

# **CHAPTER FOUR**

## **PRESENTATION AND ANALYSIS OF FINDINGS**

### **4.1. INTRODUCTION**

This chapter presents the analysis of the data collected as per the aforementioned methodology of the previous chapter. The results of the study were analysed through a variety of techniques and procedures. The data, once collated, was examined and processed in SPSS to consider any relationships, between the variables, that exist. The main variables used to observe students' motivational orientation and its effect on academic achievement, included those of school, gender and grade. Differences relating to these variables were investigated. The established relationships discovered while examining correlations in the data, lay the foreground to assist in the future development of appropriately centred curriculum, teaching practices and procedures to benefit student motivation and concurrently higher their achievement levels. The full analysis of the data from the study was inspected firstly through descriptive details of the participants, focussing in on school, gender and grade; secondly, each instrument was checked separately with special significance paid to the relationships of gender and grade on a students' motivational orientation and their academic achievement levels; and finally correlations between the two instruments were established.

Section 4.2. summaries the demographics of the participants in this study. A breakdown occurs, denoting the descriptive data relating to the frequencies of participants' gender, grade or school. The representiveness of each was explored firstly for the entire study and then more specifically focussing on each particular school. Examination also occurred on the return rate of the permission slips from students to participate in the study. Again, this analysis has a major focus of gender and grade.

Section 4.3. delineates results of the first instrument (MAMS 3-7) used in the data collection process. This motivational scaled questionnaire comprehensively studies students' levels of intrinsic, extrinsic and amotivational orientations. Correlations

examined through the analysis of independent t-tests were used to compare the means between motivation and gender, and secondly motivation and grade. Exploration of the second instrument (SWG SAT 3-7) occurs in Section 4.4. Correlations between the literacy and numeracy subscales were examined to show how each subscale was interrelated. Evaluations of item statics, including the mean and standard deviation for the two scales within this instrument, were observed. Analysis of the scaled means was then conducted on the second instrument to expose any relationships between a students' academic achievement and their gender or grade. This correlational analysis of the data combined the two aspects of literacy and numeracy in academic achievement scores. Gender is firstly investigated, illustrating differences in the mean scores in each of the three sections of both the literacy and the numeracy aspects. A similar correlation process was used in observing relationships between academic results to a students' grade.

Section 4.5., the final section of the chapter before the concluding summary, is an analysis of the correlations that exist between both the instruments used in the study. Pearson's Bi-variate Correlations were used to examine all the students. Results revealed how their scores from the motivational scales of the first instrument related to that of the academic scales of their literacy and numeracy skills, obtained through the second instrument. All of this process resulted in the final analysis of these two instruments, concluding in a summary of the effects of motivational orientation on students' academic achievement; and the subsequent effect of gender and grade on students' motivation and academic achievement.

#### **4.2. DESCRIPTIVE ANALYSIS/DEMOGRAPHICS**

Three hundred and thirty students from seven catholic primary schools within the Archdiocese of Brisbane participated in the study. All schools were situated on the northern side of Brisbane. Permission for school participation in this study was sort through Brisbane Catholic Education Office. Once permission was granted, schools were approached at the commencement of the 2004 school year. Permission forms were sent to participating schools and administered to all Year 3 and 7 students of each school (with the exception of School 5, whose Year 3 students chose not to participate in the study). Once permission forms were received by the researcher, schools were sent questionnaires for distribution. The motivational instrument was

completed during the final weeks of the first semester (term two). Once the instrument was completed by the students in the classroom setting, under examine conditions, they were collated. Principals of each school then mailed completed forms to the researcher for data analysis. In the August of the same year, students sat for the Queensland Studies Authority's State-wide Standardised Academic Tests (SWG SAT 3-7) for their appropriate year level. The results received by the principals at the conclusion of the school year, were also sent to the researcher for analysis. Figure 4.1. reflects student participation from each school that partook in the study.

Table 4.1. *Participation of students from the seven schools*

	Total (sent forms)	Total (returned forms)	Total (% returned)
School 1	158	128	81%
School 2	43	43	100%
School 3	112	34	30.4%
School 4	192	34	17.7%
School 5	76	36	47.4%
School 6	154	43	27.9%
School 7	90	12	13.3%
Total	825	330	40%

School participation in this study varied. The majority of schools approached for this study were of a fairly similar size. Schools ranked in descending order, according to size based on the permission forms sent out, are School 4, 1, 6, 3, 7, 5 and 2. However, actual participation numbers from each school, listed in descending order are 1, 2, 6, 5, 3, 4 and 7. Although School 4 contained a greater number of students, the return rate of permission slips was very low at 17.7% of the total number sent out. School 1, was extremely highly represented in this study, is the school in which the researcher was employed. The researcher, although not present during the administration of either instrument, was still present within the school environment.

This allowed for more frequent reminders to both students and teachers administrators on the return of permission slips to contribute to the study.

Analysis of gender and grade are the basis of two of the major focal questions of the research study. By understanding differences that occur in students' motivation and learning according to either their gender or developmental stage (grade), it is assumed that teachers can better plan appropriate learning outcomes, catering for diversities in students' learning styles by adapting appropriate teaching strategies for these dimensions. Gender and grade are therefore a pivotal point to this study. Table 4.2. summaries the frequency statistics of participating male and female students in year levels.

Table 4.2. *Frequency statistics on Gender and Grade*

	Year 3	Year 7	Total
Male	73	68	141 (42.7%)
Female	85	104	189 (57.3%)
Total	158 (47.9%)	172 (52.1%)	330

Out of the 330 students who participated in the study, the representation of females was slightly greater than the involvement of males. An extra 14.6% of the participants were of feminine gender. Based on the researcher's personal experience, one possible explanation for this difference is that young females tend to be more compliant and thus tend to return parental permission slips. Further investigation into these statistics showed that 19 more females participated in the study from Year 7 than from Year 3, whereas males were closer in representiveness across the year levels.

As one of the research questions examines the influence of gender in relation to a students' motivational orientation and their academic achievement, Table 4.3 exhibits the number of males and females that participated from each school.

Table 4.3. *Statistics of participants categorise by school and gender*

	Male	Female	Total (returned forms)
School 1	55	73	128
School 2	14	29	43
School 3	12	22	34
School 4	18	16	34
School 5	19	17	36
School 6	19	24	43
School 7	4	8	12
Total	141	189	330

As illustrated in Table 4.2. the trend of more female participants than males, was also evident at the individual school level. The exception was at School 4 and School 5, which exhibited a greater number of male participation. In schools 2, 3 and 7, it is interesting to note that the return of permission slips from males is approximately half of the amount of female returns. As can clearly be seen through the analysis of these findings, generally female participation was higher than their male counterparts in most of the schools.

