CHAPTER 4
RESULTS AND DISCUSSION

4.1 INTRODUCTION

The purpose of this study has been to determine whether the output mode, i.e. voice output, had any effect on the attitudes of peers to a child with disabilities who used a communication device. In this chapter the response rate is discussed, followed by the results of the CADAQ with respect to the significance of the output mode as well as the significance of the gender of the participants.

As the questionnaire (CADAQ) measured three different dimensions of peer attitudes toward the child with LNFS, the results for each of these factors are evaluated in terms of each group and possible reasons for between-group differences are promulgated. The results of item analysis are presented and discussed with reference to the reliability of the questionnaire. The consistency of the participants' responses to paraphrased statement pairs and positively and negatively worded pairs are evaluated. The additional factor of a high rate of *"I can't decide"* responses to certain statements is considered.

4.2 OVERALL RATE OF PARTICIPATION

Of the total number of Grade 6 and Grade 7 pupils, four classes were selected to participate. Of these 127 pupils, 122 completed questionnaires. Seven questionnaires from the total of 122 were rejected, so the overall rate of participation was 90.55%. The reasons for rejection were:

- three respondents failed to complete the biographical data required of age and gender
- four respondents each omitted to complete one question.

Two children failed to complete question 24; one child failed to complete question 34 and another omitted to answer question 10.

4.3 ANALYSIS OF VARIANCE

An analysis of variance (SAS Statistical package) was conducted with the total scores and the 3 dimension (the affective/behavioural component of attitude; the cognitive component of attitude and the communicative competence evaluation) scores of the CADAQ as dependent variables. The group (voice output or no voice output) and the gender (male or female) were the independent variables. The level of significance $\alpha = 0.05$.

The primary aim of the study (See 3.2.1) was to investigate whether the specific augmentative communication output technique of voice output had an effect on the attitudes of children, 11 – 13 years of age, toward a peer with a physical disability and LNFS. Results of the analysis of variance with respect to group and gender are reflected in Table 4.1 where a difference is significant when the p value is less than 0.05. Significant results are highlighted.

Table 4.1: Analysis of variance results for group (output mode) and gender

Analysis of Variance	Group					Gender				
	Group 1 – Voice Output 57 in Group		Group 2 – No Voice Output 58 in Group			GIRLS 63 in Group		BOYS 52 in Group		
	Mean	Standard Deviation	Mean	Standard Deviation	p-value	Mean	Standard Deviation	Mean	Standard Deviation	p-value
Total Scores on CADAQ	116.438596	20.506983	104.913793	16.293670	0.0008	115.571429	16.154208	104.634615	16.154211	0.0013
Affective/ Behavioural	45.280702	8.676229	41.672414	7.484224	0.0132	45.460318	6.798542	41.038462	9.246009	0.0031
Cognitive/Belief Component	31.543860	6.824599	30.637931	5.978612	0.4577	32.587302	5.749151	29.269231	6.724597	0.0052
Communicative Competence	39.614035	7.338145	32.603448	6.014426	0.0001	37.523809	6.534912	34.326923	8.344826	0.0092

4.3.1 The effect of output mode

The results as reflected in Table 4.1 indicate a marked difference between Group 1 and Group 2 in comparing the mean of total scores on the CADAQ, between Group 1 (voice output) and group 2 (no voice output). On the component scores the greatest difference is evident in the results measuring the evaluation of the communicative competence dimension. The affective/behavioural components of attitude reflect less difference and the cognitive component of attitude sub-score the least difference in total mean scores. These differences are statistically significant (p-value is less than 0.05) when comparing total scores as well as scores on the affective and communicative competence dimensions between Groups 1 and 2. Although not significant, the same tendency is reflected on the cognitive dimension scores. A possible explanation for the lesser difference on the cognitive dimension is that the factual support for beliefs is stronger than for affective responses and beliefs are more pervasive and resistant to change (Aiken 1996). The total and all the component (dimension) scores thus reflect more favourable attitudes to the presence of voice output in comparison to the no voice option.

