your student number preceded by u. If your student number only has 7 digits, add a 0 after the "u" for example. u01257394

Password: Your created password

Forgotten password: if you forgot your password, please reset it by visiting www.up.ac.za, and clicking the link to 'My TUKS login' in the top left corner. You will come to this screen:

Enter your student number preceded by u here:

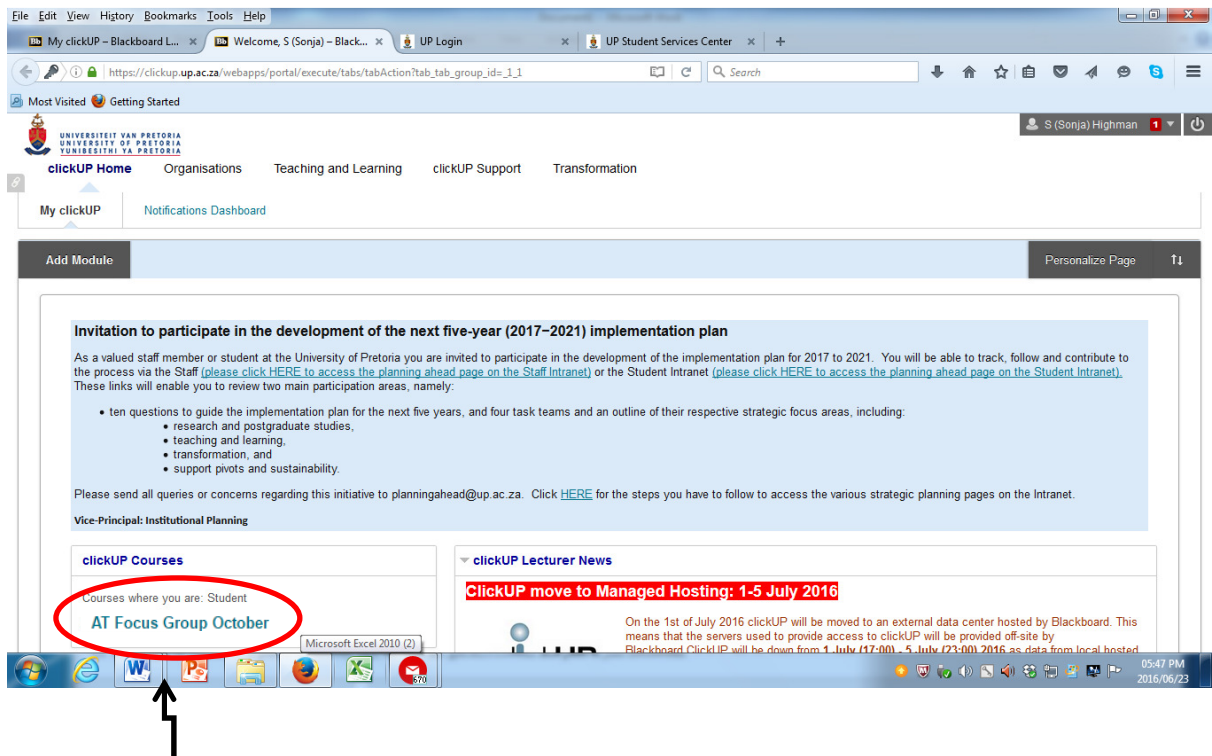


The click on Lost/forgotten password here:

You will need to answer the security questions you set up before you can get a new password.

If you struggle with this process, please let me know.

If you have your password, then you can log into clickUP <http://clickup.up.ac.za> and you will get to this screen:



Click on a link called "Focus group October"

You will get to this screen:

https://clickup.up.ac.za/webapps/discussionboard/oo/conference?toggle_mode=read&action=list_forums&course_id=_107076_o_idnav=discussio

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UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

clickUP Home Organisations Teaching and Learning clickUP Help clickUP Support Transformation Student Success

Discussion Board

Discussion Board
Forums are made up of individual discussion threads that can be organized around a particular subject. Create Forums to

Create Forum

Forum	Description
Online focus group	The online space where we will have the focus group

Click on this link

You will then see this screen:

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YUNIBESITHI YA PRETORIA

clickUP Home Organisations Teaching and Learning clickUP Help clickUP Support Transformation Student Success

