CHAPTER 3
RESEARCH METHODOLOGY

3.1 Introduction

In this chapter the research methodology is discussed. The aims and sub-aims of the study are identified, where after the research design is discussed. The procedure and results of the pilot study, as well as subsequent recommendations, are presented. The main study is described in terms of the criteria used for participant selection, materials and equipment used and data collection and analysis procedures.

3.2 Aims

3.2.1 Primary aim

The primary aim of this study is to determine how accurately typically developing rural Zulu-speaking ten-year-olds can identify 36 Picture Communication Symbols (PCS), presented thematically on a commercially available communication overlay, in response to spoken labels.

3.2.2 Sub-aims

The sub-aims of this study are:

1. To select a commercially available communication overlay which contains no concepts that are foreign to rural Zulu-speaking children.

2. To determine how accurately ten-year-old Zulu children select the correct symbol in response to its spoken label.

3. To describe error patterns.

4. To investigate factors that could influence results, specifically total frequency of selection, position on overlay and gender.

3.3 Research design

3.3.1 Description of the research design

The nature of this study was exploratory. An analytical survey was conducted in which 94 rural Zulu speakers were exposed to 36 PCS symbols in the context of a commercially available communication overlay. In response to a verbal label they had to mark the symbol they thought best depicted that concept. Sampling was purposive in the sense that schools

were selected according to accessibility. At the selected schools however, all children that met selection criteria were included in the study. The data was quantitative in nature and was therefore subjected to statistical analysis to extract meaning.

3.3.2 Research phases

The research consisted of the following phases:

- Preparatory phase
  - selection and translation of a suitable communication overlay (Goossens' et al., 1996)
  - development of a test protocol
  - training of the research assistant
  - execution of a pilot study to pretest the validity of the translation and test protocol
- Main study
  - selection of schools to be included in the sample
  - collection of data
  - capture and statistical analysis of data

3.4 Preparatory phase

In order to simulate the real-life use of PCS symbols as closely as possible, it was decided to use a communication overlay as designed and published by Goossens' et al. (1996). These overlays are used widely in this country and provide a measure of context through being organised around a theme. The preparatory phase consisted of the selection and translation of an appropriate overlay, training of the research assistant, development of a test protocol as well as pretesting the translation and test protocol in the pilot study.

3.4.1 Selection of a communication overlay

Sechrest, Fay and Zaidi (1972) use the term 'cultural distance' as a description of the degree to which objects and experiences in one culture differ from that in another culture. The aim of the selection process was to minimise cultural distance between the concepts represented on the overlay and the experiential background of the target population. The basic content of the overlay had to form part of the world knowledge of children from the target population (Blachowicz, 1994). The selection process is outlined in Figure 1.
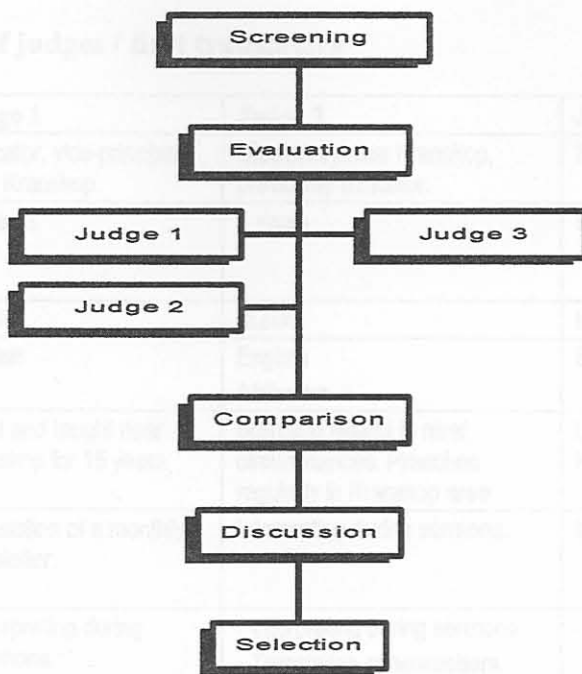
Figure 1: Schematic representation of the selection process

3.4.1.1   Step one: Screening

A preliminary screening by the researcher of the Goossens' et al. (1996) collection of matrix-36 communication overlays yielded five overlays that did not contain obvious foreign concepts: Washing and Drying Dishes by Hand (p. 258); Taking a Walk (p. 252); Preparing Coffee / Tea (p. 229); Making the Bed (p. 217) and Selecting Clothes (p. 233).

3.4.1.2   Step two: Evaluation by judges

The concepts contained in these five overlays were subjected to scrutiny by a panel of judges consisting of three educators from the Kranskop East Circuit (see Table 3). None of the educators were associated with any of the schools in the sample.

The English sentences/phrases were presented to the judges without the symbols. They were asked to indicate which concepts they thought could be foreign to members of the target population. For exact instructions given, see Appendix K. The judges worked independently.

Table 3: Description of judges / first translators

	Judge 1	Judge 2	Judge 3
Occupation	Educator, vice-principal near Kranskop.	Missionary near Kranskop, previously educator.	Educator near Kranskop.
Years of experience with children in the area	15 years	4 years	9 years
Mother tongue	isiZulu	isiZulu	isiZulu
Other languages	English	English Afrikaans	English
Experience with rural areas near Kranskop	Lived and taught near Kranskop for 15 years	Born and reared in rural circumstances. Preaches regularly in Kranskop area	Lived and taught near Kranskop for 8 years
Experience with isiZulu to English translation	Translation of a monthly newsletter.	Interpreting during sermons.	Interpreting during sermons.
Experience with English to isiZulu translation	· Interpreting during sermons. · Translation of newsletters.	· Interpreting during sermons. · Translation of newsletters.	· Interpreting during sermons since 1986. · Translation in isiZulu Third Langauge instruction.