These results support the hypothesis that the attitudes of children to peers with physical disabilities who have LNFS are significantly more positive when the communication device used has voice output.

This result correlates with the findings of Gorenflo & Gorenflo (1991) who investigated the effects of various communication techniques on the attitudes of peers toward an adult with physical disabilities who had LNFS. Using a 5 point Likert-type scale, the subjects completed the ATNP (Attitudes Toward Nonspeaking Persons) and an adapted ATDP (Attitudes Toward Disabled Persons) questionnaires. The researchers found that when the VOCA was used, peer evaluations were more favourable than when unaided or alphabet board techniques were used (Gorenflo & Gorenflo 1991).

The current findings are contrary to those of an investigation by Blockberger *et al.* (1993) into children's attitudes toward a peer who used an unaided technique, an alphabet board and a VOCA. They found that the AAC technique used had no perceivable impact on the attitudes of the fourth

graders in their study (Blockberger *et al.* 1993). As in the current study, classes of children viewed videotapes of a peer with physical disabilities who had LNFS. The peers' attitudes were measured using the CATCH scale and results indicated that the difference in scores between techniques was not significant (Blockberger *et al.* 1993). Similarly, Beck & Dennis (1996) in their research into the attitudes of 5th Graders towards a peer with physical disabilities and LNFS who used AAC found no difference in CATCH scores between those who viewed the videotape showing the nonelectronic or the VOCA system. The videotape subject in their study, a boy, used a combination of gestures, verbalisations and pointing to an alphabet board in the nonelectronic (low technological) option and a combination of gestures, verbalisations and a Touch Talker™ in the high technological option.

It is difficult to substantiate the precise reason for the difference in outcomes between the current and former studies, as there are several methodological and other differences. Besides the disparity of the subjects there are differences in the disabilities of the videotaped subjects, in their videotaped conversations, in the VOCAs and synthetic speech used. In the studies by both Blockberger *et al.* (1993) and Beck & Dennis (1996) different conversational extracts were used in the videotapes for the various AAC techniques, with possible influence from variables such as content, length and rate of aided messages, number of conversational turns etcetera. This was not so in the current study where the videotapes were, apart from the voice output, identical.

The outcome measure used was a major difference between this study and the studies of Blockberger *et al.* (1993) and Beck & Dennis (1996). The CATCH scale used by both Blockberger *et al.* (1993) and Beck & Dennis (1996) is a generalised attitude scale designed to assess children's responses to various types of disabilities. It may not be sensitive to differences in children's responses to different AAC techniques used by a peer with disabilities (Beck & Dennis 1996). Unlike the CADAQ, the CATCH does not include statements to measure the peers' evaluation of the AAC user's communicative competence which, as discussed in the literature review, is an important factor in children's initial attitudes to peers. In agreement with the studies of both Blockberger *et al.* (1993) and Beck & Dennis (1996) is the finding that girls' attitudes to a peer with disabilities and LNFS are generally more favourable than those of boys.

4.3.2 The effect of gender

A sub-aim of the study (See 3.2.2) was to determine whether the attitudes of boys differed from those of girls towards a peer with physical disabilities and LNFS. Results of the analysis of variance with respect to gender are reflected in Table 4.1 where the level of significance α = 0.05. Significant results are highlighted.

The results, as reflected in Table 4.1, indicated a significant difference between boys and girls, with girls having more favourable attitudes. The more positive attitudes of girls are reflected in the means of total scores of the CADAQ as well as in each of the three attitude dimensions of affective/ behavioural component, cognitive component, and communication competence evaluation. The results, therefore, support the hypothesis that girls have more positive attitudes than boys toward a peer with physical disabilities and LNFS. This finding is supported by the previous research of Voettz (1980), Rosenbaum *et al.* (1986), Fiedler & Simpson (1987), King *et al.* (1989), Blockberger *et al.* (1993) and Beck & Dennis (1996). An exception is the research findings of Wisely & Morgan (1981). In a study of children's ratings of peers presented as mentally retarded and physically handicapped, Wisely & Morgan (1981) reported that boys gave more favourable ratings than did girls.