Discussion Board > Forum: Online focus group

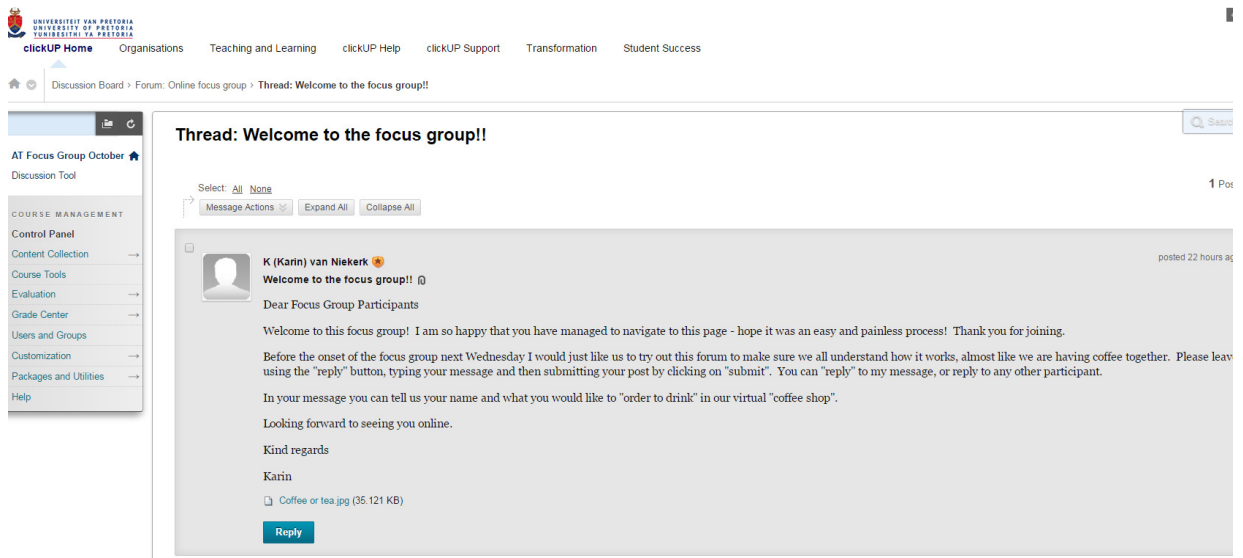
Forum: Online focus group
Organize Forum Threads on this page and apply settings to several or all threads. Threads are listed in a tabular format. The Threads can be sorted by ci

Create Thread Subscribe

Thread Actions	Date	Thread	Author
	10/20/16 5:45 AM	Welcome to the focus group!!	K (Karin) van Niekerk

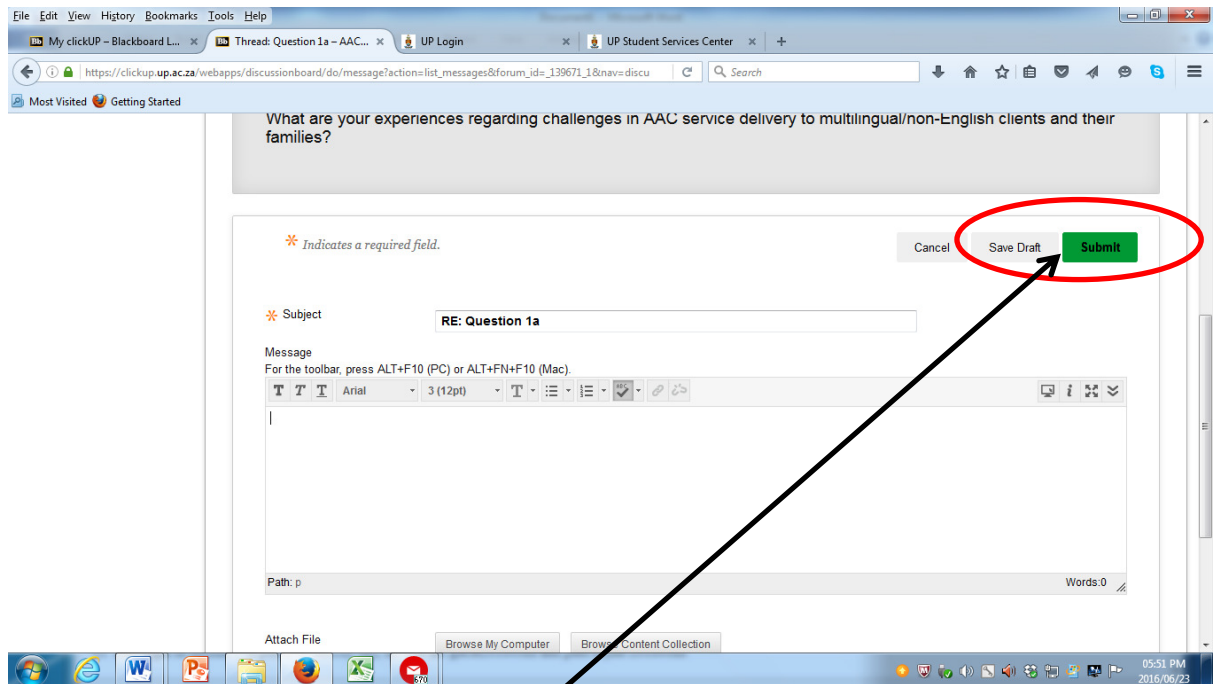
Click on first thread

You will see this screen:



Click on 'Reply'

You can now type your response in the space provided:



Once you are done, click on 'Submit'

Appendix G

Online Focus Group Script

Welcome & Introductions

Introduction of researchers

(To be included in a post in a facilitation forum within the discussion)

- ✓ Thank you for making your time available to participate in this online focus Group.
- ✓ As you know, my name is Karin van Niekerk; I am an occupational therapist and PhD student at the Centre for Augmentative and Alternative Communication (Centre for AAC) at the University of Pretoria. My supervisors, Prof Shakila Dada & Dr. Kerstin Tonsing may pop into the focus group discussion over the next few days and join the discussion.
- ✓ We are interested in assistive technology (AT) within the field of early intervention. As you know, AT can be beneficial to young children, and we would like to understand the recommendation/provision of AT to this age group better.

