CHAPTER 5

RESULTS

5.1 INTRODUCTION

The results described in this chapter focus on sub-aim four of the research, namely to determine the outcomes after having applied the BCIP to a group of 20 community health nurses. The other three sub-aims have already been met in the preceding chapters as they formed the basis for the methodology that was followed. Data will not only be organised and analysed but will also be summarised and interpreted so that conclusions can be drawn regarding the effectiveness and usefulness of the BCIP training in achieving specific outcomes. Three major components in the description of the results are important. Firstly, issues pertaining to reliability are discussed. The focus is mainly on the reliability of the scoring procedure and measuring instruments. Secondly, the outcomes of the BCIP training which includes primary outcomes (knowledge and skills pertaining to disability and beginning communication skills) and secondary outcomes (attitudes towards disability, exposure and service delivery to CSDs and a self-evaluation of knowledge and skills) are described. Finally, general comments regarding the training are made (including the methodology that was followed and the content) highlighting the strengths and weaknesses of the training. The general flow of the results is seen in Figure 5.1.

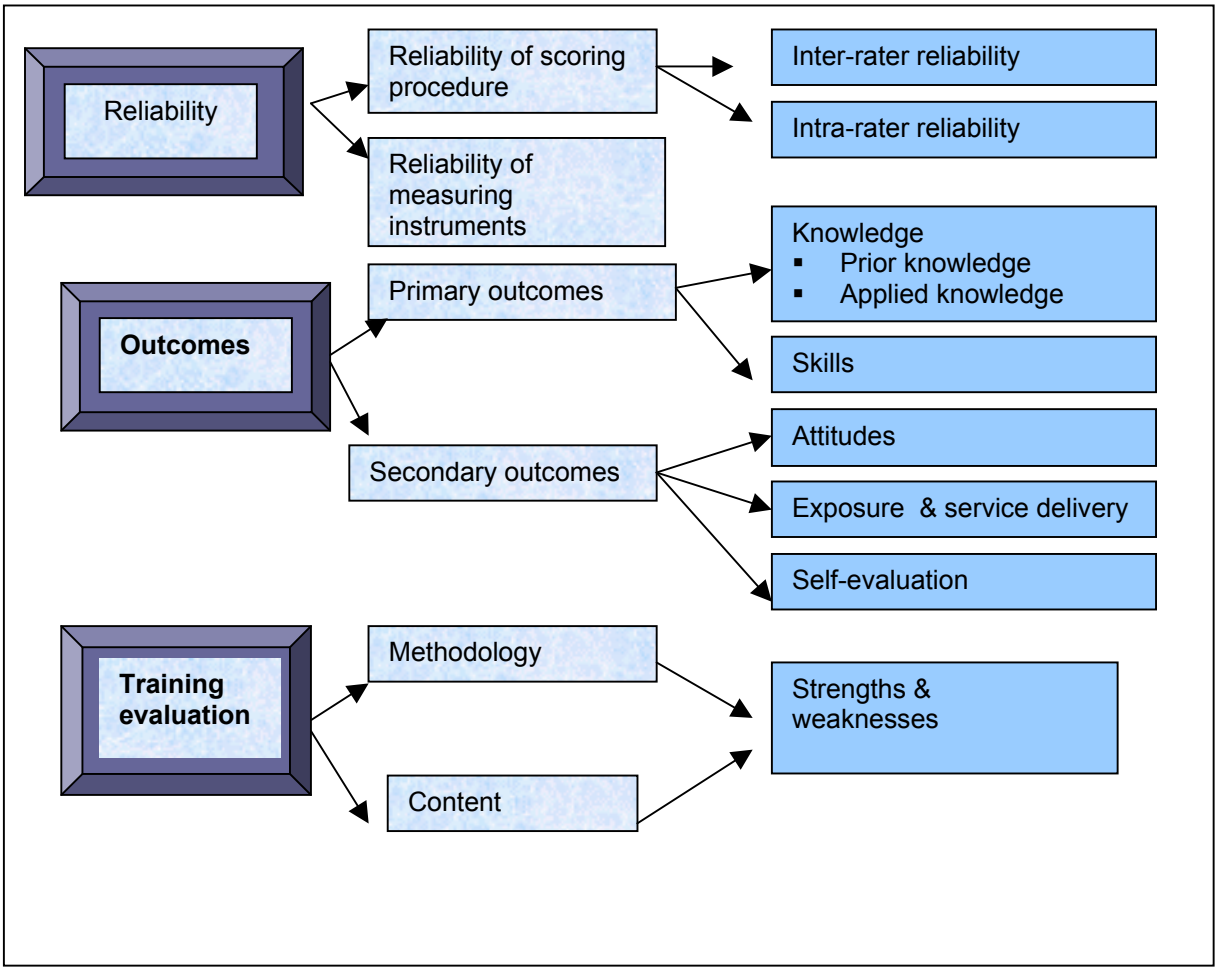


Figure 5.1 Schematic presentation of the results of this research

5.2 RELIABILITY

5.2.1 Reliability of the scoring procedure

Reliability is concerned with the consistency, stability and repeatability of the informants' accounts as well as the investigator's ability to collect and record information accurately (Brink, 1999). In order to account for this certain precautions were built into the measuring instruments and the methodology followed. Structured interviews (used to obtain the data for Response Form I) were video-recorded in order to ascertain if data

were collected and recorded consistently and accurately. Both inter-rater and intra-rater reliability measurement were included. Each will be described in detail.

5.2.1.1.1 Inter-rater reliability

Two raters (the researcher and an independent rater) independently scored Response Form I for all twenty participants in order to obtain inter-rater scores. For the first two measurements (namely pre- and post-training), both raters scored all of the 86 statements on the measuring instrument. However, it was then noted that no differences occurred for the first two sections of the measuring instrument (namely current abilities and recommendations). This was due to the fact that these sections of the measuring instrument involved verbatim transcriptions of the participants' responses. Differences did, however, occur for the third section of the measuring instrument, namely "*practical demonstration of skills*". Consequently only this section was recorded for the final three measurements. Inter-rater agreement was calculated with the following formula:

$$\frac{\text{Number of differences between Rater 1 \& Rater 2}}{\text{Number of items x number of participants}} \text{ X } \frac{100}{1}$$

In addition, where the scores differed, Rater 1 was used as the standard, and it was calculated whether the score given by Rater 2 was bigger or smaller. A bigger difference would indicate greater tolerance from Rater 2 (the independent rater) whereas a smaller difference would indicate poorer performance (stricter measurement from Rater 2). It was decided to use this calculation as opposed to kappa statistics, which would not provide descriptive information, but merely a score. Across all measurements, the inter-rater agreement averaged 96%, with the majority of differences being greater, meaning that Rater 2 was more tolerant than Rater 1 or that Rater 1 was stricter than Rater 2. This might be due to the fact that Rater 2 viewed the skills demonstration on video and, in cases where uncertainty occurred, she tended to give participants the benefit of the doubt. However, these differences are insignificantly small and will not be further discussed. It

is also important to note that the score throughout never differed with more than one category. Table 5.1 shows the scores for each individual measurement.

Table 5.1 Inter-rater reliability

Score	Pre-training	Post-training	Follow-up 1	Follow-up 2	Follow-up 3
No difference in measurement	98%	95%	96%	93%	97%
Greater difference in measurement	2%	5%	4%	5%	3%
Smaller difference in measurement	0%	0%	0%	2%	0%

5.2.1.2 Intra-rater reliability

To test the stability of judgements made by the same rater, Rater 1 re-administered Response Form I five months later. The videos of five participants (20%) were randomly selected for this purpose. The rater watched the videos and scored all 86 items. An intra-rater score of 96% across all items was obtained with 3% of the scores being greater for the second rating and 1% being smaller. Ratings never differed with more than one category.

5.2.2 Reliability of participant responses

Traditional reliability coefficients were not applicable to this particular research for two major reasons. The first relates to the nature of the measuring instruments. Training was conducted and thus it was expected that the answers would change over time. However, biographic data (obtained from Response Form II) remained consistent during the five-month period. This consistency of responses indicates that the data were reliable and repeatable. Secondly, the sample size is relatively small (n=20). Other methods were therefore included to increase the reliability of the measuring instruments, e.g. information obtained in Questions 11 and 12 (Response Form II) were compared to determine if the same nurses who reported that they never saw CSDs were also the ones

who marked that they spent no time with these individuals. Results indicated a precise comparison between these two data sets indicating that information obtained with the measuring instrument was reliable. In addition, frequencies were obtained for Question 8 (Response Form II) in order to determine whether nurses marked answers at random on the matrix. However, it became evident that the same option was never marked more than once, indicating careful consideration of each option in an attempt to provide the correct answer.

5.3 OUTCOMES

Outcomes are described in terms of the primary outcomes that relate directly to the BCIP training, namely knowledge and skills. Secondary outcomes were not directly trained, and relate to attitudes, exposure, service delivery and self-evaluation. Each of these aspects will now be described in more detail.

5.3.1 Primary outcomes

In determining the primary outcomes, two aspects are described, namely the change in knowledge (including prior and applied knowledge) and skills of the participants after having completed the BCIP training. Results are presented in Figure 5.2.

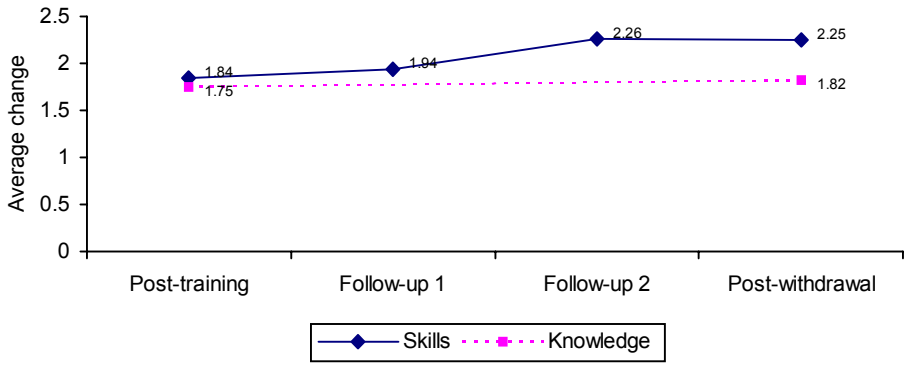


Figure 5.2 Global increase in knowledge and skills post-training

In this graph knowledge and skills are expressed relative to the measurements obtained during pre-training, as this will clearly show how these aspects increased. This implies that the pre-training average in both cases were 0 and that knowledge thus increased from pre-training to post-training with an average of 1.5 and skills with an average of 1.7. Mention should also be made of the fact that skills were measured at five different intervals and knowledge thrice. It is noticeable that skills increased at a higher rate than knowledge. This is possibly due to the fact that the focus of training was on skills and the fact that skills were measured and emphasised more regularly than knowledge during the follow-ups.

These two primary outcomes will now be described in depth. Each section will start with a global summary followed by a detailed description.

5.3.1.1 Knowledge

The knowledge dimension was divided into two sections, namely prior knowledge and applied knowledge. The prior knowledge section included a set of 29 questions divided into three categories, comprising 15 true-false questions, 10 multiple choice questions and four ranking questions. Data were obtained by using Response Form II, which was administered at three different intervals, namely pre- and post-training and post-

withdrawal. Applied knowledge on the other hand, was obtained from data recorded in Response Form I, Section 1 (Questions 1.1 - 1.3) and Section 2 (Questions 2.1 – 2.5). Data were collected at five different intervals. An in-depth discussion of these sections will now follow.

i) Prior knowledge

A Friedman test was employed to determine whether the change in prior knowledge was statistically significant over time. A p-value of 0.001 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.2 Friedman test of prior knowledge

	R_1	R_3	R_2
Rank sum	21.0	42.0	57.0
Mean	13.5	17.9	19.5
Summary of results			

For all the following multiple comparisons, it should be noted that values are in rank order from the lowest to the highest mean (x), and that the line indicates that measurements are essentially equal (i.e. there is no statistically significant difference). Table 5.2 indicates a statistically significant difference (increase) from prior knowledge at the 5% confidence level between the pre-training score (R_1) and the post-training score (R_2) and the post-withdrawal scores (R_3) respectively.

Each of the specific questions that contributed to the prior knowledge domain will now be discussed in detail.

Regarding the true-false questions a frequency table of correct answers was compiled in order to determine what the trends were with each of these questions during the various

research phases. Results are displayed in Table 5.3. Further testing on individual questions was not done as the total score was used to form part of the prior knowledge section on which a Friedman test was done.

Table 5.3 Number of nurses who answered the true-false questions correctly during the various research phases (n=20).