One of the other main goals of this study was to research the differences between the lower and upper levels of primary school. In the context of this study, lower primary is represented by Year 3 class groups while the upper primary context is examined through Year 7 classes. From those students who participated in the study, a fairly equal representation was obtained from the two grades. Figure 4.1. allows a visual representation of grade participation, displaying the frequency of students from each of the year levels.

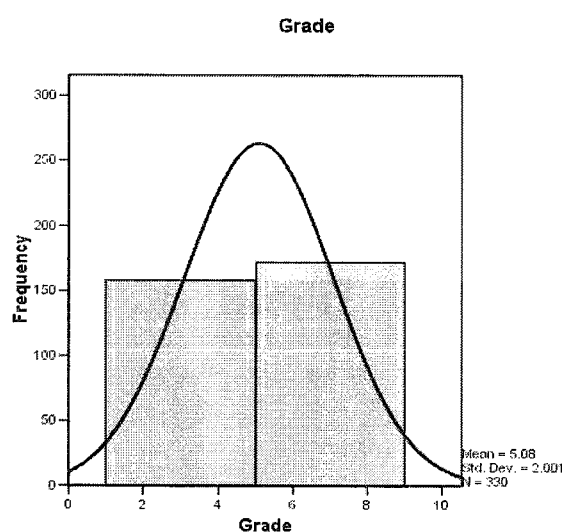


Figure 4.1. Frequency statistics based on grade participation

A significant aspect of a study was the return rate of permission forms. It is expected that on average only 30% of permission slips mailed out during a research study are returned (Linsky, 1975). Table 4.4 examines the return rate, firstly for each school; and secondly, of each respective grade represented in the lower and upper primary school context.

Table 4.4. *Return Rate of Schools characterised by Year levels*

	Year 3 (sent forms)	Year 3 (returned forms)	Year 3 (% returned)	Year 7 (sent forms)	Year 7 (returned forms)	Year 7 (% returned)
School 1	68	57	83.8%	90	71	78.9%
School 2	23	23	100%	20	20	100%
School 3	57	29	50.9%	55	5	9.1%
School 4	100	25	25%	92	9	9.8%
School 5	-	-	-	76	36	47.4%
School 6	79	16	20.3%	75	27	36%
School 7	51	8	15.7%	39	4	10.3%
Total	378	158	41.8%	447	172	38.5%

Total (sent forms)	Total (returned forms)	Total (% returned)
158	128	81%
43	43	100%
112	34	30.4%
192	34	17.7%
76	36	47.4%
154	43	27.9%
90	12	13.3%
825	330	40%

Analysis of this table reveals that the percentage of the return rates from each school varied substantially. The return rate of permission slips for all the schools that participated in the study was 40%. School 1, as mentioned earlier in this chapter, displayed a high percentage of returns, due to the proximity of the researcher to the school. The return rate from Year 3 was greater than that of Year 7, even though Year 7 still had a slightly greater number of participants.

Looking more specifically at the grade representiveness of each individual school shows a slightly different picture compared to the overall grade differences examined earlier in this chapter. Schools 1 and 6 correspond with the general overview for grades, having a greater number of participants from the higher primary grade. School 5 participation of only Year 7 students influenced the scores of this study, making more Year 7 participants in the study, even though Year 3 students had a higher percentage in the return rate of permission slips. Schools 2, 3, 4 & 7 had a greater number of Year 3 participants. It is interesting to note that schools 3, 4 & 7 had very minimal return rate from Year 7. Significance should also be noted that in Schools 3 & 4, Year 3 students' return rate is more than doubled that of the Year 7 students. The willingness of students to participate in the study is a factor that deserves attention in future motivational studies on students. Further development into students' motivations and their differences according to age and gender is represented in those who participate in the study.

#### **4.3. INSTRUMENT ONE (MAMS 3-7)**

The first instrument utilized in this study measured the scale of a students' motivational orientation. The instrument, modified from Vallerand's pre-existing Academic Motivation Scale (AMS 28) which was originally designed for college students, was changed to suit a younger primary school audience. The instrument originally measured seven constructs of motivation (3 intrinsic, 3 extrinsic and 1 amotivational). However, through the development and analysis of the modified version, these original seven scales possessed weak reliability, and hence the scales were collapsed to the three major scales namely, intrinsic motivation, extrinsic motivation and amotivation. In addition to this change, the pilot study also brought into light the weak reliability of the amotivational scale. Analysis into this determined that items within the scale contained readability issues for students of young primary school age. To rectify this, questions were reworded with assistance from linguistic specialists. The scale was also expanded by the addition of an extra item. The new and improved modified instrument to measure motivational orientation, containing 29 items in the three scales of intrinsic, extrinsic and amotivation was administered to the 330 student participants. Administration of the questionnaire occurred during the final weeks of the first semester, under exam conditions, during the course of an average school day. On completion, it was returned to the researcher where data analysis of the instrument and the assessment of students' motivational orientation began.

To empirically analyse the data, the raw data was converted to a numerical value. This was achieved by assigning a numerical value to each of the Likert scaled responses. Answers "nothing like me" were assigned the lower value of one, with each response ascending in value until reaching a value of five for responses of "exactly like me". The scores from all items within a scale were then added together and divided by the total number of items of that scale. This method was used to assign values for each students score for three reasons. Firstly, the scale had been graded as being from 1 to 5, so mean scores were used as they are the easiest to understand. Secondly, the use of a unit-weighted sum is most easily understood and explained; and finally with high Cronbach Alpha levels, it is therefore assumed that the items form a linear scale and that they can be added to form a meaningful total.



This process of finding the mean rate of agreement was repeated for each of the three scales so that all students were assigned a value for the level of their intrinsic, extrinsic and amotivational orientation.

Before delineating the item statistics of each of the three motivational scales, the Cronbach Alpha's of each scale were assessed. Revelations from this analysis uncovered that all scales within the motivational scaled instrument contained adequate measures of reliability. These scales' Cronbach Alphas, as represented in Table 4.5., permitted the researcher to assume that all items within a scale were well associated and interrelated.