Introduction of study

(To be included in a post in a facilitation forum within the discussion)

My study is about the Perceptions of health care professionals on the factors that influence the provision of Assistive Technology (AT) to young children (birth to 6 years) in South Africa. As professionals that have indicated that you actually provide AT to children within this age group, your insights will be very valuable to me. You will have the opportunity in this online focus group to share your experiences & thoughts with the group. You are welcome to include experiences from your current or previous work environments.

When I speak of assistive technology during this focus group, I am referring to any item, product or piece of equipment that could be either purchased off the shelf, or modified/customised in any way or made from scratch, that is used to increase, maintain or improve the functioning of a person with disability in

everyday activities. I am interested in your experiences regarding any AT that might be provided within your scope of practice – whether it be complex or as simple as an adapted crayon.

I realise some of you will also have experience in provision of AT to older children or perhaps adults. In this focus group, we would like to focus specifically on children birth to 6 years.

Procedures of the online focus group (To be included in a post in a “procedures for the discussion” thread)

- ✓ *Before joining the discussion, please ensure that you have completed the electronic consent and background information forms. Thank you.*
- ✓ *This focus group discussion will be open for four days.*

I will post two questions on the first day of the focus group and two questions on the second day.

- ✓ You may contribute to questions as often as you are able. You are requested to answer every question at least once.
- ✓ You may access the group at any time of the day or night.
- ✓ Each question will have its own discussion “thread”. You can answer the questions under each thread by selecting “reply” and then typing your response into the space provided. You can submit your response by clicking on “submit”. You can edit your response after you have submitted it by clicking on “edit”, and modifying your response in the space provided. Click on “submit” after you have completed your edits.
- ✓ I would like to encourage you to share your views and experiences as openly as possible, even if they differ/contrast to those of another participant.
- ✓ Responding to each other’s contributions is strongly encouraged.
- ✓ You are welcome to use "emojicons" such as :) for happy to communicate your emotions during the focus group.
- ✓ There are no right or wrong answers – your input & experience is what matters to us.

- ✓ The facilitation forum can be used throughout the focus group for any questions, comments or conversations that do not specifically relate to any one of the questions.
- ✓ Please respect the confidentiality of the other group members by not sharing any information from this group.
- ✓ Please remember that you can decide to leave the focus group at any time.

Discussion

Question 1

- ✓ Could you please introduce yourself, share your profession and explain where you work.

Question 2

- ✓ Please share with us what types of AT you work with?

Question 3

- ✓ Please describe the process of how AT is provided/recommended to children birth to 6 years at your current place of work.
- ✓ Probing questions may be asked including: “Any examples to illustrate this?” or “Could you explain that please?”
- ✓ Specific questions can be asked for statements that require further clarification.

Question 4

- ✓ What factors do you think influence professionals when providing/recommending AT to young children? Please explain.
- ✓ Probing questions may be asked including: “Any examples to illustrate this?” or “Could you explain that please?”
- ✓ Specific questions can be asked for statements that require further clarification.

Closure (email sent to participants)

- ✓ Thank you for your valuable time used to take part in this focus group.

Appendix H

View of the Online Forum with Focus Group Discussion Threads

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[Teaching and Learning](#)
[clickUP Help](#)
[clickUP Support](#)
[Transformation](#)
[Student Success](#)

[Home](#)
[Discussion Board > Forum: Online Focus Group](#)

K (Karin) van Niekerk 2

[List View](#)
[Tree View](#)

Edit Mode is: **ON** ?

AT Focus Group November

Discussion Tool

COURSE MANAGEMENT

Control Panel

Content Collection

Course Tools

Evaluation

Grade Center

Users and Groups

Customization

Packages and Utilities

Help

Forum: Online Focus Group

Organize Forum Threads on this page and apply settings to several or all threads. Threads are listed in a tabular format. The Threads can be sorted by clicking the column title or the caret at the top of each column. [More Help](#)

[Create Thread](#)
[Subscribe](#)

[Search](#)
[Display](#)

Thread Actions		Collect	Delete		Date	Thread	Author	Status	Unread Posts	Total Posts
☐					10/27/16 9:09 PM	Welcome to the focus group!	K (Karin) van Niekerk	Published	0	18
☐					11/1/16 4:52 PM	Facilitation Forum	K (Karin) van Niekerk	Published	0	4
☐					11/1/16 4:53 PM	Introductions & Procedures (Read this first)	K (Karin) van Niekerk	Published	0	2
☐					11/1/16 4:56 PM	Question 1: Introductions	K (Karin) van Niekerk	Published	0	25
☐					11/1/16 4:57 PM	Question 2: AT	K (Karin) van Niekerk	Published	0	35
☐					11/3/16 5:44 AM	Question 3: Process	K (Karin) van Niekerk	Published	0	30
☐					11/3/16 5:45 AM	Question 4: Factors	K (Karin) van Niekerk	Published	0	36

Thread Actions

Collect

Delete

Displaying 1 to 7 of 7 items | [Edit Paging...](#)

Appendix I

Online Focus Group Evaluation Survey

Online focus group evaluation

Thanks again for your participation in the online focus group.

