The effects of attributional style on the mathematics performance of senior secondary school students

by

Akolade Olubunmi Lapite

Submitted in partial fulfilment of the requirements for the degree

Philosophiae Doctor
(Educational Psychology)

Department of Educational Psychology
Faculty of Education
University of Pretoria

Supervisor:
Prof J.G Maree

PRETORIA
October 2020

In memory of my late father

Chief Emmanuel Abolade Lapite

who waited patiently and prayerfully for the completion of my PhD thesis (until he passed on).

DECLARATION OF ORIGINALITY

I, Akolade Olubunmi Lapite (student nr: 11316897) declare that the thesis titled **"The effects of attributional style on the mathematics performance of senior secondary school students"** which I hereby submit for the degree Philosophiae Doctor in Educational Psychology at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

_____

AKOLADE O. LAPITE

30 OCTOBER 2020

ETHICAL CLEARANCE CERTIFICATE

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Education

RESEARCH ETHICS COMMITTEE

CLEARANCE CERTIFICATE	CLEARANCE NUMBER: **EP 13/04/04**
DEGREE AND PROJECT	PhD The effects of attributional style on the mathematics performance of senior secondary school students
INVESTIGATOR	Mr Akolade Olubunmi Lapite
DEPARTMENT	Educational Psychology
APPROVAL TO COMMENCE STUDY	11 August 2016
DATE OF CLEARANCE CERTIFICATE	20 August 2020

CHAIRPERSON OF ETHICS COMMITTEE: Prof Funke Omidire

CC Ms Bronwynne Swarts
Prof. J.G. Maree

This Ethics Clearance Certificate should be read in conjunction with the Integrated Declaration Form (D08) which specifies details regarding:

- Compliance with approved research protocol,
- No significant changes,
- Informed consent/assent,
- Adverse experience or undue risk,
- Registered title, and
- Data storage requirements.

ETHICS STATEMENT

Full names: Akolade Olubunmi Lapite

Student number: 11316897

1. I understand what plagiarism is and I am aware of the University's policy in this regard.
2. I declare that this is my original work. Where other people's work has been used (either from a printed source, the internet, or any other source), this has been properly acknowledged and referenced in accordance with departmental requirements.
3. I have not used work previously produced by another student or any other person to hand in as my own.
4. I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as his or her own work.

_____

Akolade O. Lapite

STUDENT

_____

Prof. J. G. (Kobus) Maree

SUPERVISOR

DECLARATION FROM LANGUAGE EDITOR

10 September 2020

TO WHOM IT MAY CONCERN

Akolade O. Lapite's thesis, **The effects of attributional style on the mathematics performance of senior secondary school students,** was language-edited by me between December 2018 and September 2020. It is, of course, the author's prerogative to accept or reject my suggested changes.

Tim Steward
Accredited translator and also English editor
(South African Translators' Institute – Membership No: 1000723)
Tel: +27 (0)12 346-8061 Cell: +27 (0)82 586-7654

ACKNOWLEDGEMENTS

I give special adoration, honour, and glory to Almighty God for availing me the opportunity, wisdom, and good health to complete this programme.

I would like to thank the following people for their assistance, encouragement, and love in making this thesis a reality.

- My supervisor, Prof. Kobus Maree, for his mentorship, constructive intellectual guidance, inspirational words, commitment, and encouragement in helping me achieve this academic height. I would not have completed this study without his intervention and supervision.
- Prof. Chika Sehoole, Dean: Faculty of Education, University of Pretoria, for giving me another chance.
- Prof. Ruth Mampane, Head: Department of Educational Psychology, for her encouragement and support.
- Dr. Kolawole Samuel Adeyemo and Dr. Akinola George Dosunmu, for their unwavering support and encouragement.
- Mrs. Joyce Jordaan, Department of Statistics, University of Pretoria, for her kind assistance with the quantitative results.
- Mr. Tim Steward, for the language editing.
- Mrs. Mardeleen Muller, for the technical editing.
- My wife, Olufunke, for her endurance, support, and understanding.
- My colleagues and friends at Adeniran Ogunsanya College of Education, Lagos.
- Adeniran Ogunsanya College of Education, for granting me study leave to undertake the doctoral programme.
- The Tertiary Education Trust Fund (TETFund), for offering me a scholarship.
- I also thank the following friends and colleagues for their moral support: Dr. Mayowa Ogunjimi, Dr. Tola Olujuwon, Mr. Johnson Mafikuyomi, Mr. Muyideen Ismaila, Dr. Dayo Daodu, Dr Kikelomo Adedotun, Dr. Babajide Abidogun, Dr. Collins Potokri, Dr. Lekan Rufai, Dr. Eucharia Igbafe, Mr. Godwin Udofia, Mr. Dotun Oluwa, Mr. Oladotun Dahunsi, Mr. Taiwo Adebesin, and Mr. Peter Yetonde.

ABSTRACT

The purpose of this study was to explore the effects of attributional style on the mathematics performance of senior secondary school students. The study involved a sequential explanatory mixed methods approach (QUANTITATIVE + qualitative). The quantitative phase of the study involved 300 students drawn from two schools in two education districts in Lagos State, Nigeria. The qualitative phase involved focus group interviews with 20 students (10 students per school). The major data generation instruments for the study were the *Attributional Style Questionnaire (ASQ)*, the mathematics performance scores of the students, and the focus group interviews. Quantitative data were analysed by calculating correlation coefficients, conducting multiple regression analyses, and performing one-way analysis of variance to compare the subscales across gender, socio-economic status, and attitude of the students towards mathematics. Conversation analysis was used to analyse the qualitative data generated. The findings revealed no significant relationship between attributional style and mathematics performance. Gender-based differences were found in the students' performance on the stability and globality scales as well as in regard to the effect of their socio-economic status and attitude towards mathematics on their mathematics performance. Future research on all the variables explored in this study could be replicated using different samples. Researchers could also consider using an attributional style questionnaire appropriate for academic issues with a sample similar to that in this study.

Keywords: attributional style, stability, globality, attributional style questionnaire, mathematics performance, mixed methods approach

LIST OF ABBREVIATIONS

AS	Attributional Style
ASQ	Attributional style questionnaire
SES	Socio-economic status
CoNes	Composite negative
CoPos	Composite positive
RLTH	Reformulated learned helplessness theory
WAEC	West African Examination Council

TABLE OF CONTENTS

DECLARATION OF ORIGINALITY I
ETHICAL CLEARANCE CERTIFICATE II
ETHICS STATEMENT III
DECLARATION FROM LANGUAGE EDITOR IV
ACKNOWLEDGEMENTS V
ABSTRACT VI
LIST OF ABBREVIATIONS VII
TABLE OF CONTENTS VIII
LIST OF TABLES XV
LIST OF FIGURES XVII

CHAPTER 1 BACKGROUND TO AND RATIONALE FOR THE STUDY 1
1.1 INTRODUCTION 1
1.2 BACKGROUND TO THE STUDY 2
1.3 PROBLEM STATEMENT AND RATIONALE FOR THE STUDY 4
1.3.1 Global research on attributional style 4
1.3.2 Global research on attributional style and mathematics 4
1.3.3 Shortcomings in some studies on AS and mathematics performance 4
1.3.4 Research on AS in different context 5
1.3.5 Mathematics Education 5
1.3.6 Socio-demographic factors and mathematics performance 5
1.4 AIM OF THE STUDY 6
1.5 EXPLANATION OF SOME CORE CONCEPTS 6
1.5.1 Attributional style 6
1.5.2 Socio-demographic factors 6
1.5.3 Mathematics performance 7
1.6 THEORETICAL FRAMEWORK 7
1.6.1 Reformulated learned helplessness theory 7
1.7 RESEARCH QUESTIONS 8
1.7.1 Primary research question 8
1.7.2 Secondary research questions 8
1.7.3 Research hypothesis 8
1.8 RESEARCH DESIGN AND METHODOLOGY 8
1.8.1 Sampling, data collection, and research sites 8
1.8.2 Data collection and analysis 9
1.8.3 Quality assurance 9
1.9 ROLE OF THE RESEARCHER 10
1.10 ETHICAL CONSIDERATIONS 10
1.11 CONCLUSION 10

CHAPTER 2 LITERATURE REVIEW 11

2.1 INTRODUCTION 11
2.2 THEORETICAL FRAMEWORK 11
2.2.1 Reformulated Learned Helplessness Theory (RLHT) 11
2.2.2 Attributional style dimensions 14
2.2.2.1 Internality 14
2.2.2.2 Stability 15
2.2.2.3 Globality 15
2.2.3 Attributional style composites 15
2.2.4 Causal attributions 16
2.2.5 Gender and attributional style 17
2.2.6 Academic motivation and attributional style 18
2.2.7 Attribution and Mathematics performance 20
2.2.8 Expectancy and attribution 22
2.2.9 Cross-cultural difference in attributional style 22
2.3 MATHEMATICS PERFORMANCE 24
2.3.1 Mathematics anxiety of students 25
2.3.2 Mathematics attitudes of students 27
2.4 DEMOGRAPHIC FACTORS 29
2.4.1 Socio-economic status and mathematics performance 29
2.4.2 Gender and mathematics performance 30
2.5 CONCEPTUAL FRAMEWORK 31
2.6 CONCLUSION 33

CHAPTER 3 RESEARCH DESIGN AND METHODOLOGY 34

3.1 INTRODUCTION 34
3.2 RESEARCH PARADIGM 34
3.2.1 Pragmatism 34
3.3 RESEARCH DESIGN 35
3.3.1 Mixed methods research design 36
3.3.1.1 Sequential explanatory mixed methods design 38
3.4 RESEARCH METHODOLOGY 40
3.4.1 Sampling 40
3.4.1.1 Sampling techniques for the quantitative study 40
3.4.1.2 Sampling techniques for the qualitative study 41
3.4.2 Data collection instruments and procedures 42
3.4.2.1 Questionnaire 43
3.4.2.2 Scale Adaptation 44
3.4.2.3 Mathematics performance scores (criterion variable) 44
3.4.2.4 Focus group interviews 45
3.5 DATA ANALYSIS 46
3.5.1 Quantitative data analysis 47
3.5.2 Qualitative data analysis 47
3.5.3 Data integration 48
3.6 QUALITY ASSURANCE 49
3.6.1 Quantitative data 49
3.6.1.1 Reliability 49
3.6.1.2 Concurrent Validity 49
3.6.1.3 Construct Validity 50
3.6.2 Qualitative data 50
3.6.2.1 Trustworthiness 50
3.6.2.2 Credibility 50
3.6.2.3 Dependability 51
3.6.2.4 Transferability 51
3.6.2.5 Confirmability 52
3.7 ROLE OF THE RESEARCHER 52
3.8 ETHICAL CONSIDERATIONS 53
3.8.1 Obtaining access to research participants from ‘gatekeepers’, voluntary participation, and informed consent 53
3.8.2 Protection from harm and risk 54
3.8.3 Privacy and confidentiality 54
3.9 CONCLUSION 54

CHAPTER 4 QUANTITATIVE ANALYSIS 55
4.1 INTRODUCTION 55
4.1.1 Blending the Findings (results) and Discussion sections 55
4.2 OUTCOMES OF THE QUANTITATIVE STUDY 56
4.2.1 Descriptive statistics: Demographic information 56
4.2.2 Descriptive statistics: Attitude towards mathematics 59
4.2.3 Correlations, reliability, and descriptive statistics of subscales of the ASQ 63
4.2.4 Research questions 71
Primary research question 71
Secondary research questions 71
4.2.4.1 Secondary research question 1 72
4.2.4.2 How well do stability and globality as well as gender and socio-economic factors predict mathematics performance? 78
4.2.4.3 What is the influence of socio-demographic and attitudinal factors on mathematics performance? 84
4.3 CONCLUSION 93

