CHAPTER 5

ANALYSIS AND INTERPRETATION OF DATA

5.1 INTRODUCTION

This chapter reports on the empirical investigation conducted to address the following research objectives:

- To document the profile of educators involved in Technology Education as well as to determine In-Service Education and Training (INSET) and other forms of support they received;
- To determine educators' attitudes towards the implementation of Technology as a learning area in schools;
- To determine learners' construct and attitudes towards Technology; and
- To determine available Technology resources in schools.

The qualitative and quantitative data collected are summarized in this chapter.

5.2 DATA PRESENTATION

5.2.1 Biographical data of Technology educators (Appendix 5, section A)

Table 5.1 is a statistical computation to illustrate the biographical patterns of the respondents. This information is necessary to know what type of respondents participated in the study. The information helped to establish the profile of Technology educators teaching the senior phase in the North West Province. Information provided in Table 5.1 is subsequently discussed.

		f	%
1. Gender	Male	180	52.3%
	Female	164	47.7%
Total		344	100%
2. Age (years)	Below 25	5	1.5%
	26 - 30	32	9.3%
	31 - 40	167	48.5%
	Above 40	140	40.7%
Total		344	100%
3. Teaching experience	1 - 5	78	22.7%
	6 - 10	56	16.3%
	11 - 15	87	25.2%
	Above 15	123	35.8%
Total		344	100%
4. Experience in Teaching Technology	1 - 5	238	69.2%
	6 - 10	56	16.3%
	11 - 15	7	2%
	Above 15	8	2.3%
	Missing	35	10.2%
Total		344	100.%
5. Highest educational level	Educators' Certificate	14	4.1%
	Diploma	190	55.2%
	Bachelor's Degree	73	21.2%
	Hons/BEd Degree	56	16.3%
	Masters Degree	11	3.2%
Total		344	100%
6. Highest educational level in Technology	Less than one year	86	25%
	One year	36	10.5%
	Two years	38	11.0%
	Three years	30	8.7%
	More than three years	32	9.3%
	None	122	35.5%
Total		344	100%
7. Position Held	Principal	24	7%
	Deputy Principal	11	3.2%
	Head of Department	44	12.8%
	Educator	265	77%
Total		344	100%
8. School category	Primary	88	25.6%
	Middle	157	45.6%
	High	52	15.1%
	Combined	47	13.7%
Total		344	100%
9. Type of settlement	Rural	222	64.5%
	Urban	122	35.5%
Total		344	100%

Table 5.1: Description of biographical data of respondents

1. Gender

The respondents constituted of a fair number of males and females. Table 5.1 shows that there were 180 males (52.3%) and 164 females (47.7%) who participated in the study. It is pleasing to note that the majority of female educators teach Technology in schools as they are the role models for female learners. The contributory factor for this large number of female educators is that Technology is a compulsory learning area in the General Education and Training Band.

2. Age

The respondents reported on their age by selecting one of the given four age groups on the questionnaire. From Table 5.1 it is noted that about 167 respondents (48.5%) were between ages 31-40 at the time of study, followed by 140 respondents (40.7%) of those who were above 40 years of age. Five respondents (1.5%) were below the age of 25 and the remaining 32 respondents (9.3%) were between ages 26 and 30. Most of the respondents are mature and have been in the teaching profession for some time. They were therefore able to share their experiences adequately regarding the implementation of Technology.

3. Teaching experience

The respondents were required to state their teaching experience based on four categories given in the questionnaire. According to Table 5.1, 123 respondents (35.8%) have over fifteen years teaching experience. Eighty seven respondents (25.2%) had between eleven and fifteen years teaching experience while 56 respondents (16.3%) had between five and ten years. The remaining 78 respondents (22.7%) had between ages one to five years teaching experience. This indicates a fair distribution of teaching experience commensurate with the age of the respondents. Some respondents pioneered Technology since it was introduced in 1998 and they were able to respond about its implementation having a broader view.

4. Experience in teaching Technology

Table 5.1 shows that 238 respondents (69.2% of the respondents had between 1 – 5 years experience in teaching Technology, only 56 (16.3%) of the respondents had experience of between six to ten years of teaching Technology. Only seven respondents (2%) indicated that they had experience of teaching Technology for 11 – 15 years. This could be attributed to the fact that some educators have taught Technology even before its official introduction in 1998. This means that 85.5% educators who are implementing Technology in the North West Province are adequately experienced in teaching Technology.

5. Highest educational level

Table 5.1 indicates that 122 respondents (55.2%) had an educators' diploma as their highest qualification followed by 73 respondents (21.2%) that had a Bachelor's degree. Fifty six respondents (16%) have an Honours degree as their highest qualification and 11 respondents (3.2%) had a Master's degree. The remaining 14 respondents (4.1%) had an educators' certificate as their highest qualification at the time of the study. All educators except for the fourteen had a Relevant Education Qualification Value (REQV13) of thirteen which is a minimum requirement to be an educator. This means that there were still some educators who were under-qualified at the time of the study. The implication of some educators not being qualified is that they may not cope with certain content of the curriculum. This will in turn disadvantage learners because educators will not be in a position to deliver the curriculum to defined standards.

6. Highest educational level in Technology

As shown in Table 5.1, 122 respondents (35.5%) do not have a formal qualification in Technology. Eighty six respondents (25%) have less than one year training in Technology while 36 respondents (10.5%) have one year training. The remaining 38 respondents (11.0%), 30 respondents (8.7%) and 32 respondents (9.3%) have two, three and above three years training in Technology respectively. This clearly indicates that most educators are not qualified to teach Technology. They might have been orientated through the three-day departmental workshops. These are not sufficient to capacitate the educators to teach Technology confidently.

7. Position held

Table 5.1 indicates that 265 respondents (77%) are post-level ones educators. Forty four respondents (12.8%) are heads of departments while 11 respondents (3.2%) are deputy principals. The principals constituted 24 respondents (7%). It is pleasing to note that even educators who occupy high positions are involved in the teaching of Technology. This indicates that respondents who occupy positions at management level teach Technology as well.

8. School category

Table 5.1 shows that 157 respondents (45.6%) are from the middle schools. This is the category of schools that is offering senior phase Technology (Grades 7-9). Primary schools constituted 88 respondents (25.6%) and most of them offer Technology up to grade 7. The high schools comprised of 52 respondents (15.1%) and offer Technology in grades 8 and 9.The combined schools offer Technology from grade R to 9 and 47 respondents (13.7%) were sampled from this category of schools. Different types of schools have been included in the sample commensurate with the types of schools available in the Province. This means that information from different types of schools was sought regarding the implementation of Technology.

9. Type of settlement

As shown in Table 5.1, 222 respondents (64.5%) are from rural schools and the remaining 122 respondents (35.5%) are from urban schools. This is a well-known fact that a large percentage of the North West Province is rural in nature. Therefore the majority of schools are situated in rural areas and most of the problems confronting rural schools affect the implementation of Technology in these schools.

5.2.2 Biographical data of Technology learners (see Appendix 6, section A)

A learner questionnaire was administered to the sample to obtain information regarding the attitudes of learners towards Technology. The biographical information of such learners is subsequently discussed hereunder.

1. Age

Learners were requested to indicate their ages on the questionnaire. As seen in Table 5.2 the most important category is the attitude forming capacity age (ages13-16). This category constituted 6294 respondents (84%). The first age category is of learners who started grade 1 earlier. The schools were lenient regarding the admission policy and 6% of these learners were sampled. Another age category is the 17-19 and the 20-22 age category. These categories constituted 570 respondents (7.4%). These categories of age groups might have been retained (made to repeat a grade due to unsatisfactory performance) for more than once in a phase. Three hundred and seven respondents (4%) did not indicate their age.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	11 - 12 years	463	6.1	6.3	6.3
	13 - 16 years	6294	82.4	85.9	92.2
	17 - 19 years	552	7.2	7.6	99.8
	20 - 22 years	18	.2	.2	100.0
	Total	7327	95.9	99.9	
Missing	missing	307	4		
	Total	307	4.0		
Total		7634	100.0		

Table 5.2: Age category of learners

2. Location of schools

According to Table 5.3, about 4332 of the respondents (56.7%) constituted of learners from urban areas. These were within easier reach than rural schools, which comprised of 3006 respondents (39%). Thirteen respondents (0.2%) did not indicate if they were from rural or urban areas.

	Frequency	Percent	Valid percent
Urban	4332	56.7	56.7
Rural	3006	39.4	39.4
Missing	296	3.9	3.9
Total	7634	100	100

Table 5.3: Location of schools from which learners were sampled

3. Regions

The questionnaires were administered in each of the five education regions. There was almost a balance of the returned questionnaires from each of the education regions as indicated in Table 5.4. There were 1518 participants in region 1 comprising 19.8% of the respondents. In region 2 there were 1524 participants making 20% of the respondents and in region 3 there were 1515 participants forming 19.8% of the respondents. In both regions 4 and 5 there were 1426 and 1651 participants respectively. These comprised 18.7% and 21.6% of the respondents respectively.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1518	19.9	19.9	19.9
	2	1524	20.0	20.0	39.9
	3	1515	19.8	19.8	59.7
	4	1426	18.7	18.7	78.4
	5	1651	21.6	21.6	100.0
	Total	7634	100.0	100.0	

Table 5.4: Five education regions from which learners were sampled

4. Grade

According to Table 5.5 almost four percent of the learners indicated that they are doing grades 1 and 2. The reason for this error is that the capturing instrument was not validated to take grades 7, 8 and 9 only. Ten respondents (0.1%) did not indicate the grade they were in. The study therefore comprised of 2217 (29%) grade 7 learners, 2421 (31.7%) grade 8 learners and 2702 (35.4%) grade 9 learners.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	142	1.9	1.9	1.9
	2	142	1.9	1.9	3.7
	7	2217	29.0	29.1	32.9
	8	2421	31.7	31.8	64.6
	9	2702	35.4	35.4	100.1
	Total	7624	99.9	100.1	
Missing	System	10	.1		
Total		7634	100.0		

Table 5.5: Grades from which learners were sampled

5. Gender

Table 5.6 shows that 49.8% of the respondents are boys and 49.7% are girls. This shows that all sexes are well represented. Zero comma five percent of the respondents did not indicate if they were boys or girls.

	Frequency	Percent
Boy	3806	49.8%
Girl	3792	49.7%
Missing	36	0.5%
Total	7634	100%

Table 5.6: Gender of sampled learners

5.3 DATA PERTAINING TO TECHNOLOGY EDUCATORS

5.3.1 Support received by Technology Educators (Appendix 5, section B)

The purpose of this section was to establish empirically the level of training and support received by Technology educators in schools. The variables considered in the study were:

- Hours of curriculum related in-service training;
- The kind of recognition educators receive from curriculum related in-service training;
- The availability of teacher resource center, library and the internet;
- Training of educators in health and safety;
- Links with industry (industry-education partnership);
- The support of the School Management Team (SMT);
- The total time per week allocated to teach Technology;
- Meetings with curriculum planners, principal, parents, school governing body, fellow educators and school management team;
- The purpose of the departmental official's visit to the school; and
- The INSET courses the educators have received.

This section gives a discussion of these factors.

1. Hours of curriculum related In-Service Training

Table 5.7 shows the responses of the educators regarding curriculum related in-service training. Six hundred and two respondents (60.2%) indicated that they had less than eighty hours of in-service education training. Nineteen respondents (5%) received eighty hours of training while 42 respondents (12.2%) indicated that they received more than eighty hours training. The remaining 71 respondents (20.6%) have indicated that they have not received any training at all. These points provide a gloomy picture to realize that educators do not have sufficient training given the fact that Technology is a new learning area in the curriculum.

	Frequency	Percent
Less than 80 hours	207	60.2
80 hours	19	5.5
More than 80 hours	42	12.2
None	71	20.6
Missing	5	1.5
Total	344	100

Table 5.7: Hours of curriculum In-Service Training received by educators

2. The kind of recognition educators receive from curriculum related In-Service training

According to Table 5.8, 179 respondents (52%) indicated that they did not receive recognition for the INSET courses they attended. Sixty nine respondents (20.1%) indicated that they have not attended any INSET courses at all. Sixty eight respondents (19.8%) indicated that they received an attendance certificate and the remaining 19 respondents (5.5%) have received credits for further study. It is worrying to realize that there are still some educators who teach Technology without receiving any INSET courses.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Attendance Certificate	68	19.8	20.3	20.3
	Credits for further study	19	5.5	5.7	26.0
	No recognition	179	52.0	53.4	79.4
	Have not attended any-inservice training	69	20.1	20.6	100.0
	Total	335	97.4	100.0	
Missing	System	9	2.6		
Total		344	100.0		

Table 5.8: The kind of recognition educators receive from curriculum related in-service training

3. The availability of teacher resource center, library and internet

In Table 5.9, it is indicated that 244 respondents (70.9%) of the respondents did not have the teacher resource center. Seventy three respondents (21.3%) had the resource centers and 27 respondents (7.8%) did not comment on this question. This might be an indication that they do not have resource centers as well.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	73	21.3	23.0	23.0
	No	244	70.9	77.0	100.0
	Total	317	92.2	100.0	
Missing	System	27	7.8		
Total		344	100		

Table 5.9: The availability of teacher resource centers

In Table 5.5, 266 respondents (77.3%) indicated that they do not have the Internet in their schools. Only 12.5% (43) of the respondents confirmed that they had the Internet connection as a result of the "School-Net" programme. The remaining 10% (35 respondents) did not comment on the question. Again the assumption being made is that they do not have connection. In Technology, learners are required to investigate (research), design, make, evaluate and communicate solutions to problems. Part of the investigation and communication aspects includes searches on the web. The unavailability of such resources handicaps some of the crucial skills required for the world of work (DoE, 2002:12).

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	43	12.5	13.9	13.9
	No	266	77.3	86.1	100.0
	Total	309	89.8	100.0	
Missing	System	35	10.2		
Total		344	100.0		

Table 5.10: The availability of the Internet

4. Training of educators in health and safety

Table 5.11 shows that 188 respondents (54.7%) of the respondents are not trained in health and safety issues. Only 150 respondents (43.6%) of the total respondents have been trained and the remaining 1.7% of the participants did not comment on the question. Technology requires educators to be fully trained in safety aspects. They need to make learners aware of safety precautions to be observed when they perform different processes. (DoE, 2002:13).

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	150	43.6	44.4	44.4
	No	188	54.7	55.6	100.0
	Total	338	98.3	100.0	
Missing	System	6	1.7		
Total		344	100.0		

Table 5.11: Training of educators in health and safety

5. Links with industry (industry-education partnership)

In Table 5.12, 263 respondents (76.5%) of the participants indicated that they did not have partnership with industries. Only 74 respondents (21.5%) indicated that they do have some links with industries. The remaining seven respondents (2%) did not comment on the question). This means that the majority of schools do not see the importance of involving industry in the implementation of Technology in their schools. There is therefore no partnership between schools and industry.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	74	21.5	22.0	22.0
	No	263	76.5	78.0	100.0
	Total	337	98.0	100.0	
Missing	System	7	2.0		
Total		344	100.0		

Table 5.12: Links between the school and industry

6. The support of the School Management Team (SMT)

In Table 5.13 it is noted that 145 respondents (42.2%) are sometimes supported by the SMT. Only 21.2% (73) respondents indicated that they always received support from the SMT. Fifty seven respondents (16.6%) indicated that they usually received this kind of support from the SMT and the remaining 20% (69) of the respondents indicated that they never received such support. This is disturbing to realize that educators are not supported in the classroom. This also clearly shows that the implementation of the Integrated Quality Management System (IQMS) is lacking. According to this policy educators should be observed in practice to establish if they plan lessons, assess learners, create a conducive learning environment and if they are knowledgeable about their learning area.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always	73	21.2	21.2	21.2
	Usually	57	16.6	16.6	37.8
	Sometimes	145	42.2	42.2	79.9
	Never	69	20.0	20.0	100.0
	Total	344	100.0	100.0	

Table 5.13: Support provided by SMT to Technology educators

7. The total time per week allocated to teach Technology

Table 5.14 shows that 169 respondents (49.1%) indicated that they teach Technology for more than two hours per week. One hundred and thirty one respondents (38%) indicated that they teach Technology for two hours and the remaining twelve percent (41 respondents) indicated that they teach Technology for less than two hours. Technology as part of the curriculum is normally taught for a period of two hours. It is extremely pleasing to note that the majority (169 respondents) exceeded the allocated hours.

	Frequency	Percent	Valid percent	Cumulative percent
Less than 2 hours	41	11.9	12.0	12.0
2 hours	131	38.1	38.4	50.4
More than 2 hours	169	49.1	49.6	100
Missing	3	0.9		
Total	344	100	100	

Table 5.14: Total time per week allocated to teach Technology

8. Meeting with curriculum planners, principals, parents, school governing bodies, fellow educators and school management teams

The respondents were requested to indicate the frequency they hold meetings with various stakeholders within the school community. According to Table 5.15, 144 respondents (41.8%) indicated that they sometimes held meetings with curriculum planners. One hundred and twenty nine respondents (37.5%) indicated that such meetings never took place. The principal is the most important stakeholder in the school community. However, 112 respondents (32.5%) indicated that they sometimes had a meeting with the principal. Seventy seven respondents (22.4%) indicated that they never had meetings with the principal. Only 56 respondents (16.3%) indicated that they always had a meeting with the principal. Eighty three respondents (24.1%) indicated that they occasionally meet the principal. This means that educators do not meet sufficiently with the key stakeholders where they can get support from.

	Always		Usually		Sometimes		Never		Missing		Total	
	f	%	f	%	f	%	f	%	f	%	f	%
17.1Curriculum planners	22	6.4%	33	9.6%	144	41.8'%	129	37.5%	16	4.7%	344	100%
17.2 Principal	56	16.3%	83	24.1%	112	32.5%	77	22.4%	16	4.7%	344	100%
17.3 Parents	12	3.5%	40	11.6%	115	33.4%	165	48%	12	3.5%	344	100%
17.4 Fellow educators	86	25.0%	106	30.8%	117	34.0%	29	8.4%	6	1.8%	344	100%
17.5 SGB	12	3.5%	36	10.5%	94	27.3%	188	54.6%	14	4.1%	344	100%
17.6 SMT	56	16.3%	73	21.2%	127	36.9%	74	21.5%	14	4.1%	344	100%

f = frequency   % = percentage

Table 5.15: Meeting between various stakeholders in the school

9. The purpose of the departmental official's visit to the school

The questionnaire required respondents to indicate the purpose of the visit of departmental officials to the school on seven given purposes. Two hundred and seventy seven respondents (80.5%) as shown in Table 5.16 (item 18.1) indicated that the departmental officials do not just come to the school for a cup of tea or coffee. Only the minority of the participants (5.2%) indicated that some officials come for a cup of coffee or tea to the school. On item 18.2 of Table 5.16, it is pleasing to note that 167 respondents (48.5%) indicated that some of the purposes of the departmental official's visit is to deliver material. Item 18.3 of Table 5.16 shows that 161 respondents (46.8%) indicated that they were visited in class. However in item 18.4 of Table 5.16, most of the respondents (52.3%) indicated that these officials never attended to problems related to Technology learning area. This finding is also confirmed by item 18.5 of Table 5.16 where the majority of respondents (45.1%) indicated that these officials never discussed the learners' work with the educator. Worse still, there is a strong indication that the departmental officials never attended parent meetings. Two hundred and sixty-three respondents (76.5%) confirmed this as seen on item 18.6 of Table 5.16. It is discouraging to note that the officials never discussed learners' problems with the principal as alluded to by 207 respondents (60.2%).

	Yes		No		Missing		Total	
	f	%	f	%	f	%	f	%
18.1 Simply dropping for a coffee and a chat	18	5.2%	277	80.5%	49	14.3%	344	100%
18.2 To deliver material	167	48.5%	133	38.7%	44	12.8%	344	100%
18.3 To complete an observation form	161	46.8%	136	39.5%	47	13.7%	344	100%
18.4 To attend to problems relating to Technology	112	32.6%	180	52.3%	52	15.1%	344	100%
18.5 To discuss learner's work with educator	145	42.1%	155	45.1%	44	12.8%	344	100%
18.6 To attend a parents meeting	34	9.9%	263	76.5%	47	13.6%	344	100%
18.7 To discuss learners' problems with the principal	90	26.1%	207	60.2%	47	13.7%	344	100%

Table 5.16: The purpose of the departmental official's visit to the school

5.3.2 The INSET courses received by Technology educators

For those educators who have received INSET courses, 232 of the respondents (67.4%) in item 19.1 of Table 5.17 indicated that the training was well organized and the trainers had great expertise (66% of the respondents in item 19.2 of Table 5.17). It is satisfying to find out that the training gave the majority of the respondents (57.8%) confidence in teaching Technology and it was also not boring (75%) as shown in items 19.3 and 19.4 of Table 5.17. However, the majority of the participants (58.2%) indicated that the training gave them in-depth knowledge on the content. This finding is reflected in item 19.5 of Table 5.17. The majority of the respondents (60.5%) as shown in item 19.6 of Table 5.17 indicated that the training covered the methodology that educators use in the classrooms.

	Yes		No		Missing		Total	
	f	%	f	%	f	%	f	%
19.1 The training was well organized	232	67.4%	77	22.4%	35	10.2%	344	100%
19.2 The trainers presented training material with great expertise	227	66%	77	22.4%	40	11.6%	344	100%
19.3 The training did not give me confidence	100	29.1%	199	57.8%	45	13.1%	344	100%
19.4 The training was boring	42	12.2%	258	75%	44	12.8%	344	100%
19.5 The training provided in-depth information on the content	200	58.2%	103	29.9%	41	11.9%	344	100%
19.6 The training covered the methodology used in classrooms	208	60.5%	94	27.3%	42	12.2%	344	100%

Table 5.17: INSET courses received by Technology educators

5.3.3 Educators' attitudes towards Technology (see Appendix 5, section C)

The purpose of this section was to establish empirically the educators' attitudes towards Technology. The factors considered in the study are summarized in Table 5.19.

	Factors
	Importance of Technology in life
	Technological careers
	Males being better at Technology than females
	The difficulty of Technology
	Support needed by Technology educators
	The difficulty of Technology related activities
	The impact of Technology on the environment
	Males knowing more about Technology than females
	Reading Technology magazines
	Males and females experiencing the difficulty of Technology
	Motivation to teach Technology
	Preparedness to teach Technology
	Performance of learners in Technology
	Unavailability of tools and equipment
	Provision of resources for educators
	Time allocated to teach Technology
	Learners' abilities in Technology
	Exclusion of Technology from the curriculum

Table 5.18: Factors in educators' attitudes towards Technology

The above factors are subsequently discussed.

According to Table 5.19, item 20, 332 respondents (96.5%) agreed and strongly agreed that Technology is very important in life. Again 93.9% agreed that a female can have a technological career as much as a male as shown in item 21 of Table 5.19. This is a positive finding in the sense that Technology was previously seen as a predominantly male career. These aspects have been alluded to in chapter 1 (paragraph 1.2.5). There is almost a tie between respondents who believe that males are able to repair things better than females and those who disagree. In item 22, 51.2% of the participants do not agree with this statement.

Item 23 of Table 5.19 indicates that there is almost half of the respondents (52.3%) disagree that to understand something in Technology you have to do a difficult course. Three hundred and nine respondents (89.7%) agreed that they need support to teach Technology effectively. This is indicated in item 24 of Table 5.19. In item 25 of Table 5.19, 231 respondents (67.5%) are of the opinion that Technology related activities are not difficult to understand. Only 111 respondents (32.5%) agreed that these activities are difficult to understand. According to Table 5.19, item 26, 291 respondents (84.6%) do not agree that Technology is always bad for the environment. This is a positive finding in the sense that the respondents understand the impact of Technology on the environment. This means that half of the educators who were sampled feel confident about Technology and another half feel that Technology activities are difficult for them. According to Kimbell, Stables, Wheeler, Wosnak & Kelly (1998:20), the attitudes of educators about the place of creativity in schools are mixed. This is also a finding from the interviews that in schools where Technology is implemented best educators have a positive attitude. Educators' attitudes are sometimes recognized as being a powerful motivating force for educators and learners. It can also be a vehicle for high level of individualized achievement.