The interaction between gender and group was also investigated but was nowhere found to be significant.

4.4 RELIABILITY

Reliability implies consistency in differentiating among persons and, accordingly, the reliability of an attitude scale increases with the age of respondents (Aiken 1996). To facilitate reliability in determining the attitudes of 6th and 7th graders, the environment, administration and presentation of the study and questionnaires to both groups were uniform. In addition, only fully completed questionnaires were scored. The ITEMAN programme (Assessment Systems Corporation) was used to compute Cronbach alpha's and to do an item analysis to determine the internal consistency of the questionnaire. Coefficient alpha for the affective/behavioural dimension was .892 for the

voice option and .0853 for the no voice group. Coefficient alpha for the cognitive dimension was .811 and .774 for voice and no voice groups respectively. Coefficient alpha for the communicative competence dimension was .845 for the voice group and .764 for the no voice group. The deletion of item 26 (I feel upset when I see how Alan has to 'talk') in the affective/behavioural dimension would improve the reliability coefficient of this dimension as the item scale correlation for this statement was -.13 for the voice group and .17 for the no voice option group.

The Cronbach alpha's and intercorrelations between the three dimensions of the questionnaire are presented in table 4.2.

Table 4.2: Comparison of Cronbach Alpha's and dimension intercorrelations.

In this table, 1 = Affective/behavioural dimension of attitudes, 2 = Cognitive/belief dimension of attitudes and 3 = Communicative competence dimension.

Comparison of Cronbach Alpha's and the component intercorrelations.						
	VOICE 57 in Group 1			NO VOICE 58 in Group 2		
	1	2	3	1	2	3
Alpha	0.892	0.811	0.845	0.853	0.774	0.764
	Dimension Intercorrelations			Dimension Intercorrelations		
	1	2	3	1	2	3
1	1.000	0.727	0.666	1.000	0.591	0.491
2	0.727	1.000	0.739	0.591	1.000	0.562
3	0.666	0.739	1.000	0.491	0.562	1.000

Although high enough, Cronbach alpha's >0.6, and the correlations being significant on the 5% level, both are lower for the no voice than the voice group (Owen & Taljaard 1995). This, together with the greater diversity in frequencies, would suggest some inconsistency in the responses of the participants in the no voice group. (See Appendix I for the response frequencies of the affective/behavioural dimension, Appendix J for the response frequencies of the cognitive

dimension and Appendix K for the response frequencies of the communicative competence dimension). This suggests that the subjects of the no voice group were uncertain of how they felt.

The close correlations between the various dimensions (1,2 & 3) are positive as these dimensions are closely related and form integral sections of the same attitudinal scale. Notably, the correlations between the various dimensions are not as high for the no voice option as for the voice option, again indicating less consistency in the responses of the participants who watched the no voice option.

The item scale analysis for the affective/behavioural component statements that make up the affective/behavioural dimension of the CADAQ are presented in Table 4.3.

Table 4.3: Item analysis for the affective/behavioural dimension

1.	Affective/Behavioural Components		
		VOICE	NO VOICE
		Item/scale Correlation	Item/scale Correlation
6	I would worry if Alan sat next to me in class.	.48	.51
9	I would be scared to talk to Alan.	.66	.73
13	I would be embarrassed to communicate like Alan does.	.58	.67
15	It would be fun to talk to Alan.	.86	.50
26	I feel upset when I see how Alan has to 'talk'.	-.13	.17
10	I would like to talk to Alan.	.84	.52
12	I would tell my secrets to Alan.	.66	.45
16	Alan would be unwelcome at my birthday party.	.73	.73
18	If Alan was in my class I would like to do a project with him.	.73	.61
21	I would try to stay away from Alan if he came to my school.	.76	.72
28	Alan would not be my best friend.	.75	.74
31	I would like to go to 'The Spur' with Alan.	.74	.78
37	I would like Alan to sit next to me in class.	.81	.75