CHAPTER 5 QUALITATIVE ANALYSIS 94

5.1 INTRODUCTION 94
5.2 THEME ONE: PERCEPTION OF THE ASQ 97
5.2.1 Mastery of subject matter 98
5.2.2 Language use 100
5.2.3 Preferred situations in the ASQ 101
5.3 THEME TWO: PERCEPTION OF MATHEMATICS 103
5.3.1 Mathematics difficulty 104
5.3.1.1 Teaching style 105
5.3.1.2 Lack of interest 105
5.3.2 Mathematics preparedness 107
5.3.2.1 Home study 107
5.3.2.2 Negative perceptions of mathematics 108
5.3.2.3 Effort and hard work 109
5.4 THEME THREE: ATTRIBUTIONS FOR MATHEMATICS PERFORMANCE 109
5.4.1 Success factors 110
5.4.1.1 Internal factors 111
5.4.1.2 External factors 111
5.4.2 Failure factors 112
5.4.2.1 Internal factors 113
5.4.2.2 External factors 114
5.4.3 Interest in mathematics 115
5.4.3.1 Perceptions of mathematics 116
5.4.3.2 Teachers' professional etiquette and qualifications 116
5.4.3.3 Students' academic ability, attitude, and behaviour 117
5.4.4 Teachers' attitude and teaching methods 119
5.4.4.1 Teachers' personality 119
5.4.4.2 Teachers' methods 120
5.4.5 Mathematics anxiety 122
5.4.5.1 External factors (teacher-related behaviour) 122
5.4.5.2 Internal factors 122
5.5 THEME FOUR: MATHEMATICS PERFORMANCE AND SOCIO-DEMOGRAPHIC FACTORS 124
5.5.1 Gender 124
5.5.1.1 Male performance 125
5.5.1.2 Female performance 126
5.5.2 Socio-economic factors 126
5.5.2.1 Support by family members and acquaintances 127
5.5.2.2 Lack of support by family members and acquaintances 127
5.6 CONCLUSION 128

CHAPTER 6 FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS 130

6.1 INTRODUCTION 130
6.2 SYNOPSIS 130
6.2.1 Chapter 1: Orientation 130
6.2.2 Chapter 2: Literature review 131
6.2.3 Chapter 3: Research design and methodology 131
6.2.4 Chapter 4: Quantitative results 132
6.2.5 Chapter 5: Qualitative results 132
6.3 REVISITING THE RESEARCH QUESTIONS 132
6.3.1 Secondary research questions 133
6.3.1.1 How do stability and globality attributional styles relate to mathematics performance? 133
6.3.1.2 How well do stability and globality as well as gender and socio-economic factors predict mathematics performance? 134
6.3.1.3 What is the influence of socio-demographic and attitudinal factors on mathematics performance? 135
6.3.2 Primary research question 136
6.4 ETHICAL CONSIDERATIONS 137
6.5 STRENGTHS OF THE STUDY 137
6.6 LIMITATIONS OF THE STUDY 138
6.7 RECOMMENDATIONS 139
6.7.1 Recommendations for improved practice 139
6.7.2 Recommendations for policy-makers 139
6.7.3 Recommendations for further research 140
6.8 WHAT WOULD I HAVE DONE DIFFERENTLY? 140
6.9 POSSIBLE CONTRIBUTIONS OF THE STUDY 141
6.10 PERSONAL REFLECTION ON THE STUDY 141
6.11 CONCLUSION 142

LIST OF REFERENCES 144

APPENDIX A: GUIDELINES FOR THE INTERPRETATION OF THE NEGATIVE ATTRIBUTIONAL STYLE QUESTIONNAIRE 172

APPENDIX B: INTERVIEW QUESTIONS 174

APPENDIX C: QUESTIONNAIRE 175

APPENDIX D: GMAIL - PERMISSION LETTER TO CHANGES MADE IN ATTRIBUTIONAL STYLE QUESTIONNAIRE 183

APPENDIX E: LETTER TO THE MINISTRY OF EDUCATION 187

APPENDIX F: LETTER TO PRINCIPLES 188

APPENDIX G: LETTER TO PARENT/GUARDIAN 189

APPENDIX H: CONSENT FORM (PRINCIPAL) 190

APPENDIX I: LETTER OF ASSENT TO PARTICIPANTS 191

APPENDIX J: ASSENT FORM (STUDENT) 192

APPENDIX K: CONSENT FORM (PARENT/GUARDIAN)..... 193
APPENDIX L: INTERVIEW TRANSCRIPT EXAMPLE..... 194

LIST OF TABLES

Table 1.1: Results of the senior school certificate examination conducted by the WAEC between 2012 and 2018 3
Table 1.2: Data collection plan 9
Table 3.1: Rationale for mixed methods research (adapted from Green et al., 1989) 37
Table 3.2: Sample participants in the quantitative study 40
Table 3.3: Profiles of participants in the qualitative study 42
Table 3.4: Changes in Items from original attributional style questionnaire (*ASQ*) 44
Table 3.5: Steps in mixed data analysis (adopted from Onwuegbuzie & Teddlie, 2003) 46
Table 3.6: Steps in qualitative analysis (adapted from Nieuwenhuis, 2010b) 48
Table 4.1: Gender of participants 56
Table 4.2: Age in years of the participants 57
Table 4.3a: Total number of family members 57
Table 4.3b: Descriptive statistics of family members 58
Table 4.4: Socio-economic status 59
Table 4.5: Mathematics use in future career 59
Table 4.6: Motivation to do well in mathematics 60
Table 4.7: Finding help when struggling with mathematics 60
Table 4.8: Anxiety in mathematics 61
Table 4.9a: Reported and actual maths marks 62
Table 4.9b: Correlation between reported and actual mathematics marks 62
Table 4.10: Cronbach's alpha for the stability/instability subscale of the ASQ 63
Table 4.11: Item-total statistics for stability/instability (No. of items = 12) 63
Table 4.12: Cronbach's alpha for the globality/specificity subscale of the ASQ 64
Table 4.13: Item-total statistics for globality/specificity (No. of items = 12) 65
Table 4.14: Cronbach's alpha for attitude towards mathematics 66
Table 4.15: Item-total statistics for attitude towards mathematics 66
Table 4.16: Cronbach's alpha for attitude towards mathematics 67
Table 4.17: Descriptive analysis of item statistics for attitude towards mathematics 67
Table 4.18: Item-total statistics for attitude towards mathematics 68
Table 4.19: Reliability of scale of attitude towards mathematics 17A-C 68
Table 4.20: Item-total statistics for attitude towards mathematics V17A-C 68
Table 4.21: Correlation analysis showing relationship between globality and stability 69
Table 4.22: Correlation analysis showing relationship among stability, globality, actual mathematics marks, and reported mathematics marks (V17E) 69

Table 4.23: Test of normality using Kolmogorov and Shapiro 70
Table 4.24: Correlation analysis of actual mathematics marks, reported mathematics marks (V17E), and attitude towards mathematics 71
Table 4.25: Pearson's correlation coefficients and corresponding p-values 72
Table 4.26a: Mean gender scores on the stability dimension of the ASQ 73
Table 4.26b: Mean gender scores on the globality dimension of the ASQ 74
Table 4.27: Multiple regression analysis of mathematics marks for the girls – Model 1 79
Table 4.28: Table for the estimated regression coefficients 79
Table 4.29: Multiple regression analysis of mathematics marks for the girls – Model 2 80
Table 4.30: Regression coefficients of mathematics marks for the girls – Model 2 80
Table 4.31: Multiple regression analysis of mathematics marks for the boys – Model 1 81
Table 4.32: Regression coefficients for stability, globality, and socio-economic status for the boys – Model 1 81
Table 4.33: Mathematics for future career 84
Table 4.34: Mathematics motivation 85
Table 4.35: Finding help when struggling with mathematics 85
Table 4.36: Anxiety in mathematics 85
Table 4.37: Item total statistics for attitude towards mathematics 86
Table 4.38: Multiple regression analysis of mathematics marks for the girls – Model 1 87
Table 4.39: Regression coefficients for the attitudinal scale and socio-economic status for the girls 87
Table 4.40: Simple regression analysis of mathematics marks for the girls 88
Table 4.41: Regression coefficient for attitude towards mathematics marks 88
Table 4.42: Multiple regression analysis of mathematics marks for the boys – Model 1 89
Table 4.43: Regression coefficients for mathematics marks for the boys 89
Table 4.44: Simple regression analysis of mathematics marks for the boys – Model 2 90
Table 4.45: Regression analysis of socio-economics status for the boys 90
Table 5.1: Three-digit coding system used to reference data (transcription) 95
Table 5.2: Themes and subthemes from the data analysis 96
Table 5.3: Theme one (with subthemes) 97
Table 5.4: Theme two and subthemes 104
Table 5.5: Theme three (attributions for mathematics performance) and subthemes 110
Table 5.6: Theme four and subthemes 124

LIST OF FIGURES

Figure 2.1: Conceptual framework for the study 32
Figure 3.1: Diagram of the sequential explanatory mixed methods design procedures (adapted from Ivankova & Stick, 2007) 39

CHAPTER 1
BACKGROUND TO AND RATIONALE FOR THE STUDY

1.1 INTRODUCTION

Mathematics, as a mandatory subject in secondary school educational programmes in Nigeria, is crucial in many fields of human endeavour. Its significance for transitioning to higher educational levels in Nigeria as a developing country cannot be overemphasised (Akase, Mwekaven, Awuhe, & Tombuwua, 2015). Despite its status in school education programmes, the high failure rate in the subject is alarming (Sa'ad, Adamu, & Sadiq, 2014). Many factors have been reported in the literature as being responsible for the poor mathematics achievement in Nigeria. These include teacher influence (Adegoke, 2011), the influence of low/poor self-concept and deficient academic motivation (Ajayi, Lawani, & Salomi, 2012), instructional methods, student attitudes to the subject (Akinsola & Olowojaiye, 2008; James, 2009), gender factors (Awofala, 2011), and class size (Olatunde, 2010). Popoola and Olarewaju (2010) list a wide range of factors affecting performance in mathematics, including the factors mentioned above, such as a lack of qualified teachers, the deprived background of many students, the difficulty of mathematics as a subject, lack of concentration, inadequate teaching facilities, socio-economic factors, and lack of enthusiasm for the subject.

Attributing reasons for behavioural actions is a common human characteristic. Shores and Smith (2010) describe attribution as individuals' ascription of failures and successes in life to causes that are either resident in or external to people. The authors add that individuals who are internally driven ascribe their success to their own ability or effort and accept liability for such performance. Those who are externally motivated ascribe their success to elements beyond their control, such as luck or the easiness of a task (Houston, 2016). Students in mathematics, too, attribute their successes or failures to either internal or external factors. Shores and Smith (2010, p. 24) state that "there appears to be a need to continue research on attribution, which is important to the success of students in Mathematics". The objective of this study was to determine the significance of attribution in understanding the poor performance of students in mathematics. As a result of achieving this objective, the study thus investigated the attributional thinking of the students in the study regarding success and failure in mathematics performance. Mathematics performance in this study was measured in terms of the students' examination scores and correlated with socio-demographic factors such as the gender and socio-economic status of the students. The next sections cover the

background to the study, the problem statement and rationale, the aim of the study, as well as the theoretical framework and research design.

1.2 BACKGROUND TO THE STUDY

In Nigeria, secondary school education takes six years (three years for a junior secondary and three years for a senior secondary qualification). Mathematics is compulsory for admission to tertiary education. The other mandatory subjects are English Language, one Nigerian language, Biology, Physics or Chemistry, and any other four or five from Arts, Commercial Science, Social Science and combinations of Science subjects. No fewer than five of these subjects must be passed in the final year examination as a condition to advance to a tertiary institution. As important and mandatory mathematics as a subject is, based on the requirements outlined above, the consistently poor performance in mathematics is alarming (Aremu & Tella, 2009). Researchers (Adebule & Ayoola, 2016; Boruchovitch, 2004; Buhagiar, 2013; Ifamuyiwa & Akinsola, 2008; Musa, Dauda, & Umar, 2016; Nenty, 2010) and stakeholders in education have distinguished the likely reasons for students' failure in mathematics, such as the attitude of students, the ineffectiveness of mathematics teachers, and a lack of interest in the subject.

Some other reasons could be adduced to the poor performance in mathematics in Nigerian secondary schools. For instance, it has been observed that students in science classes consider mathematics more important than any other subject or subject combination (Tella, 2007). Mathematics is referred to by Ajayi, Lawani, and Adeyanju (2011, p. 202) "as the queen of all sciences and servant to all disciplines". In a related study, Ajayi, Lawani, and Salomi (2012) contend that the attitude of students to the subject may be a contributory cause of poor performance. The authors maintain that students who continuously fail mathematics may come to believe that they can never pass the subject. However, Akinsola and Olowojaiye (2008) argue that a positive attitude can be formed if students experience success in the subject. Tella (2007) reports that when a positive attitude and interest are exhibited by students, mathematics teachers will be motivated to teach the subject regardless of the challenges they may face. Ifamuyiwa and Akinsola's (2008) research reveals the importance of self-instructional and cooperative strategies in promoting a positive attitude to mathematics in individual students without the direct intervention of a teacher. It is therefore argued that if students' attributional style can be improved (made more positive), this will help in resolving the problem of mathematics learning in Nigerian secondary school students. Attributions are the explanations individuals give for their success or failure in any activity they have embarked upon. Changing the attributions of students positively can thus provide a way of removing a sense of personal blame and thereby counter poor performance, especially in mathematics.