In Table 5.19, item 27, 229 respondents (66.8%) do not agree that males know more about Technology than females. The remaining 114 respondents (33.2%) agree that males are better at Technology than females. It is pleasing to see that 274 respondents (80.4%) indicated that they like to read Technology magazines as indicated in item 28. The remaining 67 respondents (19.6%) do not like to read Technology magazines. This implies that most respondents have interest in Technology by reading the magazines. If interest is the educators' strength we need to allow them to make a start on Technology projects and build on their confidence (Stables, 1997:13). The American Association of University Women (AAUW, 1992:12) found that research spanning the past twenty years consistently reveals that males receive more attention than do females. Following their research the following were their findings:

- In middle schools, girls appeared to enjoy Technology education and have confidence in their abilities;
- Most of the educators felt that transition from industrial arts to Technology education makes the learning area more attractive to girls, since there is less emphasis on the use of heavy equipment
- In classroom observation and focus group interviews, evidence was found that girls may respond more positively to some aspects of Technology education classes. While some educators spoke of gender-neutral projects, many of the projects being built are more likely to be attractive to boys.
- Looking at the factors that discouraged both boys and girls from taking Technology education, many factors had a particularly strong impact on girls. The lack of knowledge of technological careers, failure to connect what students were doing in class with future careers and the lack of a sense of economic realities were particularly discouraging to girls because they had less information about Technology from experiences outside of school.

One hundred and eighty two respondents (53%) indicated that they agree that Technology is as difficult for males as it is for females. The remaining 161 respondents (47%) did not agree with the said statement. This is indicated in item 29 of Table 5.19. In item 30 of Table 5.19, 290 respondents (85%) indicated that they are highly motivated to teach Technology. The remaining 55 respondents (14.9%) indicated that they are not highly motivated or they have a low morale. According to Table 5.19 item 31, only 134 respondents (39.7%) indicated that their training prepared them to teach Technology.

However, 203 respondents (60.3%) indicated that their training did not prepare them to teach Technology. Two hundred and thirty seven respondents (70.1%) in Table 5.19, item 32 agree that most of the learners they teach perform well in Technology. The remaining 101 respondents (29.9%) did not agree with the statement.

According to item 33 of Table 5.19, 244 respondents (71.9%) agreed that the shortage of tools and equipment demoralizes learners. The remaining 95 respondents (28.1%) do not agree with this statement. Item 34 indicates that 231 respondents (68.6%) agree that they do not have sufficient resources. Only 106 respondents (31.4%) indicated that they have sufficient resources. In item 35 it is shown that 149 respondents (43.8%) agree that time allocated to teach Technology is enough to prepare learners for examinations. However, 191 respondents (56.2%) do not agree that time is sufficient. In grade 9, learners write their Common Tasks of Assessment (CTA) examinations which makes them to qualify for the General Education and Training Certificate (GETC). It was discussed in the literature review that such examinations count for 25% of the final mark.

One hundred and ninety nine respondents (59.3%) in Table 5.19 (item 36) indicated that the availability of physical facilities do not limit the abilities of learners. However, the remaining 137 respondents (40.7%) do not agree with the statement. Two hundred and eight respondents (61%) agree that learners who cannot read and write do not perform well in Technology. Only 131 respondents (31%) did not agree with the statement. This is indicated in item 37 of Table 5.19. Also according to Table 5.19 (item38), 282 respondents (83.2%) indicated that Technology should not be removed from the curriculum. However, the remaining 57 respondents (16.6%) felt that Technology should not be part of the curriculum. It is encouraging to note that despite the challenges that surround Technology, most educators still feel that it is an important aspect of the curriculum.

	D		SD		A		SA		MISSING		TOTAL	
	f	%	f	%	f	%	f	%	f	%	f	%
20. Technology is very important in life	6	1.7%	4	1.2%	118	34.3%	214	62.2%	2	0.6%	344	100%
21. A female can have a technological profession just as well as a male	12	3.5%	9	2.6%	116	33.7%	206	59.9%	1	0.3%	344	100%
22. Males are able to repair things better than females	108	31.4%	68	19.8%	105	30.5%	63	18.3%	0	0	344	100%
23. To understand something of technology you have to take a difficult training course	180	52.3%	86	25%	43	12.6%	32	9.4%	3	0.9%	344	100%
24. I need support in order to teach technology effectively	16	4.7%	15	4.4%	144	41.8%	165	47.9%	4	1.2%	344	100
25. Technology related activities are difficult to understand	155	45.3%	76	22.2%	85	24.9%	26	7.6%	2	0.6%	344	100%
26. Technology is always bad for the environment	186	54.1%	105	30.5%	26	7.6%	27	7.8%	0	0	344	100%
27. Males know more than females about technology	131	38.2%	98	28.6%	75	21.9%	39	11.4%	1	0.3%	344	100%
28. I like to read technology magazines	40	11.7%	27	7.9%	196	57.5%	78	22.9%	3	0.9%	344	100%
29. Technology is as difficult for females as it is for males	106	30.9%	76	22.2%	100	29.2%	61	17.8%	1	0.3%	344	100%
30. I am highly motivated to teach technology	30	7.6%	25	7.3%	176	51.6%	114	33.4%	3	0.9%	344	100%
31. My training at college/university prepared me to teach technology	130	38.6%	73	21.7%	73	21.7%	61	18.1%	7	2%	344	100%
32. Most learners I teach perform well in technology	58	17.2%	43	12.7%	192	56.8%	45	13.3%	6	1.7%	344	100%
33. Unavailability of tools and equipment demotivate learners	43	12.7%	52	15.3%	114	33.6%	130	38.3%	5	1.4%	344	100%
34. Administration does not provide necessary resources for educators	58	17.2%	48	14.2%	129	38.3%	102	30.3%	7	2%	344	100%
35. Time allocated to teach technology is enough to prepare learners for exam	100	29.4%	91	26.8%	110	32.4%	39	11.5%	4	1.2%	344	100%
36. Learners' abilities are not limited by the facilities available	68	20.2%	69	20.5%	156	46.4%	43	12.8%	8	2.3%	344	100%
37. Reading and writing capabilities of learners affect performance in technology	85	25.1%	46	13.6%	136	40.1%	72	21.2%	5	1.4%	344	100%
38. Technology should be excluded from the curriculum	127	37.5%	155	45.7%	19	5.6%	38	11.2%	5	1.4%	344	100%

Table 5.19: Educators' attitudes towards Technology

5.3.4 Technology resources (see Appendix 5, section D)

The aim of this section is to determine the specific tools, equipment and other resources that exist in schools. The factors considered in the study are summarized in Table 5.20.

	Factors
	Protective worktops
	Scissors
	Paper punch
	Ruler
	Mathematics set
	Junior hacksaw
	Combination pliers
	Small bench vice
	Soldering iron
	Multi-meter
	Scale
	Tape measure
	Stove
	Sewing machine
	First aid kit
	Glue gun
	Drilling machine

Table 5.20: Factors in Technology resources

These factors are subsequently discussed.

According to Table 5.21 (item 39.1), most respondents (91.3%) did not agree that they have protective worktops in their Technology rooms. Only the remainder of the respondents (8.5%) indicated that they do have protective worktops. A protective worktop is usually made of hard glass or tough rubber and is placed on top of the desks/Tables when learners are working with sharp or hot material. It prevents the desks/Tables from being damaged by the afore-mentioned operations. If most respondents do not have this worktop it may imply that they do not work with sharp and hot material or they are merely taking a risk if they do.

Table 5.21 (item 39.2) shows that at least 65.3% of the respondents have scissors in their Technology classrooms while 34.7% of the sample indicated that they do not have this tool. A pair of scissors helps learners when they cut paper and card as well as other cutting operations. In item 39.3 of Table 5.21, only 53.4% of the participants have paper punches while the remaining 46.6% do not have. Paper punches help to punch holes when learners make artifacts of paper and card.

An overwhelmingly 80.6% of respondents as shown in item 39.4 of Table 5.21 indicated that they have a ruler in their classrooms while the remaining 19% indicated that they do not have. A ruler is a basic instrument needed when measuring the size of objects and when communicating in Technology lessons. Without this basic instrument learners will not be in a position to draw detailed, dimensioned drawings.

Almost half of the respondents (50.9%) as shown in Table 5.21 (item 39.5) indicated that they do not have mathematical instruments and the remaining participants (49.1%) have such instruments. These instruments are necessary for drawing geometrical shapes. According to the same Table (item 39.6), most respondents (75%) indicated that they do not have hacksaws in their classrooms. Only 25.1% of the sample has such a tool at their disposals. Hacksaws are used to cut metal, plastic or wood pieces to specified lengths. It is discouraging to note that 76% of the sample does not have combination pliers as shown in item 39.7 of Table 5.21. Only 23.6% of the participants have pliers in their classrooms. A plier is used to cut wire as well as bending it to shape.

Table 5.21 (item 39.8) shows that 80.2% of the respondents do not have a vice and it is only a minority (19.8%), which have such equipment at their disposal. A vice is used to hold work pieces that are to be filed, cut or hammered. It is very difficult or almost impossible to perform such operations without this device. It is correlating perfectly to see that 83.7% of the respondents do not have a soldering iron as well as a multi-meter as shown in items 39.9 and 39.10 of Table 5.21. A soldering iron is used to solder electrical and electronic components together. A multi-meter is used to check the resistance, voltage and current that flows through these components. Clearly this shows that this section of the syllabus is not taught properly in schools.

Almost seventy eight percent of the respondents indicated that they do not have a scale in the Technology classroom as indicated in Table 5.21 (item 39.11). The scale is used to weigh the mass of objects. It is crucial in determining the quantities learners are working with. Both items 39.12 and 39.13 of Table 5.21 show that 54.4% of the respondents did not have a measuring tape and a stove in the Technology classroom. However, 46.6% of the respondents indicated that they do have such instruments. These instruments are used to measure the lengths of objects on a full scale like the size of a classroom as well as for processing food and other products. Technology is taught within a particular context, which includes the home context, the industrial context as well as the context of the community.

It is discouraging to learn that 87.4% of the respondents do not have a sewing machine in their schools as shown in Table 5.21 (item 39.14). Only a minority of the participants (12.6%) indicated that they have such equipment in their schools. This clearly shows that the section on processing textiles is not clearly taught in the Technology curriculum. According to Table 5.21 (item 39.15), most respondents (61.5%) indicated that they have a first aid kit in place. This is a positive finding although the kit may not only be used for Technology learners; at least there is some safety equipment in the school. However, there is a concern that this type of equipment does not exist in 38.5% of the sampled schools.

Table 5.21 (items 39.16 and 39.17) indicates that the majority of respondents (66.6% and 76.8% respectively) do not have a glue gun and a drilling machine. These types of equipment are necessary to ensure that the semi-permanent fastening processes are complied with. Once again their absences in the classrooms indicate that they are not taught to defined standards.

	Yes		No		Missing		Total	
	f	%	f	%	f	%	f	%
39.1 Protective worktop	29	8.5%	313	91.3%	1	0.3%	344	100%
39.2 Scissors	224	65.3%	119	34.7%	1	0.3%	344	100%
39.3 Paper punch	183	53.4%	160	46.6%	1	0.3%	344	100%
39.4 Ruler	275	80.6%	66	19.4%	3	0.9%	344	100%
39.5 Mathematics set	169	49.1%	175	50.9%	0	0	344	100%
39.6 Junior hacksaw	86	25.1%	257	74.9%	1	0.3%	344	100%
39.7 Combination pliers	81	23.6%	262	76.4%	1	0.3%	344	100%
39.8 Small bench vice	68	19.8%	275	80.2%	1	0.3%	344	100%
39.9 Soldering iron	56	16.3%	287	83.7%	1	0.3%	344	100%
39.10 Multimeter	54	15.8%	287	84.2%	3	0.9%	344	100%
39.11 Scale	76	22.4%	263	77.6%	5	1.4%	344	100%
39.12 Tape measure	186	54.4%	156	45.6%	2	0.6%	344	100%
39.13 Stove (gas/paraffin/electricity)	186	54.4%	156	45.6%	2	0.6%	344	100%
39.14 Sewing machine	43	12.6%	297	87.4%	4	1.2%	344	100%
839.15 First Aid Kit	211	61.5%	132	38.5%	1	0.3%	344	100%
39.16 Glue gun	114	33.4%	227	66.6%	3	0.9%	344	100%
39.17 Drilling machine	79	23.2%	262	76.8%	3	0.9%	344	100%

Table 5.21: Tools, equipment and resources that exist in the schools

5.4 MAJOR FINDINGS PERTAINING TO EDUCATOR QUESTIONNAIRES

Technology as a learning area has been only included in the curriculum less than ten years ago in South Africa. At the time of implementation, educators were not adequately trained and therefore incompetent. It is also a matter of concern to note that while Technology is a relatively new learning area, most educators felt that they are not supported sufficiently in schools. The gender variable cannot be overemphasized, as it is an important predictor of attitudes towards Technology-the same way it is in predicting attitudes towards Science. It is only when such educators show confidence that even female learners could be encouraged to follow such line of education and eventually conquer the world of work in Technology related occupations which was initially associated with males.

The study on educators' attitudes towards Technology indicates that generally most educators feel self-assured, and are comfortable with the learning area. They have interest in among others new discoveries, reading Technology related material and working with their hands. A point of concern running through the responses is a need for a constant support system as well as a thorough in-service training mechanism.

5.5 DATA PERTAINING TO TECHNOLOGY LEARNERS

5.5.1 Learners' attitudes and concepts of Technology (see Appendix 5, section B)

An analysis on the attitude and concept of learners towards Technology was done concentrating on six factors. These are interest, gender, consequences, difficulty, curriculum and careers. The responses were on a four-point scale, i.e. 1= Strongly agree, 2 = Agree, 3 = Disagree and 4 = Strongly disagree. This scale was chosen so that the respondents may commit themselves to either agree or disagree with the statement. The researcher tried to avoid the five point scale to eliminate the error of central tendency. A further analysis was also done to obtain the mean percentages to establish whether respondents agree or disagree with the statements. This was a combination of the positive responses (agree and strongly agree) as well as the negative responses (disagree and strongly disagree).

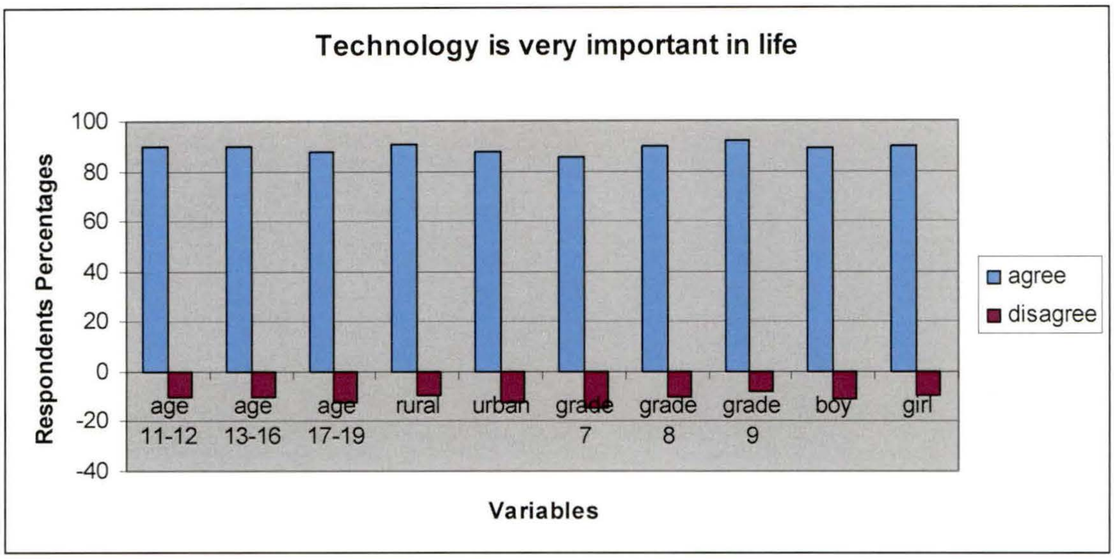
The chi-square tests were also analysed on the learners' attitude questionnaire. According to Ary, Jacobs & Razavieh (1990:209), a chi-square test is used to determine the level of significance among the proportion of respondents. In this study a chi square test was run to determine the level of significance using the following variables:

- Age;
- Location of schools (urban or rural);
- Grades (7, 8 or 9); and
- Gender.

Only those questions that had a significant difference (Pearson chi square value being less than 0.005) have been taken into consideration. The results are subsequently discussed.

5.5.1.1 Analysis of responses with age, location, grade and gender as variables

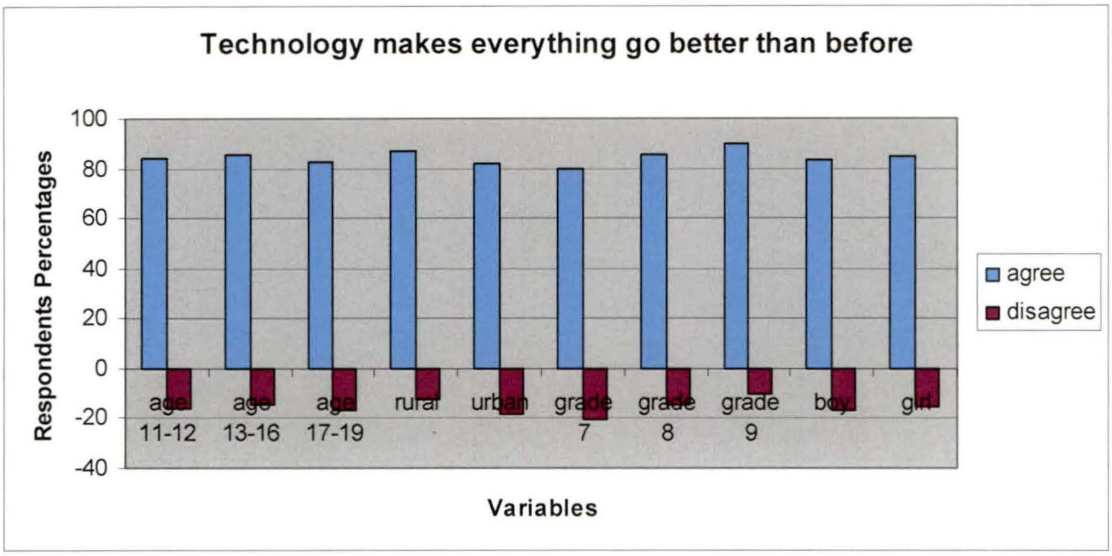
According to graph 5.1, learners between the age group of 11-12, 13-16 and 17-19 showed a positive response rate of 89.5%, 89.5% and 87.6% respectively. The 11-12 and 13-16 age groups were more positive to the statement than the 17-19 age group. This means that they have a better concept and construct that Technology is important in life than the other age groups. The remainder of the respondents (10.4%, 10.5% and 12.3%) did not agree with the statement. The urban and rural samples indicated a positive response rate of 90.4% and 87.7% respectively. The remaining respondents (9.6% and 12.3%) did not agree with the statement that Technology is important in life. Urban learners were more positive to the statement than rural learners. This could be as a result of the exposure of urban respondents to banks, robots industries and the like as some of these things are not available in the rural areas. The grades 7, 8 and 9 respondents showed a positive response rate of 85.2%, 90.1% and 92.1% respectively. The remainder of the respondents (14.8%, 9.9% and 7.9% respectively) did not agree with the statement. The grade 9 respondents were more positive to the statement than other respondents. Boys and girls showed a positive response rate of 88.8% and 90.2% respectively. The remainder of the respondents (11.2% and 9.8%) was less positive towards the statement. Girls were more positive than boys to the statement. This question was looking at interest as a factor that builds on learners' attitudes and concepts. The majority of respondents taking all variables into consideration showed a positive response to the question.



Graph 5.1: The importance of Technology in life

In graph 5.2 learners between the age group of 11-12, 13-16 and 17-19 showed a positive response rate of 84.4%, 85.5% and 82.4% respectively. The remainder of the respondents (15.8%, 14.4% and 17.1%) did not agree with the statement. The 13-16 age group was more positive to the statement than other age groups. This is the stage at which attitude forming capacity begins which Wolters (1989:9) proposed. This means that the 13-16 age group has a better understanding and construct that Technology makes everything go better than before. The rural and urban respondents indicated a response rate of 87.3% and 82.1% respectively. The remaining respondents (12.7% and 17.9% respectively) did not agree with the statement. Urban respondents were more positive to the statement than the rural respondents. The grades 7, 8 and 9 respondents showed a positive response rate of 79.9%, 85.2% and 89.5% respectively. The remainder of the respondents (20.1%; 14.8% and 10.5% respectively) did not agree with the statement. The grade 9 respondents were more positive to the statement than other grade respondents. The boys and girls showed a positive response rate of 83.3% and 85% respectively. The remainder of the respondents (16.7% and 15% respectively) did not agree with the statement. Girls were more positive to the statement than boys. Generally, most respondents agree that

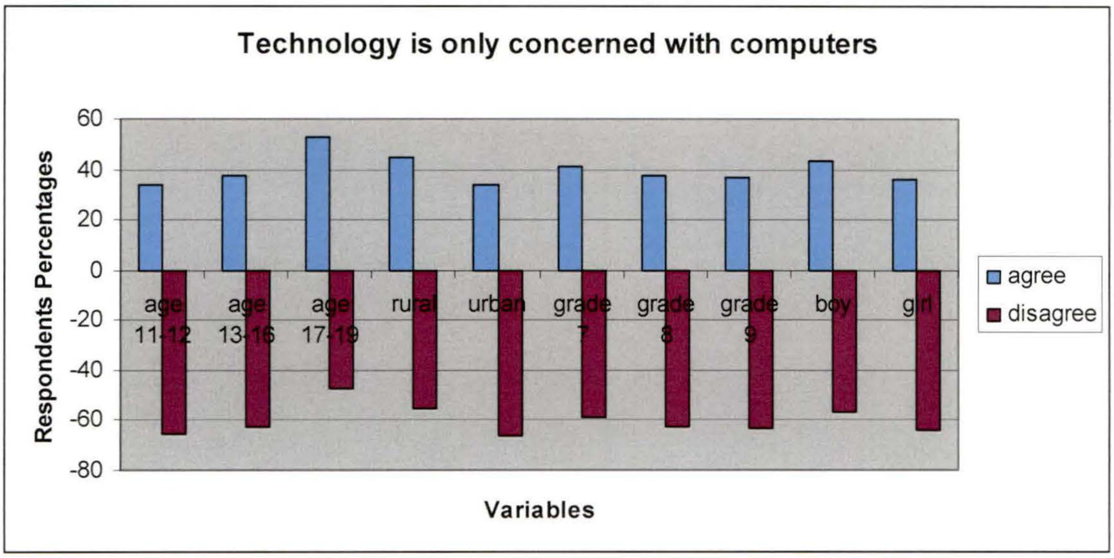
Technology makes everything easier. They see Technology as making life easier (interest as factor).



Graph 5.2: Technology makes everything go better than before

As shown in graph 5.3, learners between the age group of 11-12, 13-16 and 17-19 showed a positive response rate of 34.2%, 37.3% and 52.4% respectively. The remainder of the respondents (65.8%, 62.7% and 47.6%) did not agree with the statement. The urban and rural respondents indicated a positive response rate of 33.9% and 44.7% respectively. The remaining respondents (66.1% and 55.3% respectively) did not agree with the statement. The 17-19 age group was more positive to the statement than other age groups. This means that they do not have a proper understanding and construct of Technology. Technology is not only concerned with computers but computers are part of Technology. Rural learners agreed more on the statement than urban learners. This may merely shows the gap between urban and rural learners concerning their understanding of what Technology is. The grades 7, 8 and 9 respondents showed a positive response rate of 41.3%, 37.3% and 36.7% respectively. The remainder of the respondents (58.7; 62.6% and 63.3% respectively) did not agree with the statement that Technology is only concerned with computers. The grade 7 respondents were more positive than other grade respondents. Boys and girls showed a positive response rate of 43.4% and 36%

respectively. The remaining respondents (56.6% and 64% respectively) did not agree with the statement. Boys were more positive to the statement than girls. It is encouraging to see that most respondents did not agree with the statement. Technology is not only concerned with computers. This question aimed to test the knowledge of the curriculum in implementing Technology. There are three assessment standards that address the knowledge areas of Technology in learning outcome two of the Revised National Curriculum Statement (DoE, 2002:10).