3.4.1.3 Step three: Comparison

The researcher compared the work of the judges with one another. The concepts queried by the judges are presented in condensed form in Table 4.

Table 4: Concepts questioned by judges

Nr	Theme	Judge 1	Judge 2	Judge 3
1	Washing and Drying Dishes by Hand	No queries.	34. Let's leave it on the *counter*.	28. In the *drawer*.
2	Taking a Walk	4. Let's head out.	No queries.	4. Let's head out. 9. ...around the block 16. Wow! 17. Gross
3	Selecting Clothes	16. It matches.	No queries.	No queries.
4	Preparing Coffee / Tea	No queries.	14. Look in the *counter*. 15. Look in the closet.	13. Look in the *drawer*.
5	Making the Bed	No queries.	No queries.	31. Whoops!

3.4.1.4 Step four: Discussion

Both overlays 3 and 5 had only one concept queried. Consequently Judge 1 and Judge 3 were approached and asked to decide which of the two concepts would be the most foreign. Judge 1 maintained that 'It matches' would be unfamiliar to the target population. Judge 3 acknowledged that he had queried the concept 'Whoops' not because of potential unfamiliarity, but because of potential difficulty with translation.

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It was decided to use Overlay 5: Making the Bed.

Although it was not required of judges to judge extra items in order to calculate reliability, a high degree of consistency in their responses is evident. Where they deemed a certain word unfamiliar, they indicated all occurrences of that word across overlays (see cursive in Table 4).

3.4.2 Translation of symbol labels

To minimise the influence of linguistic factors on the performance of participants, the entire procedure was conducted in isiZulu. Consequently all labels, that is the sentence/phrase accompanying each symbol on the overlay, had to be translated into isiZulu.

3.4.2.1   *General considerations*

In this study the goal was to translate the labels of the 36 concepts on the communication overlay into the target language, but also into the target culture so that participants could identify with it. Brislin (1980) calls this ethnographic translation. According to Retief (1988) the best way to accomplish valid ethnographic translation is to involve persons that are familiar with both the source and the target language. For this reason mother tongue speakers of isiZulu with proficiency in English, as well as mother tongue speakers of English with proficiency in isiZulu, were included as judges and translators in this study.

Since cultural knowledge develops through membership to and interaction with members from a group (Hetzroni & Harris, 1996; Taylor & Clarke, 1994), care was taken to select persons that had had considerable experience with both cultures. Furthermore all judges and translators involved had obtained at least their senior certificate (Bracken & Barona, 1991). All were indigenous to the area and familiar with members of the target population.

The whole process of selection and translation involved eight people, five of which were mother tongue speakers of isiZulu, two of which spoke English as a mother tongue and one who spoke German as mother tongue. The German translator was included because of his proficiency in English and Zulu and his many years' experience especially with the vernacular Zulu of the region. The involvement of many translators was aimed at enhancing the validity of the translation.

Brislin (1980) discusses four basic translation methods, namely back translation, the bilingual technique, the committee approach and pretest procedures. For a compact description of each method the reader is referred to Retief (1988). The steps suggested by Bracken and Barona

(1991) are similar: source to target language translation, blind back-translation, translation – back-translation repetition and bilingual review committee. The present study employed a synthesis of the blind back-translation, review committee and pretest procedures. Three first translators independently translated the source phrases into isiZulu. These three translations were reviewed by the three first translators and modified until they agreed on one translation, the First Consensus (see Appendix C). The First Consensus was translated back to English by three second translators individually. The researcher compared the three back translations, and six of the 36 phrases were not the same across translations. The second translators were shown the source text and asked to suggest better isiZulu phrases for the six problem phrases. These suggestions were laid before two of the first translators who ultimately decided on which phrases would be used to form the Second Consensus (see Appendix C). The Second Consensus was presented to two third translators, who once again translated it into English. It seemed that no more changes were needed, and the translation was pretested in the Pilot Study. Minor changes resulted in the Final Consensus (see Appendix C). The process is reflected in Figure 2. The different steps are discussed in detail in Table 5 to Table 7.