Research shows that the reasons many Nigerian students give for their poor performance in mathematics include the difficulty of the subject, a lack of good mathematics textbooks, ineffective teaching strategies, and the abstract nature of the subject (Abdulahi & Onasanya, 2010; Akinsola & Olowojaiye, 2008; James, 2009). As mentioned earlier, this study focused on attributional style and its effect on the mathematics performance of students. In the global context, Basturk and Yavuz (2010) report that various factors contribute to success or failure in mathematics, such as inadequate mathematics course materials and the belief of many students that mathematics is difficult because of their past experiences with the subject.

The Mathematics' results of the regional examination conducted by the West African Examination Council (WAEC, 2012-2018) over a period of ten years show a downward trend in which subjects, inclusive of Mathematics, thus indicating the poor performance in mathematics in Nigerian senior secondary schools.

Table 1.1: Results of the senior school certificate examination conducted by the WAEC between 2012 and 2018

Year	Total of students who sat for the WAEC	A1 – C6 in mathematics	
		Number of students who passed	%
2012	1, 672,224	649,156	38,81
2013	1, 689,188	889,636	52,67
2014	1, 692,435	529,425	31,28
2015	1, 593,442	616,370	38,68
2016	1, 552,758	878,040	52,97
2017	1, 471,151	923,486	59,22
2018	1,572,396	786,016	49,98

Source: WAEC Test and Development Unit, Lagos, Nigeria (WAEC, 2012-2018)

Table 1.1 shows the percentage pass at distinction and credit levels of senior secondary school students who sat for the senior secondary school certificate examination in mathematics from 2012 to 2018. The WAEC statistics is cited in this study because the WAEC examination is the major and government approved examination for transition from senior secondary schools to tertiary institutions in Nigeria. The WAEC grading system is as follows: A1 (distinction), B2, B3, C4, C5, C6 (credit pass), D7, D8 (ordinary pass), F9 (fail). From 2012 onwards, the percentage pass rate at distinction and credit levels increased in 2013 when it was 52,67%, after which it started decreasing. The table indicates that over the seven-year period, the average pass rate at distinction and credit levels in mathematics was lower than

47%. The level of mathematics performance reflects the overall quality of the Nigerian education system at the time of the study.

1.3 PROBLEM STATEMENT AND RATIONALE FOR THE STUDY

1.3.1 Global research on attributional style

Attributional style (AS) as a psychological construct has attracted wide global attention over the years (Alloy, Peterson, Abramson, & Seligman, 1984; Higgins & LaPointe, 2012; Nokelainen, Tirri, & Merenti-Valimaki, 2007). Researchers have concentrated on AS in connection with depression and other psychological or emotional problems in practical rather than in academic terms (Ashforth & Fugate, 2006; Shelly & Craig, 2010). However, little research has been conducted on the relationship between AS and mathematics performance, and the present study therefore endeavoured to fill this research gap.

1.3.2 Global research on attributional style and mathematics

Because individuals tend to attribute happenings in their lives to negative as well as positive events, the present study set out to determine how the students in the study perceived the negative and positive events that became apparent in their lives. Gibb, Zhu, Alloy, and Abramson (2002) believe that AS can be used in an academic setting. In this study, the researcher investigated AS in the context of mathematics achievement in relation to gender and socio-economic status. Perry, Stupnisky, Daniels, and Haynes (2008) argue that success and failure outcomes are influenced by attributional thinking, a deeper knowledge of which could be helpful in motivating students in new learning environments. International studies reveal that secondary school students attribute their success or failure in mathematics to a variety of factors (some of which have been identified earlier) such as inadequate mathematics textbooks, students' perception that mathematics is a difficult subject, as well as where students sit in mathematics classrooms. Others identified factors are socio-economic circumstances, poor initial teaching in mathematics, students' lack of concentration, the location of schools, the preferred future occupations (jobs) of students, and task difficulty (Basturk, & Yavuz, 2010; Boruchovitch, 2004; Farid & Iqbal, 2012; Nenty, 2010; Shores, 2011).

1.3.3 Shortcomings in some studies on AS and mathematics performance

Researchers on attributional style and mathematics performance have identified various shortcomings in their studies. For instance, most studies on AS and the mathematics performance of students have been conducted using quantitative methods (Basturk & Yavuz, 2010; Morris & Tiggerman, 2013; Nokelainen et al., 2007). Ideally, the results of quantitative

studies should be supported by other methods, such as interviews. The present study accordingly complemented the quantitative data obtained with qualitative data obtained through focus group discussions. In the past, different researchers used respondent samples ranging across all educational levels. There was thus no consistency in the samples selected by researchers on AS and mathematics performance, as illustrated also by Nokelainen et al. (2007) who conducted research with mathematically talented subjects from higher education and secondary schools. Shores (2011) involved pre-service teachers in their study. Many studies on AS style and mathematics performance thus focused on academically advantaged students (Houston, 2016; Morris & Tiggerman, 2013). Although research on AS and mathematics performance is common in Western countries, few such studies have been conducted in Africa (Nenty, 2010; Tachie & Chireshe, 2013). Research on AS and mathematics performance in Africa, especially in Nigeria, is needed to add to the existing body of world literature on the topic in order to establish its cross-cultural value.

1.3.4 Research on AS in different context

Research on attributional style has been carried out in different contexts (workplaces and organisations) in developed countries (Dasborough, Harvey & Martinko, 2011; Harvey, Martinko & Gardner, 2006; Lightsey & Barnes, 2007). However, as mentioned earlier, research on attributional style and Mathematics performance, especially in Nigeria, is not available and little research on attribution-related studies has been conducted in the country.

1.3.5 Mathematics Education

Most colleges of education students in Nigeria do not choose mathematics as their major subject or discipline, and mathematics-orientated courses that students register for are often not studied with any enthusiasm or passed (Salman, Yahaya, & Adewara, 2011). This attitude can be traced to their secondary school education where the foundation for a positive mathematics orientation has to be laid.

1.3.6 Socio-demographic factors and mathematics performance

Different studies on the socio-demographic factors in AS and mathematics performance have been reported (McConney & Perry, 2010; Tucker-Drob & Harden, 2012).The current study was interested in determining the effect of such factors on mathematics performance, taking into account the nature of Nigeria as a developing country. Gender has been a major issue in mathematics performance in Nigeria, where female students are now competing successfully with their male counterparts (Ajai & Imoko, 2015). Various factors that affect mathematics performance referred to earlier, such as the deprived background of many students, a lack of teaching facilities, large class sizes, the seating arrangement in mathematics classrooms, and

inadequate mathematics textbooks, are directly linked to broader socio-economic factors. These factors as well as gender and attitude of students towards mathematics served as the moderating variables in the study and were correlated with the main constructs in the study (Shores & Smith, 2010).

Against this background, the present study investigated the effect of AS on the mathematics performance of students in senior secondary schools in Lagos State, Nigeria, to see if AS was related to success in mathematics, as measured by the mathematics scores of the students. The study was conducted in an entirely different geographical location not explored previously.

1.4 AIM OF THE STUDY

The aim of the study was to achieve a better understanding of the extent to which the attributional style (AS) of the students in the study and socio-demographic factors such as socio-economic status, gender and attitude towards mathematics could determine the quality of the students' performance in mathematics. The stability and globality dimensions of attributional style[1] were used as the independent variables.

1.5 EXPLANATION OF SOME CORE CONCEPTS

1.5.1 Attributional style

Attributional style (AS) or explanatory style is individuals' ascriptions of different meanings or causes to situations they find themselves in (Weiner, 1986). Attributional style evolved from Abramson, Seligman, and Teasdales' (1978) reformulated learned helplessness theory which holds that people attribute different meanings to negative events that happen to them. Attributional style relates to individual differences in terms of three dimensions regarding how people describe positive and negative situations they face in life. The dimensions are internality, stability, and globality. In the present study, negative or positive AS is the same as pessimistic or optimistic AS has been defined before.

1.5.2 Socio-demographic factors

Socio-demographic factors refer to a group of variables in a study's population, such as age, gender, social class or socio-economic status, family size, and birth order (Alordiah, Akpadaka, & Oviogbodu, 2015). All these factors contribute to the position a person occupies in society. Gender and socio-economic status were focused on in the present study.

[1] For more information on the meaning of these terms, see Chapter two, Sections 2.2 – 2.2.9.

1.5.3 Mathematics performance

Mathematics performance refers to the level of students' ability in mathematics as a subject. This is measured in this study by the students' scores in their mathematics end of second term examinations.

1.6 THEORETICAL FRAMEWORK

1.6.1 Reformulated learned helplessness theory

The conceptual framework for this study was influenced by Abramson et al.'s (1978) reformulated learned helplessness theory, which is a cognitive theory of unhappiness according to which individuals consistently explain or describe events that have happened to them in pessimistic or optimistic ways (Houston, 2016). Originally, the theory placed more emphasis on attributional style (AS) as a factor explaining depression where people attribute their failure to internal, stable, or global causal beliefs (Struthers & Perry, 1996). As mentioned earlier, the reformulated learned helplessness theory has been applied to the workplace (Ashforth & Fugate, 2006), and various studies indicate that causal belief is useful also in academic settings such as schools and universities (Gibb et al., 2002).

The reformulated learned helplessness theory is important in intellectual activities, especially mathematics, because the explanations, negative or positive, that students give after an academic event (such as an examination) may determine their future outcomes in similar events. For instance, a student who fails a mathematics examination and believes his failure was due to a lack of adequate preparation for the examination will have an optimistic attributional style regarding future mathematics examinations. Conversely, a learned helplessness student who fails a mathematics examination despite having prepared for the examination may believe that he[2] will never pass mathematics if he sits for the subject again in future. The student has a pessimistic attributional style.

Mathematics, as an important subject in the secondary school curriculum, has a special quality that triggers either interest of lack of interest in students. Students need to be aware of their attributional thinking. It is in the course of rethinking events that people attribute different meanings to situations they find themselves in (Weiner, 1986). Ascribing causes or meanings to different events and giving explanations or causes for each event is referred to as attributional style (AS).

[2] Feminine and masculine pronouns (she, he, her, him, hers, his) should be regarded as interchangeable.

1.7 RESEARCH QUESTIONS

1.7.1 Primary research question

How does attributional style relate to mathematics performance in Nigerian senior secondary school over and above socio-demographic and attitudinal factors?

1.7.2 Secondary research questions

1. How do stability and globality attributional style relate to mathematics performance?
2. How well do stability and globality as well as gender and socio-economic factors predict mathematics performance?
3. What is the influence of socio-demographic and attitudinal factors on mathematics performance?

1.7.3 Research hypothesis

The following research hypothesis underpinned the study.
There is a relationship between the attributional style, mathematics performance, and socio-demographic factors (gender and socio-economic status) of/relating to Nigerian senior secondary school students. This hypothesis is therefore that secondary school students' attributional style (in terms of stability and globality) relate to their mathematics performance and socio-demographic status.

1.8 RESEARCH DESIGN AND METHODOLOGY

The study was conducted using an explanatory sequential mixed-method design and implemented in two phases: QUAN→qual (Ivankova, Creswell & Plano Clark, 2010). The abbreviation indicates the sequential collection and priority of the quantitative and qualitative data (Creswell, 2012). The next section summarises the research design. The details of the research will be discussed in Chapter 3.

1.8.1 Sampling, data collection, and research sites

Data were collected from two senior secondary schools (SSS 2) in Lagos State, Nigeria. For the quantitative part of the research, data were obtained from 300 participants, and two focus group interviews involving ten participants were used for the qualitative part. A simple random sampling method was implemented for the quantitative part of the research. This sampling method requires a sample that is more representative of the study's population (Cohen, Manion, & Morrison, 2011). A purposive sampling method was used for the qualitative part of the research. In order to better understand the research process, Creswell (2012) describes

the purposive sampling method as the deliberate selection of participants and research sites by the researcher. In the purposive sampling method, the selection of study participants is based on significant participant characteristics (Nieuwenhuis, 2010a). The following table shows the stages of the data collection plan, the implemented actions, and the research sites of the present study.

Table 1.2: Data collection plan

Data collection step	Implemented actions	Research sites	Date
Step 1	Request for permission to conduct the research in the schools	Lagos State Ministry of Education and the school principals	November 9, 2016
Step 2	Orientation and sensitization of the study participants regarding the research	The school compound	October 2 and 3, 2018
Step 3	Administration of the ASQ instrument to the 300 study participants	The school compound	October 4 and 5, 2018
Step 4	Collection of the mathematics scores of the students from the school principals	The school compound	October 9 and 10, 2018
Step 5	Focus group interviews conducted by the researcher with 10 participants purposively selected from the research sample	The school compound	October 9 and 10, 2018

1.8.2 Data collection and analysis

The quantitative and qualitative data were collected sequentially, analyzed, and interpreted and integrated. The Attributional Style Questionnaire (ASQ) (Dykema, Bergbower, Doctora, & Peterson, 1996) and the mathematics scores of the students were used for the analysis of the quantitative data. The focus group interviews were conducted for the qualitative part of the research.