No	Item description	Correct answer	Pre-training	Post-training	Post-withdrawal	Comments
V18	AAC refers to Abnormal Alphabetical Communication.	False	11	16	16	Knowledge maintained.
V19	Manual signs, facial expressions and pointing to pictures are different means of communication.	True	19	19	20	Slight knowledge increase. High pre-training score.
V20	Withholding attention is an example of a deliberate communication opportunity.	True	7	20	20	Sharp increase in knowledge – 100% maintained.
V21	The WHO defines disability from the perspective of the individual's participation in the environment.	True	10	13	11	Slight decline. Score better than pre-training.
V22	Multiskilling refers to many professionals (e.g. SLP, doctors, nurses, etc.) giving skills to disabled people.	False	2	9	5	Decline, but post–withdrawal score better than pre-training score.
V23	Teaching CSDs should not take place in the natural home environment.	False	14	17	18	Knowledge continued to improve slightly.
V24	Speech is an example of a communication function.	False	1	7	11	Knowledge continued to improve.
V25	"Dressing" does not provide many communication opportunities.	False	12	18	19	Knowledge continued to improve slightly.
V26	It is not necessary to train CSDs to make choices. This skill develops spontaneously.	False	19	20	19	High scores throughout. Slight decline.
V27	Protesting is one of the last communication skills that a child develops.	False	9	15	11	Decline, but post-withdrawal score better than pre-training score.
V28	Severe disability can be the result of peri-natal factors, e.g. rubella and malnutrition.	True	18	18	19	Knowledge continued to improve slightly.

No	Item description	Correct answer	Pre-training	Post-training	Post-withdrawal	Comments
V29	Environmental factors (e.g. family stress and lack of stimulation) do not cause disability.	False	13	18	13	Decline of knowledge to pre-training score.
V30	Unaided communication refers to the use of manual signs, natural gestures, fingerspelling and speech.	True	15	18	20	Knowledge continued to improve.
V31	Using objects, photographs and symbol systems for communication is known as unaided systems.	False	15	17	17	Knowledge maintained.
V32	The EasyTalk is an example of a voice output communication device.	True	14	18	20	Knowledge continued to improve slightly.

In summary, it can be seen that the aspects that were highlighted during the follow-ups resulted in knowledge increasing in 7 of the 15 areas (V19, V20, V23, V24, V25, V30 V32) and being maintained (V18, V31). Aspects not addressed during the follow-ups resulted in post-withdrawal knowledge declining, although the decline was mostly slight (V21, V22, V26, V27, V29) and not to a level below the pre-training score. When looking at each of these aspects in more detail, for questions V19 and V28 no changes were initially observed but a small gain was noted at the post-withdrawal. This might be due to the fact that such a high number of nurses had it correct pre-training, due to the fact that these concepts are familiar to them. The greatest knowledge improvement in this section was seen for V20 that dealt with the deliberate creation of communication opportunities. This improvement was sustained over the 5-months post-withdrawal phase which might be due to the fact that this is a new concept which was highlighted during training.

Afterwards the next knowledge question, namely the multiple-choice question was further examined. This question was presented in a matrix format, where nurses had access to the answers for all four questions. Firstly, a frequency analysis was done in order to look at all the different combinations that were given in an attempt to determine whether answers had been selected at random, indicating that nurses had guessed. In addition, this procedure also determined which coding system could be used, and if

marks had to be subtracted for incorrect answers. Results indicated that nurses did not mark answers at random, as a maximum of four was marked at any given time. This implies that there is not a dramatic overestimation of answers as there were three correct answers to the first two questions and two correct answers to the last two questions. A definite increase in the number of correct answers was seen during the post-training and post-withdrawal phases.

Results for the different correct multiple-choice answers across the different research phases are displayed in Table 5.4, providing information about the specific questions. Further testing on the individual questions was not done, as the total score was included in the prior section on which a Friedman tests was done. It is important to note that the first two questions (means and functions) had three correct answers while the last two (partners and temptations) had two correct answers each. A summary of the results is shown in Table 5.4.

Table 5.4 Number of nurses who answered the multiple-choice questions correctly during the various research phases (n =20).

No	Item description	Correct answer	Pre-training	Post-training	Post-withdrawal	Comments
M1	Communication means	Pointing	20	20	19	Slight decline. High frequency in all three phases.
M4	Communication means	Vocalisations / Sounds	19	10	15	Increase in post-withdrawal, but not to pre-training level.
M6	Communication means	Crying	13	13	13	No change in frequency throughout three phases.
F2	Communication function	Requesting interaction	6	14	9	Decline post-training, but not to pre-training level.
F3	Communication function	Requesting objects	3	16	10	Decline post-training, but not to pre-training level.
F9	Communication function	Indicating "*thirsty*"	4	1	1	Lower frequency post-training and post-withdrawal.
P5	Communication partner	Mother	14	18	19	Slight increase in post-withdrawal phase.
P10	Communication partner	Other children	15	20	19	Slight decline, but not to pre-training level.
T7	Communication temptation	Creative stupidity	-	8	3	Difficult aspect throughout.
T13	Communication temptation	Providing small portions	5	18	12	Decline post-withdrawal but better performance than pre-training.

In summary, it can be noted that with six of the ten items nurses performed better post-training; with two items no change was noted and with two items they performed, interestingly enough, poorer post-training. During the post-withdrawal phase scores remained consistent in some cases (M6, F9), increased in two cases (M4, P5) and slightly declined in other cases (M1, F2, F3, P10), but the decline was never to the level of pre-training. It is interesting to note that the post-withdrawal score was lower than the pre-training score for vocalisations (M4). This tendency is often seen when training individuals in the use of AAC strategies as they become so engrossed in the different AAC strategies that a tendency to "*forget*" about speech is often noted (Bornman & Alant, 1999; Bornman, Alant & Meiring, 2001). At the 5-month withdrawal phase, this score increased but not to the pre-training level. This might be indicative of the fact that

the focus is beginning to move towards including both speech (vocalisations) and AAC strategies when viewing communication means. Likewise, nurses performed poorer in the communication functions category of "*indicating thirsty*" during the post-training and post-withdrawal phases. This might be due to the fact that this aspect was not emphasised to the same extent during training as the other two functions mentioned in this question. It is therefore not surprising to note that major increases in knowledge are to be seen in this section. It is clear that post-training nurses were much more aware that requesting interaction (F2) and requesting objects (F3) were communication functions.

The term "*communication partners*" did not require as much demystifying as some of the other concepts. Pre-training, the majority of nurses were aware of the fact that the mother could be a partner (14) as could the other children (15). Despite this, the frequencies increased and all nurses were aware of the other children as partners (P10) and 18 were aware of the mother's role (P5). Only a slight decline in both aspects was seen during the post-withdrawal phase.

Communication temptations remained the most difficult section to answer. It might be due to the fact that this concept was novel to participants and that more training regarding this aspect was required. Pre-training none could identify "*creative stupidity*" (T7), and only five could identify "*providing small portions*" (T13). These two concepts were practised at great length during training, consequently 18 could correctly identify "*providing small portions*" and 8 could identify "*creative stupidity*" post-training. Although a decline was seen during post-withdrawal, it was never to the pre-training level. It is interesting to note that these two items were trained to the same extent, but that the one yielded better results. This could possibly be because the term "*creative stupidity*" is more difficult (in spite of the fact the term was used during training) and the fact that "*providing small portions*" was trained first. In addition, "*providing small portions*" is very similar to its counterpart "*providing brief turns*" which in effect implies that nurses practised this strategy (albeit adapted) twice as much as they did "*creative stupidity*".

The final phase in this section on prior knowledge deals with the ranking question aimed at determining the nurses' knowledge of representational levels. Four different elements were provided, i.e. identical objects, miniature objects, colour photographs and line drawings, e.g. PCS. Nurses had to rank these elements in terms of the level of representational difficulty, starting with the easiest and ending with the most difficult one. Results are summarised in Table 5.5.

Table 5.5 Number of nurses who answered the ranking question correctly during the various research phases (n=20).

Item description	Pre-Training	Post-training	Post-withdrawal	Comments
All four elements correct	-	7	6	Increase post-training, although only seven had it correct.
Two elements correct *(Switching miniatures & photographs)*	-	7	5	Tendency to change miniatures and photographs around frequently seen: as often as the correct answer.
Start with correct element *(Identical objects)*	9	18	15	Better performance post-training. Majority knows what the easiest level of representation is.
First two elements correct *(Identical objects & miniatures)*	1	9	9	Better performance post-training. Almost half of participants have first two items correct. Knowledge maintained during post-withdrawal.
End with correct element *(Line-drawings e.g. PCS)*	4	14	14	Improvement with training. Majority knows what the most difficult level of representation is. Knowledge maintained during post-withdrawal.

These scores are not cumulative, and that each score is calculated out of 20.

The ranking order that was used during training, and that was regarded as the "*correct answer*" (identical objects, miniature objects, colour photographs and line-drawings) is based on the typical practice of many AAC practitioners. This is based on the assumption that three-dimensional objects (3-D) are easier recognisable than two-dimensional objects (2-D) (Todd, 1993). As alluded to in Chapter 3, the levels of representation are complex and the assumptions made in developing programmes for CSDs should be examined in greater depth. However, in the present research nurses' correlation with the sequence used in training, was investigated. Results from Table 5.5

indicate that nurses gained from training, and were able to rank four different elements according to the level of representational difficulty. It should be noted that the number of nurses who could rank all four elements according to the taught sequence, is still low. The number who ranked it according to the taught sequence during the post-withdrawal phase remained fairly consistent. Todd (1993) suggests that 3-D elements are on a lower representational level (thus easier) than 2-D elements. However, it was interesting that in this research, just as many nurses as the ones who were in accordance with the taught sequence, changed miniature objects and photographs around. This might possibly be due to the fact that nurses were not as familiar with miniature objects as with photographs and the fact that the BCIP did not contain miniatures. As the 2-D element (photographs) might represent the real object more closely than a 3-D miniature element, the nurses might have assumed that photographs were on a lower representational level than miniatures. Due to the paucity of research in this area, and the fact that some researchers are beginning to question the hierarchical levels of these items, as highlighted in Chapter 3, this aspect should be further investigated (Fuller, Lloyd & Stratton, 1997). It is also recommended that the cultural impact on the ranking of representational skills should be further investigated. Post-training almost all the nurses knew what the easiest element was (in other words where training would start) and almost 50% could rank the first two elements in the taught sequence. This trend continued during the post-withdrawal phase. It is also evident that post-training, the nurses were more certain that line-drawings were on the highest level of representation of the available options.

In order to quantify the correctness of the answers provided, ranks of answers in the taught sequence were correlated with answers given, using Spearman's rank order correlation coefficient. This was done for the pre-training, post-training and post-withdrawal phases. Results are shown in Table 5.6.

Table 5.6 Results obtained from the Spearman rank order correlation coefficient for each participant during the various research phases.

PARTICIPANT	1	2	3	4	5	6	7	8	9	10

Correlation pre-training	-1.0	-0.8	0.6*	-0.4	-0.8	-1.0	0.6*	0.6*	-0.8	-0.4
Correlation post-training	0.6*	0.2*	-0.4	-0.4	-0.8	0.2*	0.2*	1.0*	1.0*	0.2*
Correlation post withdrawal	-0.8	1.0*	1.0*	-0.8	-0.5	0.2*	0.4*	1.0*	0.2*	0.2*
PARTICIPANT	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Correlation pre-training	0.4*	-0.2	0.2*	-0.2	0.1	0.2*	-0.4	0.4*	-0.8	0.2*
Correlation post-training	1.0*	1.0*	1.0*	0.2*	1.0*	0.2*	-1.0	-0.8	0.2*	1.0*
Correlation post withdrawal	1.0*	0.8*	1.0*	1.0*	0.8*	0.2*	-0.2	0.8*	0.2*	-0.8

All variables indicating a positive correlation with the taught sequence were marked with an asterisk (*)

The unusual correlation of 1.0 (indicating 100% correlation with the taught sequence) and –1.0 (indicating a total reversal of all elements) are due to the small number of items (four) which were ranked. Pre-training it is thus noted that two nurses had a score of –1.0, indicating a total reversal and none marked all the items correctly. However, during post-training seven nurses ranked the elements in agreement with the taught sequence while only one totally reversed the elements. This might possibly be due to the fact that the question was misread. During post-withdrawal six nurses ranked all the questions correctly with nobody totally reversing the elements.

A Friedman test was employed to determine whether the change in knowledge of representation levels was statistically significant over time. A p-value of 0.02 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.7 Friedman test of knowledge pertaining to representational levels

	R_1	R_2	R_3
Rank sum	29.5	44.5	46.0
Mean	-0.2	0.28	0.32
Summary of results			

Table 5.7 indicates a statistically significant difference (increase) of knowledge of representation levels at the 5% confidence level between the pre-training score (R_1) and the post-withdrawal score (R_3), as well as a statistically significant difference (increase) at the 10% confidence level for the pre-training (R_1) and the post-training phase (R_2). This implies that a greater difference was seen during the post-withdrawal phase, implying that knowledge continued to increase.

ii) Applied knowledge

Apart from only determining the nurses' prior knowledge, their applied knowledge was also evaluated. This section is relevant to the present research as the nature of training was problem-based and thus directly impacted on their ability to apply knowledge to a particular case study. A Friedman test was employed to determine whether the change in global applied knowledge was statistically significant over time. A p-value of 0.001 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.8 Friedman test of applied knowledge

	R_1	R_2	R_3	R_4	R_5
Rank sum	20.0	59.5	63.5	75.5	81.5
Mean	15.90	29.60	30.95	32.95	33.05
Summary of results					

Table 5.8 indicates a statistically significant difference (increase) of global applied knowledge at the 5% confidence level between the pre-training score (R_1) and the post-

training score (R_2), the two-week follow-up (R_3), the six-week follow-up (R_4) and the post-withdrawal scores (R_5) respectively.

The applied knowledge section consisted of two sections; the first pertains to the skills that nurses could identify in the particular case study and the second to recommendations they could make concerning this case. A description of these two sections with their detailed questions follows.