Graph 5.3: Technology is only concerned with computers

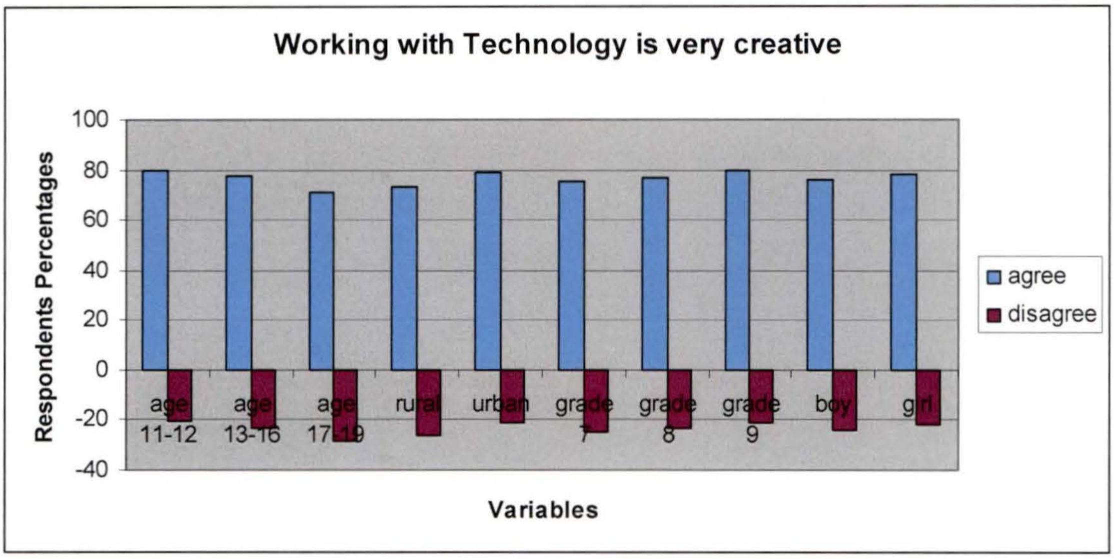
A chi test was conducted and this question was found to have a significant difference as shown below.

	Value	Df	Asymp.sig. (2-sided)
Pearson Chi-Square	57.004	6	0.000

Table 5.22: Technology is only concerned with computers

A Table of the x^2 in the appendix Table was consulted to determine the level of significance of the chi-square value (Ary, Jacobs & Razavieh, 1990:210). The first column in the Table A4 (Ary, Jacobs & Razavieh, 1990:514) shows the number of degrees of freedom involved in the chi-square problem. The remaining columns presented the values needed for the different levels of significance. By consulting the Table of x^2, the researcher found that the observed value of 57 is statistically significant at the 0.05, 0.02 and 0.001 level. The significance level at 0.005 means that there are less than five chances in a hundred of observing the differences in the perceptions of three age categories regarding the view that Technology is only concerned with computers. The level of significance, which is at 0.02, is a 98% chance that the results are due to the treatment or influence of an independent variable or combination of independent variables and to chance. The level of significance at 0.001 implies that there is a 99% chance that the results are not due to chances, a rather powerful assertion.

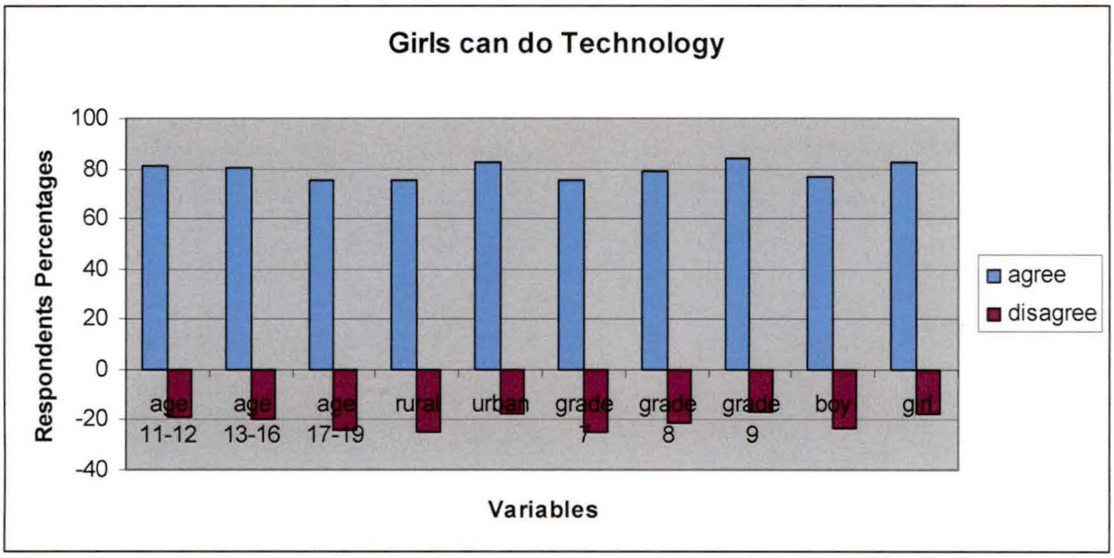
As indicated in graph 5.4, learners between the age group of 11-12, 13-16 and 17-19 showed a positive response rate of 79.6%, 77.3% and 71.3% respectively. The remainder of the respondents (20.2%, 23.2% and 28.6%) did not agree with the statement. The 11-12 age group was more positive to the statement than other age groups. This means that they have a better concept that Technology involves critical and creative thinking than the other age groups. When learners design, they have to generate multiple solutions to the problem (creative thinking) and choose the best solution (critical thinking). Urban and rural respondents showed a positive response rate of 78.8% and 73.5% respectively. The remainder of the respondents (21.4% and 26.5%) respectively did not agree with the statement that working with Technology is very creative; they want to know more about it immediately. The urban respondents were more positive to the statement than their rural counterparts. The grades 7, 8 and 9 respondents showed a positive response rate of 75%; 76.5% and 79.9%. The remainder of the respondents (25%; 23.5% and 20.9% respectively) did not agree with the statement. The grade 9 respondents were more positive than the other grade respondents. This means that they have more interest in Technology than other age groups. Boys and girls indicated a response rate of 76.2% and 77.9% respectively. The remaining respondents (23.8% and 22.1%) respectively) did not agree with the statement. Girls were more positive to the statement than boys, meaning that they have more interest. One of the aims of Technology education is to produce learners who are critical and creative. The technological process instills creativity in the sense that learners are required to generate a lot of ideas and come up with the best solution (DoE, 2002:4).



Graph 5.4: Working with Technology is very creative

Graph 5.5 indicates that the majority of respondents in each age category agreed that girls can do Technology. The mean score for the positive response is 80.9%, 80.2% and 75.6% for each of the age categories 11-12, 13-16 and 17-19 respectively. This means that there is no significant difference between age categories 11-12 years and 13-16 years on their belief that girls can also do Technology. However, the 17-19 age category agreed less than the other age groups on the statement. The mean percentage scores for the negative responses were 19.1%, 19.7% and 24.4% respectively. Technology is for both boys and girls and it is pleasing to see the majority of the respondents having this thinking. The aim of Technology education is to make every citizen literate including boys and girls. The urban and rural respondents showed a positive response rate of 82.8% and 75.4% respectively. The remainder of the respondents (17.2% and 24.6%)

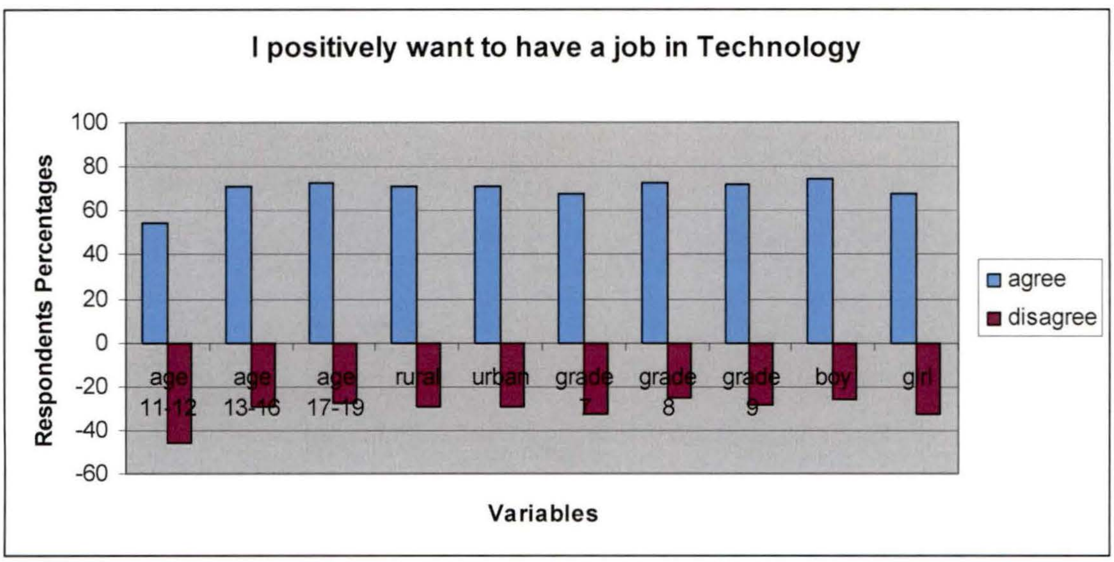
respectively did not agree with the statement that girls can do Technology. The urban respondents were more positive to the statement than the rural respondents. This is because of the traditional way in which girls are viewed in rural areas. The grades 7, 8 and 9 respondents showed a positive response rate of 75.5%, 78.8% and 84.4% respectively. The remainder of the respondents (24.5%, 21.2% and 16.6% respectively) did not agree with the statement that girls can do Technology. The grade 9 respondents were more positive to the statement than other respondents. The boys and girls showed a positive response rate of 77% and 82.7% respectively. The remainder of the respondents (23% and 17.3% respectively) did not agree with the statement that girls can do Technology. Girls were more positive to the statement than boys.



Graph 5.5: Girls can do Technology

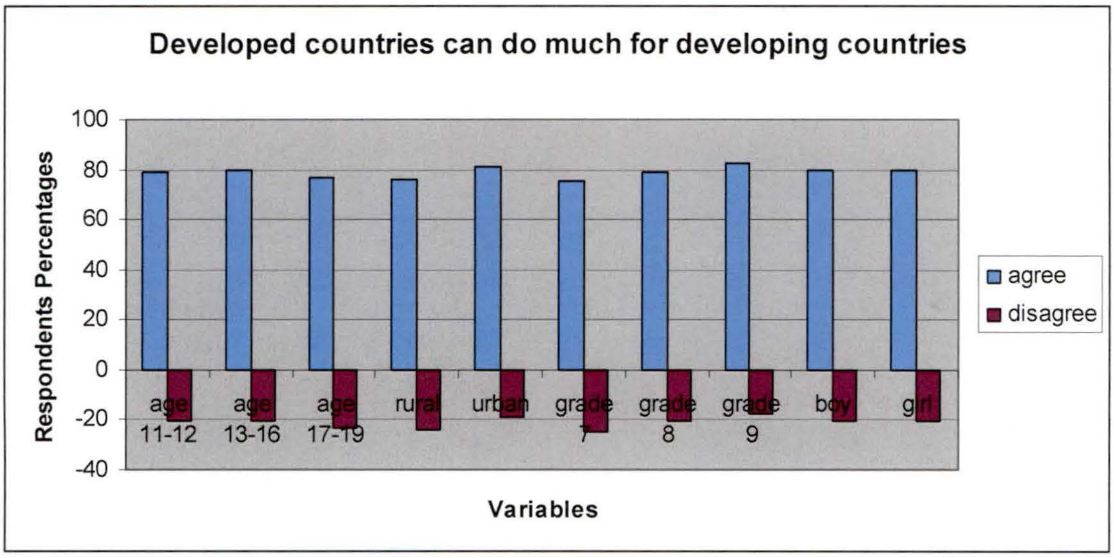
Graph 5.6 shows the responses to question 12. Interest in having a technological job grows with age. The percentages for various age groups that are positive about having a technological career are 54.4% for age category 11-12; 70.7% for age category 13-16 and 72.5% for age category 17-19. The older the learners, the more positive they become about having a job in Technology. Urban and rural respondents showed a positive response rate of 70.6% and 70.8% respectively. The remainder of the respondents (29.4%

and 29.2%) respectively did not agree with the statement that they positively want to have a job in Technology. The urban respondents were more positive to the statement than the rural respondents. The grades 7, 8 and 9 respondents showed a positive response rate of 67.7%, 72.3% and 71.6% respectively. The remainder of the respondents (32.3%, 24.9% and 28.4% respectively) did not agree with the statement that they positively want to have a job in Technology. The grade 9 respondents were more positive to the statement than other respondents. The boys and girls showed a positive response rate of 74.3% and 67.7% respectively. The remainder of the respondents (25.7% and 32.3% respectively) did not agree with the statement that they positively want to have a job in Technology. Boys were more positive to the statement than girls.



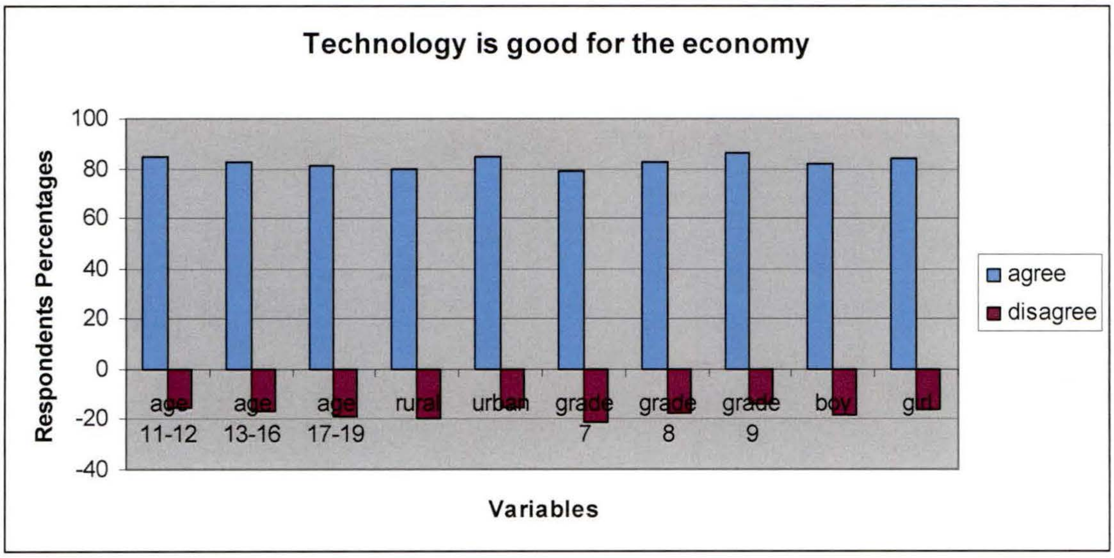
Graph 5.6: I positively want to have a job in Technology

According to graph 5.7, learners between the age group of 11-12, 13-16 and 17-19 showed a positive response rate of 79.3%, 79.5% and 76.7% respectively. The remainder of the respondents (20.4%, 20.5% and 23.3%) did not agree with the statement. Urban and rural respondents showed a positive response rate of 81.3% and 76.2% respectively. The remainder of the respondents (18.7% and 23.8%) respectively did not agree with the statement that developed countries can do much for developing countries in the implementation of Technology in schools. The urban respondents were more positive to the statement than the rural respondents. The grades 7, 8 and 9 respondents showed a positive response rate of 75.1%, 79.3% and 82.5% respectively. The remainder of the respondents (24.9%, 20.7% and 17.5% respectively) did not agree with the statement that technologically developed countries can do much for undeveloped countries. The grade 9 respondents were more positive to the statement than other respondents. Boys and girls showed a positive response rate of 79.6% and 79.5% respectively. The remainder of the respondents (20.4% and 20.5% respectively) did not agree with the statement that developed countries can do much for developing countries in implementing Technology. Girls were equally positive to the statement with boys.



Graph 5.7: Developed countries can do much for developing countries by Technology

As shown in graph 5.8, the 11-12 age group was more positive (85%) than the 13-14 age group (82.9%) and the 17-19 age group (80.8%). Literature review in chapter 2 has indicated that attitude-forming capacity begins at age 11 (Wolters, 1989:9). They see the importance of Technology as contributing to the economy more than other age categories. Urban and rural respondents showed a positive response rate of 84.9% and 80% respectively. The remainder of the respondents (15.1% and 20%) respectively did not agree with the statement that Technology is good for the economy. The urban respondents were more positive to the statement than the rural respondents. However, there is no major difference between the response rate of urban and rural learners. The grades 7, 8 and 9 respondents showed a positive response rate of 79.2%, 82.3% and 86.3% respectively. The remainder of the respondents (20.8%, 17.7% and 13.7% respectively) did not agree with the statement that Technology is good for the economy. The grade 9 respondents were more positive to the statement than other respondents. The grade 9 respondents were more positive to the statement than other respondents. This means that the grade 9 learners have done Technology for three years and understand that it has the capacity to improve the economy. Boys and girls showed a positive response rate of 81.6% and 83.7% respectively. The remainder of the respondents (18.4% and 16.3% respectively) did not agree with the statement that Technology is good for the economy. Girls were more positive to the statement than boys.



Graph 5.8: Technology is good for the economy

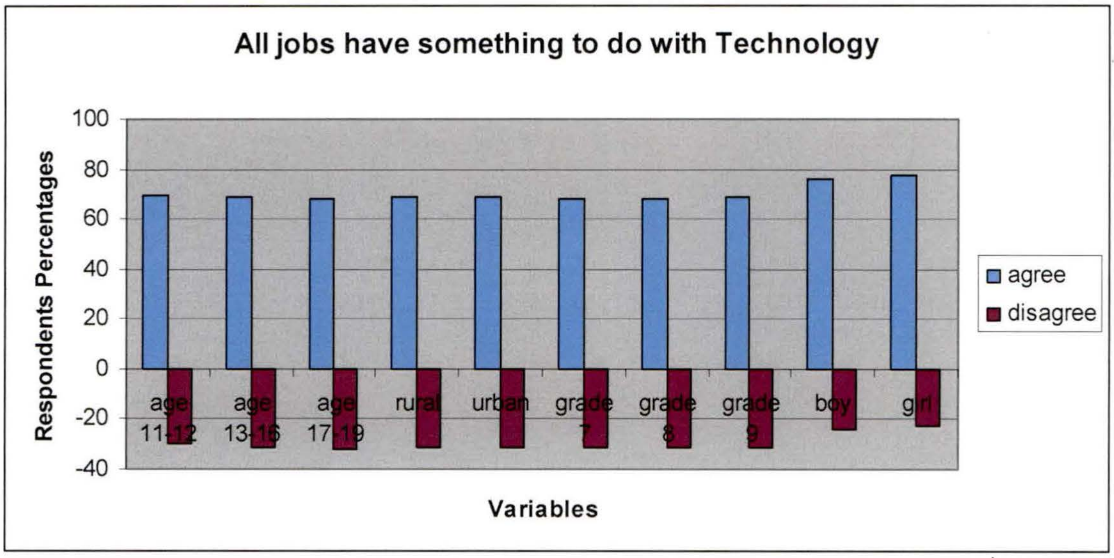
A chi square value was computed as follows:

	Value	Df	Asymp.sig. (2-sided)
Pearson Chi-Square	19.261	6	0.004

Table 5.23 : Technology is good for the economy

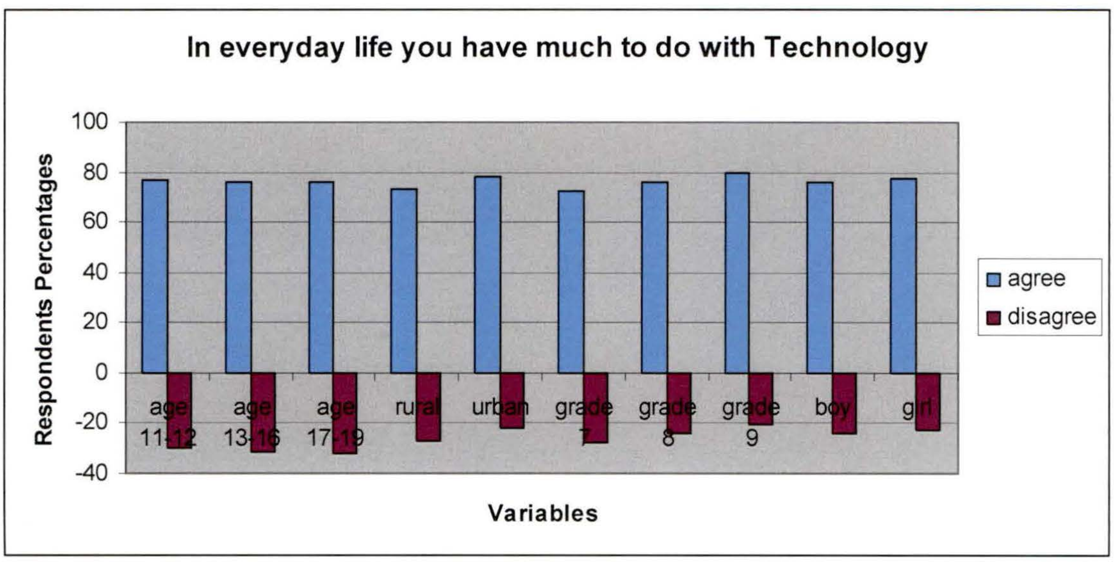
By consulting the Table of x^2 the researcher found that our observed value of 19.261 is statistically significant at the 0.05, 0.02 and 0.001 level. The significance level at 0.005 means that there are less than five chances in a hundred of observing the differences in the perceptions of three age categories regarding the view that Technology is good for the economy. The level of significance, which is at 0.02, is a 98% chance that the results are due to the treatment or influence of an independent variable or combination of independent variables and to chance. The level of significance at 0.001 implies that there is a 99% chance that the results are not due to chances, a rather powerful assertion.

According to graph 5.9, there are no significant differences in the perceptions of different age categories on their views that all jobs have something to do with Technology. The percentage responses of various groups were as follows: 69.8%, 68.6% and 67.9% respectively. However the younger the learner the more positive they are that in everyday life they have more to do with Technology. Attitude forming capacity and interest in technological careers begins at an earlier age as indicated in chapter 2. Urban and rural respondents showed a positive response rate of 68.6% and 68.6% respectively. The remainder of the respondents (31.4% and 31.4%) respectively did not agree with the statement that all jobs have something to do with Technology. It is pleasing to see that there was no difference between the views of urban and rural learners on the statement that all jobs have something to do with Technology. The grades 7, 8 and 9 respondents showed a positive response rate of 68.4%; 68.4% and 69% respectively. The remainder of the respondents (31.6%; 31.6% and 31% respectively) did not agree with the statement that all jobs have something to do with Technology. The grade 9 respondents were more positive to the statement than other respondents because of the number of years they spent doing Technology. Boys and girls showed a positive response rate of 69.3% and 68.6% respectively. The remainder of the respondents (30.7% and 31.4% respectively) did not agree with the statement that all jobs have something to do with Technology. Boys were more positive to the statement than girls.