Table 4.5. *Reliability Statistics on the three motivational orientation scales.*

	Cronbach's Alpha	N. of items
Intrinsic	0.924	12
Extrinsic	0.862	12
Amotivation	0.760	5

Considering the number of items in the intrinsic and extrinsic scales, these reliability coefficients were regarded as adequate measures of reliability. The addition of an extra item to the amotivational scale from the conclusion of the pilot study, assisted in maintaining satisfactory reliability compared to the weak reliability that was present in the earlier pilot.

Scale statistics of the three motivational types used in the data collection process of this study were examined by their means and standard deviations. Summarised in Table 4.6., these frequency statistics showed the high means of intrinsic and extrinsic motivation in both students from Year 3 and 7.

Table 4.6. *Frequency statistics*

	Mean	Standard Deviation
Intrinsic Motivation	3.86	0.87
Extrinsic Motivation	3.92	0.53
Amotivation	1.66	0.66

Results revealed that the mean of extrinsic motivation was higher than intrinsic motivation. Although this occurred, the spread of responses from students were further distributed on Likert's scale in the intrinsic scale in comparison to extrinsic. This denotes that although extrinsic motivation recorded a higher mean, responses in the intrinsic scale items varied more. The amotivation scaled received a low mean score. It was hypothesised that students in a primary school setting were unlikely to be operating out of an amotivational orientation. This was evident as the mean of responses of Year Three and Seven students showed strong disagreement to amotivated items on the questionnaire. With an understanding of each scales' statistics, evaluation into the item statistics from each scale revealed more.

#### **4.3.1. Results of the Intrinsic Scale**

To understand the breakdown of item statistics in the intrinsic scale, it is important to re-examine the instrument, its development, and an insight into the facets that occurred in creating the items within it. As mentioned in the methodology chapter, the instrument was a modification of Vallerand's AMS 28 used to assess the motivations of college students in their attendance at college. The modifications to this instrument saw the collapsing of the three intrinsic subscales of intrinsic motivation: (a) to know; (b) accomplish things; and (c) to experience stimulation, to create the single independent scale of intrinsic motivation. These subscales have students internalising goals in learning in order for the pleasure and satisfaction gained by: (a) learning; (b) accomplishing things; or (c) in order to experience stimulating sensations.

Table 4.7. displays the mean, standard deviation and the Cronbach's Alpha if the item was deleted of each item contained within the scale. The mean score is represented by a numerical value. As aforementioned, this value was determined by assigning numerical values to each of the five Likert scale response possibilities. The lower score of one was assigned to responses that strongly disagreed and ascended in value until reaching the highest value of five at strongly agreeing response. This same process was applied to both the extrinsic and amotivation scales.

Table 4.7. *Characteristics of the 12 items comprising the Intrinsic Motivation*

Question(*)	Mean	Standard Deviation	Cronbach's Alpha if item deleted
I go to school to discover new things that I never knew before.(9)	4.15	1.04	.917
I go to school for the great feeling I get when I finish something that is difficult to do.(20)	4.09	1.12	.917
I go to school to keep learning about things that interest me.(23)	4.09	1.07	.916
I go to school for the good feeling I get while reading about lots of interesting things.(25)	4.05	1.31	.916
I go to school for the great feeling I get when I do better than I have before in my learning.(13)	4.03	1.10	.917
I go to school for the terrific feeling of knowing more about things that interest me.(16)	4.03	1.08	.914
I go to school for the wonderful feeling of getting good grades in my schoolwork.(6)	3.99	1.13	.917
I go to school because I like learning new things.(2)	3.97	1.09	.918
I go to school because school allows me to feel good when I achieve well.(27)	3.62	1.13	.916
I go to school for the great feeling I get when I share my ideas with others.(4)	3.53	1.22	.918
I go to school for the wonderful feelings I get when I take in all the information that people have written about.(18)	3.45	1.33	.922
I go to school for the wonderful feeling of reading books from interesting authors.(11)	3.37	1.40	.920

\* Item number given in parentheses

As evident in Table 4.7., students ranked statements within this intrinsic motivational scale, very highly. Students generally agreed or strongly agreed to these statements regarding the internalisation of learning, especially in the rationalisation of one's attendance at school. Mean scores ranged from 3.37 to 4.15. This indicates that the majority of students strongly agreed with these statements. From this, it can be concluded that students in Year 3 and 7 are generally highly intrinsically motivated.

Results show that items that scored means of less than 3.5 (items 11 and 18) were related highly to literacy aspects of: a) reading books for information; and b) taking information from written texts. This point is interesting especially in relation to a student's motivation and the effect it has on the literacy aspects of a student's academic achievement. Another aspect to consider is that these items with lower means sit within Vallerand's scale of intrinsic motivation to know. This suggests that

students were not highly motivated to learn new things, unless it was exciting and interesting to them or involved discovering it for themselves.

Items that scored the highest means, that is scores greater than four, (items 9, 13, 16, 20, 23 and 25) displayed characteristics of either interesting content; the discovery of new things not known before; or the completion of difficult tasks. Items 16, 23 and 25 were based more on a students' ability to experience stimulation from the content (Vallerand's third type of intrinsic motivation). In other words, students reported more stronger connections with these statements because they had greater enjoyment for learning when it interested them and they experienced some kind of stimulating sensation because it was fun and interesting. The other high scoring item was item 20, which enabled students to experience a sense of accomplishment. These intrinsic motivations appeared, from these findings, to motivate students more strongly than the other intrinsic statements within this scale. All of the items in the intrinsic scale interrelated extremely well. Omission of any individual item in this motivational questionnaire would not improve the overall reliability of this scale.

#### **4.3.2. Results of the Extrinsic Scale**

In contrast to the intrinsic motivation scale is extrinsic motivation. Instead of completing something or learning for one's self, students are motivated to do things in order to earn something or avoid punishment and unwanted consequences. Vallerand's original instrument scaled the three types of extrinsic motivation as: (a) external regulation (pressured by someone else); (b) introjected regulation (self-pressure); and finally (c) identified regulation (doing something and sticking to it even though it is not fun). Table 4.8. summarises the means and standard deviation scores for the items within the extrinsic scale.