The first three questions of the applied knowledge dealt with a description of the current skills as displayed by the case study. A Friedman test was employed to determine whether the change in current skills was statistically significant over time. A p-value of 0.001 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.9 Friedman test of current skills depicted in the case study

	R_1	R_2	R_3	R_4	R_5
Rank sum	24.0	56.0	64.0	79.5	76.5
Mean	6.55	9.20	9.60	10.25	10.35
Summary of results					

Table 5.9 indicates a statistically significant difference (increase) of current skills at the 5% confidence level between the pre-training score (R_1) and the post-training score (R_2), the two-week follow-up (R_3), the six-week follow-up (R_4) and the post-withdrawal scores (R_5) respectively.

Each of these three questions will now be described in more depth. A Friedman test was employed to determine whether the change in communication means was statistically significant over time. A p-value of 0.007 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

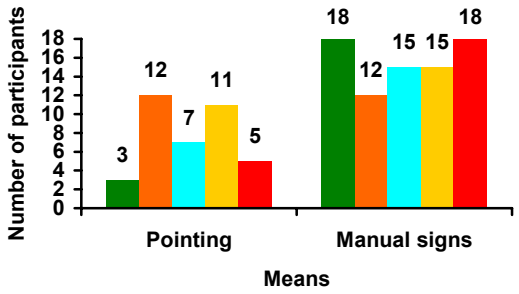
Table 5.10 Friedman test of identified communication means

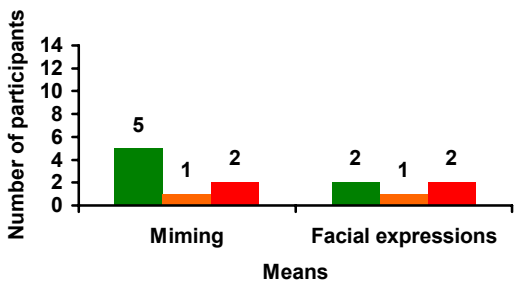
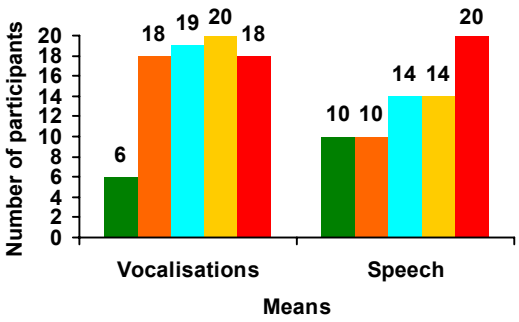
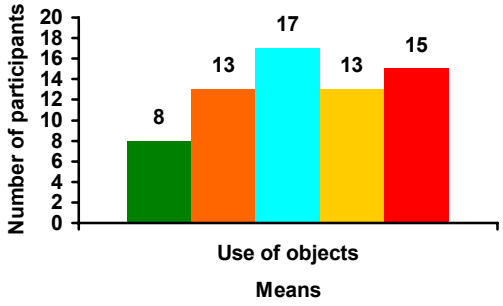
	R_1	R_2	R_3	R_4	R_5
Rank sum	36.0	54.5	65.5	67.5	67.5
Mean	2.55	3.35	3.60	3.65	3.95
Summary of results					

Table 5.10 indicates a statistically significant increase of communication means at the 5% confidence level between the pre-training score (R_1) the two-week follow-up (R_3), the six-week follow-up (R_4) and post-withdrawal scores (R_5) respectively.

In addition, frequencies were calculated for the different communication means over the various research phases. Results are shown in Table 5.11.

Table 5.11 Frequency of communication means

Description	Results
Legend	Pre-training; Post-training; Follow-up 1; Follow-up 2; Post-withdrawal
Manual signs were the means of communication most easily identified pre-training, and remained high throughout. Pre-training only three nurses identified pointing (natural gesture) but this increased post-training. During the first follow-up it declined, but during the second one it increased again and declined during the post-withdrawal, but this was not to the pre-training level.	

The frequency of miming declined post-training. This is possibly due to the fact that nurses became more aware of other means of communication and they began to realise the limitations of miming. Participants' awareness of facial expressions decreased slightly, but then increased again. The frequency for both these communication means was noticeably lower than all the other means.	
The greatest increase was seen in this section. Pre-training only six participants identified vocalisations as a communication means and during Follow-up 2 all the nurses had this correct. The increase in knowledge pertaining to speech increased in a step-like fashion, reaching its peak during the post-withdrawal phase.	
An increase in knowledge following training was seen. This knowledge continued to increase during the first follow-up, declined slightly during the second follow-up and increased again during the post-withdrawal phase.	

It is therefore clear that the total number of communication means correctly identified by the nurses increased from 52 (pre-training), to 67 (post-training), 72 (Follow-up 1) 73 (Follow-up 2) and 79 (post-withdrawal). It can thus be said that the BCIP training not only made nurses more aware of the different communication means, but also of the range of these means.

The second question dealt with **communication functions**. A Friedman test was employed to determine whether the change in communication functions was statistically significant over time. A p-value of 0.001 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.12 Friedman test of identified communication functions

	R_1	R_2	R_3	R_4	R_5
Rank sum	29.5	58.0	64.0	79.0	69.5
Mean	2.00	2.90	3.20	3.70	3.40
Summary of results					

Table 5.12 indicates a statistically significant difference (increase) of communication functions at the 5% confidence level between the pre-training score (R_1), the post-training score (R_2), the two-week follow-up (R_3), the six-week follow-up (R_4) and the post-withdrawal scores (R_5) respectively.

When investigating the nature of the change that had taken place regarding the communication functions that community health nurses could correctly identify in the case study, interesting tendencies were noted. Frequencies are given in Table 5.13.

Table 5.13 Communication functions identified by nurses

No	Function	Pre-training	Post-training	Follow-up 1	Follow-up 2	Post-withdrawal
V15	Expressing wants and needs	6	9	15	12	2
V16	Expressing emotions	2	3	1	-	-
V17	Drawing attention to self	3	7	15	20	17
V18	Requesting interaction	4	4	1	-	2
V19	Requesting objects	3	6	5	5	7
V20	Protesting	2	-	-	1	-
V21	Affirmation	10	15	17	19	20
V22	Naming	-	3	-	3	1
V23	Showing politeness	-	-	1	-	-
No	**Function**	**Pre-training**	**Post-training**	**Follow-up 1**	**Follow-up 2**	**Post-withdrawal**
V24	Greeting	5	2	-	2	3
V25-1	Indicating "*finished*"	5	3	7	8	13

V25-2	Requesting help	2	3	1	4	2
V25-3	Requesting more	-	2	1	-	7
V25-4	Making choices	-	2	-	-	-
	TOTAL	**42**	**59**	**64**	**74**	**72**

From Table 5.13 it is clear that nurses became more aware of the different communication functions as the total number of responses increased from 42 to 74. The fact that this total score continued to increase could be possibly be attributed to the fact that communication functions were addressed throughout the BCIP training (including the follow-ups). Nurses also became much more aware of the range of communication functions. Low pre-training scores were noted throughout, with V21 (*affirmation*) and V15 (*expressing wants and needs*) most frequently mentioned. This might possibly be due to the fact that these are the two best-known communication functions. V15 (*expressing wants and needs*) decreased as did V16 (*expressing emotions*), as these aspects were not stressed during training. However, *requesting help* (V25-2), *requesting more* (V25-3), *drawing attention to self* (V17) and *affirmation* (V21) which were stressed during training, continued to increase.

Finally, the third question dealt with **communication partners**. A Friedman test was employed to determine whether the change in communication partners was statistically significant over time. A p-value of 0.0058 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.14 Friedman test of identified communication partners

	R_1	R_3	R_4	R_2	R_5
Rank sum	36.5	61.5	66.0	66.0	70.0
Mean	2.00	2.80	2.90	2.95	3.00
Summary of results					

Table 5.14 indicates a statistically significant difference (increase) of communication partners at the 5% confidence level between the pre-training score (R_1), the post-training

score (R_2), the six-week follow-up (R_4) and the post-withdrawal scores (R_5) respectively. No statistical significance between R_1 and R_3 (two-week follow-up), was noted.

Frequencies were then calculated in order to determine which communication partners were easier to identify in the given case study. Results are seen in Figure 5.3.

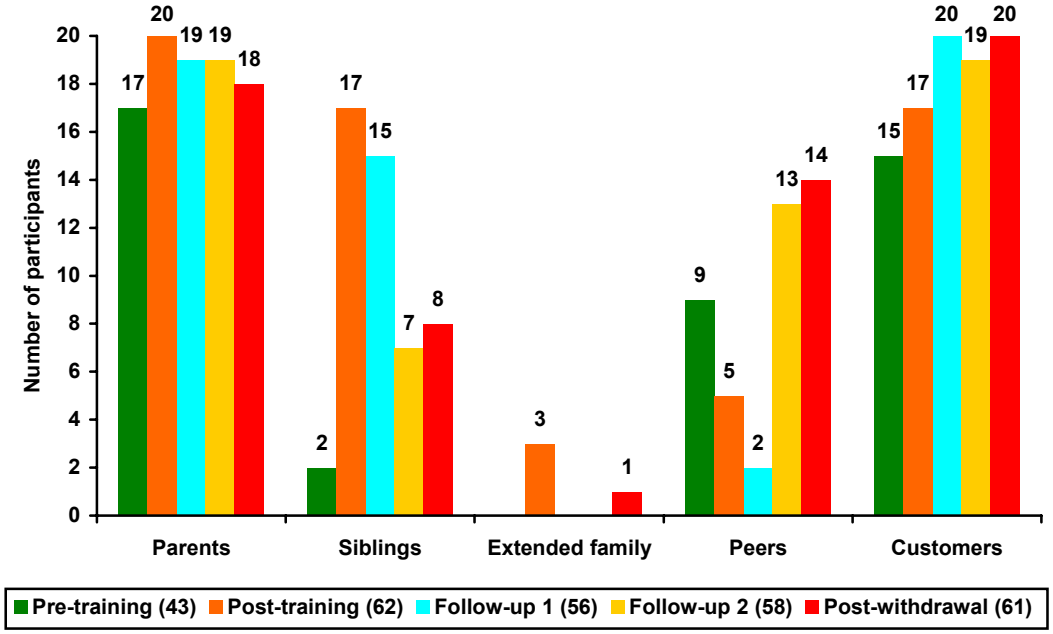


Figure 5.3 Communication partners

The two partners rated as highest throughout were the primary caregivers and the customers. Post-training it also became clear that the nurses were more aware of the importance of siblings as partners. Although this frequency decreased over time, the post-withdrawal score was still higher than the pre-training score. The role of peers also became more important, although a low frequency was noted during the post-training and Follow-up 1 phases. This might be due to the strong focus on siblings during these phases. The total number of responses increased from pre-training (43) to the post-training (62) and then declined again, but not to the pre-training level. Frequencies then increased again from Follow-up 1 (56), to Follow-up 2 (58) to post-withdrawal (61), but the highest score was seen directly post-training.

After having analysed and discussed the first section of the applied knowledge that dealt with the identification of current skills of the case study, the second section of applied knowledge that deals with recommendations for the particular case study will now be discussed. Five questions in this section were combined to obtain the combined recommendation score. A Friedman test was employed to determine whether the change in combined recommendations was statistically significant over time. A p-value of 0.001 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.15 Friedman test of combined recommendations

	R_1	R_2	R_3	R_4	R_5
Rank sum	20.5	58.5	67.5	71.5	82.5
Mean	5.95	15.60	16.75	17.80	18.20
Summary of results					

Table 5.15 indicates a statistically significant difference (increase) of combined recommendations at the 5% confidence level between the pre-training score (R_1), the post-training score (R_2), the two-week follow-up (R_3), the six-week follow-up (R_4) and the post-withdrawal scores (R_5) respectively.

Each of the five questions pertaining to communication means, functions, partners, communication opportunities and general advice was subsequently analysed in depth for the different research phases.

During the structured interview (Response Form I) nurses were asked which different communication means the particular child in the case study could still learn. It was clear from the range of answers that their knowledge in this regard had increased. See Table 5.16 for details.

Table 5.16 Communication means

No	Communication means	Pre-training	Post-training	Follow-up 1	Follow-up 2	Post-withdrawal
1	***UNAIDED COMMUNICATION MEANS***					
1a	Speech	11	8	3	9	13
1b	Crying	1	-	-	-	-
1c	Facial expressions	-	4	4	8	8
1d	Head-nodding and head-shaking	-	6	9	11	11
1e	Eye-gaze and pointing	2	9	9	13	11
1f	Body language and miming	3	2	7	6	5
1g	Manual signs	11	18	19	18	19
2	***AIDED COMMUNICATION MEANS***					
2a	Objects / Object communication box	3	11	10	13	15
2b	Miniature objects	-	5	1	-	-
2c	Photographs	-	11	4	7	8
2d	Pictures	1	-	2	4	9
2e	Line-drawings and communication boards	-	8	2	7	10
2f	EasyTalk 4 Option digital speaker	-	6	10	8	11
2g	Drawing / Writing	9	2	3	2	1
3	"*Don't know*" or incorrect, unrelated answers	4				
4	More than five correct answers	-	2	-	10	11
	TOTAL	**46**	**90**	**83**	**66**	**121**

Table 5.16 indicates that nurses became much more aware of the different communication means that can be used as the total number of correct responses increased from 46 to 121! It is also evident that pre-training the focus was on more well-known unaided strategies (speech and manual signs). A few aided strategies were mentioned, with the emphasis on drawing and writing. Post-training a wider distribution of different means was noted. The communication means mentioned in 50% or more of the cases were speech, head-nodding, eye-gaze, pointing and manual signs, while the aided means were objects, communication boards and the EasyTalk 4 Option digital speaker. Drawing and writing decreased. This was possibly due to the fact that nurses became aware of the fact that these means are not appropriate for CSDs. Finally, it is also important to note that the number of incorrect answers disappeared and that the number of nurses who had five items or more correct increased to 50% during Follow-up 2 and 55% during the post-withdrawal phase.