1.8.3 Quality assurance

Quality assurance was ensured by collecting rich and detailed data, which were validated by the researcher maintaining cordial relationships with the study participants (Creswell, 2014). Although the mixed methods approach can be exasperating and time consuming, the

researcher ensured that the trustworthiness and triangulation of the data as well as the presentation of the data were handled professionally (Bryman, 2006; Creswell, 2014).

1.9 ROLE OF THE RESEARCHER

The researcher informed the study participants about the research and subsequently administered and scored the study's instruments, conducted focus group interviews, and interpreted the results generated from the quantitative and qualitative data.

1.10 ETHICAL CONSIDERATIONS

Before embarking on the present research, the researcher applied for and received ethical clearance from the Ethics Committee of the Faculty of Education, University of Pretoria. The researcher followed the rules and regulations of the University's Code of Ethics for Research, especially with regard to professional conduct in the course of the data collection as well as the report writing. The participants' independence and confidentiality were ensured, and no pressure was exerted on them regarding their participation in the study. From the outset of the research project, the researcher adhered to all the ethical principles governing the conducting and reporting of the research. The ideas and special efforts of the participants were acknowledged, and they were informed about how information gained through the research would be used.

1.11 CONCLUSION

The study explored the effect of AS on the mathematics performance of secondary school students in Nigeria by correlating AS with various socio-demographic factors. The aim was to determine whether there were correlations among the variables of the study. The researcher's argument was that mathematics education is a continuous process in the course of which the positive effect of AS should be acknowledged. Chapter 2 covers the theoretical framework of the study and reviews related literature on mathematics performance, demographic factors, and the role of AS in mathematics performance.

CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION

This chapter covers the theoretical framework that was used to study the mathematics performance of senior secondary school students. Although attributional style (AS) has been researched in some detail, especially in the Western world, this has not been the case in Nigeria (Suleiman, 2016).

2.2 THEORETICAL FRAMEWORK

2.2.1 Reformulated Learned Helplessness Theory (RLHT)

When human beings realise that they cannot control or solve problems, a breakdown occurs between events and responses, leading to barriers to future learning (Daggol, 2018). The extent to which human beings cannot maintain control over events they face adversely affects their behaviour and organic functioning. In some instances, learned helplessness may set in. Mecee, Glienke, and Burg (2006, p. 354) state that “learned helplessness occurs when someone attributes failure to a lack of ability and gives up easily or shows a steady regression in problem-solving strategies when confronted with failure”. Learned helplessness is a behaviour people use to justify their lack of control over situations that may make them behave in a helpless manner (Houston, 2016).

Learned helplessness as a concept was developed by researchers who studied helpless behaviour in animals. Kloosterman (1984) used the term ‘learned helplessness’ to describe laboratory dogs that received periodic electric shocks. As expected, the dogs attempted to escape when faced with imminent danger but were prevented from doing so. After the passage of some time, the cages were replaced, and the dogs were free to escape. However, because of their accustomedness to being imprisoned, they no longer tried to escape. The dogs could not control their destiny, because they thought they were helpless. These earlier studies were extended to human beings to ascertain how people can control their behaviours (Alloy et al., 1984; O’Sullivan, O’Sullivan, O’Connell, O’Reilly, & Sarma, 2018; Morris & Tiggerman, 2013). Research over the years on learned helplessness has shown that human beings who are exposed to uncontrollable events, too, eventually exhibit disruptive behaviour (Kloosterman, 1984; Suleiman, 2016). People who display learned helplessness believe that the reasons for

the negative events that happen to them are permanent and that it will keep on influencing their lives. According to Alloy et al. (1984):

> "Helplessness will be relatively likely to generalise from an original situation, to a new similar situation, regardless of what attribution the person makes for the uncontrollable events in the original situation. Alternatively, helplessness should be more likely generalised from the original situation to a new dissimilar situation when the person makes a global, rather than a specific, attribution for uncontrollable events in the original situation". (p. 681)

Daggol (2018) describes learned helplessness as a key aspect of learning because learning is categorised as both a mental and an affective process. Hall, Goodwin, Heleski, Randle, and Waran (2008) on the other hand, describe learned helplessness as a mental state in which people find it difficult to be in control of adverse circumstances, believing that all their actions are unsuccessful.

In academic settings, some students feel that, no matter how hard they study, they will fail. This kind of fear of failure has affected the academic achievement of many secondary school students, especially in Nigeria (Ajayi et al., 2012; Shores & Smith, 2010). Realising the extent of the problem at hand, the researcher in the present study explored the possibility of using reformulated learned helplessness theory (RLHT) (Abramson et al., 1978) as the theoretical framework for the study. RLHT was initially used to investigate depression and, according to O'Sullivan et al., (2018),

> "[r]eformulated learned helplessness theory is based on a diathesis-stress interaction. It proposes that the symptoms of depression can be triggered by uncontrollable aversive circumstances, moderated by a cognitive vulnerability. This cognitive vulnerability, namely depressogenic attributional style, is a relatively stable tendency to explain negative events in terms of internal (e.g. "it's due to me"), stable (e.g. "it will be there in the future"), and global causes (e.g. "it affects everything I do". (p. 2)

Schroder and Ollis (2013) maintain that, according to RLHT, when people believe that the outcome of an assignment is beyond their control, a closely linked configuration of deficits (cognitive, motivational, and emotional) appears to affect their behaviour. These authors describe the above configuration of deficits as they relate to people's learned helplessness as follows:

> "The cognitive deficit refers to an impaired ability to learn and apply a suitable response even if the outcome is in fact controllable. Learned helplessness intervenes with

> problems solving skills in similar situations. The motivational deficit is characterized by lack of drive and effort resulting from that fatalistic belief that nothing can be done to bring about the desired outcome. Finally, the experience and expectation of uncontrollability lead to emotional deficit in the form of depressed mood". (Schroder & Ollis, 2013, p. 286)

As stated earlier, studies indicate that RLHT is valuable in achievement generally and in academic settings (Shmulsky & Gobbo, 2007; Pansu & Jouffre, 2008; Nokelanien et al., 2007). RLHT has been researched beyond laboratory experiments and its application expanded to academic environments (Mohanty, Pradham, & Jena, 2015). Learned helplessness is characterised by submissiveness in academic tasks and in tasks requiring perseverance, which helpless students see as daunting challenges (Sorrenti, Filippello, Orecchio, & Buzzai, 2016; Weiner, 1986). Attributing causes to various events and clarifying such events is the essence of attributional style (AS). Nokelainen et al. (2007) describe attribution styles as generalised, stereotypical patterns of attributions and dispositional beliefs while Shmulsky and Gobbo (2007, p. 299) define AS "as one's pattern of thinking about the causes of events, or as a cognitive factor related to various measures of success". AS is the way in which people think about the causes of a situation (Struthers & Perry, 1996). Various studies have been conducted on people's attributional styles (Shelley & Craig, 2010; Struthers & Perry, 1996; Harvey et al., 2006), for example a person who is constantly sensitive to disappointment may regard her[3] circumstances as uncontrollable resulting in feelings of helplessness. Successful people generally ascribe their success to their ability and luck.

Experts have identified three dimensions of AS: internality/externality, stability/instability, and globality/specificity (Haugen, Lund, & Ommundsen, 2008). When people think that their negative situation is not likely to end, they believe their problem is stable (stability), and that this may lead to other problems in their lives (globality), which are caused by themselves and not the prevailing situation (internality). There may be a negative impact on mathematics performance and achievement setting when an action is internal and stable and there is a global causal belief about what happened. However, when an academic causal ascription is external, unstable, and specific, there may be positive dimensions to the performance of students (Ashforth & Fugate, 2006). Students' AS may sharpen their perception of the future and influence their views and subsequent behaviours. Hsieh and Kang (2010) believe that the future success of students may be affected by their attributions in terms of the amount of effort

[3] Feminine and masculine pronouns (she, he, her, him, hers, his) should be regarded as interchangeable.

they put in, their motivation, and their competence, which will eventually determine their level of achievement.

Attributional style has also been examined as a predictive model and explanatory tool for people's self-concept, understanding and outcome (Maras, Moon, & Gridley, 2014). Individuals' interpretation of negative thinking or behaviour is acquired through continuous exposure to negative events that are inescapable. Conversely, people who continuously exhibit positive attributional styles will be optimistic (Higgins & LaPointe, 2012). Askim (1999) argues that personal characteristics play a major role in explaining success or failure in terms of ability (power to carry out a task) and trying (determination to complete a task), which are two important components of positive attribution.

This study was limited to the internality, stability, and globality dimensions of AS, which may determine success or failure in mathematics (Abramson et al., 1978). These AS dimensions, except for internality, served as the predictor or explanatory variables of the study and were measured by the criterion variable mathematics performance scores of the students. The internality dimension was not investigated as other studies have found it to have a low reliability (Dykema et al., 1996).

2.2.2 Attributional style dimensions

2.2.2.1 Internality

Internality is the first form of AS dimension that indicates that a situation occurs because of something about the person (internality) or something about the situation (externality). Internality is the individual uniqueness of one's nature, personality, and attitude that is self-determined while externality refers to elements driven by situations outside of one's control (Pishghadam & Abbasnejad, 2017). Attributional style holds that internality or internal attribution regarding bad events occurs as a result of loss of self-esteem (Tennen & Herzberger, 1986). Abramson et al. (1978) describe internality as personal helplessness in which people find it difficult to solve solvable problems. Similarly, these authors describe externality as universal helplessness as a result of which neither the person nor others can solve the problem. According to Abramson et al. (1978, p. 54), "universally helpless individuals make external attributions, whereas personally helpless individuals make internal attributions". An internal dimension shows that the cause of an event is dependent on the individual who is solely responsible for his actions. However, the distinction between personal helplessness and universal helplessness is low self-esteem (Abramson et al., 1978). An individual who fails to succeed in an activity that other relevant people succeed in will have lower self-esteem than an individual who fails to succeed in an activity where relevant others fail as well.

2.2.2.2 Stability

Stability is the second form of attributional dimension that indicates that an incident is permanent/lasting within the individual, or that the incident is temporary/fluctuating (unstable attribution) (Bouchaib, Ahmadou, & Abdelkader, 2018). Stability may result in a long-lasting adaptation shortfall for the individual concerned (Tennen & Herzberger, 1986). Khodayarifard, Anshel, and Brinthaupt (2006) state that stable attribution is a more persistent factor in an event while unstable attribution is momentary. Abramson et al. (1978) explain that stable attributions are considered long-lived or recurrent whereas unstable attributions are short-lived or intermittent. They add that stable-unstable is orthogonal to internal-external, that is, by implication, stable-unstable is linked directly to internal-external when attributing reasons for individuals' actions. They further explain that some individuals ascribe a bad outcome of an event to lack of ability (an internal-stable factor), lack of effort (an internal-unstable factor), the task being too difficult (an external-stable factor), or lack of luck (an external-unstable factor). Weiner (2000, p. 4) refers to stability as "the duration of a cause. Some causes, such as mathematical aptitude, are perceived as constant, whereas others, such as chance, are considered unstable or temporary".

2.2.2.3 Globality

A problem situation may be general or specific. When a broad range of situations or problems occurs that affects many aspects of a person's life endeavours, it is termed global, but if the situation is new and affects the current event, it is specific (Tennen & Herzberger, 1986). According to Abramson et al. (1978), a global attribution infers that helplessness will occur under all circumstances while a specific attribution infers weakness only in the original, specific circumstance. If a bad event is attributed to a global factor, there could be serious implications, but if it is specific, the implications could be less serious. The next section covers AS composites.

2.2.3 Attributional style composites

Attributional style composites comprise composite negative (CoNeg) and composite positive (CoPos) attributional styles. Composite Negative (CoNeg) is the sum total of bad events while composite positive (CoPos) is the sum total of positive events. Researchers have shown that the AS composites for negative and positive events correlate strongly with AS dimensions (Peterson, Semuel, Von Baeyer, Abramson, Metalsky, & Seligman, 1982). Kleiman, Chiara, Liu, Jager-Hyman, Choi, and Alloy (2017) maintain that ascribing uncontrollable negative events to the AS dimensions (internal, stable, and global) can lead to negative AS. In contrast,

people who attribute negative events to unstable and specific causes, and do not experience negative self-attributes and long-term outcomes, may be perceived as having a positive AS. For Abramson et al. (1978, p. 70), composite positive AS is achievable if “unrealistic attribution for failure is changed towards external, unstable, specific factors and change unrealistic attribution for success towards internal, stable and global factors”.