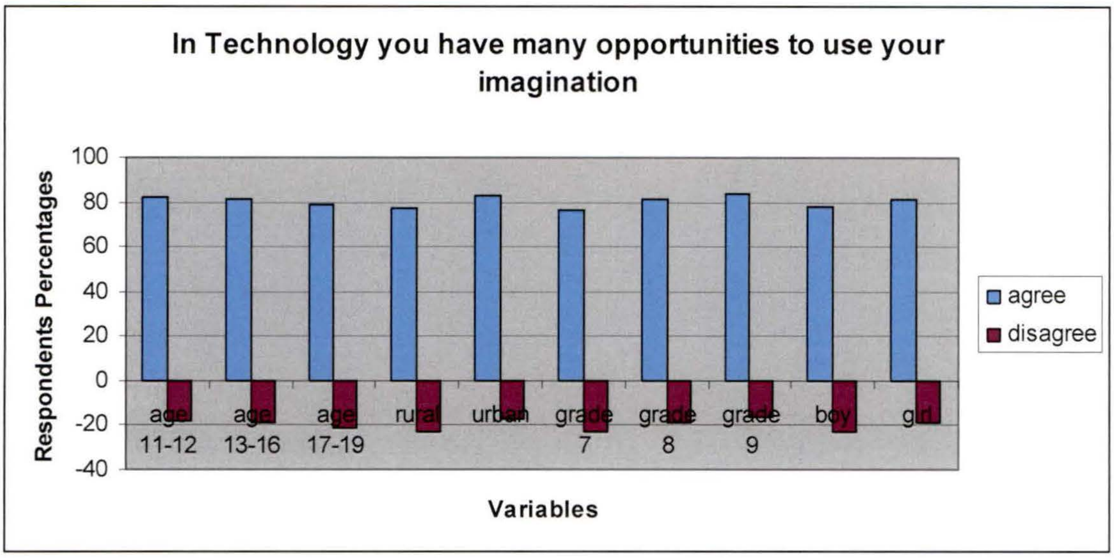
Graph 5.9: All jobs have something to do with Technology

Graph 5.10 shows the participants' responses to question 16. Participants in the age category 11-12 years were more positive than other age groups that in everyday life they have much to do with Technology. The respondents who indicated that everyday life has to do with Technology for age categories 11-12; 13-16 and 17-19 were 76.5%, 76.3% and 75.7% respectively. The remainder of the respondents (30.2%, 31.4% and 32.1% respectively) did not agree with the statement. Again the 11-12 age category was more positive although not significant than other age categories. Urban and rural respondents showed a positive response rate of 78.3% and 73.1% respectively. The remainder of the respondents (21.7% and 26.9%) respectively did not agree with the statement that in everyday life they have much to do with Technology. The urban respondents were more positive to the statement than the rural respondents. The grades 7, 8 and 9 respondents showed a positive response rate of 72.1%; 75.7% and 79.9% respectively. The remainder of the respondents (27.9%; 24.3% and 20.1% respectively) did not agree with the statement that in everyday life you have much to do with Technology. The grade 9 respondents were more positive to the statement than other respondents. Boys and girls showed a positive response rate of 75.7% and 77.2% respectively. The remainder of the respondents (24.3% and 22.8% respectively) did not agree with the statement that in everyday life they have much to do with Technology. Girls were more positive to the statement than boys.



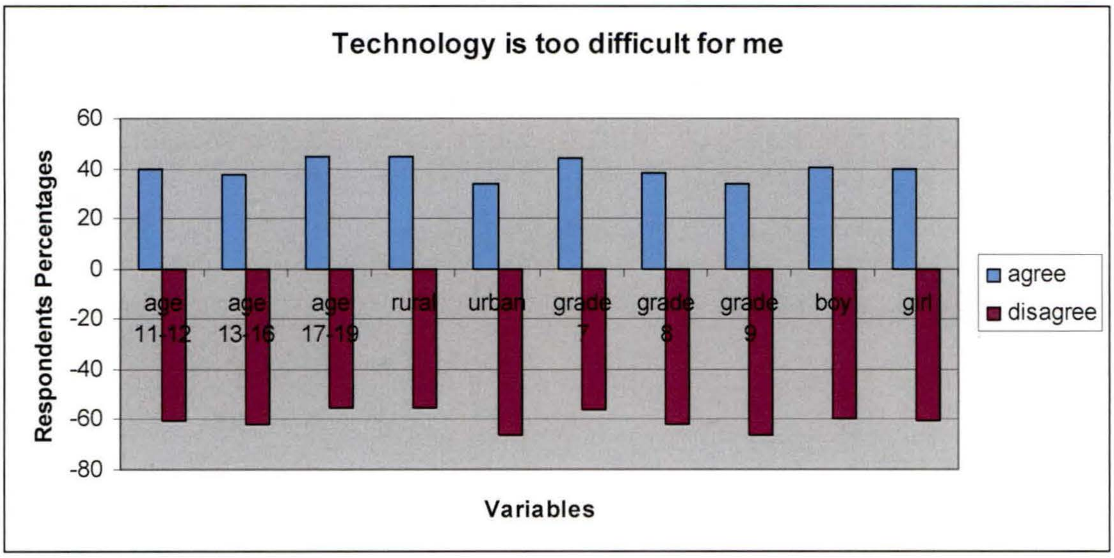
Graph 5.10: In everyday life you have much to do with Technology

Graph 5.11 shows that the 11-12 age category (82.3%) are more positive than the 13-16 age group (80.9%) and the 17-19 age group (78.9%). The younger the learners the more they agree that in Technology they have more opportunities to use their imagination. Again this confirms the finding from literature review indicated in chapter 2 that it is better to start Technology at an earlier age as it builds confidence. Urban and rural respondents showed a positive response rate of 83.1% and 77.5% respectively. The remainder of the respondents (16.9% and 22.5%) respectively did not agree with the statement that in Technology they have many opportunities to use their imagination. The urban respondents were more positive to the statement than the rural respondents. The grades 7, 8 and 9 respondents showed a positive response rate of 76.7%, 81.1% and 83.9% respectively. The remainder of the respondents (23.3%, 18.9% and 16.1% respectively) did not agree with the statement that in Technology you have many opportunities to use your imagination. The grade 9 respondents were more positive to the statement than other respondents. This is because the grade 9 learners are familiar with the technological process which improves the use of learners' imagination. The boys and girls showed a positive response rate of 77.8% and 81.3% respectively. The remainder of the respondents (22.8% and 18.7% respectively) did not agree with the statement that in Technology they have many opportunities to use their imagination. Girls were more positive to the statement than boys. In all variables, the respondents were positive about the statement. This means that the technological process (investigating; designing; making; evaluating and communicating) is taught well in schools that were sampled.



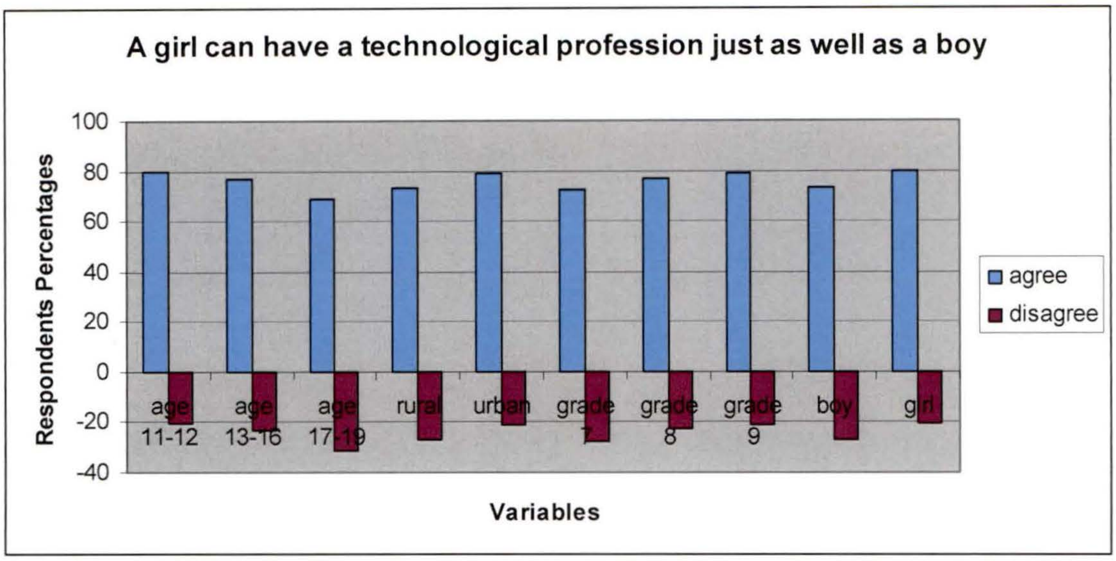
Graph 5.11: In Technology you have many opportunities to use your imagination

According to graph 5.12, the older the learner the more they agree that Technology is too difficult for them. There is however no significant difference between age category 11-12 (39.9%) and age category 13-16 (37.8%). Forty five percent of the 17-19 age category agreed that Technology is too difficult for them. This means that the younger respondents do not think that Technology is too difficult for them because they understand most concepts or they could handle most tasks. Urban and rural respondents showed a positive response rate of 34.1% and 44.8% respectively. The remainder of the respondents (65.9% and 55.2%) respectively did not agree with the statement that Technology is too difficult for them. The urban respondents were less positive to the statement than the rural respondents. The grades 7, 8 and 9 respondents showed a positive response rate of 44.1%; 38.3% and 34% respectively. The remainder of the respondents (55.9%, 61.7% and 66% respectively) did not agree with the statement that Technology is too difficult for them. The grade 7 respondents were more positive to the statement than other respondents. This means that grade 9 respondents are mature at Technology than other grade respondents and are not scared of Technology. Boys and girls showed a positive response rate of 40.4% and 39.4% respectively. The remainder of the respondents (59.6% and 60.6% respectively) did not agree with the statement that Technology is too difficult for them. Boys were more positive to the statement than girls.



Graph 5.12: Technology is too difficult for me

Graph 5.13 shows that there is no significant difference across the age categories regarding their perceptions that a girl can have a technological profession just as well as a boy. Participants who showed a positive response rate to the statement were 79.9%; 76.6% and 68.9% for each of the age categories 11-12, 13-16 and 17-19 respectively. Only the minority of the respondents did not agree with the statement (20.1%, 23.3% and 31.1%). This means that the younger respondents had a better concept and understanding of technological careers in Technology and that they could be done by both boys and girls. Urban and rural respondents showed a positive response rate of 78.7% and 72.9% respectively. The remainder of the respondents (21.3% and 27.1%) respectively did not agree with the statement that a girl can have a technological profession just as well as a boy. The urban respondents were more positive to the statement than the rural respondents. The grades 7, 8 and 9 respondents showed a positive response rate of 72.6%, 77.1% and 78.8% respectively. The remainder of the respondents (27.4%, 22.9% and 21.2% respectively) did not agree with the statement that a girl can have a technological profession just as well as a boy. The grade 9 respondents were more positive to the statement than other respondents. This means that the grade 9 respondents have a better understanding of technological careers than other grade learners. Boys and girls showed a positive response rate of 73.4% and 79.5% respectively. The remainder of the respondents (26.6% and 20.5% respectively) did not agree with the statement that a girl can have a technological profession as much as a boy. Girls were more positive to the statement than boys.



Graph 5.13: A girl can have a technological profession just as well as a boy

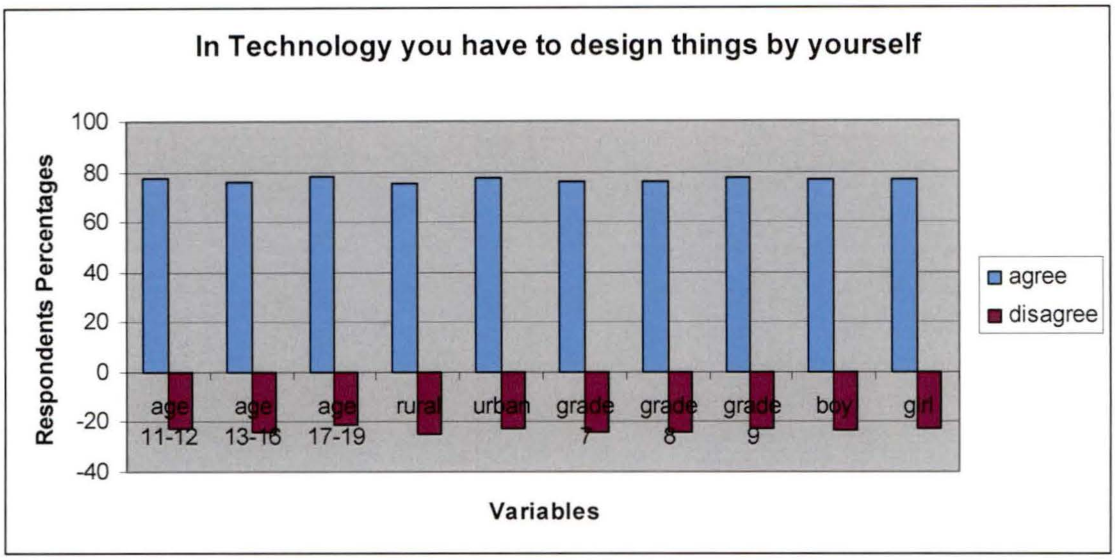
A chi square value was computed as follows:

	Value	Df	Asymp.sig. (2-sided)
Pearson Chi-Square	32.296	6	0.000

Table 5.24 : A girl can have a technological profession just as well as a boy

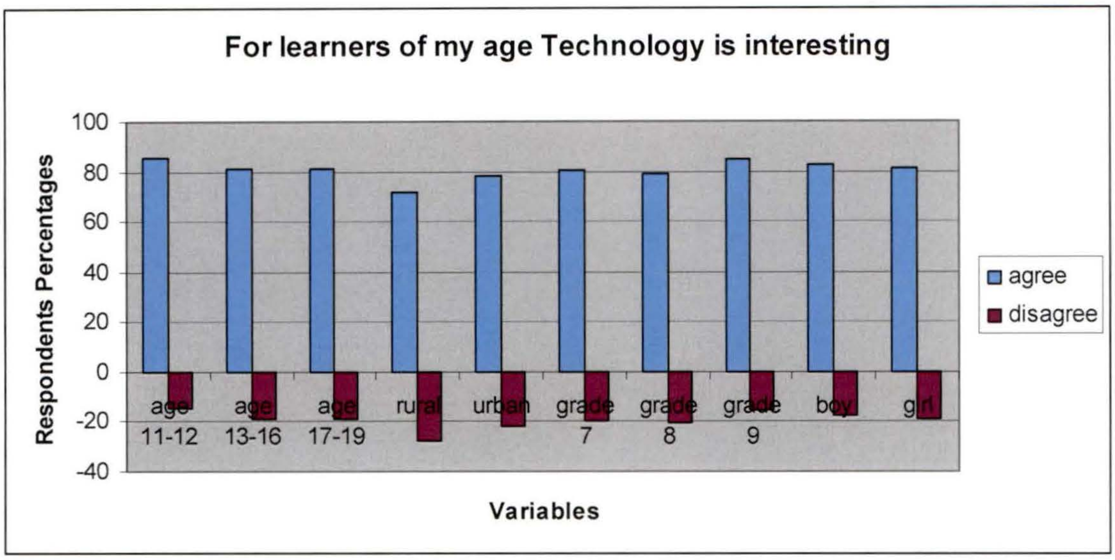
By consulting the Table of x^2, the researcher found that the observed value of 32.296 is statistically significant at the 0.05, 0.02 and 0.001 level. The significance level at 0.005 means that there are less than five chances in a hundred of observing the differences in the perceptions of three age categories regarding the view that a girl can have a technological profession just as well as a boy. The level of significance, which is at 0.02, is a 98% chance that the results are due to the treatment or influence of an independent variable or combination of independent variables and to chance. The level of significance at 0.001 implies that there is a 99% chance that the results are not due to chances, a rather powerful assertion.

Again as shown in graph 5.14, there was no significant difference across all age groups regarding their perceptions that in Technology they had to design things by themselves. The percentages of the respondents, which showed a positive response rate, were 77.2%, 76.1% and 78.5% for each of the age categories 11-12, 13-16 and 17-19 respectively. Only the minority of the participants did not agree with the statement. The 17-19 age category was more positive to the statement than other age categories. This means that the said age category had a better concept and attitude towards Technology as it relates to designing things than other age categories. Urban and rural respondents showed a positive response rate of 77.4% and 75% respectively. The remainder of the respondents (22.6% and 25%) respectively did not agree with the statement that in Technology they have to design things by themselves. The urban respondents were more positive to the statement than the rural respondents. The majority of learners, both urban and rural respondents know that in Technology you have to design things by yourself. The grades 7, 8 and 9 respondents showed a positive response rate of 75.8%, 76.1% and 77.3% respectively. The remainder of the respondents (24.2%, 23.9% and 22.7% respectively) did not agree with the statement that in Technology you have to design things by yourself. The grade 9 respondents were more positive to the statement than other respondents. This means that the grade 9 respondents have a better understanding of design than other grade respondents. Boys and girls showed a positive response rate of 76.5% and 77.1% respectively. The remainder of the respondents (23.5% and 22.9% respectively) did not agree with the statement that in Technology they have to design things by themselves. Girls were more positive to the statement than boys.



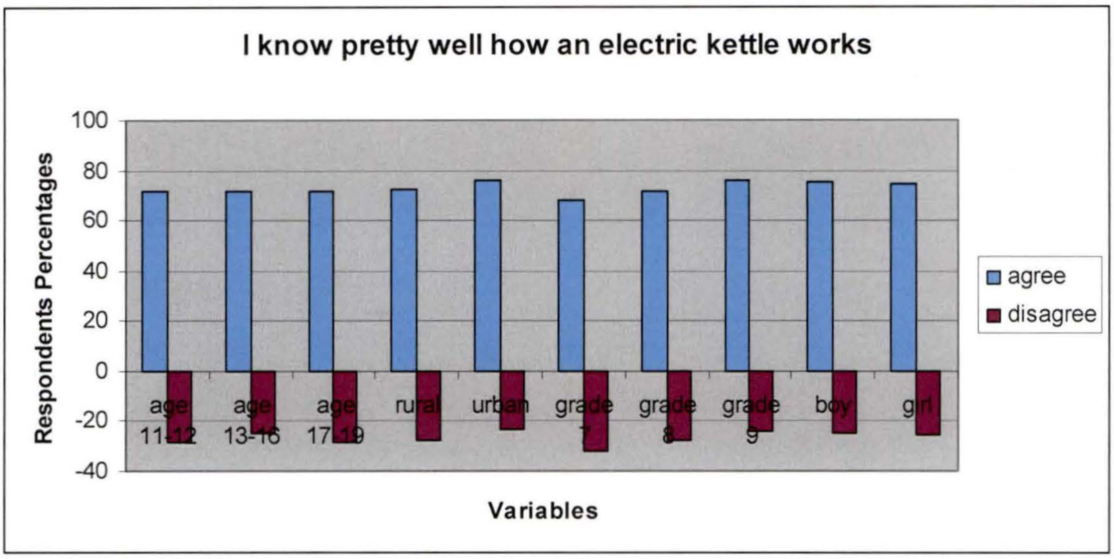
Graph 5.14: In Technology you have to design things by yourself

It is interesting to note that age 11-12 category had a more positive attitude towards interest in Technology than the other age groups as shown in graph 5.15. The respondents who showed a positive response rate were between 11-12, 13-16 and 17-19. Their response rate was 85.2%, 81.3% and 81.2% respectively. Only a minority of respondents (14.8%, 18.7% and 18.8%) did not agree with the statement. This confirms what Wolters (1989:9) found that interest about Technology is developed between age 12 and 13. Urban and rural respondents showed a positive response rate of 78% and 72% respectively. The remainder of the respondents (22.6% and 25%) respectively did not agree with the statement that For learners of their age Technology is interesting. The grades 7, 8 and 9 respondents showed a positive response rate of 80.4%; 79.3% and 84.7% respectively. The remainder of the respondents (19.6%, 20.7% and 15.3% respectively) did not agree with the statement that for learners of their age Technology is interesting. The grade 9 respondents were more positive to the statement than other respondents. Boys and girls showed a positive response rate of 82.4% and 80.9% respectively. The remainder of the respondents (17.6% and 19.1% respectively) did not agree with the statement that for learners of their age Technology is interesting. Boys were more positive to the statement than girls.



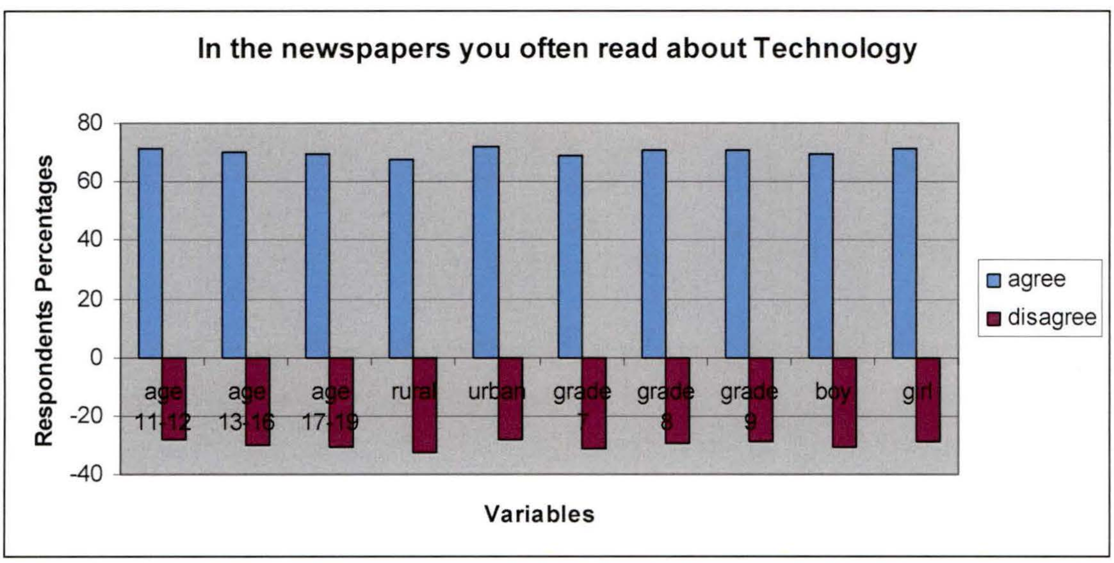
Graph 5.15: For learners of my age Technology is interesting

As shown in Figure 5.16, there was no significant difference between the different age groups on their views on how an electric kettle works. This also depends on how well Technology is taught. The 13-16-age group was a little bit more positive on this item than other groups. The respondents which showed a positive response rate were 11-12, 13-16 and 17-19 respectively. Their responses were 71.8%, 71.5% and 71.7% respectively. Only the minority of the respondents (28.2%, 24.9% and 28.3%) did not agree with the statement. However, there were no significant differences between the three age categories. This means that all age categories know well how an electric kettle works. This statement was based on the curriculum as a factor and shows that the educators have treated a section on how systems work in the curriculum (DoE, 2002:12). Urban and rural respondents showed a positive response rate of 76.4% and 72.3% respectively. The remainder of the respondents (23.6% and 27.7% respectively) did not agree with the statement. The urban respondents were more positive to the statement than their rural counterparts because of exposure to more technological equipment. The grades 7, 8 and 9 respondents showed a positive response rate of 68%, 72% and 76% respectively. The remainder of the respondents (32%, 28% and 24% respectively) did not agree with the statement that for learners of their age Technology is interesting. The grade 9 respondents were more positive to the statement than other respondents. This means that they know more than other grade respondents how an electric kettle works. Boys and girls showed a positive response rate of 75.3% and 74.4% respectively. The remainder of the respondents (24.7% and 25.6% respectively) did not agree with the statement. Boys were more positive to the statement than girls. This means that boys know more than girls how an electric kettle works.



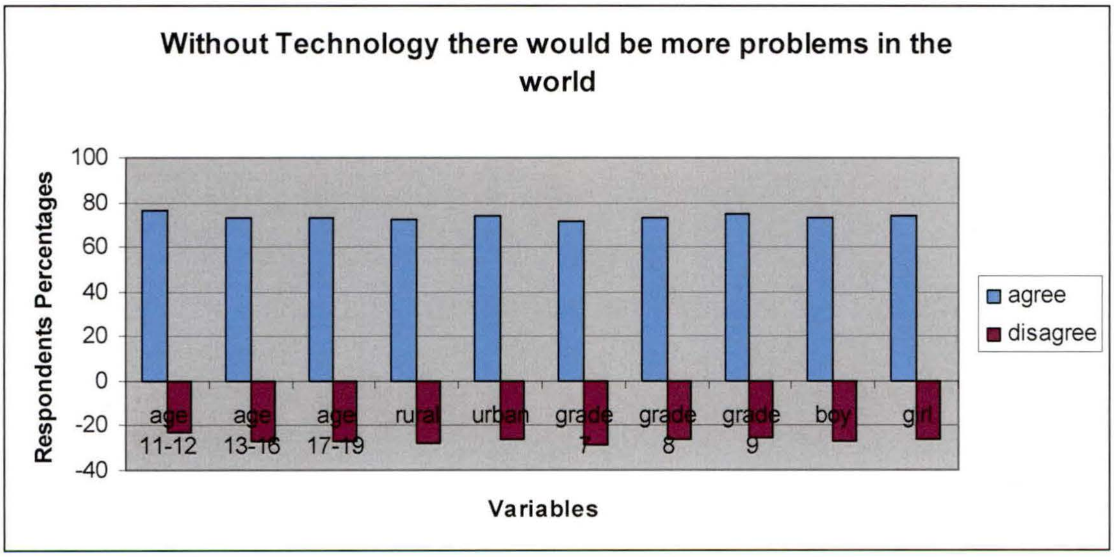
Graph 5.16: I know pretty well how an electric kettle works

Graph 5.17 shows that learners between the group of 11-12, 13-16 and 17-19 showed a positive response rate of 71.6%, 70% and 69.4% respectively. The remaining respondents (28.4%, 30% and 30.6%) did not agree with the statement. In this item there was also no significant difference in terms of the views of age categories that in the newspapers they read about Technology. However, it appears that the younger the learners are, there more interested they get in reading about Technology in the newspapers. Again as it was said previously, it confirms the findings of attitude forming capacity at the age of between 12 and 13 as espoused by Wolters (1989:9). Urban and rural respondents showed a positive response rate of 71.7% and 67.7% respectively. The remainder of the respondents (28.3% and 32.3%) respectively did not agree with the statement that in the newspapers they often read about Technology. The urban respondents were more positive to the statement than the rural respondents. This means that urban learners read more about Technology in magazines (probably because of their availability) than rural learners. The grades 7, 8 and 9 respondents showed a positive response rate of 68.7%, 70.4% and 70.9% respectively. The remainder of the respondents (31.3%, 29.6% and 29.1% respectively) did not agree with the statement that in the newspapers they often read about Technology. The grade 9 respondents were more positive to the statement than other respondents. This means that grade 9 learners read more about technology in magazines than other grade learners. Boys and girls showed a positive response rate of 69.2% and 71.4% respectively. The remainder of the respondents (30.8% and 28.6% respectively) did not agree with the statement that in the newspapers they often read about Technology. Girls were more positive to the statement than boys.