These results were then further analysed to test for statistical significance. A Friedman test was employed to determine whether the change in recommended communication

means was statistically significant over time. A p-value of 0.001 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.17 Friedman test of recommended communication means

	R_1	R_3	R_2	R_4	R_5
Rank sum	27.5	57.0	68.0	74.5	73.0
Mean	2.25	4.20	4.70	4.90	4.85
Summary of results					

Table 5.17 indicates a statistically significant difference (increase) of recommended communication means at the 5% confidence level between the pre-training score (R_1), the post-training score (R_2), the two-week follow-up (R_3), the six-week follow-up (R_4) and the post-withdrawal scores (R_5) respectively.

Secondly, the nurses were asked which different **communication functions** the particular child in the case study could still learn (Response Form I). It was clear from the range of answers that their knowledge in this regard had increased. See Table 5.18 for details.

Table 5.18 Communication functions

No	Communication functions	Pre-training	Post-training	Follow-up 1	Follow-up 2	Post-withdrawal
1	Don't know	4	-	-	-	-
2	Incorrect, unrelated answer e.g. "*speech therapy*"	9	-	1	1	-
3	Greeting	-	7	4	7	5
4	Expressing basic needs	8	1	6	1	-
5	Expressing emotions, e.g. pain	1	-	2	-	-
6	Requesting help	2	16	15	18	18
7	Requesting "more"	-	14	20	19	19
8	Labelling	4	7	5	10	13
9	Making choices	-	10	13	11	13
10	Protesting	1	11	11	18	17
11	Confirming	-	5	5	8	12
12	Asking yes/no questions	-	-	1	6	-
13	Drawing attention to self	2	9	5	11	9
14	Showing humour and surprise	-	7	-	7	12
15	Indicating finished	-	-	-	1	-
	TOTAL	**31**	**87**	**88**	**117**	**118**

As with the previous table, the number of "*don't know*" answers disappeared, the number of incorrect answers decreased and the number of correct answers increased from 31 (pre-training) to 118 (post-withdrawal). As previously mentioned, the range of correct answers also increased. In addition, answers also tended to be based on the BCIP training as the communication functions highlighted during training (e.g. no 6 – 14) increased whereas greetings (no 3), expressing basic needs (no 2) and expressing pain (no 5) decreased despite the fact that they were correct. The most noticeable difference was seen in number 7 (requesting more) which changed from 0 to 19, protesting (no 10), confirmation (no 11) and showing humour and surprise (no 14). Scores obtained during the post-training and Follow-up 1 phases correlate closely (there was an interval of two weeks between them). There was a noticeable increase between Follow-up 1 and Follow-up 2 (with an interval of four weeks), which was maintained over the five month period (post-withdrawal).

A Friedman test was employed to determine whether the change in recommended communication functions was statistically significant over time. A p-value of 0.001 was

noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.19 Friedman test of recommended communication functions

	R_1	R_2	R_3	R_4	R_5
Rank sum	25.5	59.0	69.0	75.0	71.5
Mean	1.30	3.95	4.25	4.55	4.50
Summary of results					

Table 5.19 indicates a statistically significant difference (increase) of recommended communication functions at the 5% confidence level between the pre-training score (R_1), the post-training score (R_2), the two-week follow-up (R_3), the six-week follow-up (R_4) and the post-withdrawal scores (R_5) respectively.

Thirdly, a question pertaining to recommendations regarding **communication partners** (Response Form I) when nurses were asked how the number of communication partners for the particular child in the case study could be increased. It was clear from the range of answers that their knowledge in this regard had increased. See Table 5.20 for details.

Table 5.20 Communication partners

No	Communication partners	Pre-training	Post-training	Follow-up 1	Follow-up 2	Post-withdrawal
1	Send CSD to a special school	4	1	2	3	3
2	Send CSD to a mainstream school/crèche	10	16	16	15	16
3	Take CSD on outings, e.g. shops, sports, park, vacation	5	4	4	7	9
4	Take CSD to church / Sunday school	2	12	13	8	10
5	Take CSD to PHC clinic and therapists	2	3	3	2	2
6	Arrange parent support groups	1	-	1	1	1
7	Educate community about disability	2	-	-	1	-
8	Encourage social participation: invite children to come and play	11	18	17	16	16
9	Educate neighbours and customers to accept CSD	3	8	5	13	11
10	Educate extended family	4	8	7	6	7
11	Train siblings	1	3	4	1	2
12	Find helper to look after the CSD	-	3	1	-	-
13	Have an imaginary birthday party and invite friends	-	5	5	5	10

No	Communication partners	Pre-training	Post-training	Follow-up 1	Follow-up 2	Post-withdrawal
	TOTAL	**45**	**81**	**78**	**78**	**87**

During the various research phases nurses became more aware of methods that could be employed to increase the number of communication partners. This is evident from the total number of options that increased from 45 (pre-training) to 87 (post-withdrawal) as well as from the wider range of answers. Emphasis was placed on social inclusion (e.g. *"invite other children to play", "take CSD on an outing", "take CSD to church"* and *"have an imaginary birthday party*"). The latter aspect was mentioned during training and is indicative of the power of using examples in training to facilitate knowledge, provided that participants can identify with the example. Nurses also became more aware of the importance of training others (e.g. neighbours, customers, siblings and extended family) in order to enable them to act as communication partners.

As with the other questions, a Friedman test was employed to determine whether the change in recommended communication partners was statistically significant over time. A p-value of 0.001 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results are shown below.

Table 5.21 Friedman test of recommended communication partners

	R_1	R_3	R_2	R_4	R_5
Rank sum	30.5	63.0	68.5	61.0	77.0
Mean	2.40	3.90	4.05	3.90	4.35
Summary of results					

Table 5.21 indicates a statistically significant change (increase) of recommended communication partners at the 5% confidence level between the pre-training score (R_1), the post-training score (R_2), the two-week follow-up (R_3), the six-week follow-up (R_4) and the post-withdrawal scores (R_5) respectively.

The fourth question dealt with how the number of deliberate communication opportunities given to the child in the particular case study (Response Form I) could be increased. It was clear from the range of answers that their knowledge in this regard increased. See Table 5.22 for details.

Table 5.22 Increasing communication opportunities

No	Communication opportunities	Pre-training	Post-training	Follow-up 1	Follow-up 2	Post-withdrawal
1	Take CSD on outings, e.g. zoo, church, etc.	7	-	-	-	-
2	Informal social integration, e.g. play with friends, visit relatives	8	3	-	-	-
3	Take CSD to special school	2	-	-	-	-
4	Take CSD to mainstream school/crèche	1	1	-	-	-
5	Take CSD to health clinic	3	-	-	-	-
6	Provide stimulation e.g. books	4	2	1	-	-
7	Take part in daily household activities	6	-	-	-	-
8	Be patient and appreciate communication attempts	1	-	-	-	-
9	Provide materials in small portions	1	9	19	19	18
10	Provide brief turns in activity	1	4	7	9	6
11	Deliberately provide incorrect item	-	9	11	18	15
12	Select materials that require assistance	-	5	11	11	12
13	Make items inaccessible	-	12	16	17	15
14	Provide choices	-	5	11	13	14
15	Ask yes/no questions	-	2	3	8	9
16	Deliberately withhold attention	-	9	7	11	9
17	Violate expectations	-	6	7	11	13
18	Use different communication means	-	1	1	-	-
19	Teach greeting skills	-	2	-	2	-
	TOTAL	**39**	**70**	**98**	**119**	**111**

Table 5.22 indicates that a shift had taken place from generalised statements that were provided pre-training (no 1 – 8) to more specific answers (no 9 – 19) post-training. It is also interesting to note that as nurses had the opportunity to practise using the BCIP (during the follow-up and post-withdrawal phases) their knowledge regarding the creation of deliberate communication opportunities through the use of communication temptations, continued to increase. Although all the communication opportunities addressed during the BCIP training were mentioned by participants, this was not done to the same extent. Some strategies were mentioned more frequently during all the phases

(e.g. "*providing small portions"* and *"making items inaccessible"*). This might possibly be due to the fact that nurses could identify better with these strategies, while others (e.g. *"asking yes/no questions"*) were more difficult.

A Friedman test was employed to determine whether the change in recommended communication opportunities was statistically significant over time. A p-value of 0.001 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.23 Friedman test of recommended communication opportunities

	R_1	R_2	R_3	R_5	R_4
Rank sum	22.5	48.0	76.0	76.0	77.5
Mean	0.00	2.90	4.40	4.50	4.45
Summary of results					

Table 5.23 indicates a statistically significant difference (increase) of recommended communication opportunities at the 5% confidence level between the pre-training score (R_1), the two-week follow-up (R_3), the six-week follow-up (R_4) and the post-withdrawal scores (R_5) respectively, as well as between the post-training score (R_2) and the post-withdrawal score (R_5).

Finally, the nurses' applied knowledge could also be seen in the advice that was given following the case studies as presented in Response Form I. Advice given to the mother of the particular child with a disability as depicted in the various case studies is shown in Table 5.24.

Table 5.24 Advice given following a particular case study

No	Advice	Pre-training	Post-training	Follow-up 1	Follow-up 2	Post-withdrawal
1	Referral (hospital, therapists, social worker, genetic counselling)	19	1	-	-	2
2	Refer to special school	7	3	1	3	2

3	Refer to mainstream school / crèche	1	5	7	11	9
4	Provide medical treatment	2	1	-	-	1
5	Counsel caregivers on acceptance	14	4	4	3	6
6	Discuss basic communication skills (e.g. talk slowly)	10	5	7	9	10
7	Expand on communication means	-	28	30	14	15
8	Stimulate communication functions	-	16	1	12	9
9	Use all possible communication opportunities (including toys, etc.)	1	3	4	8	6
10	Employ communication temptations	-	12	7	5	2
11	Increase social interaction, e.g. get other children to come and play	11	11	14	23	27
12	Employ helper so that mother has more time available	2	3	10	9	-
13	Increase independence	-	4	2	1	1
	TOTAL	**67**	**96**	**87**	**98**	**90**

Please note that some scores are higher than 20. This is due to the fact that some aspects were grouped together, e.g. no 7 (manual signs, EasyTalk, objects, etc).

From Table 5.24 it is thus clear that nurses became more aware of advice that could be given, as seen in their total scores. Pre-training advice tended to be general (e.g. "*counsel caregivers on acceptance*"). Post-training the advice given tended to become more specific in nature (e.g. *"increasing communication means"* and *"increasing social interaction"*). Generally they also tended to become more aware of the importance of referral to a mainstream school (referral to special schools decreased). The decline in "*referral*" over the various research phases is also interesting. This could possibly be due to the fact that nurses became more empowered and confident in their service delivery to CSDs.

A Friedman test was employed to determine whether the change in advice given was statistically significant over time. A p-value of 0.0004 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.25 Friedman test of advice given

	R_1	R_5	R_3	R_2	R_4
Rank sum	34.0	57.0	64.0	71.5	73.5
Mean	3.40	4.52	4.60	4.81	4.93
Summary of results					

Table 5.25 indicates a statistically significant difference (increase) of advice given at the 5% confidence level between the pre-training score (R_1), the post-training score (R_2), the two-week follow-up (R_3) and the six-week follow-up (R_4), respectively. It is interesting to note that this was the only section in the complete applied knowledge section where there was no statistically significant difference between the pre-training score (R_1) and the post-withdrawal score (R_5). This might be due to the fact that this aspect was not directly trained, and that nurses had to integrate and apply knowledge in order to answer this question successfully.