Table 4.8. *Characteristics of the 12 items comprising the Extrinsic Motivation Scale*

Question(*)	Mean	Standard Deviation	Cronbach's Alpha if item deleted
I go to school because I want a good life when I get older.(15)	4.42	0.91	.848
I go to school so I can get a great job when I grow up. (8)	4.25	1.02	.844
I go to school so I can get the job that I really want to do.(10)	4.21	1.06	.847
I go to school because I believe that it will make me a better worker when I get a job.(24)	4.19	1.03	.842
I go to school so that I will get a good paying job in the future.(22)	4.18	1.10	.845
I go to school because it will help me with the job that I want to do.(3)	4.11	1.03	.850
I go to school because it helps me to make a better choice about what job I'll do in the future.(17)	4.09	1.03	.847
I go to school to show myself that I can do it.(28)	4.04	1.22	.849
I go to school because only by going to school I will get a good job.(1)	3.79	1.14	.851
I go to school to prove that I can finish primary school. (7)	3.73	1.39	.852
I go to school to show that I am a smart person.(21)	3.34	1.38	.860
I go to school so that when I get good marks I feel better than the other students.(14)	2.67	1.46	.879

\* Item number given in parentheses

Mean scores in the extrinsic motivation scale ranged from a low 2.67 to the high 4.42. The range of 1.75 shows the wide diversity within the items of this scale. This illustrates that students are highly motivated in some area of extrinsic motivation but not so extrinsically orientated in others. Both Years 3 and 7 students who were highly extrinsically motivated however experienced difficulties with some items within the scale.

Items 8, 10, 15, 22 and 24 all scored higher means than that of the highest mean score of the Intrinsic scale (item 9). All of these extrinsic statements acknowledge the importance of school attendance towards ascertainment of a good job or a better life once beyond schooling years. Students identified strongly with these motivations.

The items scoring extremely high means all related to students attaining future goals. It saw students experiencing extrinsic motivation of identified regulation where benefits of completing a task appeared to be seen, even if the actual process of the task was not enjoyable or fun.

As identified in the pilot study, item 14 raised issues with many students in relation to the concluding phrase of the statement. Students seemed to want to do well and set themselves up for success, especially for later on in life, however were less likely to experience motivations towards an activity if it makes them feel better than others. Students seemed to display a nature where they do not want to see others upset or feeling less important or successful as themselves. Deletion of this item would improve Cronbach's Alpha of reliability; however, since the reliability coefficient was quite strong within this scale, this small conundrum was not a main concern of the study. Another observation of the findings with this extrinsic scale was that the second lowest scoring mean of 3.34 was for item 21. This item states that students go to school to show how smart they are. Again suggesting that, students within the primary school context do not want to appear to be better than others.

#### **4.3.3. Results of the Amotivation Scale**

Absence of intrinsic and extrinsic motivations qualifies as amotivation. Similar to learned helplessness, students see themselves as failures not matter what they do. Students are unclear of their involvement in tasks and believe that their results in activities are uncontrollable to them. They do not contribute their success in subjects as either luck or effort because they cannot see themselves as successful and therefore believe that they do not experience any success. Table 4.9. summaries the item statistics of the amotivation scale.

Table 4.9. *Characteristics of the 5 items comprising the Amotivation Scale*

Question(*)	Mean	Standard Deviation	Cronbach's Alpha if item deleted
I don't know why I go to school. It is really just a waste of time.(5)	1.84	1.18	.738
I wonder if I should continue going to school.(12)	1.68	1.17	.740
I don't know why I go to school, and really I wouldn't care if I did go or not.(19)	1.62	1.09	.680
I don't know why I go to school. I can't understand what I am doing here.(26)	1.61	1.16	.713
I don't understand what I'm doing here.(29)	1.57	1.10	.712

\* Item number given in parentheses

As expected, with this scale of the motivational instrument, amotivation appears to have a minimal effect on Year 3 and 7 students. Students generally strongly disagreed with these amotivational statements. A possible reason for this is that students within the primary setting are still focussed on pleasing the teacher. They respond to questions in a manner that the teacher would expect from 'good' students.

An interesting dynamic of the study, revealed through the motivational instrument, was that of the relationship between each motivational orientation scale in correlation with the others. Results, as displayed in Table 4.10., present the correlations that exists with students in regards to their intrinsic, extrinsic and amotivation.

Table 4.10. *Correlations between the motivational scales*

	Intrinsic	Extrinsic	Amotivation
Intrinsic	1	0.67	-0.47
Extrinsic		1	-0.35
Amotivation			1

These results showed that students who are highly intrinsically motivated are also highly likely to have strong extrinsic motivational orientation as well, and those with low intrinsic motivation are likely to be low for extrinsic. As hypothesised, amotivation was negatively correlated to both intrinsic and extrinsic motivation.

#### 4.3.4. Analysis of Instrument One

Once examination into the statistics of each motivational scale had been analysed, the instrument was exposed to tests analysis to compare the means of these three motivational scales to that of the two main focal questions of the study. Gender and Grade differences across the three measures of motivation were assessed using a 2 (genders) by 2 (grades) multivariate (3 measures of motivation) Analysis of variance. Since the design is fully crossed (all combinations of gender and grade were used), the several multivariate statistical tests are equivalent. Tables 4.11 through to 4.14 display the results of this analysis.

Table 4.11. Intrinsic Statistics of MANOVA (Gender x Grade)

	Gender	Grade	Mean	Std. Deviation	N
Intrinsic	Males	3	4.04	.874	73
		7	3.37	.900	68
		Total	3.72	.944	141
	Females	3	4.49	.498	85
		7	3.55	.725	104
		Total	3.97	.786	189
	Total	3	4.28	.730	158
		7	3.48	.801	172
		Total	3.86	.865	330

Table 4.12. Extrinsic Statistics of MANOVA (Gender x Grade)

	Gender	Grade	Mean	Std. Deviation	N
Extrinsic	Males	3	4.19	.687	73
		7	3.67	.832	68
		Total	3.94	.801	141
	Females	3	4.12	.590	85
		7	3.72	.686	104
		Total	3.90	.673	189
	Total	3	4.15	.635	158
		7	3.70	.745	172
		Total	3.92	.730	330



Table 4.13. *Amotivation Statistics of MANOVA (Gender x Grade)*

	Gender	Grade	Mean	Std. Deviation	N
Amotivation	Males	3	1.91	.999	73
		7	1.83	.909	68
		Total	1.87	.954	141
	Females	3	1.47	.664	85
		7	1.54	.641	104
		Total	1.51	.651	189
	Total	3	1.67	.862	158
		7	1.66	.769	172
		Total	1.66	.814	330