2.2.4 Causal attributions

Causal attribution refers to the approach of trying to determine the causes of people’s behaviour to the events that affect them (Muwonge & Ssenyonga, 2015). Weiner (1986) highlights ability, effort, task difficulty, and luck as causal attributions for the success or failure of individuals. Ability and effort reside in the individual while task difficulty and luck are external. These attributions are categorised into three dimensions, namely: locus, stability, and control (Cortes-Suarez & Sandiford, 2008; Haynes Stewart, Clifton, Daniels, Perry, Chipperfield, & Ruthig, 2011Weiner, 1986). The locus dimension is either internal (centring on the outcome of the activity achieved or not achieved) and can be perceived as being within the individual, or external and thus subject to environmental influence (luck and task difficulty). The stability dimension is the fixed or variable attribution of outcomes. Some causes of behaviour may vary while some may be constant; for example, ability is stable while effort is unstable. Secondary school students tend to believe in their ability attribution rather than their effort attribution while they are maturing (Rosevear, 2010). The controllability dimension denotes that some causal ascriptions may be subject to manoeuvring depending on the situation. One situation may be controllable while others may not be. For instance, study habits, laziness, and effort are subject to controllability or uncontrollability (Ashforth & Fugate, 2006; Hayne Stewart et al., 2011).

Mok, Kennedy, and Moore (2011) report that secondary school students often attribute their academic outcome to factors such as the teacher, the nature of the learning task, concentration, intrinsic motivation, practice, relatives or other significant people, competence, and cleverness. Siegle, Rubenstein, Polland, and Romey (2010) identify academic domain, gender, development stage, ability level, effort, and learning environment as factors affecting people’s attribution for success or failure. They state that success or failure in an activity may not necessarily be caused by some or all of the above factors. For instance, success in mathematics may be attributed to effort while success in history may be attributed to ability. Much research has focused on attribution and achievement, indicating that success is more likely to be attributed to internal factors such as ability and effort than failure and that ability attribution is a determining factor of achievement (Cortes-Suarez & Sandiford, 2008; Hsieh & Kang, 2010). The principle of the attribution construct in an academic setting is that students,

in attempting to understand, try to know why an event has happened (Korn, Rosenblau, Rodriguez, Buritica, & Heekeren, 2016). This can trigger an interest that eventually motivates them. Motivation is thus important in attributional rethinking in academic settings.

2.2.5 Gender and attributional style

Students' AS is widely considered instrumental in their academic performance (Mok et al., 2011). Different attributional styles are reflected in the gender difference of secondary school students, not only in mathematics performance but also in all other subjects. Mok et al. (2011) investigated 14 846 secondary school students' academic attribution in Hong Kong and uncovered significant gender differences in the students' performance in terms of ability, effort, and strategy, with the female students ascribing their good performance to effort. Robinson-Awana, Kehle, Bray, Jenson, Clark, and Lawless' (2001) study covered self-esteem, gender-role perception, gender-role orientation, and AS a function of academic competence. The results revealed greater academic competence in the female students than in the male students in the attributional part of the study. The male students believed that the female students' academic success was brought about by their external, unstable, and specific attributions. Rueger and Malecki's (2011) study on the effect of AS, stress, and perceived parental support on early adolescence depressive symptoms revealed that the boys, whose attributional style was pessimistic, gained more parental support when confronted with high stress levels while the girls, irrespective of their level of stress, experienced parental support. Schatt (2011) applied attribution theory when exploring the attitude to music practice of high school students with gender as a component of the research. The study found that the female students considered effort in music practice as more important than the male students did. In a related study in Singapore, Yeo and Tan (2012) investigated the relationship between the attribution style and self-efficacy of adolescents. The study revealed that the female adolescents exhibited more positive thinking than the male adolescents. The research further revealed that, contrary to the boys, the girls accepted more individual responsibility for negative or bad events. Khodayarifard, Anshel, and Brinthanpt (2006) also reported a stronger correlation between AS and anxiety in the girls in their study (in Australia) than in the boys. Tirri and Nokelainen (2011) examined how mathematical talent can be influenced by gifted boys' and girls' self-perception of ability AS. The study indicated that the attribution of success to effort tended to be greater among the girls than the boys.

Although the girls underrated their academic ability in mathematics, they believed that they performed better in English language. Unknown to them, they performed equally well in both subjects. Maras, Moon, and Gridley (2014) reported a gender difference in AS. Their study

revealed a significant difference between the male students' high composite AS score and that of the female students. The male students also recorded a higher global AS for good events than the female students. Furthermore, Farid and Iqbal (2012) reported that the male as well as the female students in their study cited teacher impact, procedure, effort, and enthusiasm as crucial reasons for their achievement in mathematics. With regard to achievement attributions in English, the female students highlighted teacher impact, effort, parental impact, methodology, and enthusiasm as reasons for their success. The male students, on the other hand, cited system, interest, teacher impact, effort, and parental impact as the principal reasons for their success.

2.2.6 Academic motivation and attributional style

A significant factor in education is motivation because of its relationship with different variables such as interest, steadiness, learning, and performance. When students are inspired, their performance in a scholastic activity generally improves. This improvement in performance leads to additional time spent on the activity, resulting in students who learn better and appreciate the activity more than when they are not motivated (Dodeen, Abdelfattah, & Alshumrani, 2014). Weiner (1979) postulates stable/unstable, controllable/uncontrollable, and internal/external factors as dimensions of causality. According to him, all these dimensions affect students' attributions for success or failure. Weiner's (1979) theory holds that the main source of motivation is the search for understanding and comprehension. Toland and Boyle (2008) support this view and state that attributions connect learning, emotion, and motivation. Weiner's (1979) attribution theory further holds that motivation is influenced when students have an attribution for success or failure in a learning task. If a successful learning task is attributed to their ability and failure to external factors, they will continually be motivated to learn. Sorić's (2009) report reveals that successful, intrinsically motivated students tend to feel more independent and determined. The students in his study attributed their success to internal and controllable reasons and not to controlled external reasons. Motivational belief in AS is also reported by Swinton, Kurtz–Costes, Rowley, and Okeke-Adeyanju (2011) in their longitudinal study on African-American adolescents.

Motivation and students' attitudes are crucial in mathematics instruction. because of the connection between motivation and achievement in mathematics. When students become less motivated to learn mathematics, their performance scores decrease (Mata, Monteiro, & Peixoto, 2012). Academic motivation of secondary school students plays a major role in determining the level of their learning outcomes. According to Ryan and Deci (2000a, p. 55), "motivation concerns activation and intention". They underscore the fact that a person who

does not have the drive to be motivated is considered unmotivated compared to someone who has the zeal and energy to achieve goals. However, motivation as explained by Zisimopoulos and Galanakiis (2009, p. 35) “is hardly a unitary construct”. People are either internally or externally motivated, based on the orientation of the motivation. Although intrinsic and extrinsic motivation provide a basis for determining and predicting students' learning outcome, the former is more useful than the latter.

Students who are motivated intrinsically tend to perform better academically and have a more favourable perception of academic work without being anxious than those motivated extrinsically (Lepper, Corpus, & Iyengar, 2005 ; Hidi, 2000). The attribution scenario, especially internally, relates to students’ causal explanation of why they are doing well. This motivational attitude, because it is resident within the individual, is a potent and practicable way for student achievement. Wentzel (1998) supports the view that students' motivation in mathematics originates from inside the student and occurs for various reasons, for example conviction about the value of mathematics, mathematics self-efficacy, and self-concept.

Contrary to the above, some researchers believe that extrinsic motivation helps students do better in their academic studies (Lepper & Henderlong, 2000). The value of extrinsic motivation is acknowledged by Hardré, Chen, Huang, Chiang, Jen, and Warden (2006, p. 189) who state that “the interaction of teaching and learning results from a complex dynamic of multiple constructs and characteristics”. Student outcomes are not the result of simple cause-effect relationships, but of systemic interactions of factors that include the characteristics that teachers and students bring to the instructional context, as well as their institutional and cultural contexts.

Researchers have found that intrinsically motivated behaviours and actions strongly positively influence achievement (Brouse, Basch, LeBlanc, McKnight, & Lei, 2010). Students' experiences and backgrounds can also have a major impact on motivation (Hayne Stewart et al., 2011). Chiu and Xihua (2008), in their research on family and motivation effects on students’ mathematics achievement, reported that families can play a vital role in students’ mathematics self-efficacy and self-concept. Families' commitment to education, training resources, and inclusion in school activities can increase students' motivation. Students who are more engaged in family activities, for example political, scholarly, and social discourses are often more inspired to study.

Families with lower socio-economic status have reduced financial resources and are often less ready and able to take part in their children’s education. This implies that children from

these families go to class less motivated to learn and are more inclined to withdraw and drop out of school. Teachers working with students from low socio-economic status families should do everything in their power to use teaching methods that increase the motivation of their students (Chiu & Xihua 2008). Implementing strategies that can improve students' motivation will help students become more engaged and thus experience greater achievement (Halat, Jakubowski, & Aydin, 2008).

2.2.7 Attribution and Mathematics performance

Mathematics, being a compulsory subject, makes some students fearful either as a result of the content (the subject itself) or the methodology (how it is taught). Baştürk and Yavuz's (2010) responses to these assertions are in the form of causal explanations and gave a clue about the reasons for actions. Boruchovitch (2004, p. 53) likewise believes that "attributing causes to events that usually happen in the environment has been considered as a human tendency". Because of their curiosity about certain events in their lives, many people take great trouble to search for and find the reasons behind such events (Boruchovitch, 2004). Students' expectations regarding performance in mathematics are considered important factors underlying their school experience and achievement (Yailagh, Lloyd, & Walsh, 2009). Their expectations tend to guide the way they approach mathematics tasks.

Research has shown that students have procedural and standard views on mathematics. Many believe that mathematics questions should be solvable in only a couple of steps and that the objective should be simply to get the correct answers (Yailagh et al., 2009). The task of students is to master mathematics and to demonstrate their ability in the subject; the task of teachers is to transmit information and to make sure that students understand it (Nenty, 2010). Such views may prevent students realising that there are other procedures and ways of dealing with different mathematical problems and different ways of describing ideas.

Some students approach activities in the mathematics class in an unfocused manner which inhibits them from creating individual techniques to understand and manage mathematical concepts. Buhagiar (2013) states that the literature shows that negative ideas and myths about mathematics are common among students. Many students perceive mathematics as a special and highly problematic and difficult subject.

Because of the importance of mathematics as a subject and its impact on the economic and technological development in any country, researchers globally have carried out numerous studies on the subject and its relationship to students' attributions (Nenty 2010; Nokelainen et al., 2007; Shores, 2011; Yailagh et al., 2009). Nenty (2010) analysed the factors that influence

causal attribution in mathematics performance among secondary schools in Lesotho. In his study, 717 Form IV students were randomly selected from 30 secondary schools, and the results revealed that causal attributions in mathematics performance were mostly traceable to external influences such as the students' preferred occupations after leaving school, and seating position in mathematics classrooms.

The researcher in the present study believes that the failure or success of secondary school students in mathematics is based on personal effort as well as external factors that enhance their interest in mathematics. A professional and well-prepared teacher of mathematics will therefore encourage students to participate in class activities. Shores' (2011) study on pre-service teachers' perceptions of student attributions in mathematics recommends that prospective mathematics teachers should be aware of their own perceptions of students' failure or success in mathematics. In their study, Yailagh et al., (2009) found that students who attribute their success in mathematics to internal causes generally have good grades while those who attribute their failure in mathematics to external causes generally get low marks in mathematics. The study revealed also that students who are internally driven ascribe their success to personal effort and ability and take full responsibility for their actions while those students who are externally driven attribute their success to task difficulty or luck. Shores (2011, p. 39) adds that "in order to increase the success rate in mathematics it is imperative that researchers and teachers understand what is causing students to fall behind".