5.3.1.2 Skills

Results for this section was obtained from data recorded on Response Form I, Section 3 (Questions 3.1 - 3.3). This questionnaire was administered at five different intervals, and was scored by two independent raters throughout. As already discussed in Section 5.2.1, a 96% inter-rater reliability was noted throughout and consequently only scores attributed by Rater 1, the main researcher, was used. A Friedman test was employed to determine whether the change in combined skills was statistically significant over time. A p-value of 0.0001 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.26 Friedman test of combined skill areas

	R_1	R_2	R_3	R_4	R_5
Rank sum	20.0	50.0	61.5	84.5	84.0
Mean	32.80	58.65	62.15	70.80	70.95
Summary of results					

Table 5.26 indicates a statistical significant difference (increase) of combined skills at the 5% confidence level between the pre-training score (R_1), the post-training score (R_2), the two-week follow-up (R_3) and the six-week follow-up (R_4) and the post-withdrawal scores (R_5), respectively. Results also indicated a statistical significant increase at the 5%

confidence level between the post-training score (R_2) and the six-week follow-up (R_4) and the post-withdrawal scores (R_5), respectively. This implies that skills increased statistically significantly during the follow-up phases when compared to pre-training and post-training. This emphasises the importance of follow-ups in skills development. Each of the skills aspects will now be described in detail.

i) Skill in representational level grading

A Friedman test was employed to determine whether the change in representational level grading was statistically significant over time. A p-value of 0.0001 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.27 Friedman test of skill in representational level grading

	R_1	R_3	R_2	R_5	R_4
Rank sum	2.05	3.30	3.35	3.75	3.80
Mean	21.5	60.0	61.0	77.5	80.0
Summary of results					

Table 5.27 indicates a statistical significant difference (increase) of representational level grading at the 5% confidence level between the pre-training score (R_1), the post-training score (R_2), the two-week follow-up (R_3), the six-week follow-up (R_4) and the post-withdrawal scores (R_5), respectively. This is viewed as an important skill as it indicates the level at which training should start.

ii) Skill in using objects for communication

A Friedman test was employed to determine whether the change in using objects for communication was statistically significant over time. A p-value of 0.0001 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.28 Friedman test of skill in using objects for communication

	R_1	R_2	R_3	R_4	R_5
Rank sum	20.0	58.0	69.5	74.5	78.0
Mean	7.75	12.95	13.55	13.85	13.80
Summary of results					

Table 5.28 indicates a statistically significant difference (increase) in using objects for communication at the 5% confidence level between the pre-training score (R_1), the post-training score (R_2), the two-week follow-up (R_3), the six-week follow-up (R_4) and the post-withdrawal scores (R_5), respectively.

iii) Skill in using photographs for communication

A Friedman test was employed to determine whether the change in using photographs for communication was statistically significant over time. A p-value of 0.0001 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.29 Friedman test of skill in using photographs for communication

	R_1	R_2	R_3	R_5	R_4
Rank sum	21.0	58.0	63.0	78.0	80.0
Mean	6.25	12.70	12.55	13.50	13.80
Summary of results					

Table 5.29 indicates a statistically significant difference (increase) in using objects for communication at the 5% confidence level between the pre-training score (R_1), the post-training score (R_2), the two-week follow-up (R_3) the six-week follow-up (R_4) and the post-withdrawal scores (R_5), respectively.

iv) Skill in using communication boards

A Friedman test was employed to determine whether the change in using communication boards for communication was statistically significant over time. A p-value of 0.0001 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.30 Friedman test of skill in using communication boards

	R_1	R_3	R_2	R_4	R_5
Rank sum	31.5	49.5	55.0	80.5	83.5
Mean	5.65	8.70	9.15	12.20	12.25
Summary of results					

Table 5.30 indicates a statistically significant difference (increase) in using communication boards for communication at the 5% confidence level between the pre-training score (R_1), the six-week follow-up (R_4) and the post-withdrawal score (R_5), and also between the post-training score (R_2) and the two-week follow-up (R_3), the six-week follow-up (R_4) and the post-withdrawal scores (R_5), respectively.

v) Skill in using manual signs for communication

A Friedman test was employed to determine whether the change in using manual signs for communication was statistically significant over time. A p-value of 0.0001 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.31 Friedman test of skill in using manual signs for communication

	R_1	R_2	R_3	R_4	R_5
Rank sum	26.5	52.0	60.0	77.0	84.5
Mean	6.00	10.15	11.55	13.35	14.00
Summary of results					

Table 5.31 indicates a statistically significant difference (increase) in using manual signs for communication at the 5% confidence level between the pre-training score (R_1), the two-week follow-up (R_3), the six-week follow-up (R_4) and the post-withdrawal scores (R_5), respectively, and also between the post-training score (R_2) and the post-withdrawal scores (R_5).

vi) Skill in using the EasyTalk 4 Option digital speaker for communication

A Friedman test was employed to determine whether the change in using the EasyTalk 4 Option digital speaker for communication was statistically significant over time. A p-value of 0.0001 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.32 Friedman test of skill in using the EasyTalk 4 Option digital speaker for communication

	R_1	R_2	R_3	R_5	R_4
Rank sum	24.5	52.5	65.5	79.5	78.0
Mean	5.10	10.35	12.50	13.80	13.65
Summary of results					

Table 5.32 indicates a statistically significant difference (increase) in using the EasyTalk 4 Option digital speaker for communication at the 5% confidence level between the pre-training score (R_1), the two-week follow-up (R_3), the six-week follow-up (R_4) and the post-withdrawal scores (R_5), respectively. In addition a statistically significant difference (increase) at the 10% confidence level was noted between the pre-training score (R_1) and the post-training score (R_2), as well as between the post-training score (R_2) and the six-week follow-up score (R_4).

vii) Dependence on prompts

A Friedman test was employed to determine whether the frequency of prompts given to nurses changed statistically significantly over time. A p-value of 0.076 was noted ($p<0.05$) indicating no statistical significance. This implies that the number of prompts remained consistent over time despite the initial hypothesis that the number of prompts will be reduced as nurses' skills increased. It would thus appear that they were dependant

on prompts in order to demonstrate their skills. On the other hand, it is also reassuring to note that the increase in skills that was noted was not due to an increase in prompts.

viii) Confidence in facilitating communication

A Friedman test was employed to determine whether the change in the nurses' confidence in facilitating communication was statistically significant over time. A p-value of 0.0154 was noted ($p<0.05$) implying that multiple comparisons were required to test the nature of the significance. A summary of these results is shown below.

Table 5.33 Friedman test of confidence in facilitating communication

	R_1	R_2	R_3	R_4	R_5
Rank sum	36.5	56.5	61.5	63.5	67.0
Mean	1.79	2.26	2.42	2.47	2.53
Summary of results					

Table 5.33 indicates a statistically significant difference (increase) in confidence at the 5% confidence level between the pre-training score (R_1) and the post-withdrawal score (R_5), and between the pre-training score (R_1) and the six-week follow-up score (R_4) at the 10% confidence level. This factor, as well as the increase in the rank sums and means, implies that the nurses' confidence continued to increase over time as their knowledge and skills increased.

ix) Summary of skills

The statistically significant increase in the nurses' skills together with a description of their confidence in demonstrating these skills and the amount of prompting required to demonstrate these skills. Results are shown in Figure 5.4.

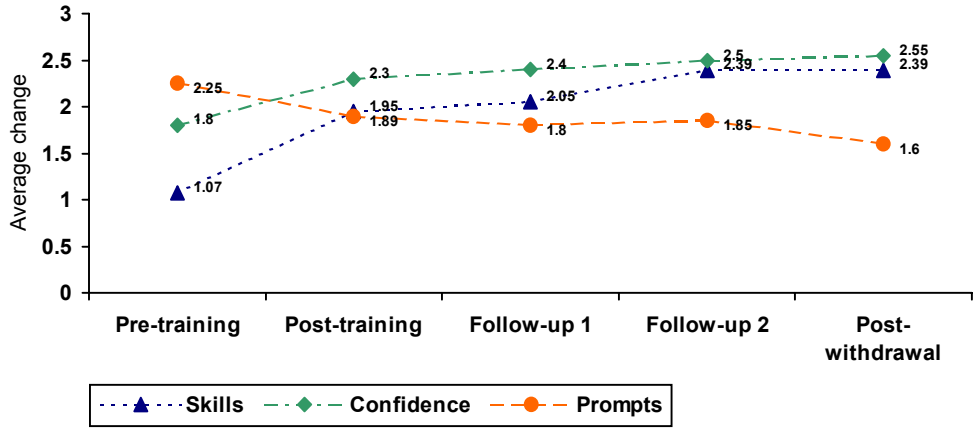


Figure 5.4 Change in skills, confidence and prompts

It is clear from Figure 5.4 that the nurses' skills initially increased noticeably and then remained consistent during the last two phases. After the noticeable first increase in confidence, the next increases were more gradual. A plateau was not reached, indicating that as skills continued to increase confidence also continued to increase. Regarding the amount of prompting that was initially required, nurses became less dependent on prompts. For the second follow-up, however, they required slightly more prompts than during the first follow-up but this declined again during the post-withdrawal period. During the pre-training phase nurses' dependence on prompts was higher than their confidence and skills, this changed post-training.

5.3.2 Secondary outcomes

Secondary outcomes pertain to those aspects not directly trained, but which changed during the course of the research, and that could possibly be attributed to the BCIP training. The aspects that will be described include attitudes, exposure and service delivery as well as a reflective self-evaluation by the nurses. These aspects were briefly described in Chapter 4, Table 4.17. The results pertaining to each of these aspects will now be described in detail.

5.3.2.1 Attitudes

This section was compiled from data recorded on Response Form II, which was administered at three different intervals. Although it was not expected that attitudes would change over the weeklong training period, it was decided to keep the measuring instrument consistent and not to make any changes to it. Due to the "*halo effect*" where participants are aware of the high social desirability of certain answers, quantitative measurements are not always the most appropriate (Guy *et al*., 1987). Consequently qualitative measurements were included to augment information about the participants' attitude towards disability. A focus group was selected as the means of data collection as they allowed participants to share ideas and thoughts (Brink, 1999). A summary of this focus group is provided in Table 5.34.

Table 5.34 Focus group with community nurses post-training and follow-ups

Category	Description
Participants	Seventeen of the 20 community health nurses who participated in the research attended the focus group. Three were absent with valid excuses. As they had attended the training together and therefore knew each other, rapport was quickly established, and the group was experienced as non-threatening which was evident from the quality of the answers. The researcher/trainer facilitated the focus group. The audio recording was made by the research assistant who had been actively involved in the whole training period (five months), with the result that she was not seen as a threat to the group. It is also important to note that the research assistant did not actively participate in the discussion.
Aims	To determine how the BCIP training impacted on the attitudes of community nurses and the services rendered by them, three open-ended interview questions were used, namely: i) How did your experience in this training change what you do in the workplace

Category	Description
	with primary caregivers and CSDs? ii) What in particular did you enjoy about the training? iii) What did you not enjoy about the training?
Method	The focus group was conducted in a semi-structured discussion of the questions and clarification was asked if concepts were unclear or open to misinterpretation (Krefting, 1991). Nurses were encouraged to participate actively, to share their experiences, to evaluate the training and to understand that no comments would discredit them. As the researcher knew what the three most important questions were and that flexibility was allowed in terms of sequence and discussion, she was able to listen, observe and respond to what she saw and heard, thereby maintaining structural coherence of the topic, increasing credibility (Krefting, 1991). In an attempt to enhance trustworthiness, member checks were included. This entailed that the researcher gave a short summary at the end of the discussion of each of the three questions, asking participants whether they agreed or disagreed and if any important issues raised were overseen. The researcher and the research assistant (who had gained substantial knowledge and insight into nursing and the field of severe disability over her five-months involvement period) spent some time debriefing directly after the focus groups to discuss interpretations and to note the major issues that were raised. No areas that needed additional probing or clarification were noted. As described in Chapter 4, debriefing is an important part of investigator triangulation and was included to heighten the credibility of the data obtained (Brotherson & Goldstein, 1992). Audio recordings were used to make verbatim transcriptions of the focus group that lasted 54 minutes.
Analysis	The researcher delineated themes and came to tentative conclusions. Transcriptions were then handed to an independent expert in the field of severe disability and qualitative research and she was also asked to delineate themes (peer debriefing). This independent and separate coding and cross-checking of data increases analytic stability (Goldberg, 1993). In order to address this, both researchers received a set of coding guidelines pertaining to the content and the analytic procedure, e.g. the initial questions as well as the decision rules for determining the categories. This aspect is discussed in detail in Chapter 4. Following the development of the themes the researcher and the independent expert met to review the theme analysis with a request for verification, correction, clarification and/or elaboration of tentative conclusions drawn from the data analysis, ensuring credibility. Apart from only obtaining significant and consistent themes in the data it is also rich in providing illustrative examples.
Results **Results (continued)**	A summary of the themes delineated from this focus group is presented in **Appendix P**. Two main themes emerged, the first pertaining to service delivery and the second to an evaluation of the training. It is important to note that responses were genuine and honest. Some admitted to having tried to dodge the researcher initially and of being apprehensive about the course before it commenced. Nurses also spoke from their own experiences and were keen to relate the impact that the training had had on them as individuals. A number of issues related to service delivery were noted, namely attitudes, new knowledge that was gained, the role of the nurse and other multi-skilling issues, job satisfaction and a strong focus on social inclusion and caregiver involvement. It is noteworthy that a variety of outcomes were achieved, despite the fact that the training focus was on knowledge and skills. It was clear that the new knowledge and skills impacted positively on how they viewed their own skills and the way this pride impacted on their job satisfaction "*but now I know that I can work with them*". It also became clear that they were more aware of the role the nurse, together with the caregivers, played in the training of CSDs. They also stated that they felt better equipped to work with caregivers and to provide them with training and guidance. In additon, a strong focus on the social inclusion of CSDs was noted, e.g. "*they*

Category	Description
	should be included in the community and accepted." Regarding the evaluation of training, a number of areas were covered. Firstly, the content of the training was discussed, and everyone felt that the most important aspects were covered during the BCIP training. It is also interesting that different nurses remembered different aspects that they particularly enjoyed, e.g. communication temptations or making object communication boards, etc. However, the two aspects that they all had in common was their enjoyment of using manual signs from SASL and the EasyTalk. On the whole nurses also enjoyed the particular training method that was used, and stated that they could identify with the case studies. In addition these case studies assisted them with a way of visualising a client and for practising their skills in cases where they did not have access to a patient. They also declared that the follow-ups formed a very important part of the training and that they did not experience them as threatening once they realised the importance of follow-ups in the revision and problem-solving areas. Nurses were keen to talk about all the positive outcomes of the training e.g. how empowered they felt, their new skills and knowledge, a positive attitude, increased confidence, a sense of achievement and pride and, finally, increased insight as they were also beginning to realise the potentially devastating effect of disability. Finally a few negative aspects were mentioned. These mostly related to time issues – nurses felt that a week was too short for training and that a whole day of interactive training was too tiring. In addition, they felt that hands-on experiences with live case studies would have improved the training.
Implications	Results from this focus group yielded important information regarding the nurses' attitudes and their evaluation of the training. A number of issues that could not be measured with the quantitative measuring instrument were brought to the foreground. Nurses experienced the training as very positive and commented that it had widened their horizons and opened up a whole new world to them. This impacted positively on the way they view CSDs, e.g. "*I don't regard disabled children as being disabled, I see them as normal kids who are unable to perform certain tasks*", how they view the caregivers of CSDs "*the parents should also be given support that we can help the children*" and how they view themselves "*but now, after this training, I know I can work with them*". The impact of the training was therefore wider than only the aspects that were trained. The content and method of the training proved to be effective and impacted positively on the nurses' knowledge and skills. The importance of using a problem-based format with follow-ups must be highlighted, and should form an important part of any future training.