This is a short evaluation checklist about your experience of the focus group. The data gathered from this evaluation will be used to enable the researcher to comment on the online focus group process. You are encouraged to answer the questions as honestly as possible.

The data from this evaluation will be kept safely, and the information will only be viewed by the PhD student and supervisors. Participant names will not be recorded/saved together with the responses for this checklist. Therefore, the researcher will not know which participant gave what scores. The data obtained will be securely stored for the purposes of research and archiving for a period of 15 years at the Centre for Augmentative and Alternative Communication, University of Pretoria.

The results from this evaluation may be reported in oral and written form that may be presented in manuscripts submitted for publication in scientific journals, or oral and/or poster presentations at scientific meetings, seminars, and/or conferences. Participant names will not be mentioned in any publication or presentation.

You are under no obligation to complete this evaluation checklist. If you would like to complete it, please submit the form only once. Your submission of this checklist will be much appreciated!

Thank you.

***Required**

☐ I would like to complete the evaluation checklist

☐ I do not want to complete the evaluation checklist

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Online focus group evaluation

Please select the most applicable response

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The researcher was able to address all issues with technology experienced before or during the group.	☐	☐	☐	☐	☐
The researcher provided clear instructions/guidelines on how to participate in the focus group.	☐	☐	☐	☐	☐
The researcher helped to keep participants engaged and participating in productive dialogue.	☐	☐	☐	☐	☐
The researcher's actions reinforced the development of a sense of belonging among participants.	☐	☐	☐	☐	☐
The researcher was able to manage different "styles" in participants – providing input to both highly active and more passive participants.	☐	☐	☐	☐	☐
Getting to know other participants gave me a sense of belonging in the group.	☐	☐	☐	☐	☐
I felt comfortable interacting with other participants.	☐	☐	☐	☐	☐
I felt comfortable disagreeing with other participants within the group.	☐	☐	☐	☐	☐
I felt that my point of view was acknowledged by the researcher and/or other participants.	☐	☐	☐	☐	☐
I felt safe to discuss my views in the discussion.	☐	☐	☐	☐	☐
The discussion piqued my curiosity.	☐	☐	☐	☐	☐
I felt motivated to discuss the questions.	☐	☐	☐	☐	☐
I was able to exchange information with others during the discussion.	☐	☐	☐	☐	☐
I was able to reflect on the questions which enabled me to make contributions to the discussion.	☐	☐	☐	☐	☐

Do you have any other comments on the online focus group that you would like to share?

Your answer

Thank you for completing this evaluation, it is much appreciated!

BACK

SUBMIT

Appendix J

Ethics Approval Letter



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
Research Ethics Committee

11 November 2015

Dear Dr Dada

Project: Perceptions of health care professionals on provision of
assistive technology to children with severe disabilities in
Gauteng, South Africa
Researcher: K van Niekerk
Supervisor: Dr S Dada
Department: Centre for Augmentative and Alternative Communication
Reference number: 01280503 (gw20151014HS)

Thank you for the response to the Committee's correspondence of 9 November 2015.

I have pleasure in informing you that the Research Ethics Committee formally **approved** the above study at an *ad hoc* meeting held on 11 November 2015. Data collection may therefore commence.

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

The Committee requests you to convey this approval to the researcher.

We wish you success with the project.

Sincerely

Prof. Karen Harris
Acting Chair: Research Ethics Committee
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail: karen.harris@up.ac.za

Research Ethics Committee Members: Prof KL Harris(Acting Chair); Dr L Blokland; Dr JEH Grobler; Ms H Klopper; Dr C Panebianco-Warrens; Dr C Puttergill; Prof GM Spies; Dr Y Spies; Prof E Taljard; Ms KT Andrew (Committee Admin); Mr V Sithole (Committee Admin)

Appendix K

Included Articles in the Systematic Search for Instruments

Author and Title	Sample	Design	Content of instrument	Availability of instrument	Reliability/validity information
Chmiliar (2007) Perspectives on assistive technology: What teachers, health professionals, and speech and language pathologists have to say?	Province of Alberta, Canada. A. total of 2000 surveys sent to teachers, 800 to OT or PT, and 500 to SLPs. The return rate was 4% for teachers (n = 129), 8% for SLPs (n = 32), and 16% for OT and PT (n = 87).	Three different mail surveys distributed to the three different professional groups.	The survey consisted of demographic questions; yes/no questions regarding training; one question asking about the nature of training; a question asking to rate skills and knowledge in AT; a open ended question asking to identify funders of AT; a list of 12 items to rate the extent to which they act as barriers; as well as a list of 10 to rate their importance in AT service provision with opportunities for comments provided.	Not published. The researcher was unable to obtain a copy of the instrument.	Survey developed through literature study. The questions were refined using a focus group with representatives from each of the professional groups. No reliability measures were reported.
Freeman, MacKinnon, & Miller (2004) Assistive technology and handwriting problems: What do occupational therapists recommend?	Canadian OT's working with school aged children. A total of 1468 surveys were distributed and 835 (57%) were returned.	Mail surveys were sent out together with return addressed envelopes.	The survey included questions on the demographics of participants; technology strategies recommended; and factors influencing recommendations. Regarding the factors, questions were asked on a rating scale with 1 (not at all influential) to 5 (highly influential). The influence of 10 different factors, specifically on keyboard strategies, dictation strategies and a combination of keyboard and dictation strategies was determined.	Not published. The researcher was unable to obtain a copy of the instrument. However, the questions could be deducted from the article.	Questions were formulated after a review of literature, also incorporating clinical experience. A pilot test was conducted by 5 experienced OTs.