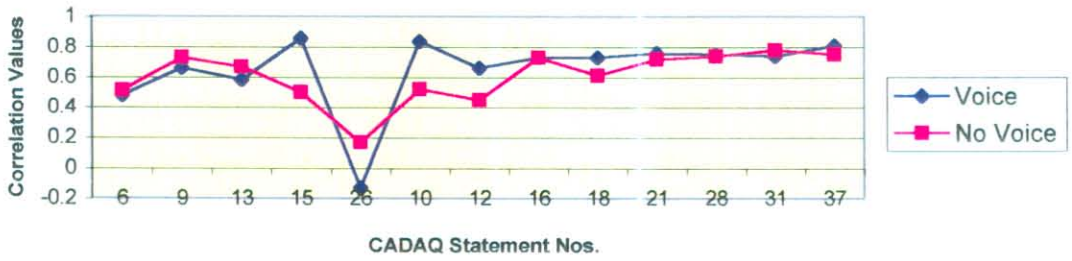

Figure 4.1: Item/scale correlations of the affective/behavioural dimension.

Item scale correlations reflect good internal consistency apart from item 26. Item scale correlations of .27 or above are acceptable for 13 items. This statement 'I feel upset when I see how Alan has to talk' is ambiguous in that agreeing with 'feeling sorry' could indicate a positive connotation of empathy but disagreeing with this statement could also indicate a positive attitude. If a peer responded that he or she disagreed with the statement, this could indicate 'I don't feel upset when I see how Alan has to talk as he is able to communicate very well with his AAC system'. For this reason this statement should have been eliminated after the pilot study. It offers the same scoring dilemma as the statement 'I feel sorry for Alan' which was eliminated after the pilot study.

The item scale analysis for the cognitive (belief) statements that make up the cognitive dimension of the CADAQ are presented in Table 4.4. (See Appendix J for the response frequencies of the cognitive dimension.)

Table 4.4: Item Analysis for the cognitive/belief dimension.

2. Cognitive Components			
		VOICE	NO VOICE
		Item/scale Correlation	Item/scale Correlation
2	Our class works too quickly for Alan.	.42	.51
4	Alan would find it difficult to make friends at my school.	.64	.47
8	I think Alan has many friends.	.70	.62
17	Alan would get teased in our class.	.43	.47
20	Alan would be popular with the girls.	.63	.55
25	Alan would need lots of help in the classroom.	.67	.56
29	Alan had interesting things to say.	.55	.44
32	Alan most likely comes last in class.	.64	.61
33	Alan should be good with computers.	.33	.55
34	I do not think Alan has much fun.	.76	.67
36	Alan needs lots of help to tell a story.	.69	.71

Figure 4.2: Item scale correlations of cognitive dimension

As there are 11 items the item scale correlation should be 0.3 or higher. All the items of the cognitive (belief) dimension, therefore, have an acceptable item scale correlation indicating good internal consistency.

The item scale analysis for the communicative competence statements that make up the evaluation of communicative competence dimension of the CADAQ are presented in Table 4.5 (See Appendix K for the response frequencies of the communicative competence dimension.)

Table 4.5: Item analysis for the communicative competence dimension.

3. Communicative Competence			
		VOICE	NO VOICE
		Item/scale Correlation	Item/scale Correlation
1	Alan took an active part in the conversation.	.34	.52
3	Kim understood everything Alan said.	.49	.57
5	If I couldn't speak I would like to communicate like this.	.58	.52
7	I found it easy to understand what Alan meant.	.69	.53
11	There must be better ways for Alan to communicate.	.51	.26
14	It was easy to understand what Alan was 'saying'.	.67	.46
19	Alan could not communicate quickly enough.	.60	.60
22	Alan was frustrated communicating like that.	.67	.44
23	Alan was unable to say what he really wanted to.	.62	.62
24	Alan could answer Kim's questions quickly enough.	.76	.57
27	Kim did not always understand what Alan wanted to say.	.52	.54
30	The way Alan communicated with Kim resulted in some misunderstanding.	.64	.31
35	Alan could say exactly what he wanted to.	.58	.65

Figure 4.3: Item scale correlations of the communicative competence dimension

As all items on the communicative competence dimension have item scale correlations above 0.27 this sub scale shows acceptable internal consistency.