In summary, the focus group provided rich, honest and relevant data regarding the positive outcomes of the BCIP training. Information pertaining to attitudes, job satisfaction and service delivery (secondary outcomes of the training) as well as information pertaining to the primary outcomes (knowledge and skills) were obtained. As discussed, certain precautions were taken with the data in an attempt to increase its trustworthiness.

The final section of Question 10 (Response Form II) was used to obtain quantitative measurements. A Friedman test statistic was obtained with a p-value of 0.39 ($p>0.05$) indicating no statistical significance, so that multiple comparisons were unnecessary. This

is supported by data from the frequency analysis where it can be seen that no nurses were "*very negative*" or "*negative*" towards disability. These results are given in Table 5.35.

Table 5.35 Attitude towards disability during different research phases (n=20)

Score	Description of motivation	Frequency pre-training	Frequency post-training	Frequency post-withdrawal
0 – 8	Very negative	-	-	-
9 – 16	Negative	-	-	-
17 – 24	Unsure	-	2	-
25 – 32	Positive	13	9	11
33 – 40	Very positive	7	13	9

As already mentioned the social desirability (Hawthorne effect) of the answers should be taken into account in Table 5.13, resulting in a ceiling effect (Babbie & Mouton, 2001). Despite the measurements included to reduce this effect, it was still noticeable. However, the positive and very positive attitudes that were noted pre-training, might also be due to the fact that nurses were selected who had indicated that they wanted to participate in the training. Post-training results are interesting. Two nurses recorded that they were "*unsure"* about their attitude towards disability. This might be due to the fact that they were more at ease with the procedure post-training and that they realised that they would not be penalised for answering honestly, thus reducing the social desirability effect. On the other hand it might also be because the training had made them more realistic, and that they realised that working with CSDs is challenging. During the post-withdrawal measurement no "*unsure*" measurements were recorded. However, it should be noted that post-training, two nurses had changed from being positive to very positive, and this was maintained during post-withdrawal. This might be because they felt better equipped to work with CSDs and less unsure about what was expected from them.

Two other important aspects that impact on attitudes, namely motivation and job satisfaction will now be described in more depth.

i) Motivation

The reversal theory of motivation was used to determine this aspect, which holds that people are predominantly telic (goal-directed) or paratelic (more *"easygoing"* and *"go with the flow"*). As motivation is an aspect that impacts on attitudes, it was further investigated for descriptive purposes. Results were obtained from using six sub-questions from Question 10 (Response Form II) with a 5-point Likert scale. In order to rate the data some of the answers were reversed, e.g. "*I prefer to work independently and to choose my own tasks*". By doing so, all nurses who were goal-directed would have a low score and all the nurses who were more "*easygoing*" would have a high score. Results for this question are shown in Table 5.36.

Table 5.36 Nurses' motivation as measured by using the reversal theory of motivation (n=20)

Score	Description of motivation	Frequency pre-training	Frequency post-training	Frequency post-withdrawal
3 – 6	Very goal-directed	-	-	-
7 – 12	Goal directed	-	-	-
13 – 18	Unsure	7	9	7
19 – 24	Easy-going	10	6	8
25 – 30	Very easy-going	3	5	5

It is important to remember that this aspect was not directly trained during the BCIP training and is therefore a secondary outcome. Table 5.36 indicates that the majority of nurses are not very goal-directed, a tendency that prevailed throughout. This might be due to the fact that these nurses choose to work in community clinics because of this, as this is a workplace where not much planning can take place and where patients come at random. Friedman test statistics confirmed that the BCIP training had no significant influence on the nurses' motivation, as a p-value of 0.49 was recorded ($p > 0.05$). Consequently multiple comparisons were not done.

ii) Job satisfaction

As with motivation, job satisfaction also impacts on attitudes, and although this aspect was not trained, it is important for descriptive purposes and was included for that reason

(See Chapter 4, Table 4.17). The next six sub-questions of Question 10 (Response Form II) evaluated job satisfaction, also using a 5-point Likert scale. Again some scores were reversed so that a nurse who was very satisfied with her job would have a high score, and a nurse who was very unsatisfied with her job would have a low score. Results are shown in Table 5.37.

Table 5.37 Job satisfaction during the various research phases (n=20)

Score	Description of motivation	Frequency pre-training	Frequency post-training	Frequency post-withdrawal
3 – 6	Very unsatisfied	-	-	-
7 – 12	Unsatisfied	-	-	-
13 – 18	Unsure	1	-	2
19 – 24	Satisfied	14	15	9
25 – 30	Very satisfied	5	5	9

From Table 5.37 it is evident that on the whole, nurses appeared to be satisfied and very satisfied with their jobs. Because the initial scores were high, a ceiling effect is seen (Babbie & Mouton, 2001). Only one nurse who appeared to be unsure pre- training also became satisfied with her job post-training, while two nurses became "*unsure*" during the post-withdrawal phase. This might possibly be due to the fact that they became more realistic because they had more exposure and hands-on experiences with CSDs. It can also be mentioned that at the end of the post-withdrawal phase, almost half of the nurses (9/20) felt very satisfied with their jobs. This factor is important as the fact that they felt satisfied with their jobs would impact on the way they viewed training and participated in it. It is also important to note that these high scores might be due to the "*halo effect*" as the nurses might have answered in a sociably desirable manner (Guy *et al.*, 1987). As expected, Friedman test statistics indicated that training did not have a statistically significant impact on job satisfaction as a p-value of 0.49 ($p>0.05$) was recorded. No multiple comparisons were thus done.

5.3.2.2 Exposure and service delivery

Results were obtained from using Questions 11, 12 and 13 (Response Form II) and Section 4 (Questions 4.1 and 4.2) of Response Form I.

Results from Response Form II were recorded on 4x4 contingency tables resulting in the frequencies in cells being very small, implying scarce data. Consequently data were re-grouped in 2x2 contingency tables and chi-square tests were done. Results are shown in Table 5.38.

Table 5.38 Nurses' exposure to CSDs and amount of time spent with them (n=20)

No of children	Amount of time spent with children	Pre-training	Post-training	Post-withdrawal
0 children	Not applicable	6	9	7
1 child	<45 minutes	3	5	4
	>45 minutes	1	-	1
2 – 3 children	<45 minutes	7	4	4
	>45 minutes	1	-	-
4 – 5 children	<45 minutes	1	2	2
	>45minutes	1	-	1
> 5 children	<45 minutes	-	-	1
	>45 minutes	-	-	-

Results indicated that pre-training, four nurses saw one child each, while eight nurses saw between two and three children, and two nurses saw more than four children. During the post-withdrawal phases it appeared that a slight increase in service delivery to CSDs could be seen, as four nurses now see more than four children. This observation should, however, be treated with caution, as the number of participants was small.

A statistical analysis was done regarding the amount of time spent with CSDs. Pre-training eleven nurses spent 45 minutes or less with a CSD and three spent more than 45 minutes. Likewise, during post-withdrawal eleven nurses spent 45 minutes or less while two spent more than 45 minutes. This appears to be a very even distribution and thus it appears that training did not really impact on this aspect.

Fisher's Exact Test was done as it tests whether there is a positive or negative association between two aspects (in this case the number of CSDs seen and the amount of time spent with them). As expected, no statistical significance was found ($p>0.05$) as the right-sided p-value was 0.6182 (which would have been indicative of a positive association) and the left-sided p-value was 0.8909 (which would have indicated a negative association). Nurses thus spent neither statistically more nor less time with CSDs in accordance with the number of CSDs to whom they provide services.

Nurses were also asked if they had used the BCIP with any of their clients. During Follow-up 1 five nurses (25%) reported that they had, during Follow-up 2 five nurses also (25%) reported that they had, and during the post-withdrawal phase nine nurses (45%) reported that they had. Reasons for either using, or not using the BCIP, are shown in Table 5.39.

Table 5.39 Independent utilisation of the BCIP (n=20)

No	Reasons	Follow-up 1	Follow-up 2	Post-withdrawal
A	**REASONS FOR NOT USING THE BCIP**			
A1	Other duties, e.g. night duty, labour ward, immunisation campaign	4	2	3
A2	No CSDs available	8	8	3
A3	No time as clinic was too busy	-	1	2
A4	Been on leave (1 month at a time)	3	3	3
A5	Been ill	-	1	
	Subtotal	***15***	***15***	***11***
B	**USE OF THE BCIP**			
B1	Seen 1 CSD briefly	2	-	2
B2	Seen 1 CSD extensively	1	3	3
B3	Seen 2 – 3 CSDs extensively	1	1	3
B4	Seen 4 – 5 CSDs extensively	1	1	1
	Subtotal	***5***	***5***	***9***
	TOTAL	**20**	**20**	**20**

Table 5.39 thus indicates that the number of nurses who utilised the BCIP increased, although still less than 50% used it at the end of the research. The extent to which it was used varied considerably as did the reasons for not using it. It is interesting to note that the one reason "*no CSDs available*" (A2) was the reason that decreased most noticeably. This might be due to a number of reasons, e.g. as the nurses held more health talks at the clinics targeting the community at large, more CSDs were referred to clinics by members of the community, and nurses might also have become more aware of CSDs who already visited the clinics as they could identify them better, or the nurses could have made a deliberate attempt to find a CSD as they wanted to practise their newly found skills.

After this nurses were asked if they had had contact with anybody regarding the BCIP (e.g. colleagues, friends, family, etc.). During the first follow-up 19 nurses (95%) reported that they had, as did 19 nurses (95%) in the second follow-up and 18 nurses (90%) during the post-withdrawal phase. The nature of this contact was then further investigated. Results are shown in Table 5.40.

Table 5.40 Nature of contact with others regarding the BCIP

No	Description of contact	Follow-up 1	Follow-up 2	Post-withdrawal

No	Description of contact	Follow-up 1	Follow-up 2	Post-withdrawal
1	Informal discussions and demonstrations with own family	6	-	-
2	Informal talks with family and colleagues (nurses and/or teachers)	4	11	9
3	Formal talks and demonstrations to colleagues	5	6	-
4	Formal talks, demonstrations and health talks to community	4	2	7
5	In-service training of nursing assistant	-	-	2
	TOTAL	**19**	**19**	**18**

Almost all the nurses had had contact with others regarding the BCIP. It is interesting to note that at the first follow-up (two weeks post-training) six nurses reported that the nature of the contact was mostly informal discussions and demonstrations with their own families. This aspect was not mentioned during the other two phases. It is also important to note that two nurses trained nursing assistants as they feared that no one would be able to render services to CSDs if they were not available, indicating how valuable they regarded the training to be. There was also an increase in health talks to the community at large.

Nurses were also asked what type of service they rendered at their respective clinics (Response Form II). This was compared during the various research phases. Data are presented visually in Figure 5.5.