Author and Title	Sample	Design	Content of instrument	Availability of instrument	Reliability/validity information
Lahm & Sizemore (2002) Factors that influence assistive technology decision-making	Kentucky, USA. Service providers recommending AT in the Kentucky First Steps Programme, serving children birth to 3 years (n=15); including SLP, AT suppliers, educators, AT practitioners and OTs.	Telephone survey	Demographic data on the participants in the study were collected. A total of six questions were included about the educational background of the participants; as well as 12 questions regarding the implementation of teaming in AT decision-making.	Instrument published with article.	A pilot was conducted; adaptations were made to the questionnaire after the pilot. No reliability measures were reported.
Reed & Kanny (1993) The use of computers in school system practice by occupational therapists	Washington, USA. State, rural and Urban OTs were sent surveys (n=78); the response rate was 86,7% .	Four mailings of a survey were sent over a 7 week period.	A total of 24 questions were included in three different sections. These included computer tech applications with students and for what purposes; perceived barriers and needs regarding the use of computer technology; and demographics of respondents.	Not published. The researcher was unable to obtain a copy of the instrument.	Face and design validity was established in pilot by 3 OTs with applicable expertise and between 6-15 years experience in public schools. No reliability measures reported.
Wilcox, Guimond, Campbell, & Weintraub Moore (2006) Provider perspectives on the use of assistive technology for infants and toddlers with disabilities	States in the USA were selected. Recruitment notices were sent to 17,126 randomly selected providers (e.g., OTs, PTs and SLPs). A total of 2,166 providers participated (12.9% of the sample).	Telephone survey	A total of 26 questions were included. The survey collected data on each of the following topics: 1) definitions and use of AT in ECI ; 2) beliefs and other factors that may influence decisions about AT; 3) the availability of resources that support the use of AT , and 4) determining details about provider training and disciplines.	Instrument published with article	An initial version of the survey was administered to 100 providers who attended a workshop that focused on AT in early intervention. Feedback and responses on the preliminary survey served as the basis for the elimination, refinement or addition of questions.

Appendix L

Expert Panel Review Form

Dear Expert Panel Participant

As you know, the plans for my questionnaire changed recently. Although you have looked at another version of my expert panel form previously, I would like to ask that you please complete the form for this online discussion, as participant in my expert panel. Although I have received feedback from an expert panel before, the questionnaire has changed a lot since then, so I realise that I have to do this step again :). Please complete the consent form that I will send to you electronically. Thank you ladies!

The aim of the questionnaire is to explore the perceptions of rehabilitation professionals on the factors that influence the provision of AT to young children (birth to 6 years) in the South African context. As part of earlier phases of my study, I have studied the literature on this topic by means of a systematic review and I have conducted focus groups with local therapists to determine what factors they believe influence AT provision in our context. I have integrated this data to adapt an existing framework on AT selection, indicating the various components that influence AT provision in our context. This is included in the supplementary document. For every component on the list, a definition as conceptualised for this study is provided.

I have started to develop a questionnaire with items based on this framework. In other words, every item in the questionnaire is included to measure a specific component of the framework. The final questionnaire will be completed in an online survey format. This will also include biographical information that is not included here.

For the items you are looking at, I am interested to know how participants "weigh up" the different items in terms of their perceived influence on their selection of AT. Items that I would like you to look at will be presented in sets (24 sets of six items at a time, set up in an experimental design) to each participant, asking them to select the most and least influential of every set. Therefore, all 48 items will not be listed one after the other, as in this form - this is only for the expert panel.

An example of a completed question will look like this:

*For each group of six factors that may influence your recommendation of AT for children 0 to 6 years:
Please select one factor that you consider to be most influential, and one factor that you consider to be the least influential on your recommendations.*

Most influential		Least influential
☐	Cost of the device	☐
☐	The possibility for the AT to "grow" with the child.	☐
☐	The availability of the AT for the child to try out during assessment.	☐
☐	The availability of the AT for the child to try out at home.	☐
☐	The ease of maintenance of the AT.	☐

What would I like you to do?

Please look at all the items in the tables. By using the list of definitions of each component, please indicate which component you think is targeted in every item. Please use the dropdown list to enter your choice of component.

If you do not feel that the item represents any of the given components, please select the "None of the above" option at the bottom of the drop down list and provide feedback on what you think the item is asking about.

Appendix L

Please comment on what items you think should be deleted or on what you think could be added. You are most welcome to suggest items based on the framework if you feel that would be necessary.

Furthermore, please also rate every item on its conciseness and clarity on a scale with:

1 (item is not at all clear & concise);

2 (item could improve on its clarity & conciseness);

3 (item is clear and concise)

Please provide any comments regarding any of the items in the column provided. Additional comments can be entered in the space provided after the tables.

Thank you. I appreciate your input tremendously!