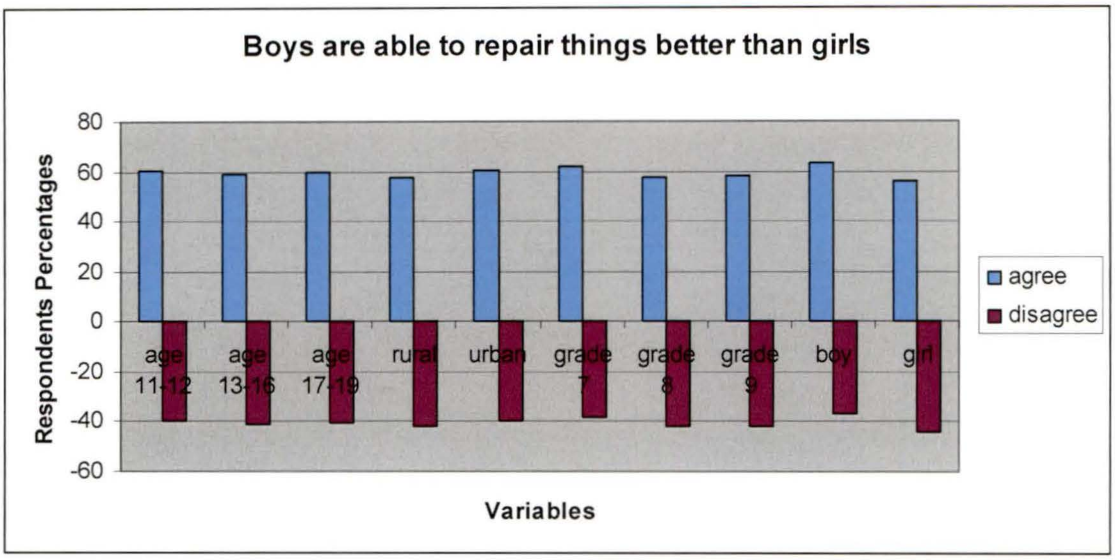
Graph 5.17: In the newspapers you often read about Technology

Learners between the age groups 11-12, 13-16 and 17-19, as indicated in graph 5.18, showed a positive response rate of 76.8%, 73.3% and 73% respectively. Only the minority of the respondents (23.2%, 26.7% and 27%) respectively) did not agree with the statement. The younger age category agreed more than other age categories that there would be problems in the world if there was no Technology. This means that the 11-12 age category has better concepts about the importance of Technology than other age groups. Urban and rural respondents showed a positive response rate of 74.1% and 72.6% respectively. The remainder of the respondents (25.9% and 27.4%) respectively did not agree with the statement that without Technology there would be more problems in the world. The urban respondents were more positive to the statement than the rural respondents. This means that urban learners know the importance of Technology more than the rural learners. The grades 7, 8 and 9 respondents showed a positive response rate of 71.8%; 73.5% and 74.8% respectively. The remainder of the respondents (28.2%; 26.5% and 25.2% respectively) did not agree with the statement that without Technology there would be more problems in the world. The grade 9 respondents were more positive to the statement than other respondents. This means that grade 9 learners know the importance of Technology more than the grade 7 and 8 learners. Boys and girls showed a positive response rate of 73.4% and 73.9% respectively. The remainder of the respondents (26.6% and 26.1% respectively) did not agree with the statement that without Technology there would be more problems. Girls were equally positive to the statement with boys.



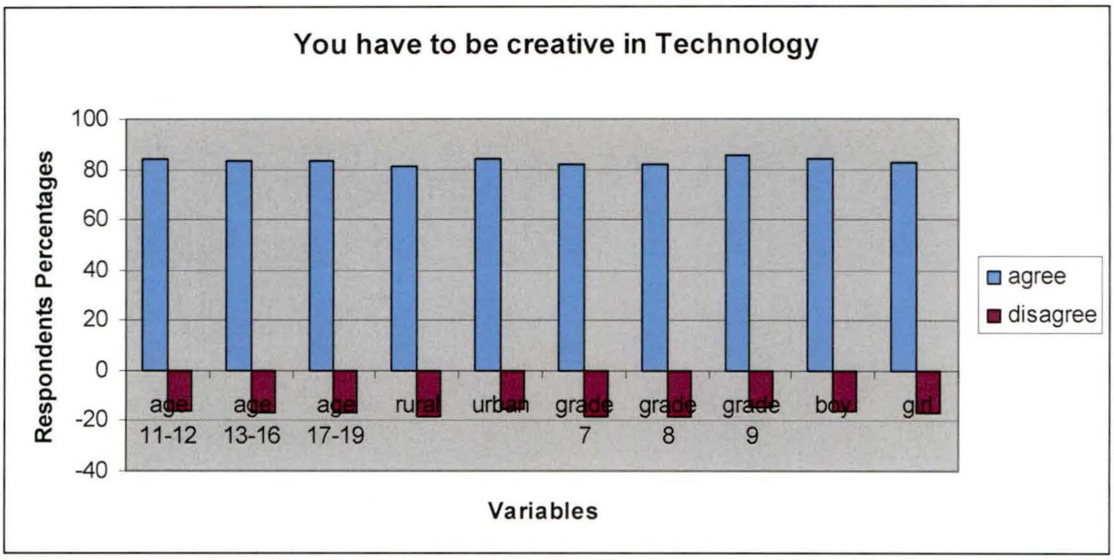
Graph 5.18: Without Technology there would be more problems in the world

According to graph 5.19, all age groups agreed that boys are better at dismantling facilities than girls. The age categories 11-12, 13-16 and 17-19 showed a positive response rate of 60.6%, 59.1% and 59.9% respectively. Only the minority of the respondents (39.4%, 40.9% and 40.1% respectively) did not agree with the statement. The curriculum requires learners to dismantle products and evaluate them. This is a negative finding because Technology is meant to empower both boys and girls in repairing equipment. This means that all age categories almost equally agree that boys are able to repair things better than girls. Urban and rural respondents showed a positive response rate of 60.1% and 57.8% respectively. The remainder of the respondents (39.9% and 42.2%) respectively did not agree with the statement that boys are able to repair things better than girls. The urban respondents were more positive to the statement than the rural respondents. This indicates that more still has to be done to encourage girls to manipulate things. The grades 7, 8 and 9 respondents showed a positive response rate of 62.1%; 57.8% and 58.1% respectively. The remainder of the respondents (37.9%; 42.2% and 41.9% respectively) did not agree with the statement that boys are able to repair things better than girls. The grade 7 respondents were more positive to the statement than other respondents. The boys and girls showed a positive response rate of 63.3% and 55.9% respectively. The remainder of the respondents (36.7% and 44.1% respectively) did not agree with the statement that boys are able to repair things better than girls. Boys were more positive to the statement than the girls.



Graph 5.19: Boys are able to repair things better than girls

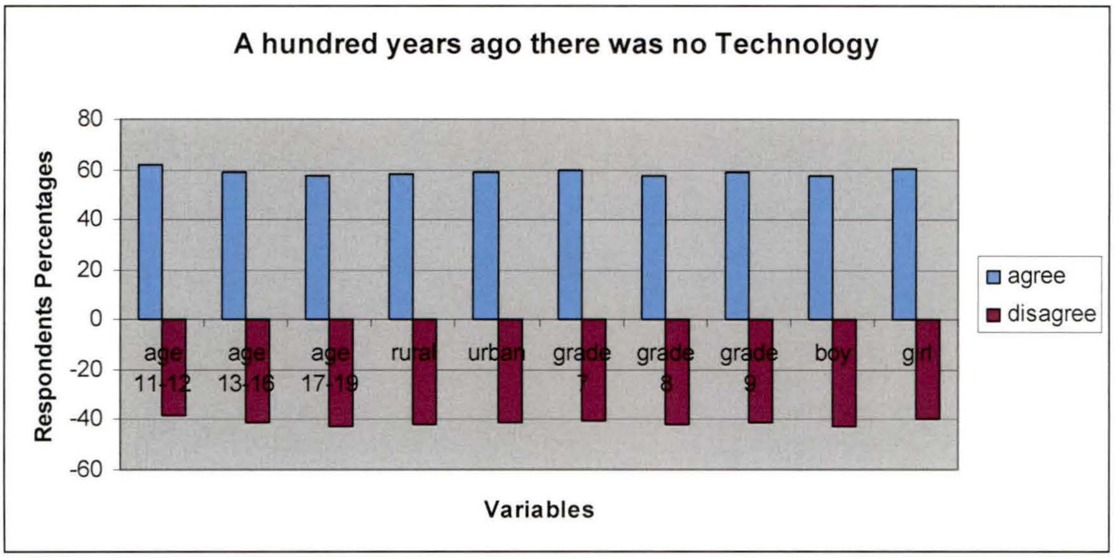
According to graph 5.20, learners of all age categories agree that Technology involves creativity. The age categories 11-12, 13-16 and 17-19 showed a positive response rate of 84%, 83.2% and 83.4% respectively. Only the minority (16%, 16.8% and 16.6% respectively) of the respondents did not agree with the statement. Creativity is critical to learning Technology. Creativity means generating as many ideas as possible. During the design stage of the technological process learners are expected to generate at least three possible ideas and come up with the best (DoE, 2002:6). Urban and rural respondents showed a positive response rate of 84.4% and 81.5% respectively. The remainder of the respondents (15.6% and 18.5%) respectively did not agree with the statement that they have to be creative in Technology. The urban respondents were more positive to the statement than the rural respondents. This means that urban learners are more creative in Technology than their rural counterparts. The grades 7, 8 and 9 respondents showed a positive response rate of 82.1%; 82.1% and 85.2% respectively. The remainder of the respondents (17.9%; 17.9% and 14.8% respectively) did not agree with the statement that they have to be creative in Technology. The grade 9 respondents were more positive to the statement than other respondents. This means that the grade 9 learners are more creative than other grade learners in Technology. Boys and girls showed a positive response rate of 84.1% and 82.9% respectively. The remainder of the respondents (15.9% and 17.1% respectively) did not agree with the statement that they have to be creative in Technology. Boys were more positive to the statement than the girls, meaning that they are more creative.



Graph 5.20: You have to be creative in Technology

In graph 5.21, the age categories 11-12, 13-16 and 17-19 indicated a positive response rate of 61.9%, 58.7% and 57.4% respectively. Other respondents (38.1%, 41.3% and 42.6% respectively) did not agree with the statement. It is discouraging to note that the majority of respondents have a view that Technology is very new. Technology is as old as human beings. This means that the younger age category thought Technology is more recent than other age categories. Urban and rural respondents showed a positive response rate of 59.1% and 58.4% respectively. The remainder of the respondents (40.9% and 41.6%) respectively did not agree with the statement that a hundred years ago there was no Technology. The rural respondents were more positive to the statement than the urban respondents. This means that rural learners think Technology is recent more than their urban counterparts. The grades 7, 8 and 9 respondents showed a positive response rate of 59.5%, 57.8% and 59.1% respectively. The remainder of the respondents (40.5%; 42.2%

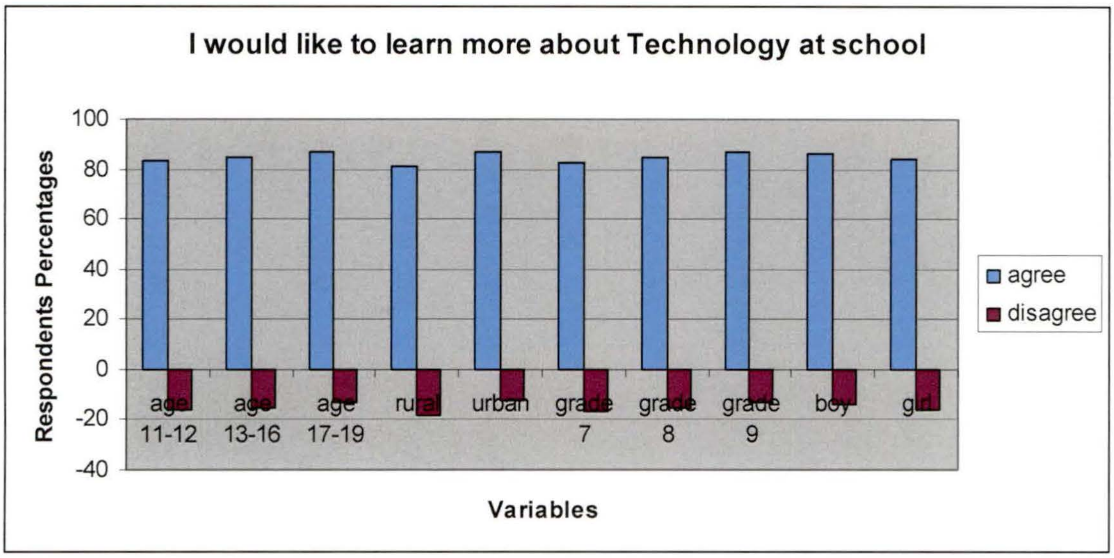
and 40.9% respectively) did not agree with the statement that a hundred years ago there was no Technology. The grade 7 respondents were more positive to the statement than other respondents. This means that grade 7 learners think Technology is recent more than grades 8 and 9 learners. Boys and girls showed a positive response rate of 57.3% and 60.2% respectively. The remainder of the respondents (42.5% and 39.8% respectively) did not agree with the statement that a hundred years ago there was no Technology. The girls were more positive to the statement than the boys meaning they think Technology is recent.



Graph 5.21: A hundred years ago there was no Technology

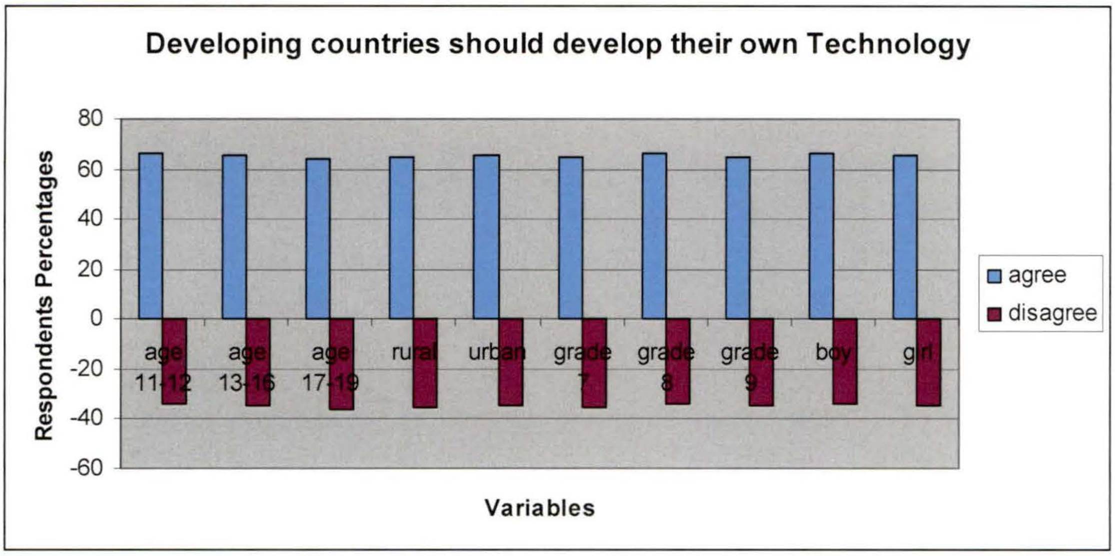
According to graph 5.22, the desire to know more about Technology grows with age. The age categories 11-12, 13-16 and 17-19 indicated a positive response rate of 83.6%, 84.7% and 86.6% respectively. Only a few respondents (16.4%, 15.3% and 13.4% respectively) did not agree with the statement. It is encouraging to see that the majority of the respondents would like to learn more about Technology at school. Technology is only taught for two hours per week in the National Curriculum (DoE, 2002:2). This means that the 17-19 age category would like to learn more about Technology at school than other age categories. Urban and rural respondents showed a positive response rate of

87.3% and 81.4% respectively. The remainder of the respondents (12.7% and 18.6%) respectively did not agree with the statement that they would like to learn more about Technology at school. The urban respondents were more positive to the statement than the rural respondents. The grades 7, 8 and 9 respondents showed a positive response rate of 82.9%, 84.5% and 86.6% respectively. The remainder of the respondents (17.1%, 15.5% and 13.4% respectively) did not agree with the statement that they would like to learn more about Technology at school. The grade 9 respondents were more positive to the statement than other respondents. Boys and girls showed a positive response rate of 86.2% and 84% respectively. The remainder of the respondents (13.8% and 16% respectively) did not agree with the statement that they would like to learn more about Technology at school. Boys were more positive to the statement than girls.



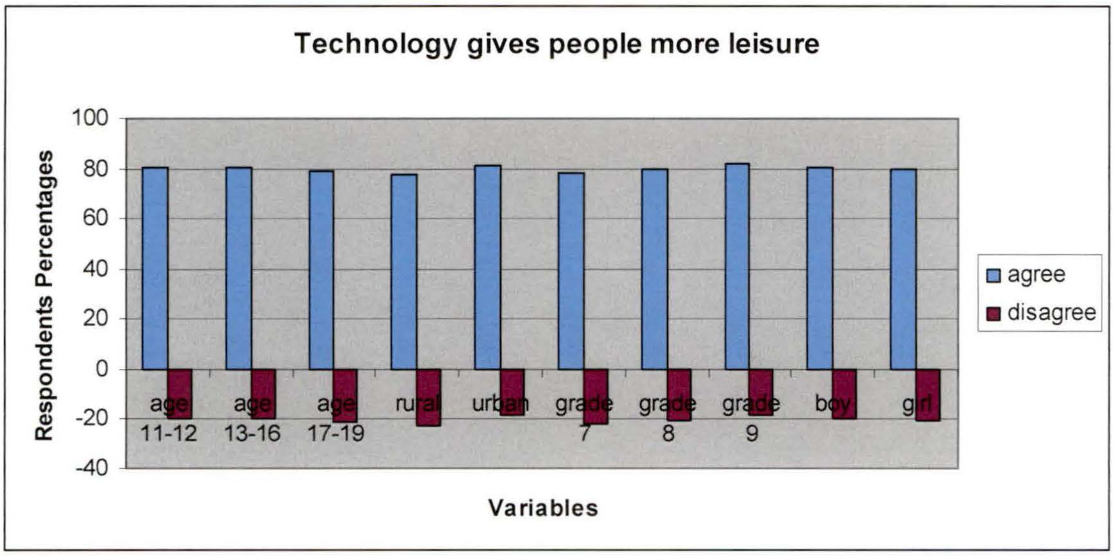
Graph 5.22: I would like to learn more about Technology at school

According to graph 5.23, the age categories 11-12, 13-16 and 17-19 indicated a positive response rate of 66.4%, 65.4% and 64% respectively. Other respondents (33.6%, 34.6% and 36% respectively) did not agree with the statement. There is a difference between various age groups on their perceptions that developing countries should develop their own Technology with the 11-12 age group being more positive. This perception reduces with age. In other words, the younger the learner the more he/she believes that developing countries should have their own Technology. Urban and rural respondents showed a positive response rate of 65.6% and 64.8% respectively. The remainder of the respondents (34.4% and 35.2%) respectively did not agree with the statement that developing countries should develop their own Technology. The urban respondents were more positive although not significant to the statement than the rural respondents. The grades 7, 8 and 9 respondents showed a positive response rate of 65%; 65.9% and 65.1% respectively. The remainder of the respondents (35%, 34.1% and 34.9% respectively) did not agree with the statement that developing countries should develop their own Technology. The grade 8 respondents were more positive to the statement than other respondents. Boys and girls showed a positive response rate of 66.1% and 65.3% respectively. The remainder of the respondents (33.9% and 34.7% respectively) did not agree with the statement that developing countries should develop their own Technology. Boys were more positive to the statement than girls. This statement was testing the thoughts of learners on indigenous knowledge systems (IKS). There may be many solutions to a technological problem depending on the context and societal needs. This statement is also alluded to in the Revised National curriculum Statement (DoE, 2002:14).



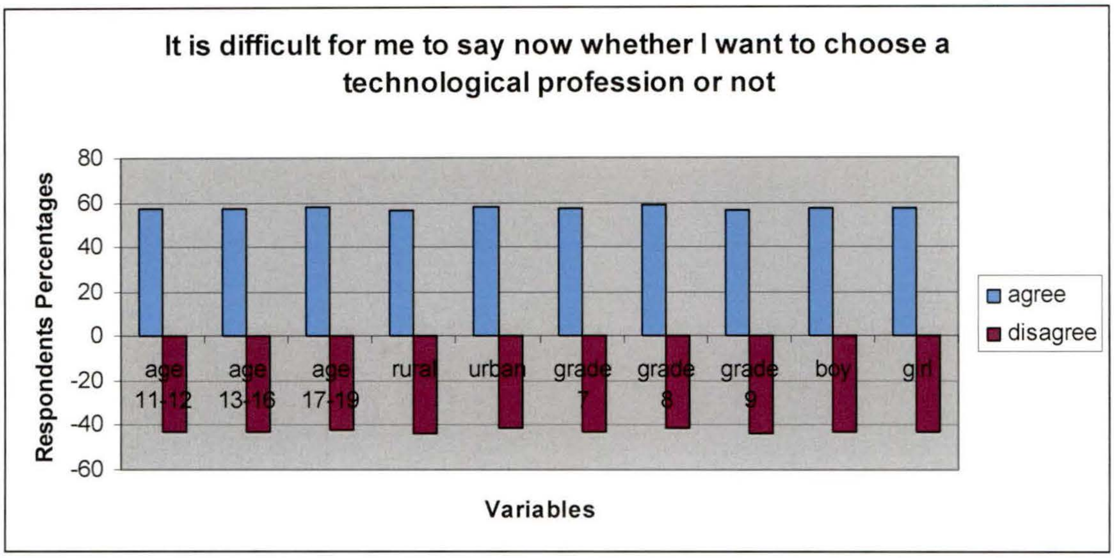
Graph 5.23: Developing countries should develop their own Technology

According to graph 5.24, the younger the learners the more they agree that Technology gives more people leisure. The age categories 11-12, 13-16 and 17-19 indicated a positive response rate of 80.5%, 80.1% and 78.8% respectively. Only a few respondents (19.5%, 19.9% and 21.2% respectively) did not agree with the statement. This means that the 11-12 age category has better concepts than other age categories that Technology gives people more leisure. Again, this emphasizes the attitude forming capacity which was advocated by Wolters as taking place between ages 12 and 13. Urban and rural respondents showed a positive response rate of 81.7% and 77.7% respectively. The remainder of the respondents (18.3% and 22.3%) respectively did not agree with the statement that Technology gives people more leisure. The urban respondents were more positive to the statement than the rural respondents. The grades 7, 8 and 9 respondents showed a positive response rate of 78.4%, 79.4% and 81.6% respectively. The remainder of the respondents (21.6%, 20.3% and 18.4% respectively) did not agree with the statement that Technology gives people more leisure. The grade 9 respondents were more positive to the statement than other respondents. Boys and girls showed a positive response rate of 80.5% and 79.9% respectively. The remainder of the respondents (19.5% and 20.1% respectively) did not agree with the statement that Technology gives people more leisure. Boys were more positive to the statement than girls.