Peterson et al. (1982) claim that attributional dimensions have a direct impact on the academic performance of students because these dimensions are dispositional beliefs of success or failure actions. Yailagh et al., (2009) and Shores (2011) argue that students find it easy to know when they perform well or not in mathematics when they compare their mathematics results to their peers. If the performance is attributed to the student's internal, stable, or global causal belief, there may be a negative impact on performance in mathematics, but if the attribution is external, unstable, or a specific causal belief, there may be positive dimensions to the performance. These findings are corroborated by various studies (Baştürk & Yavuz, 2010; Bempechat, Drago-Severson, & Bonlay, 2002; Boruchovitch, 2004) on enhancing mathematics performance through attributional style. Boruchovitch's (2004) study on the causal attribution for success and failure in mathematics among public secondary school students in Brazil revealed that the personal effort of the students in the study was the main attribution for success while lack of effort accounted for failure in mathematics performance. In a related study, Baştürk and Yavuz (2010) found that substandard mathematics textbooks for students, and students having the perception that mathematics was a difficult subject, were causal attributions for poor mathematics performance.

2.2.8 Expectancy and attribution

Expectancies are people's belief in their success in a future task (Clinkenbeard, 2012). Weiner (2000, p. 5) refers to this "as the subjective likelihood of future success". Martin and Dowson (2009) explain that if a cause is stable, the outcome may be repeated. Therefore, if failure is apparently due to lack of ability on the part of the student in an examination or test, there is likely to be a similar result in other examinations. Nuttall (2016) describes performance expectancy as people's convictions about how they will perform in an assignment. The author adds that performance expectancy and students' attributions for failure and success may be strongly linked to motivation. Attribution for success or failure inspires emotional feedback and success expectations, which will later encourage motivation and future performance (Sorić & Palekcic, 2009). Students with low self-esteem, especially in mathematics, may be hesitant to face new tasks they do not expect to succeed in. The converse is the case with students with high self-esteem and who have a positive mindset for success. Burden (2005), as cited in Casserly (2013), used expectancy theory to explain situations where the likely actions of individuals are determined by their expectations. If sufficient care is taken, intellectually and academically gifted students will be expected to perform well if the right measures are put in place (Clinkenbeard, 2012).

Students' interpersonal views are often influenced by their expectancies. However, Gurland, Grolnick, and Friendly (2012) found that students' interactions and associations do not necessarily arise from their expectancies. Haugen et al. (2008) argue that people's accumulation of aspiration in an achievement setting determines their expectancy both in general and specific domains, and this often forms the standard by which they evaluate their achievement. Cross-cultural differences in attributional style are discussed in the next section.

2.2.9 Cross-cultural difference in attributional style

The study of AS and academic performance is common in the Western world but not in Africa, including Nigeria (Baştürk, 2016; Camgoz, Tektas, & Metin, 2008; Tulu, 2013; Nenty, 2010; Tachie & Chireshe, 2013). Baştürk (2016) contends that people's opinions of and values with regard to their attributional thinking are most likely culturally distinctive. Numerous studies have been done on cross-cultural differences in the AS and academic performance of students (Nokelainen et al., 2007; Nurmi, 2001; Rowe & Lockart, 2005).

Camgoz et al. (2008) conducted a study among university students in Britain and Turkey to determine the cultural differences between the two countries in terms of AS. The study revealed clear differences between the British and Turkish students with regard to academic

attributional style dimensions (internality, stability, and globality). The AS dimensions of the British students were more positive than those of the Turkish. The study also identified the individualistic and collectivistic components that Britain and Turkey have regarding cultural variability.

Nokelainen et al. (2007), too, explored the reasons for success and failure in mathematics on an individual basis among Finnish youths and adults with various levels of mathematics talent. Three groups (highly, moderately, and mildly mathematically gifted) were explored. The results showed that the highly and moderately mathematically gifted students ascribed their achievement to ability rather than to effort, although effort was also acknowledged as important for success. Similarly, Rowe and Lockart's (2005) study on the AS and academic performance of Hispanic students revealed that a more marked negative attributional style was shown by the students with lower scholastic performance levels.

In a culturally diverse study on AS among American and Finnish students, Nurmi (2001) found that more American than Finnish students ascribed positive results to internal, stable, and global factors. Baştürk (2016) investigated the causal attributions for success and failure in mathematics among mathematics student teachers in Turkey and found three causes: failure caused by the students themselves, failure caused by poor instruction and learning, and failure caused by the nature of mathematics itself. Other causes were negative attitudes to mathematics.

In the African context, a study carried out in Ethiopian high schools by Tulu (2013) investigated the performance of students studying English as a foreign language and their attributions. Eight factors were identified as the apparent basis of the students' success, using principal component analysis. These factors included making an effort, having ability, good teaching practices, and task simplicity. Other factors were teachers' encouraging behaviour, teachers' supportive predisposition, 'luck' and the availability of good instructional materials. In the same way, seven factors were identified as the basis for students' failure. These included lack of effort, lack of ability, poor teaching practices, and task difficulty. Other factors were teachers' negative behaviour, lack of luck, and bad mood.

Nenty's (2010) research investigated factors that affected the students' attributions for success and failure in mathematics performance in some secondary schools in Lesotho. The study also identified a pattern of attribution that influenced the students' causal attributions. The results revealed totally diverse dimensions of attributional causes for success or failure such as the people with whom the students were living, the students' preferred occupation after leaving school, and preferred seating zones in mathematics classrooms. The gender of the students in the research had no influence on their mathematics performance. Tachie and

Chireshe's (2013) study conducted in a district in the Eastern Cape in South Africa found that the learners in the study attributed their failure mainly to external factors such as a lack of human and study resources, poor teachers, poor teaching methods, and negative teacher behaviour. Some of the learners attributed their failure to internal factors such as laziness, lack of interest, and absenteeism. The next section discusses the mathematics performance of students.

2.3 MATHEMATICS PERFORMANCE

In Nigeria, secondary school students traditionally place a lot of emphasis on mathematics as a subject that must be passed at any level of examination, whether internal or external. Although this is necessary for improving their academic and social advancement, the results of mathematics examinations at these levels have not been encouraging. Students attribute their performance in terms of success or failure to either internal or external causes (Weiner, 1986; 2000). Researchers believe that several factors are responsible for the poor mathematics performance of Nigerian senior secondary school students. In their study, Popoola and Olanrewaju (2010) compiled a list of key factors responsible for the poor performance of secondary school students in mathematics such as the lack of qualified teachers, the lack of incentives for teachers, teachers' absenteeism, the lack of interest of students, and students' limited understanding of mathematics. Other factors included mathematics difficulty, the abstractness of the subject, obsolete teaching materials, lack of parental encouragement, ill-equipped libraries, and limited funds to buy textbooks.

Abdulahi and Onasanya's (2010) study on the impact of teachers' effectiveness on secondary school students' mathematics performance in Kwara State, Nigeria, revealed that some teachers were not adequately qualified to teach mathematics. The authors suggested that the poor mathematics performance could be improved by providing qualified teachers with sufficient teaching experience as well as good instructional material and activities.

Adegoke (2011) believes that teachers of mathematics should identify the personality traits and capability of individual students and use this knowledge to apply appropriate teaching methods. He further advocates that students should also be encouraged to participate fully in all mathematics teaching activities in order to improve their mathematics performance.

In a study conducted in the northern part of Nigeria involving secondary school students, James (2009) found that the students attributed their poor performance in mathematics to a lack of textbooks, inadequate teaching materials, and unqualified teachers. In similar vein, but with different results, Yara (2009) investigated students' attitude to mathematics in selected

secondary schools in south-western Nigeria where he found a positive attitude to the subject. Ifamuyiwa and Akinsola (2008) report that most secondary school students have a negative attitude to mathematics resulting in their performing poorly in internal and external examinations.

Some public secondary schools in Nigeria, especially those in the large cities and towns, have an excessive number of students in the classes. Olatunde (2010) found in his study that class size has an effect on mathematics performance and that teachers of large classes find it difficult to individualise their teaching, making quality teaching virtually impossible. In large classes, students often leave the classroom unnoticed before and during mathematics lessons. Poor mathematics performance is also attributable to the personality and attitude of teachers (Abdulahi & Onasanya, 2010) as well as their classroom practice and pedagogy (Arends, Winnaar, & Mosimege, 2017; Imms & Byers, 2017). With regard to teachers' attitude and personality, Popoola and Olanrenwaju (2010) report that "teachers' personal attitude to the subject and the students contributes much to generate in students a positive or negative attitude. Teachers' commitment, concentration, concern for the students' welfare and success are an attraction for the students" (p. 57). Arends et al,'s (2017) study on teacher classroom practice and students' mathematics performance corroborates the above statement.

2.3.1 Mathematics anxiety of students

Mathematics anxiety is a pessimistic feeling and discomfort that some people experience when confronted with mathematics assignments, thereby affecting their level of confidence (Park, Ramirez, & Beilock, 2014). Ashcraft and Moore (2009, p 197) define mathematics anxiety as "a person's negative affective reaction to situations involving numbers, mathematics and mathematics calculations". In relation to AS, students with mathematics anxiety often have little confidence when engaged in mathematics learning. Mathematics anxiety can occur in any form, either formal or informal, on a daily basis. Researchers such as Park et al. (2014) and Vukovic, Kieffer, Bailey, & Harari (2013) contend that mathematics anxiety affects people's physical, psychological, cognitive, and social life. Physically, students with mathematics anxiety may manifest severe worry and fear, which may affect their psychological and social interactions (Vukovic et al., 2013). Park et al. (2014) add that mathematics anxiety "negatively impacts mathematics problem solving by creating performance-related worries that disrupt the working memory needed for the task at hand" (p. 103).

Similarly, Gresham (2018, p. 91) describes mathematics anxiety as "a phenomenon where individuals suffer from the irrational fear of mathematics to the extent they become paralyzed

in their thinking and are unable to learn or be comfortable with mathematics''. In different countries, and in all education systems, mathematics anxiety influences students' academic functioning (Schillinger, Vogel, Diedrich, & Grabner 2018). Dowker, Sarkar, and Lool (2016) state that mathematics anxiety is a global concern because of students' low performance and low participation in the subject and related activities. There is a general belief that mathematics anxiety and other negative emotions towards mathematics are more common than in other academic subjects. However, few studies have compared the attitude of students to mathematics with their attitude to other subjects (Dowker et al., 2016).

Mathematics anxiety, according to the literature, is a threat to students' self-esteem, often leading to frustration and discouragement (Maloney, Risko, Ansari, & Fugelsang, 2010). Vukovic et al. (2013) found that mathematics anxiety is a determining factor when measuring individual differences in children's academic performance. Mathematics anxiety can impact the working memory of individuals negatively (Ashcraft & Moore, 2009). Mathematics anxiety cuts across age, level of exposure to mathematics, and level of educational achievement. A significant factor influencing the mathematics anxiety of students is the mathematics anxiety of teachers (Gresham, 2018; Peker, 2016; Peker, 2009). Teachers who exhibit anxiety during mathematics lessons can instil a fear of mathematics in students. Gresham (2018) found a high level of mathematics anxiety in pre-service and in-service teachers, especially when coupled with other class assignments and extra-curricular activities.

Carey, Hill, Devine, and Szücs (2016) investigated whether mathematics anxiety can lead to future poor mathematics performance or whether poor mathematics performance can lead to mathematics anxiety in a bidirectional relationship. The authors expand on the interactional effect that the two can have on each other in a seemingly vicious circle. Dowker et al. (2016) enumerate factors influencing mathematics anxiety, which include genetics, gender, age, and culture. In relation to gender, Escalera-Chavez, Moreno-Garcia, Garcia-Santillan, and Rojas-Kramer's (2017) study revealed a significantly higher level of mathematics anxiety in girls than in boys as shown in their nervousness and discomfort, indicating low self-confidence in in the subject. Yadav and Singh's (2018) study investigated the causal relationship between mathematics anxiety and mathematics performance in secondary school students. The study revealed a significant negative relationship between mathematics anxiety and mathematics performance. A significant difference was found also in the mathematics anxiety and mathematics performance of high and low performers and in high and low anxiety students. However, no significant difference was found between the male and female students in respect of such anxiety. Moreno-Garcia, Garcia-Santillan, Molchanova, and Larracilla-Salazar (2017) argue that mathematics anxiety can negatively influence students' achievement in the subject.

As a result of the heightened mental activity inherent in mathematics, mathematics anxiety can lead to fear and other negative effects in students.

2.3.2 Mathematics attitudes of students

Attitude is the inclination to categorise objects and events and to react to them in a certain manner (Sakariyu, Taiwo, & Ajagbe, 2016). Attitude can also be seen as the inclination to react with a particular goal in mind to other people, objects, circumstances, occasions, or thoughts. This led Orunaboka (2011) to conclude that a person who shows a certain attitude towards something is reacting to the conception of that thing rather than to its actual state. In addition, attitudes are shaped by individuals on the basis of different learning backgrounds, and, if the experience is positive, an inspirational frame of mind can emerge. Fasakin (2011) describes attitude as a mental and natural state of readiness organised through experiences that exert a directive influence on the individual's responses to all objects and situations. Similarly, attitude is a major factor in choosing a subject. Erdemir and Bakirci (2009) describe attitude as a characteristic that influences individuals' thoughts, emotions, and behaviours towards a psychological object.