Table 4.14. *Motivation Statistics of MANOVA (Gender x Grade)*

		Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	Intrinsic	7.946	1	7.946	14.046	.000
	Extrinsic	.018	1	.018	.038	.846
	Amotivation	10.808	1	10.808	17.050	.000
Grade	Intrinsic	51.698	1	51.698	91.504	.000
	Extrinsic	17.069	1	17.069	35.200	.000
	Amotivation	.001	1	.001	.001	.971
	Intrinsic	1.485	1	1.485	2.629	.106
	Extrinsic	.315	1	.315	.650	.421
	Amotivation	.510	1	.510	.804	.370

The MANOVA results revealed that significant differences occurred between a number of the variables in relation to students' motivational orientation and their grade and gender. Significant differences were found in four domains. Firstly, two differences were noticed in the gender variable. It can be seen that significant differences were discovered between the genders in both the intrinsic and amotivational scales. Females were more likely to have higher levels of intrinsic motivation than males, while males were more likely to be amotivationally orientated than females. Evidence also denoted significant differences between the grade in the motivational scales of intrinsic and extrinsic motivation. These were that Year 3 students had higher levels of intrinsic and extrinsic motivation than Year 7 students.

#### 4.3.4.1. Analysis of Instrument One According to Gender

To check these findings, separate t-tests were used to analyse the results. Firstly, a t-test was used to examine any significant differences between a student's motivational orientation and their gender. Table 4.15 shows the results of this completed t-test.

Table 4.15. *Gender difference in Motivation*

	Gender	Mean (SD)	T	df	Significance (2 tailed)
Intrinsic	Male	3.72 (0.94)	2.607	268.746	.010*
	Female	3.97(0.79)			
Extrinsic	Male	3.94(0.80)	.532	270.179	.595
	Female	3.90(0.67)			
Amotivation	Male	1.87(0.95)	3.906	233.089	.000*
	Female	1.51(0.65)			

\*Significance of  $p < 0.05$

The results showed that there was a significant difference between males and females in relation to their intrinsic and amotivation levels. Females had a significantly higher mean for intrinsic motivation than males, indicating that they had stronger intrinsic orientations in comparison with males. However, within the amotivational scale, males were significantly higher in amotivational levels than females. There was no significant difference between the genders in relation to their extrinsic motivational scores. These results indicated that females had higher levels of intrinsic motivations than males, while males were more likely to be amotivated than females. An important aspect to consider when examining these findings is that both males and females were highly intrinsically and extrinsically motivated, while both genders amotivation levels were low in comparison.

#### 4.3.4.2. Analysis of Instrument One According to Grade

The t-test analysis according to grade showed significant findings in relation to motivational orientation of Year 3 and Year 7 students. Table 4.16 summaries the results of the t-test analysis that compared the means of the three motivational scales between the constructs of lower and upper primary year levels.

Table 4.16. *T-Test Analysis to compare means of Motivation and Grade*

	Grade	Mean(SD)	T	df	Significance (2 tailed)
Intrinsic	3	4.28(0.73)	9.497	327.982	.000*
	7	3.48(0.80)			
Extrinsic	3	4.15(0.64)	5.955	326.215	.000*
	7	3.70(0.75)			
Amotivation	3	1.67(0.86)	.181	315.573	.856
	7	1.66(0.77)			

Significance of  $p < 0.05$

Significant differences were found in the motivational scales of intrinsic and extrinsic motivation when comparing Year 3 and Year 7 students. Results showed that Year 3 students were significantly more likely to be both intrinsically and extrinsically motivated than Year 7 students were. The findings also revealed that while Year 7 students had high levels of both intrinsic and extrinsic motivation, Year 3 students had extremely high levels of these same motivational orientations. These results also denoted that there was no significant difference between the two grades in relation to their amotivational levels of orientation. Both Year 3 and Year 7 students displayed low levels of this form of motivation.

#### **4.4. INSTRUMENT TWO (SWG SAT 3-7)**

The second instrument utilized within the study, was the Queensland Studies Authority's (QSA) statewide, standardised academic test in the aspects of Literacy and Numeracy. The QSA is a facet within the State Government of Queensland. The testing in its current format began in 1998. It was preceded in 1995-1997 by the testing program know as the Year 6 Test. The purpose of these testing programs was to collect data from the populations of those year levels, "to report on student performances in aspects of literacy and numeracy in order to account for and to contribute to the improvement of students' learning" (QSA, 2003, p. 3). Each year the test focuses on a different literary genre. The SWG SAT 3-7 (Year 3, 5, 7 Tests in aspects of literacy and numeracy) has three literacy scales (writing; spelling; reading & viewing) and three numeracy scales (number; measurement & data; space). Previous test results published by the QSA have revealed that, "performance in all

strands showed substantial increases from Year 3 to Year 5 to Year 7" (QSA, 2002, p.1). The institute concluded from these findings that therefore most students make satisfactory progress during their learning at primary school in aspects of literacy and numeracy. For analysis within this study, students' performance results are provided by the QSA as scale scores. The literacy and numeracy scales typically range from 100 through to 1200. Table 4.17 summarises the mean and standard deviations of the subscales within the literacy scale.

Table 4.17. *Item Statistics of Literacy Subscale*

	Mean	Standard Deviation
Writing	667.65	145.32
Spelling	646.13	130.29
Reading & viewing	635.00	106.89

These findings showed that students' scores within the literacy scale were similar across the three subscales. The writing subscale had students score a higher mean, with a greater spread in their achievement levels than the other literacy subscales. The reading and viewing aspect of the literacy tests resulted in the lowest student means for the scales, indicating that this area is an area that may need some future attention with regards to student academic achievement levels in literacy. Table 4.18 lists the statistics for the numeracy subscales.

Table 4.18. *Item Statistics of Numeracy Scales*

	Mean	Standard Deviation
Number	623.49	129.73
Measurement & Data	618.66	114.31
Space	624.96	111.70

Within the numeracy scale, students scored the highest mean scale on space, closely followed by number. Measurement and data revealed that students' scores were similar to the other two numeracy scales, but slightly lower. Responses of students in the numeracy subscales resulted in less mean scores than that of the literacy subscales. However, as informed by QSA's report to the minister for education,

“performance on a literacy strand cannot be compared directly with performance on a numeracy strand as they are different constructs” (2002, p. 7).