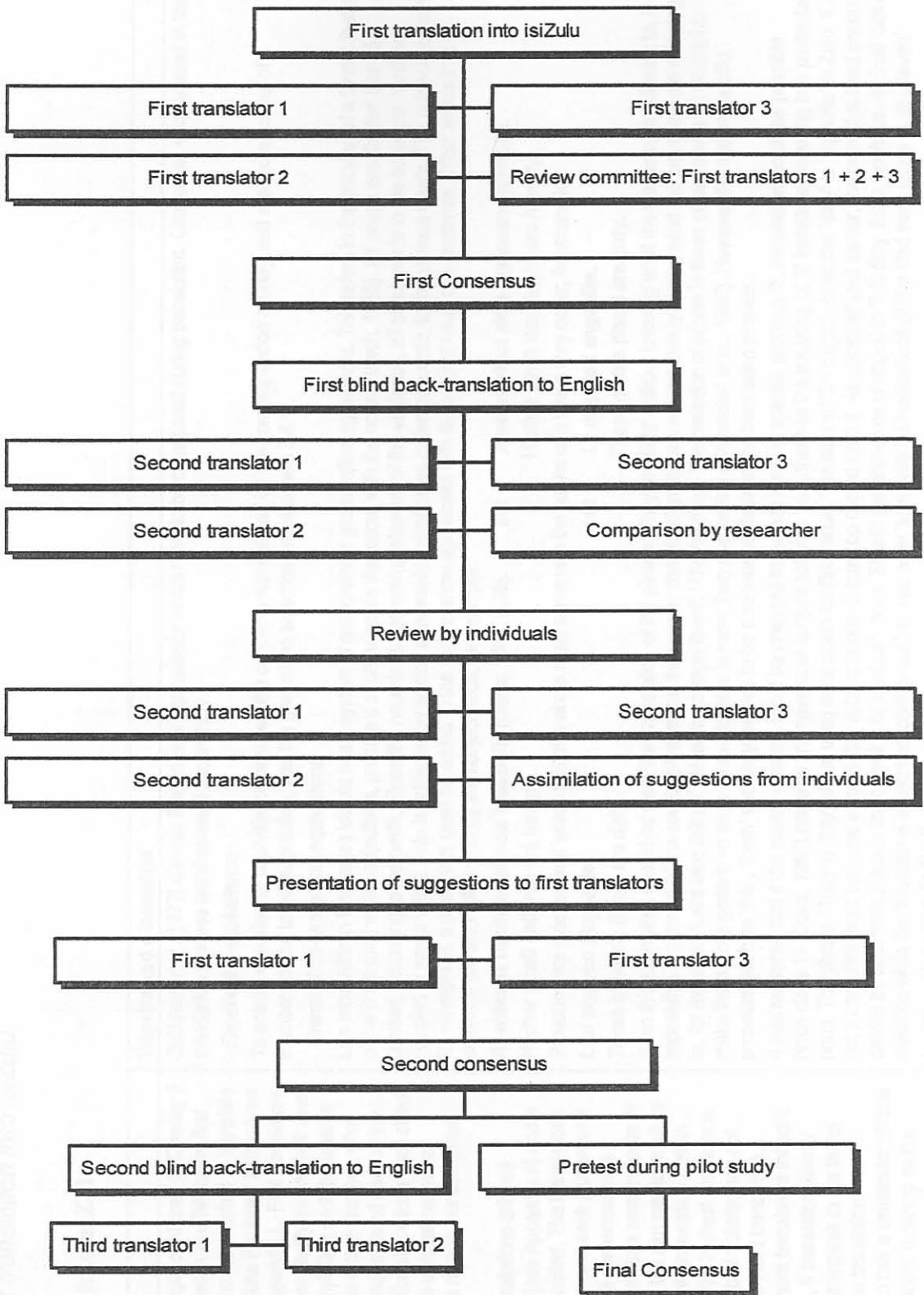Figure 2: Schematic representation of the translation process

First translation into isiZulu

First translator 1

First translator 3

First translator 2

Review committee: First translators 1 + 2 + 3

First Consensus

First blind back-translation to English

Second translator 1

Second translator 3

Second translator 2

Comparison by researcher

Review by individuals

Second translator 1

Second translator 3

Second translator 2

Assimilation of suggestions from individuals

Presentation of suggestions to first translators

First translator 1

First translator 3

Second consensus

Second blind back-translation to English

Pretest during pilot study

Third translator 1

Third translator 2

Final Consensus

Figure 2: Schematic representation of the translation process

3.4.2.2   Step one: First translation into isiZulu

Table 5: First translation into isiZulu

People involved	Procedure	Results and discussion
The panel of judges served as the first panel of translators. A description of the first translators is presented in Table 3.	The 36 concepts contained in Overlay 5 were presented in English to the first translators who were asked to translate them into isiZulu. For exact instructions given, see Appendix L. First translators worked independently and at their own pace. On completion each translation was handed to the researcher, who typed them and returned each to the relevant first translator for a spell check. Once all three translations were corrected, the researcher compared them. The three translations differed considerably (see Appendix F) and a meeting was called. The translations were reviewed and each phrase was discussed until consensus was reached. Translators were repeatedly reminded that the aim was to produce an ethnographic translation (Brislin, 1980), where the highest premium is placed on cultural validity, and not literal word-for-word translation. Therefore, where translators thought that a phrase, if translated literally, would be meaningless to the target population, the translators were encouraged to use a vernacular phrase that had the same meaning as the source phrase.	Sechrest et al. (1972) discuss five kinds of equivalence which have to be considered during translation. Challenges encountered in the translation process are discussed accordingly. · Experiential equivalence To ensure experiential equivalence between the concepts represented on the communication overlay, and real experiences of members of the target population, was the goal of the selection process (see 3.4.1). · Grammatical-syntactical equivalence Like most African languages isiZulu has a system of concordial or grammatical agreement. This refers to the copying of a formal feature of the noun onto verbs, adjectives, pronouns or other words that occur with the noun (Bosch, 1985). All nouns are divided into 15 classes, according to the prefix. Since the noun is the governing element of the sentence, all other words in the sentence must be adapted to agree with it. This is achieved by adding agreement morphemes called concords, to the various words. The subject concord, for example, is a prefix that must be added to the verb to show agreement with the subject noun of a sentence. Other words in a sentence are also influenced by the subject noun, for example: **Abantwana bakhe abancane balambile (Doke, 1968, p.39).**　but　**Amadodakazi akhe amancane alambile.** **His/her small children are hungry.**　　　　　　　　　**His/her small daughters are hungry.** Pronouns are independent words that of a whole must agree with the nouns with which they occur, for example: **Lezi zingubo zingcolile.**　　　　　　　　　　　　but　**La mapuleti angcolile.** **These blankets (they) are dirty.**　　　　　　　　　　　　**These plates (they) are dirty.** From this example it should be clear that translation of the phrase 'They are dirty' without knowing what the sentence is referring to, is impossible. A number of the source phrases on the overlay contained pronouns without clearly stating what the pronouns are referring to, for example, 'Let's take *this* off'; 'Need to change *them*'; '*They*'re dirty'. The omission of nouns in these phrases was an attempt to make them more generic so as to be serviceable in more than one setting (Goossens' et al., 1992). However the use of specific pronouns such as 'this', 'them' and 'they' proved to be a serious obstacle in the translation process. It was reasoned that if the source phrases could be changed to include the less specific pronoun 'it', translation would be possible. Noun class 10 (Doke, 1968) contains an impersonal subject concord 'ku-', that has the meaning of 'it' instead of referring to a particular noun. The phrase 'They're dirty' will be used once again for illustration. The stem of the English adjective 'dirty' is '-ngcolile' in Zulu. It is not a complete word because a prefix, the subject concord, must be copied onto it. As demonstrated earlier, the correct subject concord cannot be determined due to the omission of a subject noun. Should the phrase be changed to 'It is dirty' there would be minimal loss of meaning while the impersonal subject concord could be used as in '*ku*ngcolile'. Modifications of this kind were made to all relevant source phrases (see Appendix G).