George (2000) argues that negative attitudes stem from narrow-mindedness and feelings of having been treated in an unfair manner. Sakariyau et al. (2016) maintain that human beings are not born with attitudes but acquire them in their different developmental stages. They believe some attitudes develop as a result of people's experiences, knowledge, and abilities. As a result, attitudes change gradually over time and are therefore not permanent (Olashenide & Olatoye, 2014). In a mathematics class, students may develop negative or positive attitudes, which may be stable and have affective as well as cognitive features (Goldin, 2002). Marchis (2011) describes mathematics attitude as a long-term positive or negative emotional disposition towards mathematics. Sirmaci (2010, p. 644) notes that "positive or negative attitudes are constant and unchangeable beliefs acquired due to the experiences of the students". Hart (1989) offers a multidimensional description of attitude and argues that attitude has three components: emotional reaction, convictions about mathematics, and behaviour related to studying the subject. Mathematics attitude is regarded as one of the predictors of achievement in mathematics (Moenikia & Zahed-Babelen, 2010). Len and Chris (2010) relates mathematics attitude to the emotional response to certain situations. Many researchers have noted a connection between students' frame of mind towards mathematics and their mathematics outcomes (Nicolaidou & Philippou, 2003; Marchis, 2011).

Mathematics teachers with a friendly disposition can have a positive effect on students while teachers who are aloof often have a negative effect (Yara, 2009). Teachers' quality of

teaching, their teaching strategies, and the learning content can also have a significant impact on students' mathematics performance. Consideration of these factors may help low achievers in mathematics develop a more positive attitude. Fishbein and Ajzen (1975) describe attitude as a learned way in which people respond in a consistent manner to a given object, either favourably or unfavourably. In addition, students who have a positive attitude to mathematics are more likely to have a greater interest in and to put more effort into their studies. Their positive attitude can be seen in their engagement with the subject during and after the mathematics lesson. Aire and Tella (2003) consider students' attitude to mathematics and the teacher, and the attitude of the peer group to mathematics and the teacher, as dimensions of attitude that influence the mathematics performance of students. Marchis' (2011) study found that the teacher is the most important factor in the development of a positive attitude towards learning mathematics. James (2009), Yara (2009), and Akinsola and Olowojaiye (2008) state that the negative attitude of Nigerian students is one of the main reasons for their poor performance in mathematics. However, environmental factors such as the home, the family, and society were found by Aire and Tella (2003) to play a key role in shaping people's attitude to mathematics.

Ashby (2009) identified other factors that influence students' attitude to mathematics such as confidence, the students' belief in the importance of mathematics in their careers, its value in practice, and mathematical anxiety. Other factors include students' belief in the usefulness of mathematics in their everyday life, their self-efficacy, and their self-judgement. Imasuen and Omorogbe's (2016) study revealed that many students develop a positive attitude to mathematics if the teacher's method of instruction is positive and if they have a high level of awareness of the importance of mathematics for nation building. This is in line with the findings of Opara, Magnus-Arewa, and Nwaukwu (2017) that teachers' competencies and students' self-efficacy can determine students' attitude to mathematics. It is also consistent with Davadas and Lay's (2018) findings that perceived parental influences, teachers' affective support, and classroom instruction are significant predictors of students' attitude to mathematics. Adebule and Aborisade's (2014) gender comparison study on the attitude of senior secondary school students to mathematics found that the male and female students in the study had almost the same attitude to mathematics.

Nicolaidou and Philippou (2003), however, found that students' negative attitude to mathematics is often the result of repeated poor performances in mathematics tests and that this negativity could well be permanent. These authors add that the negativity could also be the result of poor school grades, the strain of having to perform well, demanding mathematics tasks, uninteresting exercises, and teachers' negative dispositions.

2.4 DEMOGRAPHIC FACTORS

2.4.1 Socio-economic status and mathematics performance

Schulz (2005) maintains that the effect of students' socio-economic background on academic performance is one of the most consistent factors in educational research. McConney and Perry (2010), too, investigated the relationship between students' socio-economic status (SES) and mathematics performance as well as that between students' interest in science subjects and school socio-economic status. The study revealed a significant difference in mathematics performance between the students with a low SES and those with a high SES but reported little difference in terms of school SES. Levine, Vasilyeva, Lourenco, Newcombe, and Huttenlocher's (2005) longitudinal study used mental transformation and syntax comprehension to determine whether the spatial advantage of the boys changed in children with different SES. It was found that the boys with middle and high SES did better in mathematic than the girls in the same status group while there was no difference in the task performance of the boys and girls with low SES.

Tucker-Drob and Harden (2012) maintain that mathematics performance is influenced positively by high SES and positive genetic factors. Six hundred and fifty pairs of four-year old identical and fraternal twins were used in their study. The results indicated that motivation to learn and achieve high marks in mathematics varied according to SES and genetic influences. In a related study, Williams (2005) examined cross-national differences in rural mathematics performance in 24 industrialised countries (some European countries, the United States of America, some Asian countries, the Russian Federation, and New Zealand). He found that 14 of the countries were rurally disadvantaged and urbanly advantaged while three countries were both rurally and urbanly disadvantaged. In addition, five countries were urbanly disadvantaged and two countries rurally advantaged.

Geske, Grinfelds, Dedze, and Zhang's (2006) study also found that geographical location (rural and urban areas) affected SES and mathematics performance and concluded that children with high SES would be exposed to more stimulating influences and an environment that would enhance their productivity in class activities than children with low SES and who struggled to utilise the few facilities at their disposal (Harris & Goodall, 2008). This, however, does not mean that children whose parents are not wealthy, but have time for home lessons and assignments, will not do well academically.

In addition, school location and environment can affect the academic performance of students, especially in mathematics. Ewumi (2012, p. 28) argues that "schools in low socio-economic

status areas are more likely to have a higher percentage of students with lower achievement test scores, lower graduation rates, and fewer students going to college".

2.4.2 Gender and mathematics performance

Research on gender differences in mathematics performance, especially among secondary school students, has attracted a lot of attention. The historical dominance of boys in subjects such as mathematics has today been largely replaced by successful competition from girls. Research suggests that female students are now showing more interest in subjects previously popular with male students such as mathematics and science (Martinot & Désert, 2007; Wilhelm, 2009), although disparities still exist regarding these subjects. Some research has revealed dominance in mathematics either by male students or female students while other research has shown that both genders perform well when the learning processes are thorough and students are able to implement what has been taught in a practical way (Combs, Slate, Moore, Bustamante, & Onwuegbuezie, 2010; Else-Quest, Hyde, & Linn, 2010; Geist & King, 2008). Kniveton (2006, p. 37) states that "there are educational justifications, under some circumstances, for working with members of the other sex rather than the same sex or on their own". The author emphasises the importance of both genders working together to promote their confidence in the correctness of their responses in classroom engagement.

This suggests that it is beneficial for students to work together with members of the opposite sex. Rogers and Hallam (2010) report that in their study no significant differences were found in the academic performance of the male and female students whereas Ewumi (2012) discovered a significant difference in the academic performance of the two sexes. Matteucci and Mignani (2011) investigated gender differences in mathematics performance in an Italian lower secondary school. Using a large-scale assessment test, their study revealed significantly better performances by the male students and generally low mathematics proficiency on the part of the female students. Interestingly, significant gender differences were noted between the girls' and the boys' attributional patterns with the girls' being more self-enhancing.

Lloyd, Walsh, and Yailagh's (2005) study with British Columbian public-school students involving 62 Fourth Grade and 99 Fifth Grade students found that the girls' achievement in mathematics surpassed that of the boys. The attributional patterns of the girls were more self-enhancing, pointing to an attribution improvement in the girls. The girls, however, revealed under-confidence with respect to their unique mathematics achievements in contrast to the boys who were more prone to ascribe failure in mathematics to a lack of teachers' help. Conversely, Mok et al. (2011), in their investigation on attribution and gender, found that more

of the female students than the male students stated that lack of ability and strategy were reasons for their academic failure.

Gender stereotypes that affect the mathematics performance of students, especially female students, have been reported in the literature. Schmader, Johns, and Barquissan (2004) analysed two studies on gender differences in respect of women's experience in the mathematics domain and the cost of accepting gender differences. The first study revealed that women with perceptions of status differences between men and women will probably accept gender stereotypes about women's mathematics abilities. The second study revealed that women who were inclined to accept gender stereotypes would be more likely to suffer the negative effects of stereotyping in mathematics performance.

The results showed that women were more likely to perform poorly in mathematics when gender differences were mentioned. A conclusion that can be drawn is that women do not demonstrate confidence when competing with men in mathematics ability. In a related study, Martinot and Désert (2007) examined gender stereotypes and the negative reputation of girls regarding mathematics, correlating it with their self-perception. The study involved Fourth and Seventh Grade boys and girls in a French school, with the results revealing that gender stereotypes regarding mathematics ability did not favour the boys. Surprisingly, the girls in the two grades did better than the boys. Those boys who believed in the girls' superior performance in mathematics viewed their own performance as lower when gender identity was underscored. Smith (2006) carried out a similar study on female stereotypes, performance-avoidance goals, and women's mathematics performance expectations. The results showed that women who were exposed to stereotypes in a mathematics salient situation tended to underperform.

2.5 CONCEPTUAL FRAMEWORK

The conceptual framework for this study is depicted in Figure 1.1. According to the framework, AS dimensions (stability and globality) are the explanatory variables and mathematics performance scores are the criterion variable. Internality was excluded from the study because of its low reliability according to various research findings (Dykema et al., 1996). Stability is described as a permanent situation or aspect in an individual. Abramson et al. (1978) argue that stable attributions are long-lived or recurrent while unstable attributions are temporary or intermittent. Globality dimensions are attributions that occur in a wider situation while specificity dimensions occur in a current event or situation. The conceptual framework includes the moderating variables used in the study, namely gender and socio-economic status. These variables were all measured to determine the relationships among the study variables.