#### 4.4.1. Analysis of Correlations for Instrument Two

Since the two constructs of numeracy and literacy received similar mean scores, a correlation was used to examine the relationship between all subscales of the instrument. Table 4.19 summarizes the findings of the correlations that exist between all the subscales of the literacy and numeracy scales within the standardised academic test instrument.

Table 4.19. *Correlation of SWG-SAT Subscales*

	Writing	Spelling	Reading & Viewing	Number	Measurement & Data	Space
Writing	1	0.81	0.81	0.66	0.69	0.64
Spelling		1	0.81	0.71	0.70	0.67
Reading & Viewing			1	0.78	0.80	0.78
Number				1	0.80	0.74
Measurement & Data					1	0.76
Space						1

Analysis of these findings revealed that all subscales of literacy and numeracy highly correlated with each other. The literacy subscales were extremely highly interrelated. This was presumed to be the case as the instrument is a well-scrutinized, quality assured test. Numeracy subscale correlations were similar to, but slightly less than those of the literacy scale. The size of this difference, were at most small. Further examination of these results revealed that although literacy and numeracy constructs are different and are not to be directly compared with each other, they still correlated well. Significantly high correlations existed within the reading and viewing subscales and all numeracy scales. This appears to suggest that the reading and viewing abilities of a student will effect their achievement in the numeracy aspect of this instrument. The weakest correlations existed between the writing subscale and all

subscales of numeracy. Figure 4.2 shows that although literacy and numeracy are different constructs, within the results of this instrument there is a strong positive correlation between them.

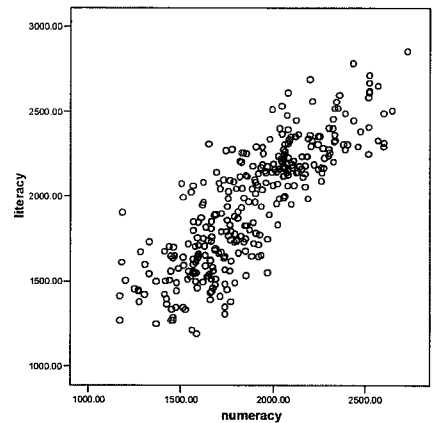


Figure 4.2. Correlation between Literacy & Numeracy Scales

The strong correlation between the literacy and numeracy scales is an expected phenomenon in the educational setting. It is presumed that a student, who is a high achiever, will achieve high results in both academic areas of literacy and numeracy. Table 4.20 presents the differences between the genders in the literacy subscales of this test.

Table 4.20. *Gender Analysis of Literacy Scale*

		Writing	Spelling	Reading & Viewing
Male	Mean(SD)	635.04(149.53)	623.87(132.11)	625.21(108.28)
Female	Mean(SD)	691.76(137.63)	662.58(126.79)	642.24(105.57)

These results indicate that there is a significant difference between the academic results of males and females. Results showed that within the literacy scale of a students' academic achievement levels, females scored significantly higher results than males. This is compliant with current literature that denotes that females tend to achieve higher than males on linguistic/language based assessments (Collins, Kenway & McLeod 2000; Halpern & LaMay, 2000). Table 4.21 presents the differences between the genders in the numeracy subscales of the academic instrument.

Table 4.21. *Gender Analysis Numeracy Scales*

		Number	Measurement & Data	Space
Male	Mean(SD)	632.83(129.88)	623.05(110.52)	637.28(110.14)
Female	Mean(SD)	616.70(129.55)	615.46(117.19)	616.01(112.27)

Results of the numeracy scales also revealed significant differences between the genders. These results showed that males were similar to, but slightly higher than females. Literature relating to gender differences in the area of numeracy concurs with these findings (Halpern & Lamay, 2000; Harter & Jackson, 1992; Lightbody & Siann, 1996).

As represented in the mean scale scores, males and females appear to achieve fairly similar results across both literacy and numeracy subscales of the academic achievement test. This is consistent with the QSA reports on previous years' analysis of this testing program (2002). These findings support generally agreed upon trends within the populations, regarding the achievement levels of the genders in the areas of literacy and numeracy. Although males and females achieve similar results, there is a significant difference between the genders in relation to their academic achievement in literacy and numeracy.

Table 4.22 summaries the mean scale scores of grade achievement differences in the literacy aspect of the instrument.

Table 4.22. *Grade Analysis on the Literacy Scale*

		Writing	Spelling	Reading & Viewing
3	Mean(SD)	550.81(91.29)	542.41(91.43)	539.09(51.02)
7	Mean(SD)	773.37(95.57)	739.96(78.86)	721.78(59.36)

Table 4.23 summaries the mean scales scores of grade differences in the numeracy scale.

Table 4.23. *Grade Analysis on the Literacy Scale*

		Number	Measurement & Data	Space
3	Mean(SD)	538.49(102.24)	538.29(78.47)	544.84(66.39)
7	Mean(SD)	700.95(100.40)	691.89(90.13)	697.97(93.03)

The results of both the literacy and the numeracy scales of the academic achievement instrument showed a significant and increased difference between Year 3 results and Year 7 results. These results were also consistent with previous results of this testing program as reported by QSA officials over the years of its operation. The findings denote a definite increase in mean scale scores from Year 3 to Year 7. For this reason, the data was split into year level groupings so as to examine the correlations that exist between a student's motivational orientation and their academic achievement results.

#### **4.5. ANALYSIS OF CORRELATIONS BETWEEN INSTRUMENTS**

Examination of each individual instrument only allowed a minimal analysis of students in relation to their motivation and academic achievement. To learn more about students' motivation and its effects on their academic achievement levels, a correlation between the two instruments occurred. Table 4.24 summaries Pearson's bivariate correlations that exist between the primary and secondary instrument of this study for students in Year 3.



Table 4.24. Year 3 Pearson's Correlations of SWG-SAT Subscales

		Intrinsic	Extrinsic	Amotivation
Pearson Correlation	Writing	.045	-.069	-.122
	Spelling	.147	-.009	-.145
	Reading & Viewing	.011	-.162*	-.157
	Number	-.060	-.026	-.191*
	Measurement & Data	-.053	-.177*	-.125
	Space	-.113	-.122	-.029
Sig. (2-tailed)	Writing	.586	.398	.171
	Spelling	.070	.908	.075
	Reading & Viewing	.894	.046	.053
	Number	.463	.747	.018
	Measurement & Data	.513	.028	.123
	Space	.162	.133	.721

\*\*Correlation is significant at the 0.01 level (2-tailed)

\*Correlation is significant at the 0.05 level (2-tailed)

Within Year 3, the results showed that there were very minimal correlations that existed between all of these variables. Pearson's bivariate correlations revealed that there were significant negative correlations between three constructs: 1) Extrinsic Motivation & Reading and Viewing; 2) Extrinsic Motivation & Measurement and Data; and 3) Amotivation & Number. However, seeing these results were of such a low negative correlation, they were viewed as a nil effect.