Table 5: First translation into isiZulu

People involved	Procedure	Results and discussion
		Similar problems were experienced with the 'lead-ins' with which many of the sentences started. Phrases such as 'Got to…'; 'Have to…'; 'Need to…' and 'Let's…' were used to temper the imperative value of some sentences and to make them serviceable for self-talk (Goossens et al., 1992). Sentences starting with 'Let's…' could be accurately translated since the subject was known ('us'). When sentences started with an auxiliary verb without indicating the subject, as for 'Got to…' 'Have to…' and 'Need to…', accurate translation was impossible. These source phrases were modified to start with 'You…' (see Appendix G).
		It should be noted that the phrase 'Let me' does not include a main verb, which resulted in an incomplete isiZulu sentence that might have been foreign to the participants. For illustration the sentence 'Let me help' is used. In this sentence the speaker is the subject. Therefore, when this sentence is translated into isiZulu, the first person subject concord 'ngi-' is added to the main verb '-siza' as in 'Ake *ngi*size'. If the main verb was not known, the last word of the sentence would not be complete. Since the source phrase 'Let me' contained no main verb, it was translated to 'Ake ngi-' which is not a complete sentence and therefore might have been foreign to the participants.
		The fact that isiZulu is a tonal language had to be considered. The tone used when pronouncing an utterance carries meaning (Doke, 1968; Dent & Nyembezi, 1969). This complicated translation, since certain phrases can have several meanings which are impossible to discriminate in context-free print. The translation for the statement 'It is nice and clean' for example, if intonated in another way, could be used as an imperative: 'Make it nice and clean'. It was decided that during training, the research assistant would be informed of the intended meaning of each phrase in order to ensure correct intonation.
		· Vocabulary equivalence
		The phrase 'Put it in the hamper' was interpreted as 'Put it in the (receptacle for dirty washing)'. According to first translators rural Zulus have different receptacles for dirty washing. After some discussion they agreed that although a basket may be used by urban Zulus, a plastic tub is used most often in rural areas. The phrase was translated accordingly.
		· Idiomatic equivalence
		The translation of an interjection is very difficult since it rather has emotional value than a clearly definable meaning. The interjection 'Whoops' is explained as 'an exclamation of apology or dismay, as at a blunder' (Barnhart & Barnhart, 1992, p. 1454) and 'used when one has almost had an accident, broke something etc.' (Cowie, 1989, p. 1459). The first translators had difficulty finding a phrase that conveyed the same emotional value, and consequently they agreed upon the interjection 'Hhayi bo!', with some reserve.
		According to the first translators there is no set expression in isiZulu for 'You are welcome'. Although there are some phrases that can be used, the typical response to being thanked is to thank the speaker in return. Three of the five overlays presented to the judges contained this phrase, and it is unfortunate that the judges did not notice it when this specific overlay was considered. Nevertheless a satisfactory translation was easily found and no further problems was experienced with this phrase.
		· Conceptual equivalence
		The phrase 'Have to make it fat' was interpreted in the context of this specific overlay as meaning puffing up a pillow or duvet. If translated literally, the result would have been applicable to people only, and not to bed linen. The phrase was therefore changed to 'Puff it up'.

The result of this phase of translation was called the First Consensus (see Appendix C).

3.4.2.3 Steps two to four

Table 6: First blind back-translation, review and suggestions

Step	People involved	Procedure	Results and discussion
Step two First blind back-translation into English	The second translators (see Table 8).	The First Consensus (see Appendix C) was presented to the second translators, who worked independently and without knowledge of the theme of the communication overlay. For exact instructions, see Appendix M. On completion each translation was handed to the researcher. Translations were compared by the researcher.	Thirty phrases correlated highly across all three second translators. Two of the phrases were completely foreign to all three second translators and for four phrases translations differed, resulting in six problem phrases (see Table 10).
Step three Review by individuals	The second translators (see Table 8).	Each of the three second translators were approached individually and shown the English source text as well as the First Consensus. They were requested to suggest better translations for each of the six problem phrases.	The second translators offered no suggestions for the problem phrase 'Fold it back' (see Table 10). The back translations into English for this phrase differed and therefore it was included in the list of problem phrases. When the second translators saw the source phrase however, all maintained that 'Kugoqele emuva' was the best translation after all. The same explanation applies for problem phrase "It is nice and soft'. The suggestions made were written down.
Step four Presentation of suggestions to first translators	Two of the first translators, Judges 1 and 3 (see Table 3).	The suggestions from step three were presented to Judges 1 and 3, who made the final decision regarding which translations would be used.	The translation that was used for 'pillowcase' is 'iphilo'. This is a colloquialism derived from English. All three second translators thought it meant 'pillow'. The first translators maintained however that it was the accepted word for 'pillowcase'. This was confirmed by several grade 12 isiZulu-speakers who were questioned informally.