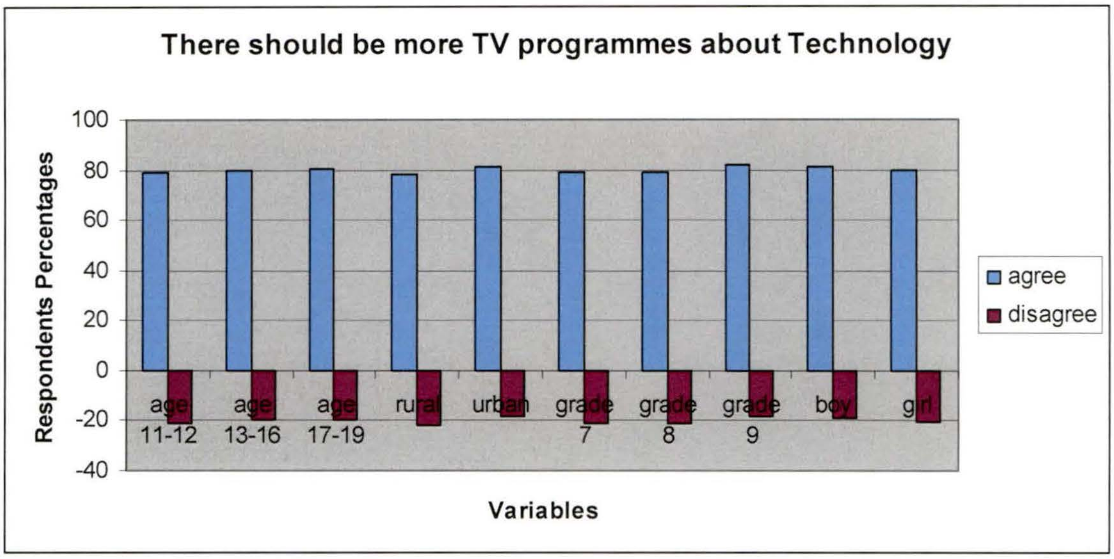
Graph 5.24: Technology gives people more leisure

According to graph 5.25, the older learners agreed more than other age groups that it is difficult for them to say now whether they want to choose a technological career or not. The age categories 11-12, 13-16 and 17-19 indicated a positive response rate 57.5%, 57.2% and 58.3% respectively. Other respondents (42.5%, 42.8% and 41.7% respectively) did not agree with the statement. Younger learners agree less with the statement. However it is evident that most respondents for each age category see choosing a technological career as problematic especially the 17-19 age category. Urban and rural respondents showed a positive response rate of 58.1% and 56.1% respectively. The remainder of the respondents (41.6% and 43.6%) respectively did not agree with the statement that it is difficult for them to say now if they want to choose a technological career or not. The urban respondents were more positive to the statement than the rural respondents. Although a number of respondents like Technology as a learning area and see its importance, a number of respondents are undecided about following a technological career. The grades 7, 8 and 9 respondents showed a positive response rate of 56.9%, 59% and 56.3% respectively. The remainder of the respondents (43.1%, 41% and 43.7% respectively) did not agree with the statement that it is difficult for them to say now whether or not they want to choose a technological career. The grade 8 respondents were more positive to the statement than other respondents. This means that the grade 8 learners are undecided about following a technological career more than grades 7 and 9 learners. Boys and girls showed a positive response rate of 57.5% and 57.5% respectively. The remainder of the respondents (42.5% and 42.5% respectively) did not agree with the statement that it is difficult for them to say now whether or not they want to choose a technological profession. Girls were equally positive to the statement with boys.



Graph 5.25: It is difficult for me to say now whether I want to choose a technological profession or not

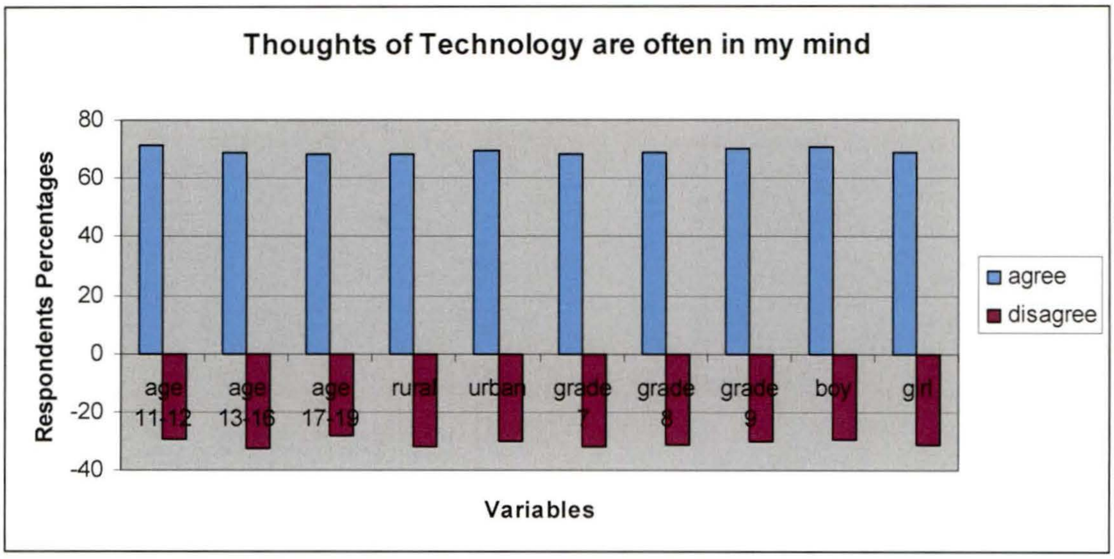
Graph 5.26 shows that the age categories 11-12, 13-16 and 17-19 indicated a positive response rate of 79.1%, 80% and 80.6% respectively. Other respondents (20.9.1%, 20% and 19.4% respectively) did not agree with the statement. The older the learners the more they agreed that there should be more TV programmes about Technology. However there were no significant differences between the three age groups. This means that they equally need more of the TV programmes about Technology in schools. Urban and rural respondents showed a positive response rate of 81.5% and 77.9% respectively. The remainder of the respondents (18.5% and 22.1%) respectively did not agree with the statement that there should be television programmes about Technology. The urban respondents were more positive to the statement than the rural respondents. This means that they need more of TV programmes in schools about Technology more than their rural counterparts. The grades 7, 8 and 9 respondents showed a positive response rate of 78.9%, 78.8% and 82.1% respectively. The remainder of the respondents (21.1%, 21.2% and 17.9% respectively) did not agree with the statement that there should be TV programmes about Technology. The grade 9 respondents were more positive to the statement than other respondents. This means that the grade 9 respondents need more TV programmes than their rural counterparts. Boys and girls showed a positive response rate of 80.9% and 79.7% respectively. The remainder of the respondents (19.1% and 20.3% respectively) did not agree with the statement that there should be more TV programmes about Technology. Boys were more positive to the statement than girls.



Graph 5.26: There should be more TV programmes about Technology

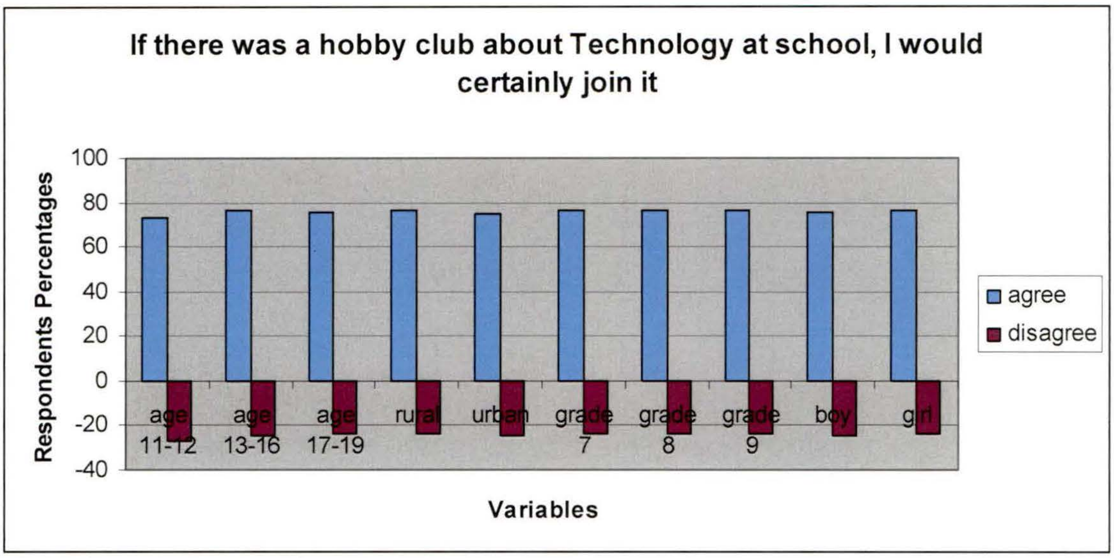
Graph 5.27 shows that the age categories 11-12, 13-16 and 17-19 indicated a positive response rate of 71.6%, 68.9% and 68.1% respectively. Only a few respondents (29.3%, 32.5% and 28.4% respectively) did not agree with the statement. The 11-12 age group was more positive than other age categories implying that thoughts of Technology are often in their minds. Urban and rural respondents showed a positive response rate of 69.7% and 68.1% respectively. The remainder of the respondents (30.3% and 31.9%) respectively did not agree with the statement that thoughts of Technology are often in their minds. The urban respondents were more positive to the statement than the rural respondents. The grades 7, 8 and 9 respondents showed a positive response rate of 68.2%; 68.5% and 70.1% respectively. The remainder of the respondents (31.8%, 31.5% and 29.9% respectively) did not agree with the statement that thoughts of Technology are often in their minds. The grade 9 respondents were more positive to the statement than other respondents. Boys and girls showed a positive response rate of 70.5% and 68.5%

respectively. The remainder of the respondents (29.5% and 31.5% respectively) did not agree with the statement that thoughts of Technology are often in their minds. Boys were more positive to the statement than girls.



Graph 5.27: Thoughts of Technology are often in my mind

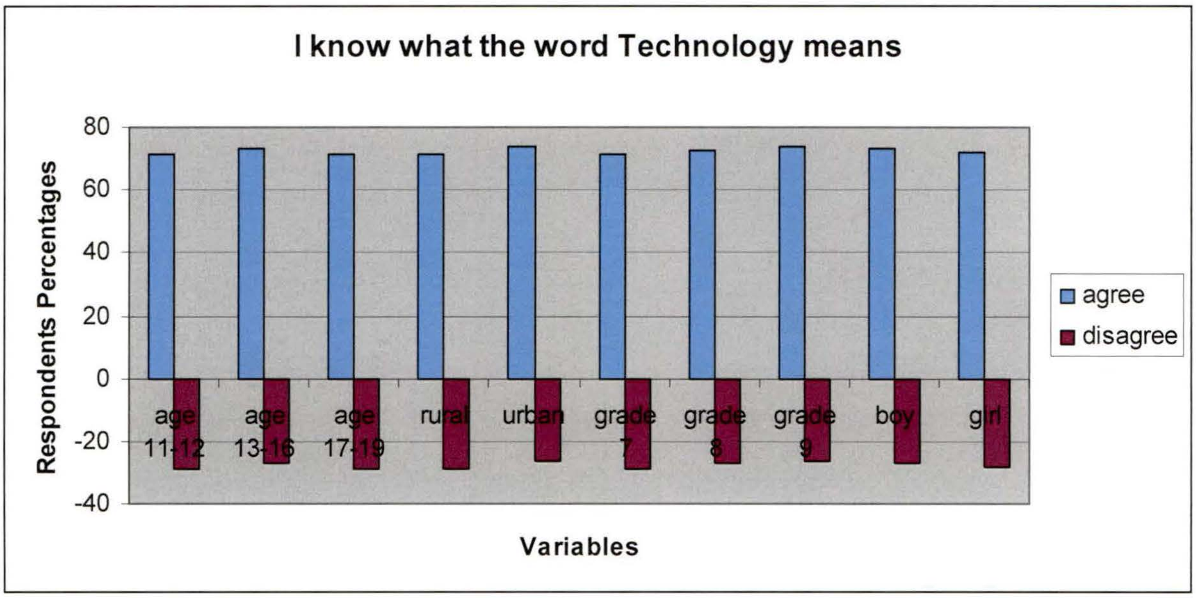
Graph 5.28 shows that the older the learners the more they would like to be involved in the hobby club about Technology. The age categories 11-12, 13-16 and 17-19 indicated a positive response rate of 73%, 76.6% and 75.9% respectively. Only a few respondents (27%, 24.4% and 24.1% respectively) did not agree with the statement. Critical and creative thinking that results in inventions characterize Technology. The older the learners the more they become interested in Technology. Urban and rural respondents showed a positive response rate of 75.1% and 76% respectively. The remainder of the respondents (24.9% and 24%) respectively did not agree with the statement that if there were a hobby club at school, they would certainly join it. The rural respondents were more positive although not significant to the statement than the urban respondents. The grades 7, 8 and 9 respondents showed a positive response rate of 76%, 76% and 76% respectively. The remainder of the respondents (24%, 24% and 23.9% respectively) did not agree with the statement that if there was a hobby club about Technology at school, they would certainly join it. The grades respondents were equally positive to the statement. Boys and girls showed a positive response rate of 75.5% and 76% respectively. The remainder of the respondents (24.5% and 24% respectively) did not agree with the statement that if there was a hobby club at school, they would certainly join it. Girls were more positive to the statement than boys.



Graph 5.28: If there was a hobby club about Technology at school, I would certainly join it

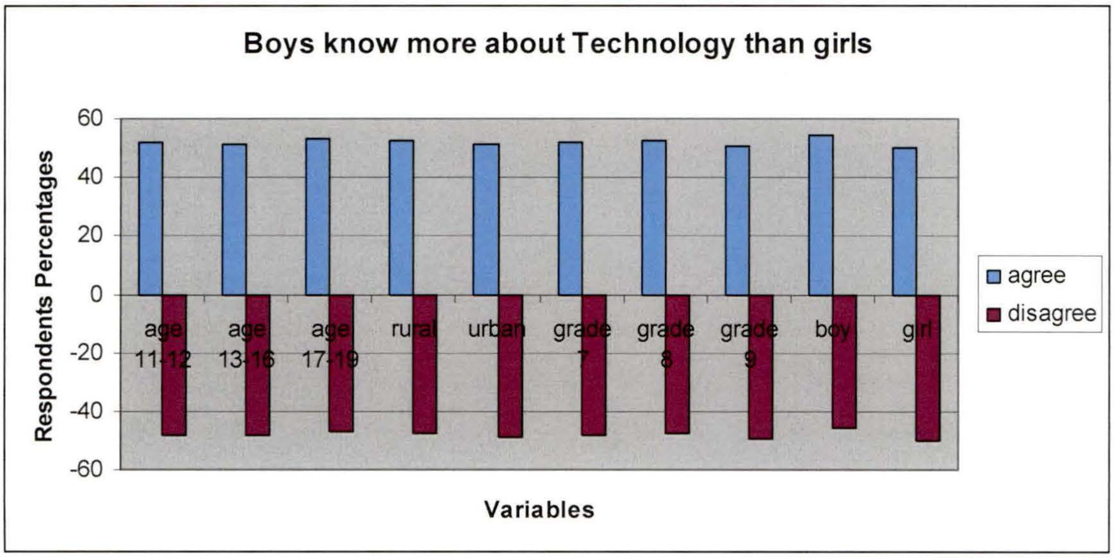
In graph 5.29, the percentages, which showed a positive response rate, are 71.1%, 72.9% and 71.5% for each of the age categories 11-12, 13-16 and 17-19 respectively. Only the minority of the respondents (28.9%, 27.1% and 28.5% respectively) did not agree with the statement. Technology has many definitions as discussed in chapters 1 and 2. The main aim of the question was to find out if learners do understand the meaning of Technology. The majority of respondents for each age category indicated that they know what Technology includes with the 13-16 age category being more positive to the statement. Urban and rural respondents showed a positive response rate of 73.5% and 71.5% respectively. The remainder of the respondents (26.5% and 28.5%) respectively did not agree with the statement that they know what the word Technology includes. The urban respondents were more positive to the statement than the rural respondents. The grades 7, 8 and 9 respondents showed a positive response rate of 71%, 72.8% and 73.9%

respectively. The remainder of the respondents (29%, 27.2% and 26.1% respectively) did not agree with the statement that they know what the word Technology includes. The grade 9 respondents were more positive to the statement than other respondents. Both boys and girls showed a positive response rate of 73.3% and 72.1% respectively. The remainder of the respondents (26.7% and 27.9% respectively) did not agree with the statement that they know what the word Technology includes. Boys were more positive to the statement than girls.



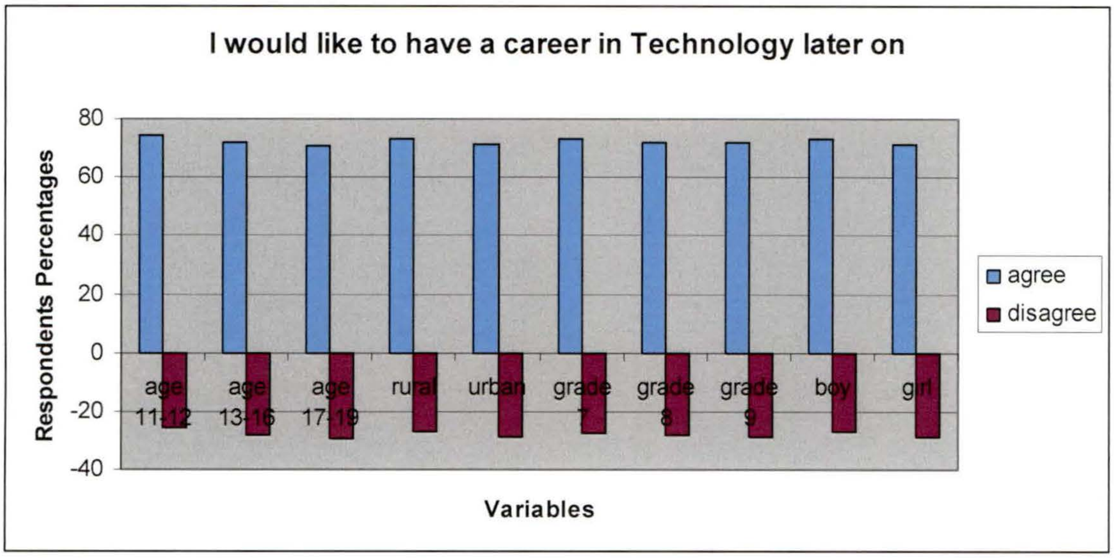
Graph 5.29: I know what the word Technology means

As seen in graph 5.30 the age categories 11-12, 13-16 and 17-19 indicated a positive response rate of 51.7%, 51.6% and 53.3% respectively. Other respondents (48.3%, 48.4% and 46.7% respectively) did not agree with the statement. Most respondents agree that boys know more about Technology than girls. This is a negative finding, which should be put straight through teaching Technology properly. Urban and rural respondents showed a positive response rate of 51.3% and 52.4% respectively. The remainder of the respondents (48.7% and 47.6%) respectively did not agree with the statement that boys know more about technology than girls. The rural respondents were more positive to the statement than the urban respondents. This means that rural learners aspire more than urban learners to have a career in Technology. The grades 7, 8 and 9 respondents showed a positive response rate of 51.7%, 52.7% and 50.8% respectively. The remainder of the respondents (48.3%, 47.3% and 49.2% respectively) did not agree with the statement that boys know more about Technology than girls. The grade 8 respondents were more positive to the statement than other respondents. Boys and girls showed a positive response rate of 54.1% and 50.1% respectively. The remainder of the respondents (45.9% and 49.9% respectively) did not agree with the statement that boys know more about Technology than girls. Boys were more positive to the statement than girls.



Graph 5.30: Boys know more about Technology than girls

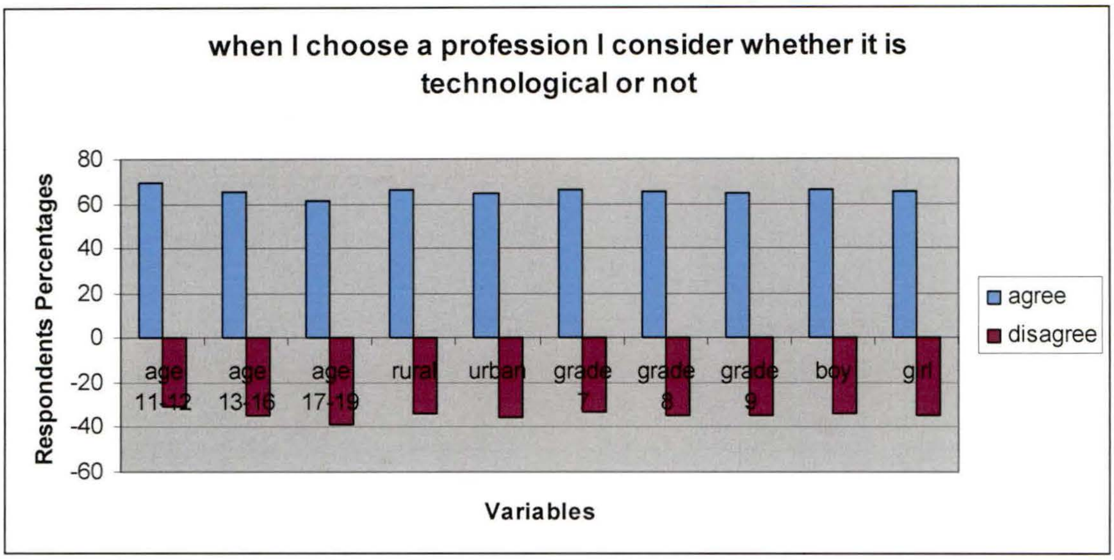
According to graph 5.31, the younger age group is more interested in having a career in Technology than the older learners. The age categories 11-12, 13-16 and 17-19 indicated a positive response rate of 74.3%, 71.8% and 70.6% respectively. Only a few respondents (25.6%, 28.2% and 29.4% respectively) did not agree with the statement. This is a positive finding to see that most participants are interested in pursuing technological careers. The 11-12 age category respondents were more positive to the statement than other age category respondents. This means that they would like to have a career in Technology at a later stage. Urban and rural respondents showed a positive response rate of 71.1% and 73.1% respectively. The remainder of the respondents (28.9% and 26.9%) respectively did not agree with the statement that they would like to have a career in Technology later on. The rural respondents were more positive to the statement than the urban respondents. The grades 7, 8 and 9 respondents showed a positive response rate of 72.9%, 72% and 71.9% respectively. The remainder of the respondents (27.4%, 28% and 28.8% respectively) did not agree with the statement that they would like to have a career in Technology later on. The grade 7 respondents were more positive to the statement than other respondents. Boys and girls showed a positive response rate of 73% and 71.4% respectively. The remainder of the respondents (27% and 28.6% respectively) did not agree with the statement that they would like to have a career in Technology later on. Boys were more positive to the statement than the girls. This means that girls aspire to have a career in Technology at a later stage more than boys.