Table 4.25 summaries Pearson's bivariate correlations that exist between the primary and secondary instrument of this study for students in Year 7.

Table 4.25. *Year 7 Pearson's Correlations of SWG-SAT Subscales*

		Intrinsic	Extrinsic	Amotivation
Pearson Correlation	Writing	-.060	-.172*	-.055
	Spelling	.044	-.091	-.260**
	Reading & Viewing	-.145	-.246**	-.071
	Number	-.099	-.109	-.131
	Measurement & Data	-.052	-.088	-.171*
	Space	-.054	-.084	-.165*
Sig. (2-tailed)	Writing	.443	.025	.475
	Spelling	.571	.242	.001
	Reading & Viewing	.060	.001	.361
	Number	.201	.157	.089
	Measurement & Data	.501	.255	.026
	Space	.484	.278	.032

\*\*Correlation is significant at the 0.01 level (2-tailed)

\*Correlation is significant at the 0.05 level (2-tailed)

Results from Year 7 students displayed similar results. Again, minimal negative correlations existed between all constructs. Although the Year 7 results contained a greater number of significant correlations, it was again established that these results of low negative values were to be viewed as a nil effect.

Overall, Pearson's Bivariate Correlations revealed a nil effect between students' motivational orientation and their academic achievement levels in both of the year levels. This finding was further examined through the analysis of scatterplot graphs on the correlations that existed between the two academic scales of literacy and numeracy in relation to each of the three motivational scales. Figures 4.3 through to 4.6 reveal these correlations grouped in year levels and academic scale. Figure 4.3 summaries the correlations between the Year 3 students' numeracy results and the three motivational scales.

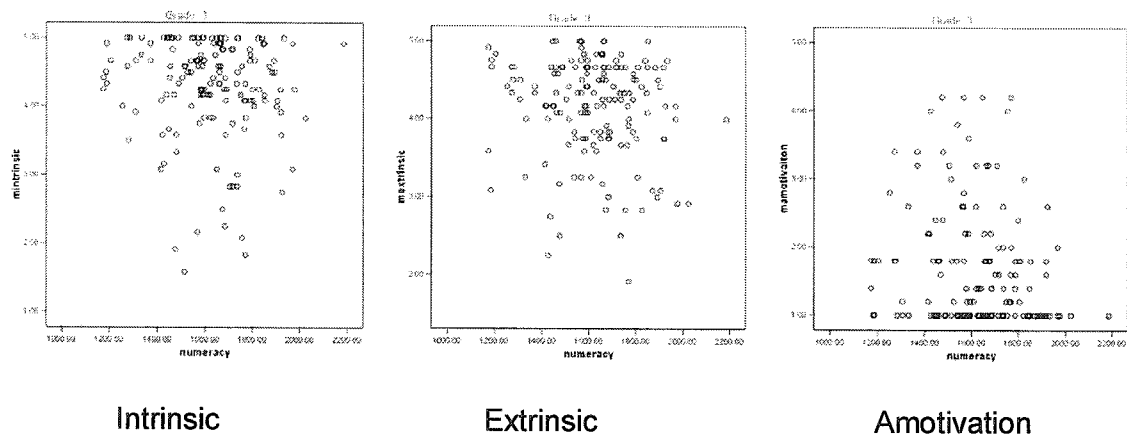


Figure 4.3. Correlations between Year 3 students' numeracy results and motivational scales.

These scatterplot graphs revealed that for the intrinsic and extrinsic motivational scales a strong 'ceiling effect' was created. This appears to indicate that most students at this stage of development display high levels of both intrinsic and extrinsic motivation, but vary substantially in their academic achievement levels. In contrast, students' results in correlations of numeracy and amotivation displayed the reversed 'basement effect'. This effect was due to the extremely low presence of amotivation. Figure 4.4 displays the same set of results among the Year 7 participants of the study.

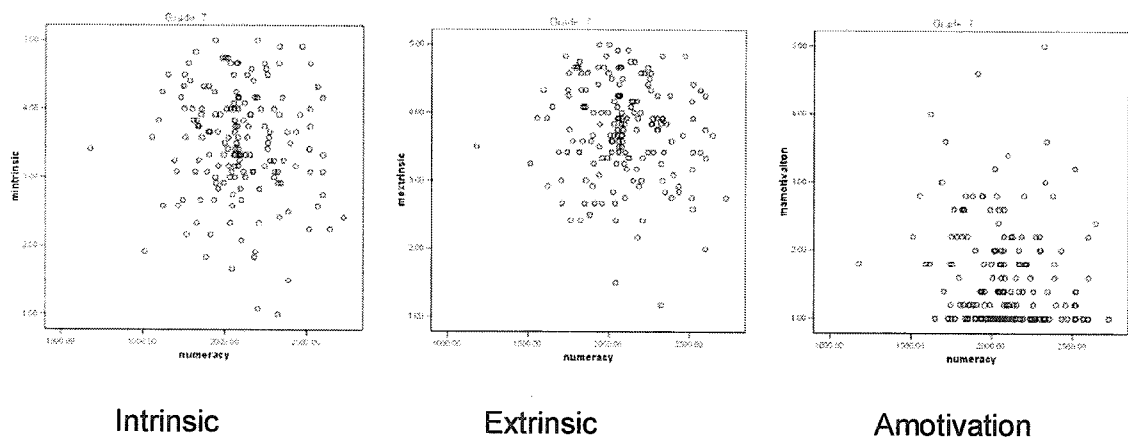


Figure 4.4. Correlations between Year 7 students' numeracy results and motivational scales.

Although similar results occurred amongst the Year 7 students and the correlations between the motivational scales and their numeracy achievement levels, the effects were less pronounced. Year 7 students produced more spread results within the intrinsic and extrinsic motivational scales; however, the 'ceiling effect' still influenced the results. The 'basement effect' on the amotivational correlations was significantly

caused by the low mean scores in the amotivation items on the motivation instrument.

Represented in figure 4.5 are the scatterplot graphs displaying the correlations between Year 3 students' literacy results and the three motivational constructs.