The translation for the problem phrase 'Let us put on' was not known to any of the second translators. Translator 6 consulted a dictionary to find the meaning. It was suggested that a more widely used word be selected. The first translators maintained that 'maseleke' was the best translation but consented to the use of 'masendlale'.

The first translation for 'Puff it up' ('Uvokomalise') was also not understood by any of the three second translators, and a more child-friendly form of the word ('Khukhumalisa') was suggested and accepted.

The interjection 'Hhayi bo!' was deemed too negative to adequately translate 'Whoops!'. The first translators accepted the suggested 'We!' on condition that the research assistant was informed of the intended meaning so as to use the correct intonation. |

The result of this phase of translation was called the Second Consensus (see Appendix C).

3.4.2.4 Steps five and six

Table 7: Second blind back-translation and pretesting

Step	People involved	Procedure	Results and discussion
Step five Second blind back-translation to English	The third translators (see Table 9).	The Second Consensus was presented to the third translators They were asked to translate the isiZulu phrases into English. They worked independently without knowledge of the theme of the overlay.	On completion the translations were handed to the researcher who compared them (see Appendix I). The researcher was satisfied that the translation was valid and no further modifications were made.
Step six Pretesting of translation	The ten participants for the pilot study (see Table 12).	The first phase of the pilot study employed Second Consensus. Responses given by participants were investigated in order to determine whether they had understood the translation. They were also asked if they had questions, and to indicate whether they generally understood the task.	The only phrase that needed modification was 'Let us put on...'. The Second Consensus used the translation 'Masendlale...' for this phrase, which is very close to the phrase used for 'Let us make the bed' ('Asendlale umbhede'). All ten participants chose the same symbol for both phrases. Consequently it was decided to use the original 'Maseleke' in the main study. As a further measure of the validity of this phrase, participants were asked individually about the meaning thereof on completion of the first three test sessions. 100 % of those asked could explain the meaning. This confirmed that rural isiZulu-speakers did indeed understand the phrase.

The result was the Final Consensus as found in Appendix C.

Table 8: Description of second translators

	Translator 4	Translator 5	Translator 6
Occupation	Minister and educator near Kranskop	Missionary and shopowner near Kranskop	Missionary and educator near Kranskop
Exposure to Zulu (in years)	25	22	20
Mother tongue	English	German	English and Afrikaans
Other languages	isiZulu, German, Afrikaans	isiZulu, English, Afrikaans	isiZulu, German
Experience with isiZulu to English translation	· 20 years' experience as interpreter during sermons. · Written translation.	· 20 years' experience as interpreter in diverse settings.	· Interpreting during sermons. · Translation in isiZulu Third Language instruction.
Experience with English to isiZulu translation	· Interpreting during sermons.	· 10 years of limited experience.	· Interpreting during sermons. · Translation in isiZulu Third Language instruction.

Table 9: Description of third translators

	Translator 7	Translator 8
Occupation	Educator at ABET adult school near Kranskop	Missionary, educator at ABET adult school near Kranskop
Exposure to English (in years)	20	10
Mother tongue	isiZulu	isiZulu
Other languages	English	English
Experience with isiZulu to English translation	Translation in isiZulu Second Language instruction.	Translation in English Second Language instruction.
Experience with English to isiZulu translation	Translation in isiZulu Second Language instruction.	Translation in English Second Language instruction.

Table 10: Suggestions for the six problem phrases

	Problem phrase (English)	Problem phrase (isiZulu)	Suggestions by Translator 4	Suggestions by Translator 5	Suggestions by Translator 6	Decision by first translators
1	Fold it back	Kugoqele emuva	No better suggestion	No better suggestion	No better suggestion	Kugoqele emuva
2	Let us put on	Maseleke	Agesifake	Faka	Masifake / Masendlale	Maseleke / Masendlale
3	Pillowcase	Iphilo	No better suggestion	No better suggestion	No better suggestion	Iphilo
4	Puff it up	Uvokomalise	No better suggestion	Khukhumalisa	Khukhumalisa	Khukhumalisa
5	It is nice and soft	Kuntofontofo	No better suggestion	Kuntofontofo	No better suggestion	Kuntofontofo
6	Whoops!	Hhayi bo!	We!	Hawe!	We!	We!

3.4.3 Development of test protocol and training of research assistant

A research assistant was selected in collaboration with the principal of the school where the pilot study was performed since she was familiar with all candidate assistants and with the target population. The research assistant was not professionally trained as such, but was deemed suitable because of her proficiency in Zulu and English and because she is indigenous to the Kranskop area. The research assistant is described in Table 11.