Kind regards

Karin

Item	Rating of clarity & conciseness 1 (item is <i>not at all</i> clear & concise); 2 (item <i>could improve</i> on its clarity & conciseness); 3 (item is <i>clear and concise</i>)	Component of framework	Any comments regarding item
1. Cultural beliefs regarding the cause of disability.	Choose a Rating.	Choose a component.	
2. Degree of importance attributed to independence within the child's culture	Choose a Rating.	Choose a component.	
3. The family's attitude toward AT.	Choose a Rating.	Choose a component.	
4. The attitudes of the professionals that will assist in the implementation of the AT.	Choose a Rating.	Choose a component.	
5. The child's attitude toward AT.	Choose a Rating.	Choose a component.	
6. Your attitude toward AT.	Choose a Rating.	Choose a component.	
7. The social acceptability of the recommended AT.	Choose a Rating.	Choose a component.	
8. Current AT practices at the school the child attends/ would like to attend.	Choose a Rating.	Choose a component.	
9. Policies related to AT recommendation/provision applicable to your place of work	Choose a Rating.	Choose a component.	
10. Guidelines related to AT recommendation/provision implemented at your place of work	Choose a Rating.	Choose a component.	
11. Practice barriers related to AT recommendation, e.g. long waiting lists, excessive red tape, the fragmented nature or services	Choose a Rating.	Choose a component.	
12. Financial provision for AT, e.g. through tender policy, medical aid	Choose a Rating.	Choose a component.	
13. The characteristics of the physical environment where the child will use the AT, e.g. home, school, community	Choose a Rating.	Choose a component.	

Item	Rating of clarity & conciseness 1 (item is <i>not at all</i> clear & concise); 2 (item <i>could improve</i> on its clarity & conciseness); 3 (item is <i>clear and concise</i>)	Component of framework	Any comments regarding item
14. Availability of electricity in the home, school and community	Choose a Rating.	Choose a component.	
15. Crime rate in the community	Choose a Rating.	Choose a component.	
16. Your knowledge and training of in recommending/providing AT	Choose a Rating.	Choose a component.	
17. Your sense of confidence when recommending/providing AT	Choose a Rating.	Choose a component.	
18. Your technical expertise and experience in recommending/providing AT	Choose a Rating.	Choose a component.	
19. Your resourcefulness in recommending/providing AT solutions	Choose a Rating.	Choose a component.	
20. The family's knowledge of AT	Choose a Rating.	Choose a component.	
21. The family's skill and experience with AT	Choose a Rating.	Choose a component.	
22. The possibility to train families on AT	Choose a Rating.	Choose a component.	
23. Availability of funds for AT, e.g. through fundraising or family funds	Choose a Rating.	Choose a component.	
24. Availability of sustained professional/paraprofessional support for child after AT has been acquired/provided	Choose a Rating.	Choose a component.	
25. Social support available to families and children using AT	Choose a Rating.	Choose a component.	
26. Availability of a team to work with during the recommendation/provision of AT	Choose a Rating.	Choose a component.	
27. The support of your mentor in recommending/providing AT	Choose a Rating.	Choose a component.	

Item	Rating of clarity & conciseness 1 (item is <i>not at all</i> clear & concise); 2 (item <i>could improve</i> on its clarity & conciseness); 3 (item is <i>clear and concise</i>)	Component of framework	Any comments regarding item
28. Availability of time for recommending/providing AT	Choose a Rating.	Choose a component.	
29. The family's ability to support the implementation of the AT.	Choose a Rating.	Choose a component.	
30. Expectations of the family regarding AT for a child	Choose a Rating.	Choose a component.	
31. Your expectations related to AT for a child	Choose a Rating.	Choose a component.	
32. Expectations of professionals (e.g. teachers) of AT for a child	Choose a Rating.	Choose a component.	
33. The child's preference regarding AT	Choose a Rating.	Choose a component.	
34. The family's preference regarding AT	Choose a Rating.	Choose a component.	
35. Your preference regarding AT	Choose a Rating.	Choose a component.	
36. Activities that the child should/would like to participate in	Choose a Rating.	Choose a component.	
37. The child's current abilities and skills	Choose a Rating.	Choose a component.	
38. Needs indicated by the family	Choose a Rating.	Choose a component.	
39. Needs indicated by the child	Choose a Rating.	Choose a component.	
40. Your therapy goals for the child	Choose a Rating.	Choose a component.	
41. Appropriateness of the match between the child and the AT.	Choose a Rating.	Choose a component.	

Item	Rating of clarity & conciseness 1 (item is <i>not at all</i> clear & concise); 2 (item <i>could improve</i> on its clarity & conciseness); 3 (item is <i>clear and concise</i>)	Component of framework	Any comments regarding item
42. Your approach to assessment	Choose a Rating.	Choose a component.	
43. Cost of the AT	Choose a Rating.	Choose a component.	
44. The possibility for the AT to "grow" with the child.	Choose a Rating.	Choose a component.	
45. The availability of the AT for the child to try out	Choose a Rating.	Choose a component.	
46. Characteristics of the AT, e.g. ease of maintenance, portability	Choose a Rating.	Choose a component.	
47. Materials available to make AT at your practice/department	Choose a Rating.	Choose a component.	
48. Availability of AT on tender	Choose a Rating.	Choose a component.	