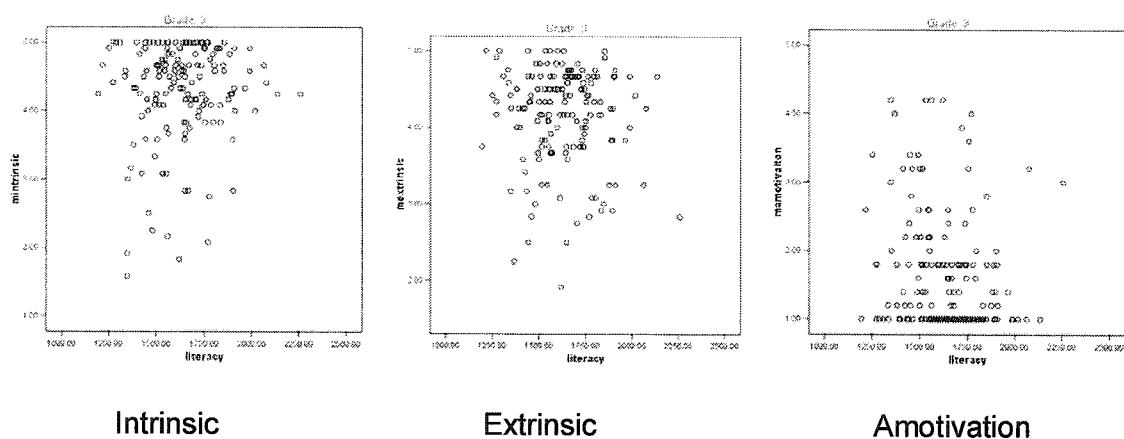


Figure 4.5. Correlations between Year 3 students' literacy results and motivational scales.

As with the numeracy scales' relationship with the motivational scales for Year 3 students, results in the literacy scales yielded similar results. Again within the intrinsic and extrinsic motivations, the Year 3 students produced a 'ceiling effect' when correlated against their literacy results of the academic achievement instrument. The amotivation scales produced the similar 'basement effect' in the literacy scale as was the case with the numeracy scale.

Figure 4.6 show the Year 7 results in literacy correlated with the motivational scales

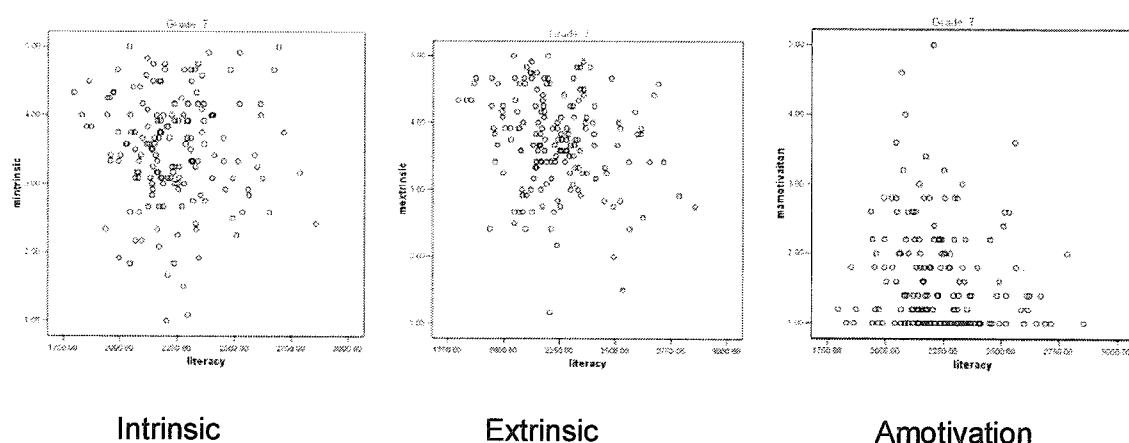


Figure 4.6. Correlations between Year 7 students' literacy results and motivational scales.

Year 7 correlations in literacy were similar to those established for numeracy. Again, a less pronounced 'ceiling effect' was evident in the literacy correlations with intrinsic and extrinsic motivation. A strong 'basement effect' was displayed in amotivation. These results indicate that the correlations between students' motivational orientations and their academic achievement were obscured by 'ceiling & basement effects'. These appear to imply that a more precise instrument is needed to examine motivational differences between these academic variables at these particular stages of a student's development.

#### **4.6. SUMMARY**

Analysis of the results of this study and the two instruments used in the data collection process have revealed many crucial points to answering the questions posed in this research. Findings from instrument one, the motivational scale, revealed two major findings. The first denotes the differences between the genders in relation to their motivational orientation. It was found that there was a significant difference between males and females. Males tended to have higher levels of amotivation than females, even though both genders displayed low levels of amotivation. Females, on the other hand, worked more for intrinsic means than males. Both genders were highly extrinsically motivated. The second major finding related to differences in motivation according to a students' grade (developmental stage). It was discovered that Year 3 students possessed significantly higher means of intrinsic and extrinsic motivation than Year 7 students. At both stages of development, students whether in Year 3 or in Year 7 displayed low levels of amotivation.

The second instrument analysing students' academic achievement levels, yielded results that showed significant differences existed between the genders. These results corroborated with the literature findings. It validated previously reported results that females tend to achieve significantly higher results in literacy than males, whilst males achieve significantly higher results in numeracy skills than females.

By culminating these two instruments to examine the correlations that exist between them analysis into the effects of motivations on academic achievement, in relation to gender and grade differences, were investigated. The correlations revealed a 'nil effect'. Further examination exposed that within each year level correlation results

between motivational orientation and academic achievement were distorted because of a 'ceiling' or 'basement' effect. These 'effects' obscured the findings and is the reason behind the nil effect in these results. This result is contradictory to the current literature in the field of motivation. Although the instruments showed that intrinsic and extrinsic motivation levels were higher in Year 3 students than the Year 7 students, the results did not reveal any correlation between students' motivational orientation and their academic achievement levels. Since results were distorted by a 'ceiling effect' in intrinsic and extrinsic motivation and a 'basement effect' in amotivation, it was determined that a more precise instrument, that measures a greater range in these motivations needs to be developed.

Chapter 4 presented the results of the study. It reported on the results of the study relating to generalisations from tables of represented data. The next chapter reviews the empirical findings of this research and draws implications for teaching. It also discussed the limitations of the study and highlights areas for future research.