Table 11: Description of the research assistant

Mother tongue	IsiZulu
Gender	Female
Age	22 yrs
Highest qualification	Senior Certificate. First year part time student of B Com Business Management at Unisa
Current occupation	Switchboard operator, part time PRO work for two youth organizations
Nature	Friendly, open, spontaneous, quickly establishes rapport with young children, disciplined
Experience with children	Co-rearing eight younger cousins within the area of Kranskop, loves children according to self-report

During the first stages of training the research assistant received general background information and instructions and was presented with the communication overlay, the isiZulu and English phrases. Thereafter the procedure was performed thrice on individual children, as part of training, but also in order to develop a practical test protocol. The research assistant worked from a crude protocol designed by the researcher, and instructions were modified in consultation with the researcher where it seemed necessary. After three sessions it was felt that the research assistant had mastered the procedure and the test protocol was ready to be tested.

3.4.4 Pilot study

Execution of a pilot study is important to ensure the feasibility of planned data collection procedures and suitability of test material. The pilot study was performed in two phases. Participants in the pilot study were selected according to the same selection criteria used for the main study, but were not later included in the main study.

3.4.4.1 Description of participants

Ten participants were tested of which six were females and four males. The mean chronological age was ten years and eight months. The distribution of participants across age (y:m), gender and school is presented in Table 12.

Table 12: Description of participants in the Pilot Study

School	10:0 – 10:3		10:4 – 10:6		10:7 – 10:9		10:10 – 11:0		Total
	F	M	F	M	F	M	F	M	
A	2	0	1	1	1	1	2	2	10

3.4.4.2 Phase one

In the first phase of the pilot study the procedure was conducted on ten participants as described in Table 13.

3.4.4.3 Phase two

The second phase of the pilot study entailed conducting the procedure a second time on the same ten participants, one week after the first administration. Results were compared in order to establish test-retest reliability. A comparison of the results of the two studies is presented in Appendix N.

Paired t-tests (Steyn, Smit, Du Toit & Strasheim, 1996) were performed on the two groups of data and no significant differences were revealed. It is clear that the procedure was reliable.

Table 13: Pilot Study objectives, procedures, results and recommendations

Objective	Procedure	Results	Recommendations
To determine the number of training items needed to ensure understanding of the task.	Required performance was three consecutive independent correct responses. A correct response comprised first considering all alternatives, then marking the correct one. Ten training items were included, the first three of which were modelled. The number of trials needed for each P to reach requirement was recorded. The mean was calculated and used for the main study.	All P reached required performance within three items.	· Three items should be modelled, whereafter three items should be completed independently by P.
To determine the size of P groups.	Ten P were included and efficiency was monitored.	The group was manageable although firm control was necessary to minimize opportunity for copying.	· Placement of P should be arranged so as to minimize opportunity for copying. · P should be instructed to close their work and not look at the work of others. · R should continually move between P to prevent copying.
To determine the feasibility of the test protocol.	An attempt was made to execute sessions exactly according to the test protocol. Problem areas were identified by the R.	P did not consider all the symbols offered before indicating a choice.	· P should be given approximately 40 seconds per item. · Instructions to look at all the pictures before indicating a choice should be added.
		The RA adapted to the observed needs of the P during sessions and consequently did not execute every session verbatim according to the protocol.	· The RA should be allowed to augment instructions during training where needed, but should use only the protocol instructions during the test procedure.
To determine the validity of the translation.	As mentioned in 3.4.2.4, step six of the translation process was to test whether P understood the translation. Responses given by P were investigated and they were asked general questions after the session, especially about the phrase for 'Let us put on…'.	The only phrase that caused confusion was the phrase for 'Let us put on…'. The Second Consensus used the translation 'Masendlale…', which is very close to the phrase used for 'Let us make the bed' ('Asendlale umbhede'). All ten P chose the same symbol for both phrases.	· The original 'Maseleke' should be used in the main study. The remainder of the translation should be used unchanged.

(R = researcher, RA = research assistant, P = participants).

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3.5 Main study

3.5.1 Participants

3.5.1.1 Participant selection criteria

Participants were selected according to the following criteria:

- Age: Participants had to be between the ages of 10 and 11 years at the time of the survey. The task of selecting a symbol in response to a spoken label has been shown to be one that typically developing ten-year-olds should be able to perform (Daehler, Lonardo & Bukatko, 1979). Thus the possibility of inadequate symbolic representation skills as cause for errors was reduced.

- Mother Tongue: Participants had to be mother tongue speakers of isiZulu.

- Academic Performance: Participants must never have failed a school year. In the absence of formal assessment of mental abilities, this criterion was included to control for severe learning and mental disabilities.

- Grade Level: Participants had to be in grade 4 or 5. In previous years it was common for children in rural areas to start school whenever it was convenient for their parents, albeit earlier or later than the traditional age of six (P. Müller, personal communication, May 30, 2001). This criterion would ensure that participants had largely been exposed to similar learning experiences.

- Sensory Acuity: There had to be no indication of hearing loss or uncorrected sight problems, as confirmed by their teachers. This was screened during the training phase.

- Previous Exposure to PCS: Participants must have had no prior exposure to PCS. Because of the complete absence of therapeutic or special education staff in the Kranskop East Circuit, the probability of exposure was extremely slight (H. Bulcock, personal communication, June 11, 2001).

3.5.1.2 Principles for sample selection

The province of KwaZulu-Natal is divided into eight regions, comprising 41 districts divided further into 196 circuits (P. Müller, personal communication, July 6, 2001). A total of 5792 schools are registered with the KwaZulu-Natal Department of Education and Culture. The twenty-two primary schools in the Kranskop East Circuit were targeted for this study. This

circuit lies south of the Tugela River and east of the village of Kranskop in the Natal Midlands.