Graph 5.31: I would like to have a career in Technology later on

According to graph 5.32, most respondents indicated that when they choose a profession they consider if it is technological in nature or not. The age categories 11-12, 13-16 and 17-19 indicated a positive response rate of 69.7%, 65.5% and 60.9% respectively. The remaining respondents (30.3%, 34.5% and 39.1%) did not agree with the statement. The

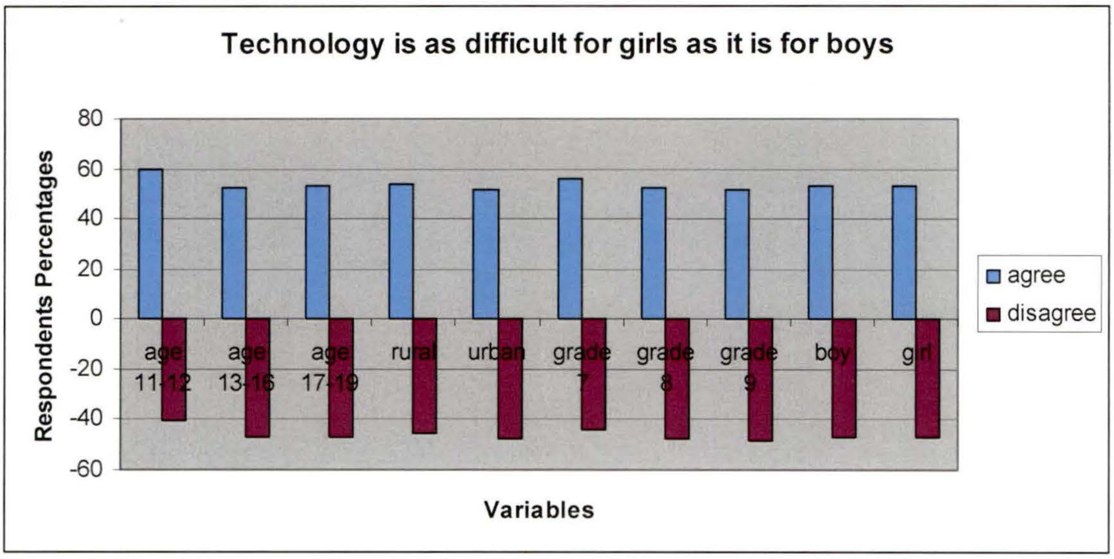
11-12 age group was more positive to the statement than other age groups. This means that they have a better concept that when they choose a career they should consider whether it is technological or not than the other age groups. Urban and rural respondents showed a positive response rate of 64.5% and 66.3% respectively. The remainder of the respondents (35.5% and 33.7%) did not agree with the statement that when they choose a profession they consider whether or not it is technological. The rural respondents were more positive to the statement than the urban respondents. This means that the rural learners have a better understanding that when they choose a career they should consider whether it is technological or not than the urban learners. The grades 7, 8 and 9 respondents showed a positive response rate of 66.5%, 65.3% and 64.9% respectively. The remainder of the respondents (33.5%, 34.7% and 35.1%) did not agree with the statement that when they choose a profession they consider whether or not it is technological. The grade 7 respondents were more positive to the statement than other respondents. This means that grade 7 learners have a better concept that when they choose a career they should consider whether it is technological or not than the grades 7 and 8 learners. Boys and girls showed a positive response rate of 65.9% and 65.6% respectively. The remainder of the respondents (34.1% and 34.4% respectively) did not agree with the statement that when they choose a career they consider whether or not it is technological. Boys were equally positive to the statement as girls. This means that both boys and girls have a good concept that when they choose a career they should consider whether it is technological or not.



Graph 5.32: When I choose a profession I consider whether it is technological or not

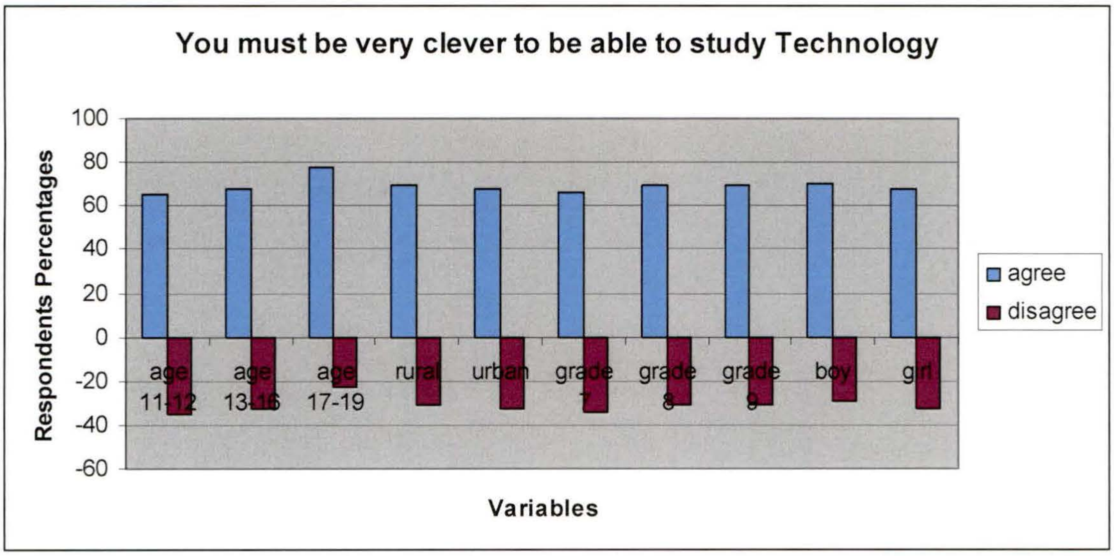
As illustrated in graph 5.33 the age categories 11-12, 13-16 and 17-19 indicated a positive response rate of 59.4%, 52.7% and 53.1% respectively. The remaining respondents (40.6%, 47.3% and 46.9%) did not agree with the statement. The majority of the respondents indicated that Technology is as difficult for girls as it is for boys. The younger age group was more positive about the statement than other age groups. The 11-12 age group has a better understanding and concept that Technology is equally difficult for both boys and girls than other age groups. Urban and rural respondents showed a positive response rate of 52% and 54.2% respectively. The remainder of the respondents (48% and 45.8%) respectively did not agree with the statement that Technology is as difficult for girls as it is for boys. The rural respondents were more positive to the statement than the urban respondents. The rural respondents have a better understanding and concept that Technology is equally difficult for both boys and girls than urban respondents. The grades 7, 8 and 9 respondents showed a positive response rate of 55.8%; 52.2% and 51.8% respectively. The remainder of the respondents (44.2%, 47.8% and 48.2% respectively) did not agree with the statement that Technology is as difficult for girls as it is for boys. The grade 7 respondents were more positive to the statement than other respondents. The grade 7 learners have a better understanding and concept that

Technology is equally difficult for both boys and girls than the grades 8 and 9 learners. The boys and girls showed a positive response rate of 53.4% and 53.3% respectively. The remainder of the respondents (46.6% and 46.7% respectively) did not agree with the statement that Technology is as difficult for girls as it is for boys. Boys were equally positive to the statement as girls.



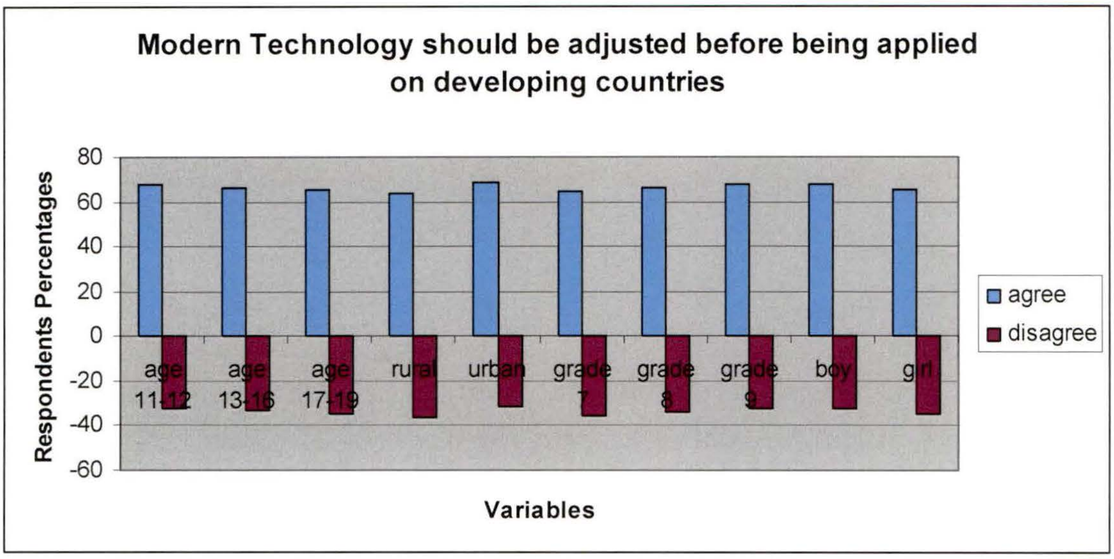
Graph 5.33: Technology is as difficult for girls as it is for boys

In graph 5.34, the age categories 11-12, 13-16 and 17-19 indicated a positive response rate of 65.2%, 67.6% and 77.3% respectively. The remaining respondents (34.8%, 32.4% and 22.7% respectively) did not agree with the statement. The majority of the respondents indicated that you must be clever to study Technology as shown in graph 5.59. Technology involves invention through creativity and this needs learners to be bright. The 17-19 age group was more positive to the statement than other age groups. This means that they have a better understanding and concept that one has to be above average intelligence to be able to study Technology than other groups. Urban and rural respondents showed a positive response rate of 67.7% and 69.1% respectively. The remainder of the respondents (32.4% and 30.9% respectively) did not agree with the statement that they have to be very clever to study Technology. The rural respondents were more positive to the statement than the urban respondents. This means that rural learners have a better understanding and concept that you have to be above average intelligence to be able to study Technology than urban learners. The grades 7, 8 and 9 respondents showed a positive response rate of 65.7%, 69.3% and 69.3% respectively. The remainder of the respondents (34.3%, 30.7% and 30.7% respectively) did not agree with the statement that you must be very clever to be able to study Technology. The grade 8 and 9 respondents were equally positive to the statement than the grade 7 respondents. This means that grades 8 and 9 learners have a better understanding and concept that you have to be above average intelligence to be able to study Technology than the grade 7 learners. Boys and girls showed a positive response rate of 70.3% and 67.3% respectively. The remainder of the respondents (29.7% and 32.7% respectively) did not agree with the statement that they must be clever to be able to study Technology. Boys were more positive to the statement than girls. This means that boys have a better understanding and concept that you have to be above average intelligence to be able to study Technology than girls.



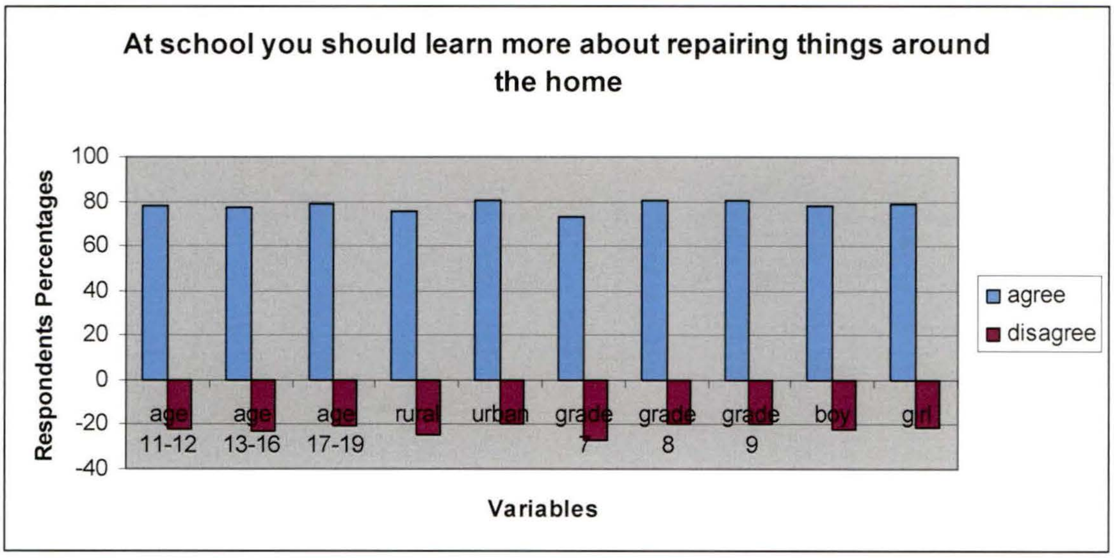
Graph 5.34: You must be very clever to be able to study Technology

According to graph 5.35, the age categories 11-12, 13-16 and 17-19 indicated a positive response rate of 67.4%, 66.5% and 65.4% respectively. The remaining respondents (32.6%, 33.5% and 34.6% respectively) did not agree with the statement. However, there was no significant difference between all age groups regarding their perception that modern Technology should be adapted before being applied in developing countries. This therefore means the majority of respondents in all age categories have an understanding that in the implementation of Technology in schools modern Technology needs to be adapted before being applied in developing countries. Urban and rural respondents showed a positive response rate of 68.4% and 63.4% respectively. The remainder of the respondents (31.6% and 36.4% respectively) did not agree with the statement that modern Technology should be adapted before being applied in developing countries. The urban respondents were more positive to the statement than the rural respondents. This therefore means the urban learners have an understanding that in the implementation of Technology in schools modern Technology needs to be adapted before being applied in developing countries than the rural learners. The grades 7, 8 and 9 respondents showed a positive response rate of 64.7%, 66.4% and 67.9% respectively. The remainder of the respondents (35.3%, 33.6% and 32.1% respectively) did not agree with the statement that modern Technology should be adapted before being applied in developing countries. The grade 9 respondents were more positive to the statement than other respondents. This therefore means the grade 9 learners have an understanding that in the implementation of Technology in schools modern Technology needs to be adapted before being applied in developing countries than the grades 7 and 8 learners. Boys and girls showed a positive response rate of 67.4% and 65.3% respectively. The remainder of the respondents (32.6% and 34.7% respectively) did not agree with the statement that modern Technology should be adapted before being applied in developing countries. Boys were more positive to the statement than girls. This therefore means boys have an understanding that in the implementation of Technology in schools modern Technology needs to be adapted before being applied in developing countries than girls.



Graph 5.35: Modern Technology should be adapted before being applied in developing countries

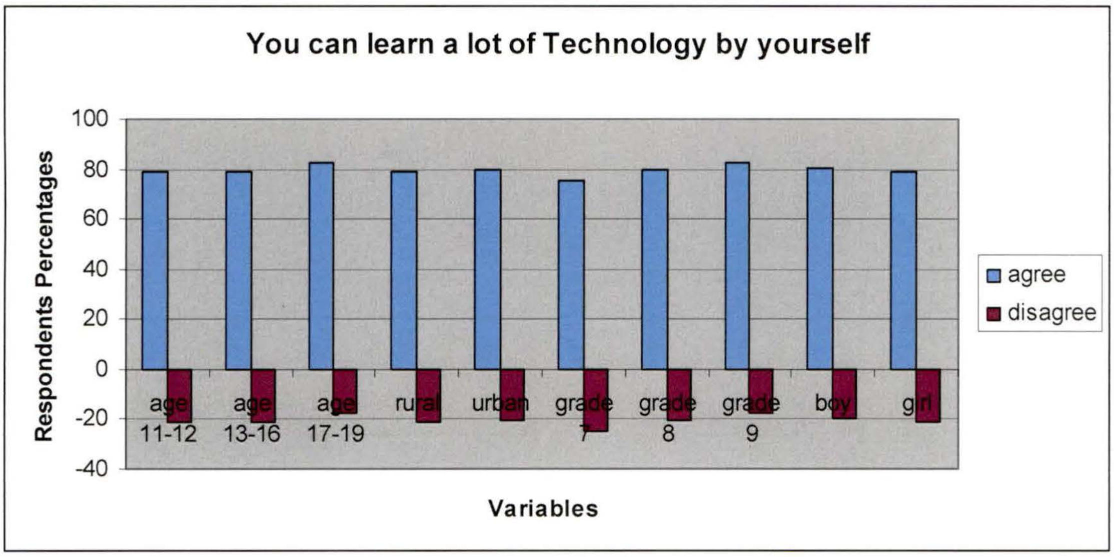
In graph 5.36, the age categories 11-12, 13-16 and 17-19 indicated a positive response rate of 77.8%, 77.4% and 79.2% respectively. The remaining respondents (22.2%, 22.6% and 20.8% respectively) did not agree with the statement. It is a positive finding to note that Technology can be applied around the home by most participants. This therefore means that learners of all age categories are motivated to learn things that are of practical value in their lives. Urban and rural respondents showed a positive response rate of 80.3% and 75.3% respectively. The remainder of the respondents (19.7% and 24.7% respectively) did not agree with the statement that at school they should learn more about repairing things around the home. The urban respondents were more positive to the statement than the rural respondents. This therefore means that urban learners are motivated to learn things that are of practical value in their lives than rural learners. The grades 7, 8 and 9 respondents showed a positive response rate of 73.4%, 80.1% and 80.1% respectively. The remainder of the respondents (26.6%, 19.9% and 19.9% respectively) did not agree with the statement that at school they should learn more about repairing things around the home. The grade 9 and 8 respondents were equally positive to the statement than the grade 7 respondents. This therefore means that grades 8 and 9 learners are motivated to learn things that are of practical value in their lives than the grade 7 learners. Boys and girls showed a positive response rate of 78.1% and 78.5% respectively. The remainder of the respondents (21.9% and 21.5% respectively) did not agree with the statement that at school they should learn more about repairing things around the home. Girls were more positive to the statement than boys. This therefore means that girls are motivated to learn things that are of practical value in their lives than boys.



Graph 5.36: At school you should learn more about repairing things around the home

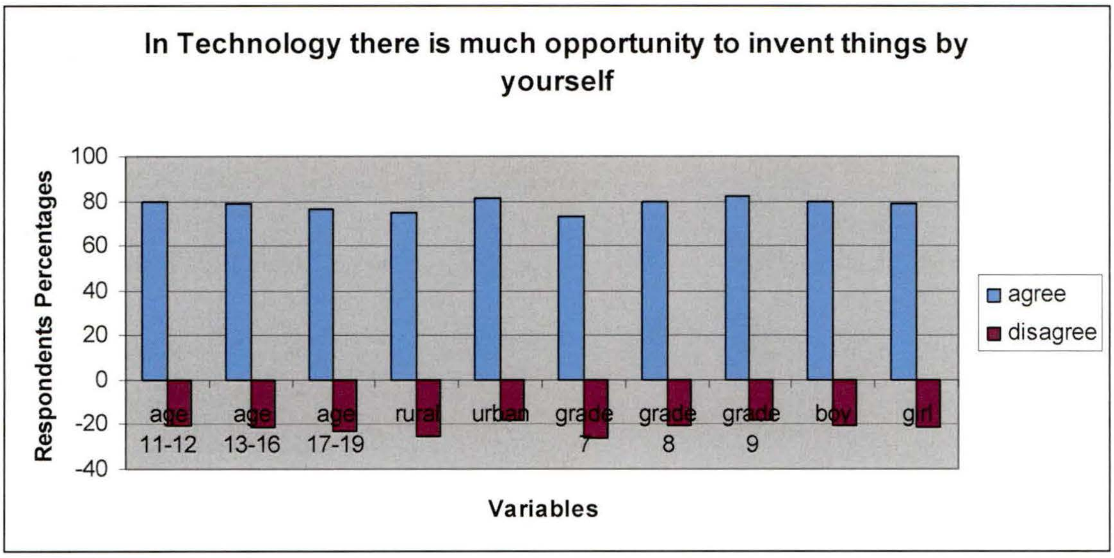
As shown in graph 5.37 the age categories 11-12, 13-16 and 17-19 indicated a positive response rate of 78.8%, 79% and 82.4% respectively. The remaining respondents (21.2%, 21% and 17.6% respectively) did not agree with the statement. Again it is encouraging to see that most respondents agree that you can do a lot of Technology by yourself. The 17-19 age group was more positive to the statement than other age groups. This means that they have a better concept and understanding that you can learn a lot of Technology by yourself than the other age groups. Urban and rural respondents showed a positive response rate of 79.5% and 78.8% respectively. The remainder of the respondents (20.5%

and 21.2% respectively) did not agree with the statement that they can learn a lot of Technology by themselves. The urban respondents were more positive to the statement than the rural respondents. This means that urban learners have a better concept and understanding that you can learn a lot of Technology by yourself than rural learners. The grades 7, 8 and 9 respondents showed a positive response rate of 75%, 79.6% and 82.3% respectively. The remainder of the respondents (25%, 20.4% and 17.7% respectively) did not agree with the statement that they can learn a lot of Technology by themselves. The grade 9 respondents were more positive to the statement than other respondents. This means that grade 9 learners have a better concept and understanding that you can learn a lot of Technology by yourself than the grades 7 and 8 learners. Boys and girls showed a positive response rate of 80.5% and 78.8% respectively. The remainder of the respondents (19.5% and 21.2% respectively) did not agree with the statement that they can learn a lot of Technology by themselves. Boys were more positive to the statement than the girls. This means that boys have a better concept and understanding that you can learn a lot of Technology by yourself than girls.



Graph 5.37: You can learn a lot of Technology by yourself

As indicated in graph 5.38 the age categories 11-12, 13-16 and 17-19 indicated a positive response rate of 79.4%, 79% and 76.7% respectively. The remaining respondents (20.6%, 21% and 23.3% respectively) did not agree with the statement. The majority of the respondents indicated that in Technology there is much opportunity to invent things by themselves. Urban and rural respondents showed a positive response rate of 81.6% and 74.9% respectively. The remainder of the respondents (18.4% and 25.1% respectively) did not agree with the statement that in Technology there is much opportunity to invent things by themselves. The urban respondents were more positive to the statement than the rural respondents. This means that urban learners have a better construct and concept that in Technology there is much opportunity to invent things by yourself than the urban learners. The grades 7, 8 and 9 respondents showed a positive response rate of 73.5%, 79.7% and 82.2% respectively. The remainder of the respondents (26.5%, 20.3% and 17.8% respectively) did not agree with the statement that in Technology there is much opportunity to invent things by themselves. The grade 9 respondents were more positive to the statement than other respondents. This means that grade 9 learners have a better construct and concept that in Technology there is much opportunity to invent things by yourself than the grade 7 and 8 learners. Boys and girls showed a positive response rate of 79.4% and 78.9% respectively. The remainder of the respondents (20.6% and 21.1% respectively) did not agree with the statement that in Technology there is much opportunity to invent things by themselves. Boys were more positive to the statement than girls. This means that boys have a better construct and concept that in Technology there is much opportunity to invent things by themselves than girls.



Graph 5.38: In Technology there is much opportunity to invent things by yourself

5.6 MAIN FINDINGS FROM LEARNERS' QUESTIONNAIRES

The attitudes of learners towards Technology have been studied worldwide as indicated in Chapter 2. Attitude forming capacity begins at the age of 12-13 years (Wolters, 1989:9). Learners in this age category were more positive to the statements than other age groups. This means that they have a better understanding and concept of Technology than other age groups. They have indicated that they would like to follow technological careers in future. It is therefore better that learners study Technology at an early age as they are becoming positive.

When Raat and de Vries investigated PATT (Holland, 2004:218) they investigated learners' attitudes toward and conceptual understanding of Technology. Their results suggested that girls see Technology as less important. Boser, Palmer and Daugherty (1998: 15) indicated that after using the integrated approach to teach Technology, there was a negative change in the attitudes towards Technology. The said authors explained that perhaps learners had achieved a more balanced view of Technology. Learners retained a more positive outlook toward Technology when they participated in less controversial content.

Regardless of gender, participation in technology education did not significantly affect learners' interest in Technology. However, girl learners perceived Technology to be less interesting than boy learners did. Boys held stereotypical views about roles of girls in Technology. According to Boser, Palmer and Daugherty (1998:16) research literature offers some explanations for these findings. Technology, mathematics, and science are still considered as nontraditional areas for women and that parental and societal perception, and teachers' behaviour and expectations, contribute to women's interest in these fields.

Overall, urban respondents were more positive to the statements than the rural learners. There is confusion between Technology education and educational Technology. Technology education is also confused with the use of computers. This means that urban learners have better construct and concept about Technology than rural learners. Intervention programmes need to be put in place to encourage the participation of rural learners in Technology. Generally, the grade 9 learners were more positive to the statements than the grades 1 and 8 learners. This means that they have a better concept of Technology than other grade learners. This is most probably because of more number of years they have spent in the senior phase doing Technology. Boys were more positive to most statements than girls. This is a negative finding and programmes that address the participation of girl learners in Technology need to be put in place. Overcoming societal norms seem to be a huge challenge.

5.7 INTERVIEWS (see Appendices 7, 8 and 9)

As discussed in chapter 4, three categories of participants were identified as respondents. These included Technology learning area heads, Technology education specialists and Technology experts. These groups represented a purposive sample, selected within the time and space limitations of the study schedule, and to ensure input from all representative groups. This data has been used to assist in answering the general research questions relating to the implementation of Technology in the North West Province and options for the future of the learning area. The following data describes findings from interviews and discussions with the qualitative sample.