Appendix M

First Invitation Letter for Participation in the Online Survey

Dear Prospective Participant

Are you a speech language therapist, physiotherapist or occupational therapist that works with YOUNG CHILDREN (birth to 6 years)?

Do you recommend ANY TYPE OF ASSISTIVE TECHNOLOGY (AT) to young children?

(This could include items that are purchased of the shelf, modified/customised, or made from scratch, used in any domain, including e.g. mobility, communication, ADL or play. The AT could be very complex or as simple as an adapted crayon.)

Understanding the factors that influence our recommendations regarding AT are important to improve our knowledge of this process. I would be grateful if you would consider completing this survey. It forms part of my PhD study aimed at helping us understand what influences AT recommendations.

Twenty-five (25) randomly selected participants will each receive a R200 gift voucher from Takealot.

FOLLOW THIS LINK TO THE SURVEY:

[\\${!://SurveyLink?d=Take the Survey}](#)

Or copy and paste the URL below into your internet browser:

[\\${!://SurveyURL}](#)

Follow the link to opt out of future emails:

[\\${!://OptOutLink?d=Click here to unsubscribe}](#)

Thank you for your participation!

Kind regards

Karin van Niekerk

Occupational Therapist and PhD student

Centre for Augmentative and Alternative Communication

University of Pretoria

karin.vanniekerk@up.ac.za

Appendix N

Second Invitation Letter for Participation in the Online Survey

Dear Prospective Participant

Last week, I sent out an email requesting your participation in a survey that forms part of my PhD study. The study is aimed at increasing our understanding of the factors that influence our recommendations regarding Assistive Technology (AT) for young children.

If you do recommend AT to young children (birth to 6 years) in your current job, I would be most grateful if you would consider completing the survey. (AT could include items that are purchased off the shelf, modified/customised, or made from scratch, used in any domain, including e.g. mobility, communication, ADL or play. The AT could be very complex or as simple as an adapted crayon.)

Twenty-five (25) randomly selected participants will each receive a R200 gift voucher from Takealot.

FOLLOW THIS LINK TO THE SURVEY:

[\\${!://SurveyLink?d=Take the Survey}](#)

Or copy and paste the URL below into your internet browser:

[\\${!://SurveyURL}](#)

Follow the link to opt out of future emails:

[\\${!://OptOutLink?d=Click here to unsubscribe}](#)

Thank you for considering this request!

Kind regards

Karin van Niekerk

Occupational Therapist and PhD student

Centre for Augmentative and Alternative Communication

University of Pretoria

karin.vanniekerk@up.ac.za

Appendix O

Online Information Letter and Consent Form for Participation in the Online Survey

Informed consent for participation in an academic research study

PERSPECTIVES OF REHABILITATION PROFESSIONALS ON ASSISTIVE TECHNOLOGY PROVISION TO YOUNG CHILDREN WITH DISABILITIES IN SOUTH AFRICA

Dear Rehabilitation Professional

You are invited to participate in a research study conducted by Karin van Niekerk, an occupational therapist and doctoral student at the Centre for Augmentative and Alternative Communication at the University of Pretoria.

The purpose of this study is to determine the perceptions of rehabilitation professionals on the factors that influence the provision of assistive technology (AT) to young children (birth to six years) in the South African context.

Any occupational therapist, speech and language therapist or physiotherapist registered with the HPCSA that recommends assistive technology to young children (birth to 6 years) in their current place of employment within South Africa is eligible to participate. For this study AT is defined as any item, product or piece of equipment that could be either purchased off the shelf, or modified/customised in any way or made from scratch, that is used to increase, maintain or improve the functioning of a person with disability in everyday activities. This could be very complex equipment or as simple as an adapted crayon. The AT could be recommended for use in any domain, including for example mobility, communication, ADL or play.

Please use the >> button to proceed, and the << button if you need to move back in the survey.

Please note the following:

This study involves a survey. Your name is not recorded in the survey and your answers are confidential.

At the end of the survey, you will have the opportunity to enter a lucky draw. Twenty-five (25) Takealot gift vouchers of R200 each will be distributed to participants by the researcher. You may enter your email address if you would like to be entered into the draw. This will enable the researcher to send the voucher to the winners. Email addresses will not be used for any other purpose.

Your participation in this study is very important. However, you may choose not to participate and you may also stop participating at any time. There are no known risks associated with participation in this study.

Please complete all questions in the survey, which should take approximately 30 minutes of your time. If your completion of the survey is interrupted before submission, you may return to it later.

The results of the study will be used for academic purposes only and may be published in an academic journal or presented at a conference.

Please contact Mrs. Karin van Niekerk on tel: +27 83 268 6221 or karin.vanniekerk@up.ac.za if you have any questions or comments regarding the study. Please contact the researcher if you would like to obtain feedback regarding the results of the study.

I have read and understood the above consent form and desire of my own free will to participate in this study.

Yes

No

Appendix P

Example of a Best-Worst Survey Question from the Survey

You will now be presented with 24 different sets of 6 factors that all influence the recommendation of AT to children (birth to 6 years) to a certain extent. For every group of 6 factors, please select the factor that you consider to have the **least influence**, and the factor that you consider to have the **most influence** on your recommendations.