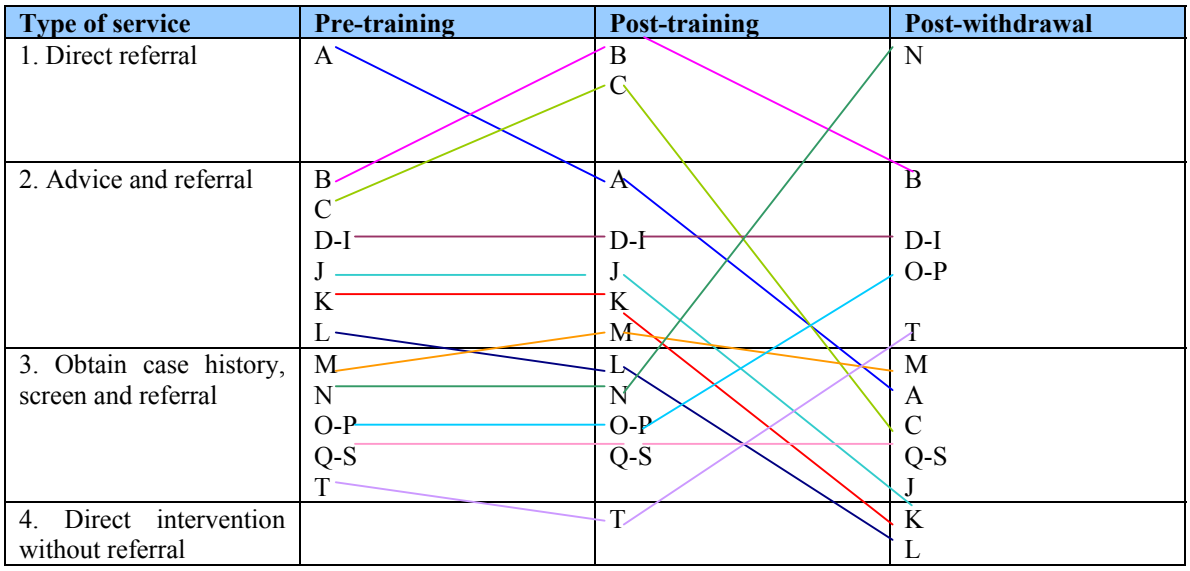


Figure 5.5 Type of service delivery rendered during the various research phases

It is important to note that these four types of service delivery follow a hierarchical pattern in terms of how independently a nurse can provide training to a primary caregivers of CSDs. On the first level, there is no mention of direct intervention and the child is merely referred, whereas on the last level, the nurse is able to work more independently. Data indicate that seven nurses tended to become more independent as training progressed (participants A, B, C, J, K, L and M). Participants K and L marked the highest level of independence. This is significant, as no nurses had marked this level pre-training. Four nurses tended to regress (N, O, P and T). Nine nurses showed no change on these levels during the research phases.

5.3.2.3 Self-evaluation

Data for this section were obtained by using both open-ended questions (Question 15, 16 and 17) and close-ended questions (Question 14) from Response Form II.

The first open-ended question dealt with a general self-evaluation of their skills as a nurse, the second with their skills that positively impacted on their treatment of CSDs and

their primary caregivers and finally the skills that they would like to improve in order to enhance their service delivery to CSDs. In all instances nurses had to mention three skills, and so sixty observations for each of these aspects are recorded.

Combined frequencies for each of these questions were recorded for the different research phases and an item analysis was done. Table 5.41 depicts the nurses' self-evaluation of their general nursing skills during these phases.

Table 5.41 Nurses' self-evaluation of general nursing skills during the various research phases (n=3x20=60)

No	Description	Pre-training	Post-training	Post-withdrawal
1	Case history & interviewing	6	5	3
2	Communication & listening skills	10	11	11
3	Providing correct medical (nursing) treatment	10	7	11
4	Assessment	6	8	6
5	Education through health talks	13	9	10
6	Counselling caregivers on accepting CSDs and adopting a positive attitude towards them	8	4	3
7	Home visits to support caregivers and CSDs	2	-	-
8	Referrals	5	4	5
9	Follow-up visits	-	2	1
10	Showing primary caregivers how to communicate by using different communication means, functions, partners and opportunities	-	9	10
11	Provide information regarding school placement	-	1	-
	TOTAL	**60**	**60**	**60**

From Table 5.41 it is clear that nurses became more aware of the importance of showing primary caregivers how to communicate with their CSD by using the BCIP principles. This was maintained during the post-training and post-withdrawal phases. In addition, they became aware of the importance of school placement and the provision of follow-up services post-training. The greatest decline was noted regarding counselling of primary caregivers on accepting their CSD and adopting a positive attitude. This is possibly due to the fact that nurses had a concrete way of achieving this post-training (e.g. using the BCIP as opposed to only talking and discussing – the traditional way of counselling). Some aspects received high scores throughout, e.g. general communication and listening

skills, providing correct medical treatment and education through health talks. Referrals remained fairly consistent over the three phases.

Secondly, nurses were asked to reflect on their skills that were particularly good when working with CSDs and their primary caregivers. As with the previous section, combined frequencies were calculated. As each nurse listed three skills, sixty responses were recorded. The results are shown in Table 5.42.

Table 5.42 Nurses' self-evaluation of nursing skills specific to working with CSDs and their primary caregivers during the various research phases (n=3x20=60)

No	Description	Pre-training	Post-training	Post-withdrawal
1	Using different unaided communication means (e.g. facial expressions, head-nodding and manual signs)	3	2	1
2	Using different aided communication means (e.g. real objects & photos).	-	3	2
3	Facilitating a positive attitude by giving advice	18	7	11
4	Demonstrating communication functions	-	4	2
5	Providing communication opportunities	-	4	5
6	Social integration by increasing communication partners & using play	2	2	4
7	Good communication and listening skills of the nurse	13	11	7
8	Service delivery:			
	▪ Case history & interviewing	6	4	8
	▪ Identification and screening	4	6	5
	▪ Referral	3	-	1
	▪ Teaching CSDs	7	-	1
	▪ Teaching feeding skills	-	1	-
	▪ Teaching primary caregivers to communicate with CSD	-	14	12
	▪ Health talk about hygiene	3	1	-
	▪ Information on disability grant	-	-	1
9	Professional secrecy	1	1	-
	TOTAL	**60**	**60**	**60**

For this question sixteen categories were formulated and Table 5.42 clearly shows that post-training nurses were aware of the specific skills which were required when working with CSDs and their primary caregivers, e.g. the highest score was obtained for "*teaching primary caregivers to communicate with CSD*", which was maintained during the post-withdrawal phase. The other skills that were mentioned were specific in nature, e.g.

'*using real objects to communicate"*, "*demonstrating communication means and functions*" and "*providing communication opportunities*". As noted in the previous table, (Table 5.41), skills mentioned pre-training were vague and general, e.g. "*teaching CSDs*" and "*facilitate a positive attitude by giving advice*". These frequencies declined during post-training as attention was focused on specific aspects e.g. "*providing communication opportunities*", "*using aided communication*" and *"demonstrating communication functions"*. During post-withdrawal, however, the frequencies for the general aspects increased again, but not to the pre-training level.

Finally a reflective, self-evaluation question pertaining to skills they would like to improve and/or receive training in was asked. An item analysis was constructed from the combined frequency counts of this open-ended question. Fifteen categories were extrapolated. Results are shown in Table 5.43.

Table 5.43 Nurses' self-evaluation of skills specific to working with CSDs and their primary caregivers that they would like to improve/receive training in, during the various research phases (n=3x20=60)

No	Description	Pre-training	Post-training	Post-withdrawal
1	More information on communication means	4	7	13
2	Knowing more about communication functions	-	4	2
3	Creating communication opportunities by using communication temptations	-	5	-
4	Knowing more about multi-disciplinary teams, each member's role and the referral route	3	4	4
8	Service delivery:			
	▪ Screening & measuring progress	-	5	4
	▪ Primary caregiver & sibling training	18	4	2
	▪ Providing primary health care & nursing	3	2	3
	▪ Basic training of CSDs e.g. providing exercises	10	1	3
	▪ Own nursing skills	4	2	-
	▪ Interviewing caregivers and communicating with them	13	4	3
	▪ Categorise CSDs according to disability types	3	-	-
	▪ Facilitating independence by functional skills	-	2	3
	▪ Teaching families to communicate with CSDs by using demonstrations	-	16	9
	▪ Know about schools for CSDs	2	3	3
	▪ How to form support groups	-	1	1
	TOTAL	**60**	**60**	**60**

Table 5.43 yields some interesting results. Pre-training eighteen, thirteen and ten nurses respectively required more training in "*training primary caregivers and siblings*", "*interviewing caregivers and communicating with them"* and "*basic training of CSDs*". It is clear that the training programme that was provided addressed these issues, as a noticeable decline was regarding these three aspects observed post-training. It is also interesting to note that "*categorising CSDs according to disability types*" was no longer an issue post-training. This is possibly due to the fact that the WHO's ICIDH-II where the emphasis is placed on participation rather than disability types was discussed (WHO, 1999). Post-training, nurses identified a whole new set of needs, with "*teaching families to communicate with CSDs by using demonstrations*" as the most pressing. This could possibly be attributed to the emphasis placed on social inclusion during the training. The other training needs revolved around the specific issues addressed during training, e.g. expanding communication means and functions and creating communication temptations. During the post-withdrawal phase the highest reported frequency was for *"using different communication means"*. This could possibly be because they were already successfully using some manual signs and wanted to expand their current vocabulary.

Following the three open-ended questions, six close-ended questions (Question 14 on Response Form II) that employ a 4-point Likert scale were evaluated. A Friedman test was conducted in order to determine whether nurses viewed their own skills more positively during the post-training and post-withdrawal phases in a statistically significant manner. A p-value of 0.12 was obtained which is not statistically significant ($p > 0.05$). Multiple comparisons were therefore not done.

5.4 GENERAL TRAINING EVALUATION

Results discussed in this section will be both qualitative and quantitative in nature. The qualitative data were obtained from the focus group that was discussed in Section 5.3.2.1.

The quantitative measurements were obtained from Response Form III that was administered twice, directly post-training and at the five-month withdrawal period. Firstly, nurses were asked if they thought that the training had helped them to improve their knowledge regarding severe disability. In order to determine whether any differences occurred post-training and post-withdrawal, 3x3 contingency tables were drawn. As none indicated that they did not gain any knowledge, this cell was empty and therefore omitted. Results are shown in Table 5.44.

Table 5.44 Nurses' rating of the extent to which the BCIP training improved their knowledge regarding disability (n=20)

		POST-WITHDRAWAL			
POST-TRAINING	***Frequency of nurses***	**Helped a little**	**Helped quite a lot**	**Helped very much**	**TOTAL**
	Helped a little	2	-	-	***2***
	Helped quite a lot	-	5	3	***8***
	Helped very much	-	6	4	***10***
	TOTAL	***2***	***11***	*7*	**20**

From this table it is evident that not many changes took place during the five-month withdrawal phase regarding the nurses' evaluation of the amount of knowledge they had gained in training. The same two nurses who initially stated that they had gained little knowledge continued to support this. Of the ten who felt that they had gained very much from training during the post-training phase, seven continued to think so. The three nurses who had changed their opinion, now stated that they had gained "*quite a lot*".

Nurses were also asked to give an overall rating of the training. None rated the training as "*very poor*" or "*poor*". Responses were recorded on a 3x3 contingency table and results are shown in Table 5.45.

Table 5.45 Nurses' overall rating of the quality of the training.

		POST-WITHDRAWAL			
POST-TRAINING	***Frequency of nurses***	**Good**	**Very good**	**Excellent**	**TOTAL**
	Good	3	3	1	*7*
	Very good	2	2	3	*7*

	Excellent	1	1	4	***6***
	TOTAL	***6***	***6***	***8***	**20**

From Table 5.45 it is clear that not much difference was noted between their rating of the quality of training during the post-training and post-withdrawal phases. One nurse each, who had respectively rated the training as "*good*" and "*very good*" during post-training, rated it as "*excellent*" during the post-withdrawal phase. In addition to these frequencies, it would add insight to look at some of the comments made by nurses during the post-withdrawal phase, to reflect their overall rating of the training: *"the course was an eye opener because after attending this course I see children with disability differently than before. I am able to deal with them and guide their parents. I think it is important and worthwhile to be included in the nursing curriculum".* From this statement it is clear that the nurse was able to qualify the knowledge that she had gained and that an attitudinal change had also taken place. Another nurse commented that *"the course was interesting and I have gained a lot. Follow-up lessons made us participate actively. I have developed interest and a love of children with disability".* This highlights the importance of the training methodology used (namely follow-ups and encouragement of active participation) as well as a change of attitude. The training methodology used was further emphasised when a nurse stated "*the lecturer is very good on teaching this, because she emphasised every little word she said. She knew that some of us are slow learners, so she was fluent enough to be heard by everybody*".

Nurses were also asked if they had enjoyed the BCIP-training as a whole, to which everyone responded that they had (during the post-training and post-withdrawal phases). All of them also indicated during the post-training phase that they felt that all nurses should undergo this training, but during the post-withdrawal phase two nurses became unsure of this. On the other hand, eighteen nurses reported that this training had helped them adopt a positive attitude towards service delivery to CSDs (two were unsure), but during post-withdrawal all of them were sure about this. As expected, when obtaining a Wilcoxon score over these three aspects for the post-training and post-withdrawal phases,

a p-value of 1.00 was obtained ($p>0.05$) indicating that no statistically significant changes had occurred over time.

The remaining section of the training evaluation will now be described in terms of the training methodology that was used and the training content.

5.4.1 Training methodology

Firstly, nurses were asked to comment on various aspects of the training in order to obtain a holistic view on the training methodology. Statements regarding the training methodology were made, and nurses had to state whether they agreed with the statement ("*Yes*"), disagreed ("*No*") or whether they were uncertain ("*Uncertain*"). Results are shown in Table 5.46.