The Deputy Chief Education Specialist in Educational Management Information Services (DCES in EMIS) for the region was consulted regarding the size of the target population. Information regarding age, grade and gender of children per school revealed that approximately 600 children met selection criteria (P. Müller, personal communication, May 3, 2001). Information about previous academic performance was not available however, rendering a more accurate estimate of the size of the qualifying group impossible.

A physical map of the Kranskop East Circuit indicated that all schools were located along three main routes. In collaboration with a physical planner from the KwaZulu-Natal Department of Education and Culture – Pietermaritzburg region, schools that would be inaccessible by sedan car were identified, and of the rest, three schools along each of the three routes were chosen. Although an attempt was made to include schools of all sizes, lack of accessibility prohibited the inclusion of any of the very small schools.

Selection of participants at the various schools proved difficult. An elimination sequence of grade level, age, children present at school on the particular day, academic performance and sensory acuity was followed. Age could only be determined by consulting class registers, class teachers and potential participants themselves. In one case birth certificates were available. Since no cumulative records of academic performance existed at any of the schools, information regarding repetition of a grade had to be obtained from each potential participant. This criterion proved to be the most limiting of all and repeatedly disqualified more than half of the potential participants.

Ultimately all children that met selection criteria at the selected schools were included in the study.

3.5.1.3   Description of participants

The nine schools that were selected were all co-educational government-funded schools. None were boarding schools, which means that all the participants were indigenous to the Kranskop East Circuit. None of the schools had facilities for learners with special educational needs. Although the mother tongue of all participants was isiZulu, the language of instruction at all schools was English. The KwaZulu-Natal Department of Education and Culture classifies schools as deep rural, rural, peri-urban and urban, according to no set definitions. Rural is simply described as far from any town, whereas deep rural means 'off the beaten track' (P. Müller, personal communication, July 9, 2001). All schools in the sample were

confirmed to be considered rural or deep rural by the department. A brief description of each school is presented in Table 14.

Table 14: Description of selected schools

School	Lowest grade	Highest grade	Learner total	Description
1	0	7	590	Deep rural
2	0	7	470	Rural
3	0	7	680	Rural
4	0	7	460	Rural
5	1	7	180	Deep rural
6	1	7	230	Deep rural
7	1	7	400	Deep rural
8	1	7	200	Deep rural
9	1	7	700	Rural

From these nine schools a sample of 94 participants were tested of which 52 were female and 42 male. The mean chronological age was ten years and five months. The distribution of participants across age (y:m), gender and school is presented in Table 15.

Table 15: Description of participants

School	10 – 10:3		10:4 – 10:6		10:7 – 10:9		10:10 – 11		Total
	F	M	F	M	F	M	F	M	
1	1	5	3	0	1	1	1	1	13
2	3	3	4	2	1	1	1	0	15
3	2	2	3	2	2	2	1	5	19
4	0	2	0	2	0	0	1	1	6
5	3	1	0	0	0	0	0	0	4
6	0	0	0	0	0	0	4	0	4
7	4	3	7	2	4	2	1	1	24
8	2	1	0	0	0	3	0	0	6
9	2	0	1	0	0	0	0	0	3
Total	17	17	18	8	8	9	9	8	94

3.5.2 Material and equipment

The material and equipment used in this study is presented in Table 16.

Table 16: Material and equipment used

Material / equipment	Use
Communication overlay	A commercially available communication overlay designed by Goossens' et al. (1996) was used. It consisted of 36 PCS symbols selected around the theme of making a bed. The only modification made was to remove all print from the overlay. See Appendix A.
Training overlay	A 36 matrix overlay containing 26 written isiZulu words and 10 line drawings judged by the researcher as being highly guessable to the target population. Used for screening and training purposes. See Appendix B.

Recording booklet	A booklet consisting of 36 A4 facsimiles of the communication overlay as test pages and six of the training overlay as practice pages. Participants were trained to indicate one choice per page.
Final consensus of phrases	The concepts that were represented by the symbols on the overlay were translated into isiZulu (see Appendix C).
Test protocol	The procedure for giving instructions and feedback during the actual testing was read by the research assistant in order to ensure consistency between sessions. The tests protocol included basic instructions for the training phase, which the research assistant augmented where deemed necessary, as well as prompts and praise phrases. See Appendix D for verbatim instructions..
Tokens	Each participant was presented with a plastic, glow-in-the-dark star as reward for participating in the study.
Worksheets	Each participant was provided with a worksheet developed by the researcher as an introduction to AAC and people with LNFS (see Appendix P) Together with discussion of the topic led by teachers, this served as debriefing.
Information to teachers	Teachers were supplied with basic information about severe disabilities and AAC to enable them to lead their classes in discussion while completing the worksheet. See Appendix O.
Markers	Each participant was provided with a marker with which to indicate choice.
Panasonic RQ-L 349 mini tape recorder	70% of sessions were audio-recorded in order to determine the consistency of instructions given across sessions.

3.5.3 Data Collection Procedures

3.5.3.1   General procedural considerations

- Permission to perform the study was obtained from the relevant authorities (see Appendix J).

- The principals of all the primary schools in the Kranskop East Circuit were addressed during a Principals' Meeting on 3 May 2001, where the aims and proposed procedures of the study were described.

- After selecting nine schools for participation, in collaboration with a physical planner from the KwaZulu-Natal Department of Education and Culture – Pietermaritzburg region, the researcher contacted each principal to make arrangements for a visit.