5.7.1 Critical issues to be considered when implementing Technology (see Appendices 7, 8 and 9)

The learning area heads indicated that when implementing Technology the following critical issues need to be considered:

- Physical resources (**Annexure 12 lines 188; 233;256**)
- Human resources (**Annexure 12 lines 211; 233;276;299**)

This means that it is difficult or almost impossible to implement Technology without the relevant physical and human resources. These sentiments were echoed by all heads of departments interviewed. The lack of these resources in schools was perceived as a challenge facing the reconstruction of education in South Africa (Anckiewicz, 1995:245; Hugh, 2003:1).

Technology education specialists reported the following as critical for the implementation of technology in schools:

- Teacher training and
- Enough support in terms of resources, equipment, textbooks and standing annual budget for Technology should be critical issues to be considered when implementing Technology in schools.

The specialists saw educator training as being crucial in the implementation of technology education. Educators need to be supported in the implementation and sufficient resources should be availed to schools. The following statements are the sentiments echoed by the subject specialist regarding critical issues to be considered:

> *"Thorough training of educators; Resource centre for enrichment purposes; Provision of Technology equipment and tools; sufficient educators and subject advisors.* (**Annexure 11 line 96**).
> *Tools and equipment must be supplied to schools; Provide bigger classrooms or workspace.* (**Annexure 11 line 119**).
> *Teachers should be properly trained; Materials and equipment should be supplied.* (**Annexure 11 line141**).
> *Funds must be made available; Educators must be trained; Trainers must be well qualified; Conducive working space for schools.* (**Annexure 11 line 164**)."

The Technology experts indicated the following as critical issues to be considered when implementing Technology:

- Educators' level of readiness. Educators are the foot soldiers of the Department of Education and if not properly trained confusion and frustration with implementation are inevitable; (**Annexure 10 line 6**);
- Support needs to be mobilized by engaging key stakeholders; (**Annexure 10 line 27**);
- Awareness campaigns about the benefits of the learning area need to be embarked upon, especially targeting parents and learners;
- Developing a sound conceptual basis for Technology education thereby using philosophy of Technology should be looked at; (**Annexure 10 line 51**);
- Collecting evidence that Technology education makes a change and for this valid and reliable assessment instruments need to be developed; (**Annexure 10 line 27**).
- Teacher understanding of the purpose of Technology education should be improved; and (annexure 10 line 73).
- Materials and equipment should be made available. (**Annexure 10 line 27**)..

This means that educators in general are not ready to implement Technology. They need to be thoroughly trained to teach Technology and get the required support from subject specialists. Research should be conducted on a continuous basis to determine the existing state of affairs of Technology implementation and review of the implementation strategy. The resources should be supplied to all schools.

It is interesting to note that all the stakeholders interviewed perceived the availability of resources and educator readiness as critical regarding the implementation of Technology. These sentiments were echoed by researchers such as Stables (1997), Ter-morshuizen (1997) and Elmer & Goodhew (1996) as reflected in chapter 2.

5.7.2 Approach to teach Technology in the North West Province (see Appendices 7, 8 and 9)

The following factors have been indicated as being important for the teaching of Technology by learning area heads:

- Making funds available to assist schools with procurement of resources (**Annexure 12 lines 233**),
- Prioritising teacher training.
- Allowing middle school learners to have a choice of learning areas. This will help to alleviate high teacher learner ratios.
- Providing all the Area Project offices with learning area advisors (**Annexure 12 lines 278**)

This means that in the implementation of Technology the department of education should consider making funds available to all schools for procurement of required equipment and materials. The second step will then be to build capacity for the educators (human resource). The final step would be to provide subject advisors to support schools in every area project office. There were also sentiments that the classrooms are overcrowded. In this regard the department should provide extra Technology facilitators or make Technology optional.

The education specialists indicated the following as the relevant approach to implement Technology in the NWP:

- Curriculum planners need to identify the schools that need to implement Technology (**Annexure 11 line 143**),
- Shortages of human and physical resources need to be identified (**Annexure12 line 141**).
- A budget needs to be drawn up to supply schools with the necessities.
- We need to start by training educators first. The universities must establish pre and in-service Technology teacher programmes. Mathematics, Science and Vocational educators need to be identified and re-trained to teach Technology.

The approach suggested by the specialists is that we should get back to the drawing board. We need to identify schools and implement in phases. We also need to take stock of existing human and physical resources. The budget should then be drawn to address the needs of schools. Educators should then be trained in the learning area.

The Technology experts said that the following is the approach that should be followed in order to teach Technology:

- Given the financial constraints it is better to focus on the teaching and learning of basic technological concepts that can be taught in any environment; (**Annexure 10 line 53**).
- It is better to develop a concept and approach of Technology Project/Model schools and marshal efforts towards them to heighten interest and implement the project in all schools; (**Annexure 10 line 10**).
- In-service ideas such as the distance learning techniques should be investigated; and (**Annexure 10 line 75**).
- A common set of materials and equipment should be produced so that educators can share common ideas and approaches. (**Annexure 10 line 75**).

Due to constraints in the supply of resources, educators would need to improvise when teaching Technology. They could use locally available materials for the projects. There should be a strategy on how Technology should be implemented in schools. Common materials would enhance the common approach among schools. All interviewed groups yearn for some model or approach in which Technology could be implemented. This model starts with the training of educators and providing resources to schools.

5.7.3 Hindrances towards Technology education implementation in schools (see Appendices 7, 8 and 9)

The learning area heads reported the following as hindrances towards the implementation of Technology education in schools:

- Lack of resources and well trained educators,
- Lack of parental support and
- Having few education specialists in the field (learning area advisors).

This means that the lack of resources in schools will render the implementation of Technology ineffective. Another hindrance reported by the learning area heads is that the parents do not give support to their children. This area was also alluded to by the Technology experts. The support of parents is crucial as they can influence their children positively to study Technology. There are few education specialists to support educators in schools. This means that for most of the time educators are left on their own without any support.

The learning area specialists reported that the following factors as hindrances towards the implementation of Technology in schools:

- Lack of resources and qualified educators; (**Annexure 11 line 100; 168**).
- Lack of support from the education department; (**Annexure 11 line 122**).
- Lack of interaction between Education department and Science and Technology department. (**Annexure 11 line 145**).

This means that in the implementation of Technology in our province is hindered by a shortage of both human and physical resources. The educators do not enjoy support from the department in terms of implementing the learning area. It was found that communication by the department of education with other government departments like the Science and technology department leaves a lot to be desired.

Technology experts indicated that the following factors are hindrances towards the implementation of Technology education:

- The poor image of the learning area with school governing bodies and parents (no high status like science). (**Annexure 10 line 13**).
- Lack of evidence so far that Technology makes a difference; (**Annexure 10 line 55**).
- Inadequately trained teacher force
- Undedicated support to train educational officials manning the National and Provincial Technology projects; (**Annexure 10 line 77**).
- Lack of awareness campaigns and physical resources; and (**Annexure 10 line 12**).
- National and Provincial Expo's tend to put Science projects ahead of Technology projects. (**Annexure 10 line 12**).

This means that a low status of the learning area was seen as a hindrance for the implementation of Technology in schools. Educators who are not appropriately qualified were also seen to be a hindrance because they do not implement Technology correctly. The unavailability of physical resources is a major handicap. Once more in all groups interviewed they see the lack of educator support as well as lack of provisioning resources in schools as major obstacles in the implementation of Technology.

5.7.4 Ways of overcoming the hindrances (see Appendices 7, 8 and 9)

The learning area heads then suggested the following ways of overcoming the hindrances:

- As a long-term strategy the department and schools should raise sufficient funds for the needed resources; (**Annexure 12 lines 216; 217**)
- Providing intensive training for educators who are already in the system; (**Annexure 12 line 305**)
- Support should be solicited from all stakeholders; (**Annexure 12 lines 239**)
- Educators should be given a year to practice in industry;
- More education specialists should be appointed to support schools.

This means that the department should strategize and budget for the resources in order to implement Technology properly in schools. Another area that would alleviate implementation hindrances was suggested to be in-service training of educators who are already teaching Technology. All stakeholders should participate meaningfully in the implementation of Technology to make it successful. There should also be partnerships between industry and schools as well as personnel who will support educators in schools.

The following sentiments were echoed by the specialists regarding overcoming the hindrances. They felt that there should be proper planning and interaction between all stakeholders. These include Department of education, Department of Science and Technology, industries and commerce and institutions of higher learning. Involvement of qualified Technology personnel when drafting policies and other relevant documents would also help alleviate the hindrances.

Some specialists said the following regarding ways of overcoming the hindrances:

> *"Thorough workshop and training of educators; Subject advisors must be provided with transport so as to perform their duties well. Restructuring each APO to be provided with its own subject advisor.* (**Annexure 11 line 102**).
> *Tools and equipment must be supplied to schools; Special Technology classrooms must be built; Training of teachers by universities.* (**Annexure 11 line 124**).
> *More workshops until everyone is clear about implementation issues.* (**Annexure 11 line 147**).

The following factors were seen as crucial for overcoming the hindrances regarding the implementation of Technology as reported by the experts:

- Most importantly get all parties involved: educators who are well trained, politicians to take supportive measures, department of education providing equipment and rooms, enthusiastic learners, industrial support and educational research to back up development. (**Annexure 10 line 57**).
- Educators with training in Technology should be given the priority to fill senior posts
- Technology needs to be made relevant to the African community by incorporating Indigenous Knowledge Systems (IKS) (**Annexure 10 line 12**).
- Link up common teacher training with a common syllabus for learners (including written materials as a workbook) with common materials and shared assessment instruments. This integrated approach would allow an economy of scale that would save a lot of money and have a greater impact. (**Annexure 10 line 75**).

There is a relationship between the crucial things to be considered when implementing Technology and the hindrances. The hindrances are the absence of crucial things in the implementation of Technology. The experts suggested that the field must be leveled in terms of getting support from politicians. The educators should then be trained and the resources should be provided to schools. There should be partnerships with industry to allow for networking. Again, all parties agreed that some kind of a strategy should be devised to implement Technology effectively.

5.7.5 Professional development programmes (see Appendices 7, 8 and 9)

The learning area heads indicated that professional development programmes are done through the following ways:

- At the moment it is taking place through in-service programmes. There are disappointments at times because educators would be told to go back to schools, as there is no Technology learning area advisor to facilitate training.
- Bojanala West region has taken an initiative to involve industries (Anglo Platinum) and University of Johannesburg to train all their educators. This initiative is plausible

because all the educators in this region will obtain an accredited qualification in Technology.

The implications of the said findings are that professional development programmes do take place but they are not enough to build proper capacity for the educators. Only one region out of five is receiving assistance from industry and they are helping educators acquire a tertiary qualification in Technology. The department could further investigate the said partnership and cascade it to other schools.

The interviewees (subject specialists) reported the following points about professional development programmes:

- In-service training is facilitated by the department of education and accredited teacher-training programmes are conducted by higher education institutions. It looks like the department is also conducting courses for educators but they are not sufficient to build capacity. Since technology educators come from various learning area backgrounds, those who have not obtained theoretical training in it seem to battle with the learning area. This statements capture what the subject specialists said:

"*Yes. Short workshops for educators.* (**Annexure 11 line104**).
Yes, Normal training by subject advisors. Courses at North West university/Wits and University of Johannesburg. (**Annexure 11 line 126**).
Yes. The in-service training workshops but they are not enough. (**Annexure 11 line 149**)."
Yes short courses that are offered by subject advisors. Educators who are not properly qualified to offer the learning areas are a cause for concern. (**Annexure 11 line 172**).

The Technology experts reported the following regarding professional development programmes:

- Professional development programmes exist both inside and outside South Africa. Eindhoven University in the Netherlands offers in-service education in Technology for two years through universities or colleges (interviews with Marc de Vries). Marc de Vries is a professor of Technology education at Eindhoven University in the Netherlands. He was the guest speaker at the Southern African Association for Research in Mathematics, Science and Technology Education (SAARMSTE) conference held on 9-12 January 2006 at the University of Pretoria. It was at this time that he was interviewed. This suggests that since Technology education is a relatively new learning area, educators' training in the learning area may not have to be done in a short period like the rest of other learning areas. University of the North (now University of Limpopo) and PROTEC offer the ACE programme over two years (interviews with Peter Middleton). Peter Middleton is a curriculum developer at PROTEC in Gauteng. University of Kwa-Zulu Natal and Technology for All is offering a similar programme (interviews with Kate Termorshuizen). Kate is a Technology lecturer at the University of Kwa-Zulu Natal (Edgewood campus). Nelson Mandela Metropolitan University (former University of Port Elizabeth and University of Transkei) and ORT-STEP offer a variety of Technology courses (interviews with Andrew Stevens). Andrew Stevens is professor of technology Education at Rhodes University. Johannesburg University offer Masters and Doctoral degrees (interviews with Justice Pitsoe). Justice is a Technology education doctoral student at Pretoria University). North West University offers the ACE, Honours , Masters and Doctoral degrees in Technology education (interviews with Norman Marumo). Norman Marumo is a Technology Masters' degree student at North West University (Mafikeng campus).

- The department of education is offering workshops, which seem inadequate.

This means that a variety of professional development programmes exist in South African Universities. The department of education could enter into a partnership with the higher education institutions and offer assistance in terms of bursaries for Technology educators. This initiative could alleviate the problem of unqualified Technology educators. This shows that the educators could attain the relevant Technology qualification through the higher education institutions.

5.7.6 Attitude of educators towards Technology (see Appendices 7, 8 and 9)

The learning area heads felt that the attitudes of educators towards Technology is not good enough due to lack of resources and support, but for schools that have the resources and support the attitudes of educators was positive. Educators who are qualified in the learning area seem to have a positive attitude towards it. The statements below are what some of the learning area heads said about the attitudes of educators.

> *"Positive and promising; some are still afraid of change*; (**Annexure 12 line 198**).
> *To some positive and others negative; educators are afraid of change*; *Technology is seen as an expensive exercise*; (**Annexure 12 line 220**).
> *Some are afraid of change; some are discouraged before they try; some believe it is difficult and won't work.* (**Annexure 12 line 243**).
> *It is negative because they don't understand it.* (**Annexure 12 line 266**).

The learning area specialists reported that educators do not like the learning area because they are not capacitated and well supported. They also said that some of the education specialists who are supposed to support educators do not know the learning area very well. The most difficult areas to support are electrical, mechanical and pneumatic and hydraulic systems. Otherwise the attitudes of educators would improve if the level of support is good. This correlates with the educators' views where 91% of the respondents indicated that they need support to teach Technology effectively. The following statements capture what some subject specialists have said about the attitudes of educators towards Technology:

> *"Some educators do not take the subject serious and some view it as being difficult. Educators do not teach all the learning outcomes and assessment standards.* (**Annexure 11 line106**).
> *Some teachers do not show interest in the learning area especially that they do not have any background knowledge.* (**Annexure 11 line128**).
> *The attitude of the educators who have been trained is fair but for those who were not trained it is negative.* (**Annexure 11 line 151**).
> *Positive but they concentrate on chapters they master most or those they have been trained on.* (**Annexure 11 line 174**)."

Regarding the attitudes of educators towards Technology, the Technology experts reported the following:

- This varies greatly between learning areas. Science educators will be inclined to say that it is not necessary because they already do Technology (which is not the case; they merely do some applied science), educators of most other areas will not be interested; craft educators generally will see a change of expanding their learning area (in particular the design approach is common to them) (**Annexure 10 line 60**).
- There are mixed feelings. Educators are positive about the opportunity the offering provides in the teaching career and for entrepreneurship. They however feel despondent about lack of resources and poor training (**Annexure 10 lines17;38**).
- Technology has earned its place as part of the curriculum in the UK for the ages 5 to 14 years. It is seen as much more than craft but it still has certain credibility problem when it embraces some material areas such as food and textiles as well as electronics and wood and plastics (**Annexure 10 line 82**).
- With reference to those who are currently involved with the ACE courses, their attitudes are positive because once they understand the need they never look back.

The attitudes of educators towards Technology are shaped by their background learning areas. The approach which they use may interest them and develop a positive attitude. The unavailability of resources, lack of support and credibility in the learning area weaken the attitudes of educators. Educators who have enrolled at higher education institutions understand the concepts of Technology better and have a positive attitude. It was highlighted in chapter 2 by Stables (1997:13) that training improves the confidence of educators in teaching Technology as well as changing their attitude. It seems that if educators could be well trained, their attitudes towards Technology would improve.

5.7.7 Attitudes of learners towards Technology (see Appendices 7, 8 and 9)

Regarding the attitudes of learners towards Technology, the learning area heads indicated that learners are interested and curious towards the Technology learning area in schools where it is properly taught. Urban learners are more positive towards technology than their rural counterparts. This means that it is important to train educators properly so that they could teach Technology well in order to improve the attitudes of learners towards the learning area. Below are some statements from the learning area heads regarding the attitudes of learners:

> "*They feel that they can't fulfill its curricular need which is expensive*; (**Annexure 12 line 200**).
> *Some realize their talent for creativity; learners love the responsibility of solving problems*. (**Annexure 11 line 222**).
> *It is positive; they love solving problems; they love to be engaged in being creative*; (**Annexure 12 line 245**).
> *They like it though they say they don't see the need to learn it since they live in rural villages*. (**Annexure 12 line 268**).

The Technology specialists indicated that the role models should stimulate learners' interest and attitudes towards Technology. They however, indicated that in most schools the role models (educators) do not take the learning area seriously. This has an influence on the learners' attitudes to be positive or negative. The following statements reflect what subject specialists have said about the attitudes of learners:

> "*Some learners enjoy it especially boys. Girls do not like the hands-on approach to Technology*. (**Annexure 11 line108**).
> *Learners like it if teachers teach it properly. (**Annexure 11 line130**).*
> *If the teacher is well prepared and enthusiastic, the attitude of the learners is positive and vice versa*. (**Annexure 11 line 153**).
> *Positive if educators are knowledgeable about the learning area*. (**Annexure 11 line 176**)."

Technology experts indicated the following factors about the attitudes of learners towards Technology:

- In those places where good Technology education is in place, learners are very positive about it. Also their initial attitude is positive (**Annexure 10 lines 40; 62**).
- Initially, they are fearful. Later they are overwhelmed. And sometimes, eventually, they are excited.

- Learners are thrilled about career opportunities that the learning area will expose them to, and are motivated that Technology rules the world. Many learners feel that Technology is distanced from their worldview and that the educational approach does not affirm the African technological contributions (**Annexure 10 line 18**).
- This rather depends on how well it is taught. Most parents are more prejudiced against Technology as a curriculum area for all than are learners (**Annexure 10 line 84**).
- Most learners are confused because of the missing link between GET and FET in terms of continuation and career pathing. This means that after completing grade 9 most learners do not know what subject combinations to follow in grade 10 that are related to Technology.

The implication of the statements uttered concerning attitudes of learners towards Technology is that learners will be more positive if Technology is taught well. Learners who have a positive attitude towards Technology would like to follow technological careers in future. They are however not provided with career guidance into Further Education and Training Band. The attitudes of learners become positive where Technology resources are available and where it is taught properly.

5.7.8 Sufficiency of tools, equipment and resources (see Appendices 7, 8 and 9)

All the learning area heads indicated that there are no sufficient tools and resources at all in schools. It looks like most of the educators improvise the use of resources. This is one of the factors that discourages educators and makes them develop a negative attitude towards the learning area. Some learning area heads indicated that the tools they got stolen. Security of tools and equipment is another area of concern. The statements below indicate what some of the learning area heads said about tools:

> "*No, we improvise instead*; (**Annexure 12 line 202**);
> No we don't have. That is why Technology is unpopular. It is expensive. (**Annexure 12 line 224**).

Not really. The lack thereof is causing implementation to be slow. **(Annexure 12 line 247)**.
The school had a toolbox which was offered during the implementation of Technology; Most of the tools are broken (hammer, pliers, and screwdriver) due to poor quality; presently we have only an empty box that need to be filled if possible. **(Annexure 12 line 346)**.

Technology education specialists reported that there are no sufficient resources and tools in schools. This was also reported as one of the factors that were seen hindrances to the implementation of Technology in schools. Some statements of what the specialists said are reflected as follows:

"No. Most schools do not have equipment and tools except for the technical schools. **(Annexure 11 line 132)**.
Most of them are having a short supply. **(Annexure 11 line 155)**."

The following issues were reported by the Technology experts regarding tools, equipment and resources:

- Technology education can be taught in a large variety of environments. In that respect no school can claim that they cannot teach Technology. Educators have to learn to see the richness of their environment to detect the many opportunities **(Annexure 10 line 64)**.
- Technology education is still afforded an inferior position compared to Science and Mathematics. It thus suffers from lack of support with regard to provision of tools, equipment and resources **(Annexure 10 line 17)**.
- Schools that have qualified educators improvise. They could make use of locally available material to bring the learning area matter closer to the learners **(Annexure 10 line 42)**.

Although the teaching of Technology requires resources, the education specialists felt that educators could still improvise. In this respect educators could teach Technology within the context of the community and home. The researcher is having some reservations with the experts' advice because learners need to know global concepts taught in Technology. It seems there is a shortage of tools and equipment in schools to enable educators to teach Technology properly.

5.7.9 Any other comment regarding the implementation of Technology in Schools (see Appendices 7, 8 and 9)

The interviewees (learning area heads) indicated that the department of education is having more advanced resources at clusters level in different Area Project Offices for the regions which have partnership with industries. Most interviewees did not comment on this question.

Technology education specialists who were interviewed indicated that training of educators, availability of resources and appointment of knowledgeable people in the department to deal with Technology issues were some of the things that impede the implementation of technology in schools. Three out of four (75%) of the subject specialists commented on this item. Other subject specialists did not comment on this question. A quote of what the three specialists said is included hereunder:

> "*Restructuring of the curriculum section, each APO should be provided with the subject advisors to give support and provide equipment and tools to schools.* **(Annexure 11 line 112)**
> *The Department should appoint more subject advisors to increase the level of support in schools.* **(Annexure 11 line157)**.
> *More practical must be offered in the GET band in well resourced spacious rooms* **(Annexure 11 line134)**."

When asked to comment on general things regarding the implementation of Technology, the Technology experts echoed the following sentiments:

- *"The coming years will be crucial for Technology education in many countries. Therefore it is important that educators are able to give a good answer to the question: what is this learning area you teach? If their answer does not go beyond the level of a list of projects in which learners have made products, they will be in trouble.* **(Annexure 10 line 66)**.

- *The value of implementing Technology is massive compared to the difficulties. While we need to acknowledge the difficulties, we are failing to communicate the benefits. (***Annexure 10 line 44**).
- *Learners will benefit enormously from Technology if implemented properly. **(Annexure 10 line 44)**.*
- *There is a danger that if we continue to implement Technology badly, then we are doing more harm than good. It would be better to make the learning area non-compulsory than to continue to "pretend" that implementation is proceeding well. "(***Annexure 10 line 44**).

This means that Technology is changing on a daily basis and educational planning need to address the needs of society. There are many advantages for implementing Technology as it has the ability to improve the economy of the country by providing skilled human resources. Technology education should therefore be implemented properly in the schools.

5.8 SUMMARY

Availability of resources, support and well-trained educators were seen as critical issues to be considered when implementing Technology. All interviewees reiterated the point that there should be a link between the department of education, industry and tertiary institutions. This was felt to be a workable approach for implementing Technology in the North West Province.

It was also established through interviews that the hindrances in the implementation of Technology could be addressed through collaborating with a number of stakeholders. These include the Department of Science and Technology, industry and parents. Quite a number of accredited professional development programmes exist in South African universities. Only selected universities offer the ACE programmes up to doctoral degrees in Technology education. The Department of Education is offering non-accredited in-service education courses to Technology educators. These would normally last from three to five days.

The attitudes of the educators were seen as mixed. In schools were Technology is implemented properly their attitudes are positive. The same applies to the attitudes of learners. Other opinions that came out were that parents are more prejudiced to Technology than learners. The equipment and tools are not adequate in schools and it was mentioned earlier as one of the factors that hinder the implementation of Technology. However there were some dissenting views that Technology education can be taught in a variety of environments. In this respect educators need to improvise in relation to their environment.

Technology was seen to have many advantages than disadvantages in its implementation. It is better to allow schools to offer Technology as a choice learning area rather than a compulsory one. This will ensure effective implementation. This is also the trend in the UK where Technology is no longer compulsory at key stage 4 as mentioned in chapter 3 earlier on.

In this chapter, the responses of the five groups that is two groups of questionnaires (educators' and learners') and three groups of respondents to the interview (learning area heads, learning area specialists and Technology experts) in the North West Province were presented. In chapter six the proposed approach of Technology implementation in the Senior Phase (Grades 7-9) will be presented.