The same factors will be presented to you in different combinations to determine how you perceive their influence. There are no right or wrong answers. If you are employed in more than one setting, focus your answers on the setting where you are most involved in the recommendation of AT to young children.

For this group of 6 factors, please select the factor that you consider to be **least influential**, and the factor that you consider to be the **most influential** in your recommendations.

Least influential

Most influential

☐

The family's skill and experience with AT

☐
☐

Expectations that professionals (e.g. teachers) have of AT for a child

☐
☐

The availability of the AT for the child to try out

☐
☐

Your approach to assessment, e.g. where or how you do assessments

☐
☐

The child's attitude toward AT

☐
☐

Availability of funds for AT, e.g. through fundraising or family funds

☐

Appendix Q

Updated Ethics Approval Letter



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
Research Ethics Committee

28 February 2018

Dear Ms van Niekerk

Project: Perspectives of rehabilitation professionals on assistive technology provision to young children with disabilities in South Africa
Researcher: K van Niekerk
Supervisor: Prof S Dada
Department: Centre for Augmentative and Alternative Communication
Reference number: 01280503 (GW20151014HS)

Thank you for the application to amend the existing protocol that was approved by the Committee on 11 November 2015.

I have pleasure in informing you that the amendment was **approved** the Research Ethics Committee at an *ad hoc* meeting held on 28 February 2018. Further data collection may therefore commence.

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

We wish you success with the project.

Sincerely



Prof Maxi Schoeman
Deputy Dean: Postgraduate and Research Ethics
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail: tracey.andrew@up.ac.za

cc: Prof S Dada (Supervisor)
Prof J Bornman (HoD)

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

Appendix R

Results ($N = 451$) for Best-worst Questions for Items Selected as Most and Least Influential, as well as Not Selected

Item number	Items	Frequency: Most influential	Frequency: Least influential	Frequency: Not selected
1	Beliefs regarding the cause of disability held by e.g. yourself or the family	53	528	772
2	Importance attributed to independence within the child's culture	225	118	1010
3	The family's attitude toward AT	243	77	1033
4	The attitudes of the professionals that will assist in the implementation of the AT	130	187	1036
5	The child's attitude toward AT	270	75	1008
6	Your own attitude toward AT	42	462	849
7	The social acceptability of the recommended AT	92	330	931
8	Current AT practices at the school the child attends/ would like to attend	174	287	892
9	Policies related to AT recommendation/provision applicable to your place of work	84	399	870
10	Guidelines related to AT recommendation/provision implemented at your place of work	111	325	917
11	Practice barriers related to AT recommendation, e.g. long waiting lists, excessive red tape, the fragmented nature or services	201	305	847
12	Financial provision for AT, e.g. through tender policy, medical aid	244	217	892
13	The characteristics of the physical environment where the child will use the AT, e.g. home, school, community	331	72	950
14	Availability of electricity in the home, school and community	25	650	678
15	Crime rate in the community	6	862	485
16	Your knowledge and training in recommending/providing AT	173	125	1055
17	Your sense of confidence when recommending/providing AT	83	319	951
18	Your technical expertise and experience in recommending/providing AT	205	154	994
19	Your resourcefulness in recommending/providing AT solutions	195	145	1013
20	The family's knowledge of AT	76	259	1018
21	The family's skill and experience with AT	120	273	960
22	The opportunity/possibility to train families on AT	187	69	1097
23	Availability of funds for AT, e.g. through fundraising or family funds	291	253	809
24	Availability of ongoing professional/paraprofessional support for child after AT has been acquired/provided	278	95	980

Item number	Items	Frequency: Most influential	Frequency: Least influential	Frequency: Not selected
25	Social support, e.g. from friends or relatives available to families and children using AT	227	239	887
26	Availability of a team to work with during the recommendation/provision of AT	93	405	855
27	The support/opinion of your mentor in recommending/providing AT	51	525	777
28	Availability of time for recommending/providing AT, including e.g. time for assessment or discussions with family	102	289	962
29	The family's ability to support the implementation of the AT	568	37	748
30	Expectations of the family regarding AT for a child	265	77	1011
31	Your expectations related to AT for a child	77	105	1171
32	Expectations of professionals (e.g. teachers) of AT for a child	90	292	971
33	The child's preference regarding AT	147	150	1056
34	The family's preference regarding AT	90	190	1073
35	Your preference regarding AT	33	443	877
36	Activities that the child should/would like to participate in	437	41	875
37	The child's current abilities and skills	651	44	658
38	Needs mentioned by the family	374	36	943
39	Needs of the child	710	3	640
40	Your therapy goals for the child	581	28	744
41	The match between the child and the AT	612	31	710
42	Your approach to assessment, e.g. whether you do assessments at the child's home or at your place of work	111	316	926
43	Cost of the AT	269	156	928
44	The possibility for the AT to "grow" with the child	310	130	913
45	The availability of the AT for the child to try out	253	196	904
46	Characteristics of the AT, e.g. ease of maintenance, portability	472	60	821
47	Materials available to make AT at your practice/department	229	183	941
48	Availability of AT on tender or from AT suppliers	233	262	858