Table 5.46 Nurses' evaluation of the training methodology (n=20)

Aspect evaluated	Positive evaluation		Negative evaluation		Uncertain	
	Post-training	Post-withdrawal	Post-training	Post-withdrawal	Post-training	Post-withdrawal
Use of a problem-based format	19	20	-	-	1	-
Appropriacy of case studies used	20	20	-	-	-	-
Sufficient training time	9	7	10	11	1	2
Sufficient time for questions and answers	18	20	2	-	-	-
Sufficient time to practise BCIP application	13	14	5	5	2	1

Table 5.46 indicates that the use of a problem-based format and the appropriacy of the case studies proved to be particularly positive. The fact that the case studies were compiled from descriptions provided by primary caregivers during focus groups in the Moretele health district might be the reason why 100% of the nurses viewed the case studies as appropriate during both phases. On the other hand, the area where the nurses were most negative, were the ones pertaining to time, particularly the length of training and enough time to practise the use of the BCIP. However, they noted that the time for questions and answers was sufficient. As is clear from this table, nurses' views regarding these aspects did not change much during the post-withdrawal phase. Wilcoxon test statistic over all the aspects that pertain to the training methodology confirmed this observation and indicated a p-value of 0.6418 ($p>0.05$) which implies that there was no statistical difference between the way nurses viewed the methodology during post-training and post-withdrawal.

This was followed by four open-ended questions regarding the training methodology, namely the three aspects of training that were most enjoyed, aspects more information were required on, suggestions to improve training and additional comments. Answers to the last three questions provided such similar answers that they were grouped together. Nurses could give any amount of information, thus the frequency scores do not add up to

twenty or any of its multiples. On analysing this information a differentiation was made between training methodology and content, of which only the former will be discussed in this section.

Results pertaining to the aspects that were most enjoyed relating to the training methodology are presented in Table 5.47.

Table 5.47 Training methodology aspects that were most enjoyed

Aspect	Post-training	Post-withdrawal	Comment
Use of case studies	7	5	Problem-based learning was a new concept. Highest frequency during both phases.
Use of videos	4	2	Less frequently mentioned in post-withdrawal phase as they were not exposed to this during the 5-month period.
Role-play and active participation	3	3	No difference between the various phases.
Hands-on workshops	3	3	No difference between the various phases.
Good & effective handouts	1	1	No difference between the various phases.
Follow-ups	-	1	This aspect was, as expected, only mentioned post-training.

From this table it becomes clear that nurses enjoyed a wide range of aspects pertaining to training methodology, of which case studies were most frequently mentioned. It also appeared that activities enjoyed post-training were the same ones enjoyed post-withdrawal, except for "*follow-up*", which was only mentioned during the final phase.

Comments on how to improve the training were then categorised. Results are displayed in Table 5.48.

Table 5.48 Training methodology that could be improved

Aspect	Post-training	Post-withdrawal	Comment
Increase training time	11	10	Suggestions varied between two weeks and one month.
Use live case studies	14	16	As some had never had hands-on experiences with CSDs they would have liked this contact during training.
Increase use of videos	3	-	Two commented that the videos should be in one of the local languages, e.g. Setswana
Group nurses according to their qualifications & train one group at a time	-	2	Interestingly enough this aspect was only mentioned post-withdrawal. Might be due to the strong hierarchy in the nursing profession.
Follow-ups are fruitful and should continue	-	6	Enjoyed this aspect of training and did not experience it as threatening.

A number of aspects most enjoyed during training (Table 5.47) were also mentioned in Table 5.48 as possible ways to improve the training. During both phases 50% of the participants felt that the training period was too short, therefore it is recommended that the training period be extended. This is possibly because all the information provided during the BCIP training was new to them and the fact that 100% had reported that they had enjoyed the training. Nurses mentioned that they enjoyed the case studies, but from Table 5.48 it is evident that they would have preferred these case studies to be live. Likewise, the use of videos were also qualified as two nurses requested that the videos should be in one of the local languages, e.g. Setswana. All six nurses who mentioned "*follow-ups*" agreed that this was very fruitful and that they should continue as part of the training methodology.

5.4.2. Training content

As with the training methodology, nurses were asked to comment on various aspects of the training content in order to obtain a holistic view on the BCIP training. These questions were displayed in close-ended format where they had to indicate "*Yes*" "*No*" or "*Uncertain*" to the statements regarding the training content. Results are shown in Table 5.49.

Table 5.49 Nurses' evaluation of the training content (n=20)

Aspect evaluated	Positive evaluation		Negative evaluation		Uncertain	
	Post-training	Post-withdrawal	Post-training	Post-withdrawal	Post-training	Post-withdrawal
Usefulness of the handout	18	20	2	-	-	-
Completeness of information	14	12	3	3	3	5
Usefulness of BCIP	18	19	2	1		
Ease of application of BCIP	14	15	2	1	4	4
BCIP enables independent planning of training	15	19	-	-	5	1

The greatest change between the two phases in Table 5.49 is seen in the area that evaluates whether the BCIP enables independent planning of training for a primary caregiver of a CSD. This is possibly due to the fact that nurses had the opportunity to experiment with the BCIP and were able to judge this aspect more accurately during the post-withdrawal phase. Areas where a relatively high percentage of "*uncertain*" responses were recorded pertain to the ease of application of the BCIP and the completeness of information provided during training. This might be due to the fact that nurses had not had sufficient opportunities to practise using the BCIP independently and thus felt that it was difficult to use. The number of nurses who were "uncertain" regarding the completeness of the BCIP increased during the post-withdrawal phase. This could be because they had started implementing it, and found that some aspects were still difficult. The initial high score of negative and "*uncertain*" responses in this regard might be due to the fact that the areas of communication and disability were novel, and thus they were not equipped to judge whether important information had been omitted.

In order to determine whether statistically significant differences had occurred in the way nurses rated the training content during the two phases, a Wilcoxon test was used. The Wilcoxon test statistic was obtained with a p-value of 0.0872 ($0.05<p<0.10$) indicating statistical significance at the 10% confidence level, but not at the 5%level. In order to determine the nature of this change, it is important to look at the mean scores. This had increased from 6.90 in the post-training phase to 6.50 in the post-withdrawal phase,

indicating that nurses had become more positive towards the training content. (The lower score comes from the fact that a 1 was given for "*yes*" answers and a 2 for "*no*" answers).

As with training methodology nurses then had to comment, in open-question format, on the three aspects of training that they most enjoyed, as well as on aspects more information was required on, suggestions to improve training and additional comments. The last three questions provided such similar answers that they were grouped together, as was done for training methodology. Results pertaining to the training content that was most enjoyed are shown in Table 5.50.

Table 5.50 Training content aspects that were most enjoyed

Aspect	Post-training	Post-withdrawal	Comment
Communication means (e.g. manual signs, EasyTalk and making communication boards)	24	23	This was by far the most frequent aspect. Specific aided and unaided communication strategies were mentioned.
Communication functions	6	9	More frequently mentioned in post-withdrawal phase as they had had the opportunity to practise it.
Using ADLs for communication	3	-	Aspect only mentioned pre-training when it was a new concept.
Creating communication opportunities	1	3	Mentioned more frequently in post-withdrawal as they became more familiar with this concept.
Other content ▪ Basic communication with CSDs ▪ Handling challenging behaviour ▪ Monitoring progress ▪ Social inclusion perspective ▪ Whole BCIP ▪ Theory	 5 1 1 - - 1	 4 - - 1 3 2	Interestingly, some aspects that were not the focus of the training and therefore not emphasised, were mentioned as the aspects most enjoyed. If training should be extended, these aspects may be included in more depth. In comparing these results to the focus group information, it is also evident that some aspects, such as the social inclusion perspective prevailed throughout. It is important to keep this perspective in training.

This table clearly shows that nurses enjoyed the four main focus areas regarding training content, with communication means being the most prominent. This could possibly be due to the fact that this is the aspect where their newly acquired skills were best seen (e.g. the use of manual signs and the EasyTalk). Communication functions and the creation of communication opportunities, on the other hand, were mentioned more frequently during post-withdrawal. This might be due to the fact that they had opportunities to practise

these two aspects during the 5-month post-withdrawal phase and became more skilled. However, using ADLs to provide the content and context for instruction was not mentioned during post-training. This may be attributed to the fact that nurses internalised this aspect; not regarding it as something that was trained. As seen in Table 5.50 some aspects that were not directly trained were also mentioned, and therefore it is important to keep this perspective. One aspect in particular, i.e. the social inclusion perspective, appeared to bring about the greatest mind shift and change of attitude as this aspect was mentioned throughout.

This section was followed by nurses' comments on possible ways to increase and enhance the training content. In addition some comments were made that referred neither to the training method nor the training content, and can best be described as "*outcomes*". It is important to also look at these aspects as they refer to aspects that already enhanced the training and that should be maintained. Results are shown in Table 5.51.

Table 5.51 Training content that could be improved or enhanced

Aspect	Post-training	Post-withdrawal	Comment
TRAINING CONTENT			
More information on communication means	16	13	Specific mention was made of manual signs and the use of the EasyTalk.
Increase information of communication functions	3	-	This aspect was not seen as a need during post-withdrawal.

Aspect	Post-training	Post-withdrawal	Comment
TRAINING CONTENT			
Intervention for specific disability categories, e.g. CP	4	4	This aspect remained a need. Aspects that were highlighted included feeding and physical management of children with CP.
Training primary caregivers	-	4	After implementing the BCIP nurses began to see this aspect as a need.
Planning a programme for CSDs and measuring outcomes	1	5	After implementing the BCIP nurses began to see this aspect as a need.
OUTCOMES : ASPECTS THAT SHOULD BE MAINTAINED			
Increased awareness of communication	3	3	Aspect mentioned during both phases. Main emphasis of the BCIP training.
Continue – should be part of curriculum for all nurses	11	11	More than 50% of the participants maintained this view throughout the training.
Want requirements for further study	1	-	One nurse wanted to continue studying in this area.
Greatly enjoyed training and the positive training atmosphere	11	8	Great enjoyment of training enhanced training and may be one of the factors why positive outcomes were obtained.

Interestingly, the aspect that was mentioned as most enjoyable, namely communication means, (Table 5.50) is also the one in which they would like to receive more training (Table 5.51). This may be due to the fact that they began to experience success and that they wanted to continue with the aspects that made them feel secure. Communication functions were only mentioned post-training as they probably began to feel more confident about this aspect when they began to implement it. As opposed to this, two aspects, namely training primary caregivers and planning a programme for a child with CSD and then measuring the outcomes, only became a priority post-withdrawal. What is important to note is that eleven of the twenty nurses stated during both phases that they felt this training should be incorporated into the general nursing curriculum. This is a positive indicator of how important they felt the training to be. A high percentage of nurses also mentioned that they had greatly enjoyed the training and the positive training atmosphere. This is possibly due to the fact that adult training principles were incorporated in the training and that a problem-based format was used, providing them with opportunities to use their prior knowledge.

5.5 CONCLUSIONS

Chapter 5 analysed and described data. The following key issues were noted:

5.5.1 Reliability

Reliability was high at 96% for both inter-rater and intra-rater reliability.

5.5.2 Outcomes

5.5.2.1 Primary outcomes

- Prior knowledge increased statistically significantly at the 5% level of confidence over the five-month period.

- Applied knowledge (regarding communication means, functions, partners, opportunities and general advice) also increased statistically significantly at the 5% level. This increase in applied knowledge was not only seen more frequently in these respective aspects, but also in the identification of a wider range of aspects.

- Skills included skill in representational level grading, in using objects and photographs for communication, using communication boards, using manual signs and using the EasyTalk 4 option digital speaker. Friedman tests statistics indicated that all these skills increased statistically significantly over the five months period. In addition, the participants' dependence on prompts did not increase, while their confidence in demonstrating these skills began to increase statistically significantly at the 10% level during the second follow-up and at the 5% level during the post-withdrawal. This implies that confidence continued to increase over time.

5.5.2.1.1 Secondary outcomes

- From qualitative measurements it became clear that post-training nurses felt more positive about CSDs, their role as nurses and the services they were able to offer CSDs and their primary caregivers, despite the fact that attitude did not change statistically significantly on the quantitative measurements. Job satisfaction and motivation, two aspects which presumably impact on attitude also did not change statistically significantly.

- It appeared that although the number of CSDs receiving services from nurses increased slightly post-training, this change was not statistically significant. The number of children who received services also did not impact on the amount of time nurses spent with these children. However, regarding the type of service delivery it became evident that nurses were beginning to be more independent in service delivery and were less likely to merely refer the child.

- The nurses' self-evaluation revealed that they had become more specific and knowledgeable about service delivery to CSDs post-training. They were clear on which aspects they would address when training primary caregivers of CSDs and why they would do this. These results were confirmed during the focus group discussion.

5.3.3 General training evaluation

5.3.3.1 Training methodology

- The use of problem-based learning with culturally relevant case studies facilitated knowledge and skill development and retention. The importance of follow-ups in providing practise opportunities was emphasised. Interactive, hands-on skill teaching was effective in involving all participants and optimising learning.

5.3.3.2 Training content

- The use of a variety of communication means (including manual signs, EasyTalk and communication boards) was greatly enjoyed during training. They also acknowledged that the BCIP was easy to use, and a useful tool in the independent planning of services for CSDs.

5.6 SUMMARY

This chapter organised, analysed and described the results of the research as they relate to the main aim of the research (in particular Sub-aim 4). It commenced with a discussion of the reliability of the results, followed by an in-depth discussion on the primary and secondary outcomes of the research during the various phases. This was followed by a general evaluation of the training in terms of the methodology used and the content. This section concluded by highlighting the most important findings of the research, namely that knowledge, skills and attitudes of nurses' regarding CSDs increased significantly over the 5-month period, despite the fact that only knowledge and skills were trained. One factor that facilitated this consistent increase was the regular follow-ups and creative problem-solving during these sessions.