4.5 CONSISTENCY OF PARTICIPANTS' RESPONSES TO PARAPHRASED ITEMS

Several statements were paraphrased in the questionnaire to establish how consistently the participants responded. Certain statements were merely rephrased and other statements were worded in the negative form.

In Table 4.6 participants' responses to paraphrased items are compared in terms of consistency. For ease of comparison the frequency of participants scoring 1 or 2 was totalled, as was the frequency of those scoring 4 or 5. Particularly when the pattern of responses between the voice and no voice options are compared, it is apparent that there is an association between the paired variables. Participants were thus consistent in how they responded to the pairs of paraphrased statements in the CADAQ. The high frequency of negative responses (scoring 1-2) for the no voice group to statements such as item 27: *Kim did not always understand what Alan wanted to say* and item 7: *I found it easy to understand what Kim was saying,* reflect the difficulty the participants experienced in understanding the messages the AAC user communicated in the absence of the synthetic voice output. The uncertainty of the participants who viewed the videotape of the no voice option is also reflected in the high ratio of undecided responses (scoring 3) to specific questionnaire statements. This is discussed in greater detail following table 4.6, the comparison of frequencies of paraphrased items.

Table 4.6: **Comparison of frequencies of paraphrased items.**

COMPARISON OF FREQUENCIES OF PARAPHRASED ITEMS

		Item 27: Kim did not always understand what Alan wanted to say.					
		VOICE			NO VOICE		
		Agree (1-2)	Can't decide	Disagree (4-5)	Agree (1-2)	Can't decide	Disagree (4-5)
Item 30: The way Alan communicated with Kim resulted in some misunderstandings.	Agree	11	11	1	31	1	3
	(1-2)	19.30%	19.30%	1.75%	53.45%	1.72%	5.17%
	Can't	6	13	1	10	7	0
	decide	10.53%	22.01%	1.75%	17.24%	12.07%	0.00%
	Disagree	6	1	7	3	2	1
	(4-5)	10.53%	1.75%	12.28%	5.17%	3.45%	1.72%

		Item 23: Alan was unable to say what he really wanted to.					
		VOICE			NO VOICE		
		Agree (1-2)	Can't Decide	Disagree (4-5)	Agree (1-2)	Can't Decide	Disagree (4-5)
Item 35: Alan could say exactly what he wanted to.	Disagree	15	2	6	22	3	2
	(1-2)	26.32%	3.51%	10.53%	37.93%	5.17%	3.45%
	Can't	7	3	8	6	2	5
	Decide	12.28%	5.26%	14.04%	10.34%	3.45%	8.62%
	Agree	2	3	1	8	4	6
	(4-5)	3.51%	5.26%	19.30%	13.79%	6.90%	10.34%

		Item 6: I would worry if Alan sat next to me in class.					
		VOICE			NO VOICE		
		Agree (1-2)	Can't Decide	Disagree (4-5)	Agree (1-2)	Can't Decide	Disagree (4-5)
Item 37: I would like Alan to sit next to me in class.	Disagree	5	2	3	8	0	2
	(1-2)	8.77%	3.51%	5.26%	13.79%	0.00%	3.45%
	Can't	6	6	4	6	5	0
	Decide	10.53%	10.53%	7.02%	10.34%	8.62%	0.00%
	Agree	0	11	20	10	17	10
	(4-5)	0.00%	19.30%	35.09%	17.24%	29.31%	17.24%

		Item 7: I found it easy to understand what Alan meant.					
		VOICE			NO VOICE		
		Disagree (1-2)	Can't Decide	Agree (4-5)	Disagree (1-2)	Can't Decide	Agree (4-5)
Item 14: It was easy to understand what Alan was saying.	Disagree	15	2	4	54	1	1
	(1-2)	26.32%	3.51%	7.02%	93.10%	1.72%	1.72%
	Can't	7	10	1	0	1	0
	Decide	12.28%	17.54%	1.75%	0.00%	1.72%	0.00%
	Agree	1	5	12	0	1	0
	(4-5)	1.75%	8.77%	21.05%	0.00%	1.72%	0.00%

4.6 THE MEANING OF A HIGH RATIO OF UNDECIDED RESPONSES

The incidence of a high percentage of subjects (above 40%) within a group giving the response of 'I can't decide' to specific questionnaire statements is presented in Table 4.7.