- The researcher and research assistant visited the selected schools personally. On arriving at a school, the first step was to select participants (see 3.5.1.2).

- All participants were divided into groups of ten or less. At one school there were 24 participants and time for only two sessions, so that each session at that school involved twelve participants.

- While selection was in progress, the room designated for the study was being readied. Conditions were similar to that described by Baddeley, Gardner and Grantham-McGregor (1995). Staff was very co-operative but space at the schools was limited. At six schools

classrooms were evacuated in order to accommodate the testing. At the remainder the school kitchen, a half-built classroom and the principal's office were used respectively.

3.5.3.2 Introduction to session

- Seats were assigned to the participants so as to minimise the opportunity for copying. While they were taking their seats the research assistant greeted the participants and made them feel at ease. She introduced herself and the researcher and gave each participant an opportunity to introduce him or herself. Both researcher and research assistant were present during the whole of the session.

- Each participant received a test booklet and marker. His/her name and number was written on the first page. The numbers were used to record the seating arrangement of each session.

- At this point the tape recorder was switched on. The introduction was given according to the test protocol (see Appendix D). Participants were given time to look through all the items on the training overlay in silence. They were not allowed to turn the page.

3.5.3.3 Training procedure

- After a reasonable lapse of time, when it was clear that all participants had scanned through the items, the research assistant explained the procedure to the participants according to the test protocol (see Appendix D). She read the first word, and repeated it twice after a few seconds. The researcher modelled the desired behaviour, and the participants were urged to copy her: they had to visibly scan through all the possibilities before marking the written form or picture of the word spoken.

- The first three training items were modelled in this fashion. The last three had to be completed independently. The research assistant augmented or repeated the protocol where she deemed necessary.

- The first two training items required the participants to mark written words, the third a picture, the fourth a word, and the last two pictures. In this way the participants were gradually prepared for the test task involving pictures only.

- This procedure served as training in scanning and selection, as well as auditory and visual screening. Participants who failed two or more items were excluded from the study. No participants failed screening.

3.5.3.4   Testing procedure

- The research assistant gave instructions for the testing procedure according to the test protocol (for verbatim instructions, see Appendix D). Participants were given time to look through all the items on the communication overlay in silence. They were not allowed to turn the page.

- After a reasonable lapse of time, when it was clear that all participants had scanned through the symbols, the procedure started. The research assistant presented each isiZulu phrase thrice according to a pre-determined random order, and participants marked their choices, one per page. The researcher made sure that participants marked only one block and did not copy from each other.

- The test was not timed since Zulu children are generally not used to speeded performance, rendering a time limit unfair (Bracken & Barona, 1991; Retief, 1988). Furthermore it was important that participants had enough time to consider all the symbols before making a choice, in order to eliminate guessing. Participants were given a reasonable amount of time, until it was clear to the researcher that all participants had marked their choice. She then signalled to the research assistant who introduced the next item. The presence of a very slow or unsure participant could arrest the smooth progression of the test for the whole group, possibly resulting in loss of interest or attention. In such cases, the researcher waited until all other participants had marked choice, then waited several seconds more before giving the signal, regardless of whether the slow participant had marked choice or not. This led to missing data but was deemed necessary to ensure the overall quality of data.

- Five prompts and praise phrases were included in the test protocol (see Appendix D). These were used verbatim by the researcher and research assistant between test items where deemed necessary. No more than one interjection between any two consecutive items were allowed, lest it distracted the attention of the participants.

- Sessions lasted between 45 minutes and one hour. This included greeting, training and testing.

- The session was concluded by the research assistant thanking the participants and giving each a reward, and both researcher and research assistant greeted the participants as they left.

- Worksheets and Information for Teachers were handed to the principal to use at own discretion.

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3.5.4 Data analysis and statistical procedures

The researcher captured the data using Microsoft Excel 97. 100% of the captured data were compared to the actual test booklets by a team of four independent individuals. No errors were detected. The data were subsequently analysed by SAS and BMDP Statistical Software using a variety of statistical procedures, as discussed in Table 17.

Table 17: Statistical procedures employed

Statistical procedure	Use
Paired t-test (Steyn et al., 1996)	The data from phase one and two of the pilot study were compared to reveal significant differences.
Descriptive statistics	Due to the discrete nature of the data, frequency distribution counts were used extensively. The mean of correct responses across symbols and standard deviation were also calculated.
Chi square variance test	The performance of males and females were compared to reveal significant differences.

3.5.5 Consistency

To ensure that the presentation of instructions for the test procedure was consistent across sessions to ensure that all participants received the same amount of clarification and motivation, the instructions of 9 out of 13 sessions (70%) were played back to Judge 3 after the completion of data collection. A checklist comprising all the instructions from the test protocol was used to record which instructions were used and which were left out or modified (see Appendix E). Consistency was computed by dividing the number of instructions used correctly, by the number of sentences that should have been said for each session. An average across sessions was then computed. Accordingly, consistency across sessions was 94% (range = 80%-100%). These figures would have been higher was it not for the frequent omission of the sentence telling participants not to write before the signal was given. It is argued that the omission of this sentence would not have affected the performance of participants.

3.6 Summary

This chapter presents the methodology used in the study. The aims and sub-aims are stated and a brief description of the research design is presented. A discussion of the preparatory phases outlines the selection of an appropriate communication overlay, the translation of the labels, and training of a research assistant. An account of the pilot study is given, including recommendations for the main study. The main study is discussed according to participants involved and materials and equipment used. Methods of data collection and analysis are also presented.