Table 4.7 Incidence of a high percentage of 'I can't decide' responses

FREQUENCY OF 'I CAN'T DECIDE' RESPONSES TO CADAQ STATEMENTS				
Question Number	Dimension	Questionnaire Statement	Group 1 Voice	Group 2 No Voice
3	Comm. Competence	Kim understood everything Alan said.		48.28
12	Behavioural	I would tell my secrets to Alan.		43.10
22	Comm. Competence	Alan was frustrated communicating like that.	42.11	
29	Cognitive	Alan had interesting things to say.		50.00
30	Communicative Competence	The way Alan communicated with Kim resulted in some misunderstanding.	43.85	
31	Behavioural	I would like to go to 'The Spur' with Alan.		43.10

The CADAQ scale lacks a neutral point, as when participants mark the 'I can't decide' option it is not known whether their attitudes are mildly positive or mildly negative (Oppenheim 1992). Scores in this middle region could be due to a number of factors, including an indifferent response, a lack of knowledge or a lack of perspective i.e. an uncertain attitude on the part of the respondent to the questionnaire statement (Oppenheim 1992).

Further confirmation of the degree of uncertainty of the respondents who watched the video with no voice output was the fact that there were four statements to which over 40% of this group responded with indecision as opposed to two statements for Group 1.

Of interest, too, was that both groups did not respond with a high percentage of indecision to the same statements. Furthermore, the above statements represent all three dimensions of peers' attitudes to a child with LNFS. There are two behavioural components from the affective/behavioural dimension. It is possible that the lack of previous experience with a peer who

has physical disabilities and LNFS resulted in uncertainty to these particular statements (Towfighy-Hooshyar & Zingle1984). Participants may not have been able to visualise how they would react to, for example, going to the 'Spur' with such a child. Studies have also shown that peers, feeling uncertain about how to interact, may choose not to interact (Kraat 1987). These questions may also have caused some uneasiness or uncertainty on the part of participants due to anxiety about how to behave towards a peer with physical disabilities and LNFS (Kraat 1987 and Donaldson 1980).

It is understandable that many participants who viewed the option without voice output were uncertain whether 'Kim understood everything Alan said' as her responses may well have seemed arbitrary as they could not hear his questions or previous responses to her questions. Their uncertainty is, therefore, an expected response. The fourth statement to which there was a great degree of uncertainty in those respondents who viewed the videotape in which the device had no voice output was from the cognitive dimension and related to the fact that 'Alan had interesting things to say'. The participants would have had to judge this from the comments of the conversational partner as it would have been most difficult for them to follow what he said from viewing his access of letters on the overlay.

4.7 SUMMARY

This chapter focussed on the findings of the research which were discussed in relation to other attitudinal studies toward adults and children with disabilities and LNFS. Analysis of variance indicated that attitudes of children toward a peer with LNFS were significantly more favourable when the AAC device used by the peer had voice output than when there was no voice output. Also reflected in the analysis of variance was a significant difference between the attitudes of girls and boys, with the former having more positive attitudes toward a peer with disabilities and LNFS.

In addition, Cronbach alpha's and an item analysis of the CADAQ were presented and discussed with relevance to confirming the internal consistency of the questionnaire. The responses of participants to paraphrased items were compared and discussed as a function of how consistently

participants responded to the CADAQ. The chapter ended with a discussion of possible reasons for a relatively high frequency of undecided responses to specific statements of the CADAQ.