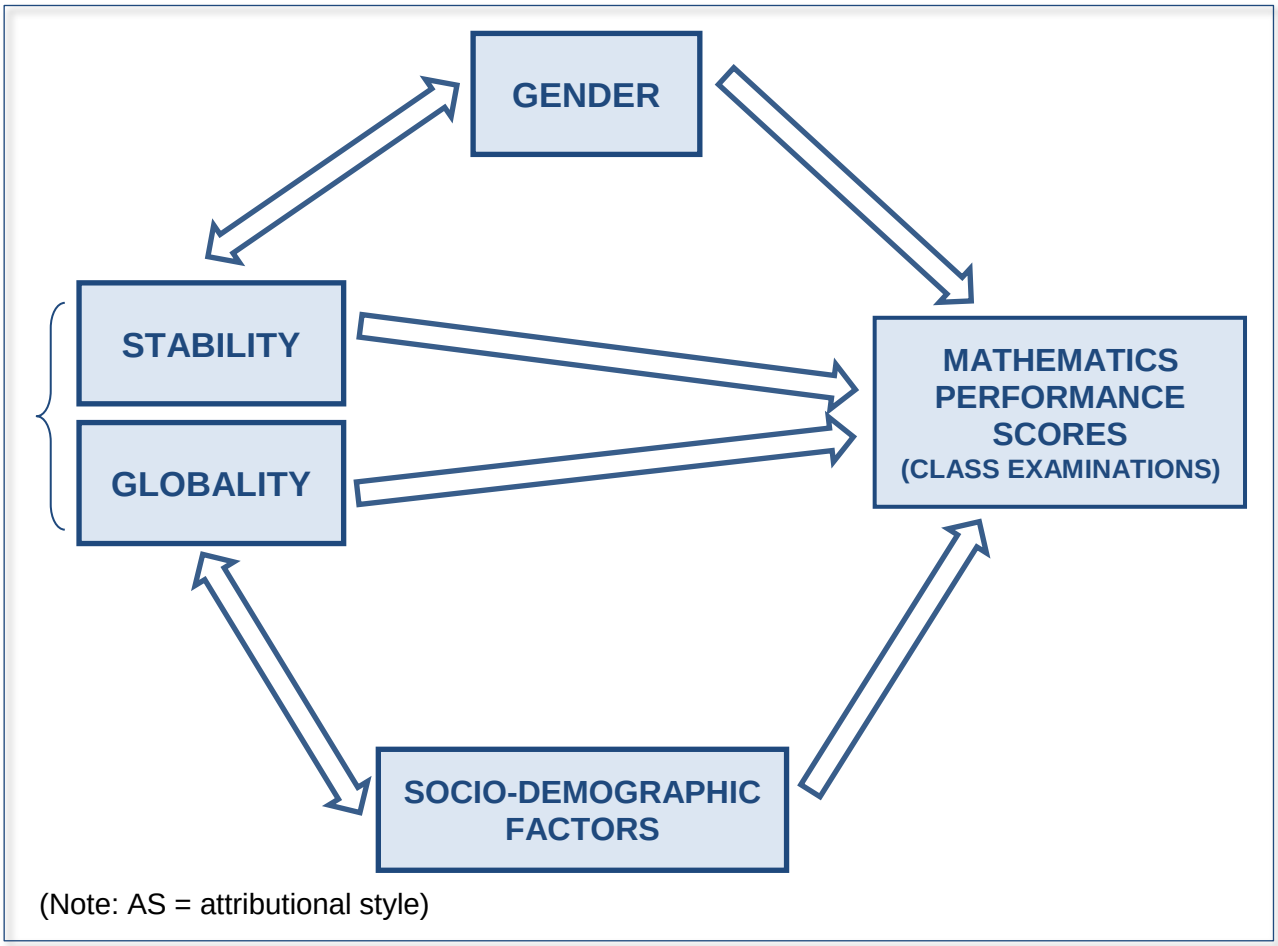

Figure 2.1: Conceptual framework for the study

In terms of the above conceptual framework, the participants' gender relationships in AS and mathematics performance will be examined (Robinson-Awana, Kehle, Bray, Jenson, Clark, & Lawless, 2001; Yeo & Tan, 2012). In their study, Yeo and Tan (2012) found more positive thinking and attribution in a stable positive situation than in a negative situation in the female students than in the male students. In Figure 1.1 above, the arrows indicate the anticipated relationship between the attributional dimensions (stability and globality) in terms of gender and mathematics performance. Furthermore, in the present study I sought to discover the relationship, if any, between the socio-economic status (SES), attitude of students towards mathematics, attributional style (AS), and mathematics performance of the students while considering the major characteristic that bound the study sample together (mixed public secondary schools). Ewumi (2012) contends that lower achievement scores may be recorded for students with low SES. This is consistent with the findings of a cross-national study by William (2005) on the SES of students. In William's study, lower mathematics performance was recorded for the students from rural areas while higher scores were recorded for students in urban centres in almost all the countries in the study. Consequently, in Figure 1.1 above,

the arrows going from the attributional dimensions (stability and globality) to SES and from SES to mathematics performance are also intended to indicate anticipated possible relationships.

2.6 CONCLUSION

This chapter covered the conceptual framework for the study together with the mathematics performance and socio-demographic features of the students, which served as the moderating variables. The literature shows that the AS and the mathematics performance of students have been extensively studied in the Western world but hardly at all in Africa, including Nigeria. It was also argued in the chapter that AS in an academic setting, especially in mathematics, should be aimed at motivating students that their performance is tailored towards positive attributional style. That is to say, poor performance in mathematics is an individual and idiosyncratic phenomenon (internal) that is temporary (unstable) and that can be controlled (specific). The next chapter discusses the research methodology of the study.

CHAPTER 3
RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

This chapter discusses the research design and methodology used to explore the effects of attributional style on the mathematics performance of senior secondary students in Lagos State, Nigeria. A research design and methodology are important in a study as they dictate the data collection and data analysis procedure (Creswell, 2012). This study used a mixed methods research design.

3.2 RESEARCH PARADIGM

A paradigm comprises the ideas, assumptions, and rules for interpreting a subject of interest (Bergman, 2010). Paradigms together with other research concepts "lay the groundwork for how researchers view truth, knowledge and their work and explain in part why different researchers value one approach to research over other'' (Klingner & Boardman, 2011, p. 210). Paradigms are also used in differentiating between quantitative and qualitative research (Bergman, 2010). Based on the above definitions and descriptions, pragmatism is an appropriate research paradigm for the mixed methods research (Ivankova, Creswell, & Plano Clark, 2010) used in this study.

3.2.1 Pragmatism

In the present study, I wanted to ascertain if/how attributional style affected the mathematics performance of secondary students, using a QUAN + qual (see Section 3.3.1) research frame of reference. Pragmatism can be used to combine the data from quantitative and qualitative research into a practical research approach (Johnson & Onwuegbuzie, 2004). Cohen et al., (2011) testify to the usefulness of pragmatism and point out that "mixed methods approaches are premised on pragmatism ontologies and epistemologies" (p. 23). These authors argue that truth and reality may be objective and sometimes subjective at the same time and may be scientific and also humanistic simultaneously. Johnson and Onwuegbuzie (2004) contend further that when evaluating ideas in research, empirical and practical end results should be taken into consideration. According to these authors (2004, p. 17), "pragmatism offers an immediate and useful middle position philosophically and methodologically; it offers a practical and outcome-oriented method of inquiry that is based on action and leads, iteratively, to further action and elimination of doubt". Denscombe (2008) describes pragmatism in mixed methods

research as the philosophical partner as it provides opinions on knowledge and inquiry that differ from those of the philosophies of positivism (quantitative research) and interpretivism (qualitative research).

Morgan (2007) argues that a pragmatic approach has three components. Firstly, there is abduction, which is a way of connecting theory and data – deductive quantitative results can contribute to inductive qualitative results, and vice versa. Secondly, there is inter-subjectivity, which resolves the dichotomy between the subjective and objective positions of qualitative and quantitative research respectively. Thirdly, there is transferability, which concerns inferences from data in place of context (qualitative) and generizability (quantitative).

3.3 RESEARCH DESIGN

The aim of the present study was to explore the effect of attributional style on the mathematics performance of senior secondary school students in Nigeria. Stated differently, I wanted to ascertain the extent to which senior secondary school students in Nigeria are aware of the reasons for their success or failure in mathematics and what they attributed it to. The study was implemented in two phases. The quantitative study was conducted in the first phase during which the scale adaptation of the study instrument was done and the pilot study (sample of 90) carried out. The objective was to ensure that I would be using an instrument that was in line with the aim of the study. The Attributional Style Questionnaire[4] (ASQ) was adapted from Dykema et al.'s (1996) original version. The purpose of the pilot study was to determine the reliability or internal consistency of the items in the adapted ASQ. Cronbach's alphas, item statistics, inter-item correlation matrices, and item total statistics were calculated, based on the two major constructs of the adapted ASQ (the stability/instability and globality/specificity attributional style dimensions).

The pilot study was followed by the quantitative research involving 300 participants. The adapted questionnaire was used to gather demographic data (age, SES, gender, and economic status) of the students. Administering the ASQ enabled me also to compute and analyse the main constructs of the study (the stability and globality attributional style dimensions). Four questions were added to the questionnaire to assess the students' attitudes towards mathematics. The questions are as follow:

(i) I will use mathematics in my career one day;

[4] As mentioned, in this study, I use the term 'attributional style questionnaire'. The negative nature of the questionnaire has been described at the study instrument section in Chapter 3 and is also referred to throughout the study. This is because I realised that developers of attributional style questionnaires do not use either positive or negative in the title of their instruments.

(ii) I am motivated to do well in mathematics;

(iii) I know where to find help when I struggle with mathematics; and

(iv) I get anxious when I do mathematics.

The students were also requested to provide their previous term's mathematics results. The data collected were analysed using IBM SPSS statistics 25. The relationship between the study variables (the attributional style and mathematics performance of the students) over and above the demographic factors (gender and socio-economic status) and attitude towards mathematics was also analysed. The scores for attitude towards mathematics were calculated by computing the averages across the four questions on attitude. These scores were also correlated with the students' marks in mathematics and the attributional style subscales.

The second phase constituted of the qualitative study. Focus group interviews were used to gather data from selected participants in the quantitative study. The purpose was to clarify the reasons for the results obtained in the quantitative study (to triangulate the findings). The focus group interviews also helped determine the cultural appropriateness of the Attributional Style Questionnaire in the Nigerian context. The focus group questions were designed in the following manner. All questions were only crafted after I had received and analysed the quantitative data. Based on the quantitative data, I articulated the 16 (qualitative) questions to see if the ASQ was structured and formulated sufficiently well to promote participants' understanding of and their perception about the notions embedded in the ASQ. The questions were also designed to establish matters related to participants' performance levels in mathematics, such as the influence of teacher attitudes and methodologies and mathematics anxiety on participants' performance.

The ASQ has been administered often in the Western world. With the use of the focus group interviews the participants were able to express their own views concerning the questionnaire. The participants' views or perceptions were discussed in Theme one of the qualitative analysis.

3.3.1 Mixed methods research design

A mixed methods research design is a way of collecting, analysing, merging, and integrating quantitative and qualitative research approaches in a study or series of studies in order to gain a condensed understanding of a particular research problem (Creswell, 2012). Johnson, Onwuegbuzie, and Turner (2007) view mixed methods research as a way of synthesising qualitative and quantitative approaches in a research study. These authors state that the rationale for a mixed methods approach is to (a) "provide a better understanding, (b) provide

a fuller picture and deeper understanding, (c) enhance description and understanding of a research study" (p. 122). Furthermore, Creswell (2014) contends that mixed methods research has the advantage of helping researchers identify quantitative as well as qualitative problems in research. It can also help them minimise the limitations of the two research approaches. Greene, Caracelli, and Graham (1989) explain the purpose of and rationale for mixed methods research such as triangulation, complementarity, development, initiation, and expansion (Table 3.1).

Table 3.1: Rationale for mixed methods research (adapted from Green et al., 1989)

	Rationale	Explanation
1.	Triangulation	Seeks convergence, corroboration, and correspondence of results from different methods.
2.	Complementarity	Seeks elaboration, enhancement, illustration, and classification of the results from one method with the results from another method.
3.	Development	Seeks to use the results from one method to develop or inform another method, where development broadly includes sampling and implementation, as well as measurement decisions.
4.	Initiation	Seeks to discover paradoxes and contradictions, new perspectives on frameworks, the recasting of questions or results from one method with the questions or results from another method.
5.	Expansion	Seeks to extend the breadth and range of inquiry by using different methods for different inquiry components

Bryman (2006) adds that a mixed methods approach can be used to understand the unexpected results of other research methods. It can also improve the credibility and integrity of research findings. Johnson and Onwuegbuezie (2004) rate mixed methods research highly in the contemporary world of research where researchers are required to harmonise different methods. They also urge researchers to familiarise themselves with the methods used by other scholars in order to facilitate communication, promote teamwork, and obtain superior research results. Silverman (2000, p. 50) argues that the use of ''multiple methods give[s] a fuller picture and address[es] many different aspects of a phenomenon''. Johnson and Onwuegbuzie (2004) maintain that mixed methods research justifies the use of multiple approaches in answering research questions, rather than restricting researchers' choices. These authors clarify further:

> [Mixed methods research] is an expansive and creative form of research, not a limiting form of research. It is inclusive, pluralistic, and complementary, and it suggests that researchers take an eclectic approach to method selection and the thinking about and conduct of research. What is most fundamental is the research question – research methods should follow research questions and offer [researchers] the best chance to

> obtain useful answers. Many research questions and combinations of questions are best and most fully answered through mixed research solutions (p. 17-18).

Creswell and Plano Clark (2007) advance three main decisions a researcher should make before embarking on mixed methods research. The first decision concerns whether the mixed method should be followed concurrently or sequentially. The second decision concerns whether the quantitative and qualitative research should be given equal priority. The third decision concerns when mixing the two research methodologies should be take place. In the present study, a sequential explanatory mixed methods approach was used where the quantitative research was accorded priority over the qualitative research (QUAN + qual). The quantitative research received priority because I wanted the ASQ to be responded to by a large sample and the qualitative study to confirm or contradict the results obtained in the quantitative study. The qualitative data were included to triangulate, complement, develop, and expand the results of the study (Greene et al., 1989). The mixing of the quantitative and qualitative research approaches occurred during the interpretation stage.

3.3.1.1 Sequential explanatory mixed methods design

As stated above, the present study adopted a sequential explanatory mixed methods data collection approach. Survey research was conducted to generate quantitative data while focus group interviews were conducted to generate qualitative data. In such an approach, qualitative study results are used to help explain the results of a quantitative study (Ivankova et al., 2010). Ivankova, Creswell, and Stick (2006) add that a sequential explanatory mixed methods design is particularly valuable when ‘surprising’ results emerge from a quantitative study. The main purpose of sequential explanatory mixed methods research is to provide a more detailed explanation of the results obtained from quantitative research through the results derived from the qualitative phase of a study (Terrell, 2012). Figure 3.1 illustrates the sequential explanatory design procedures in the present study.

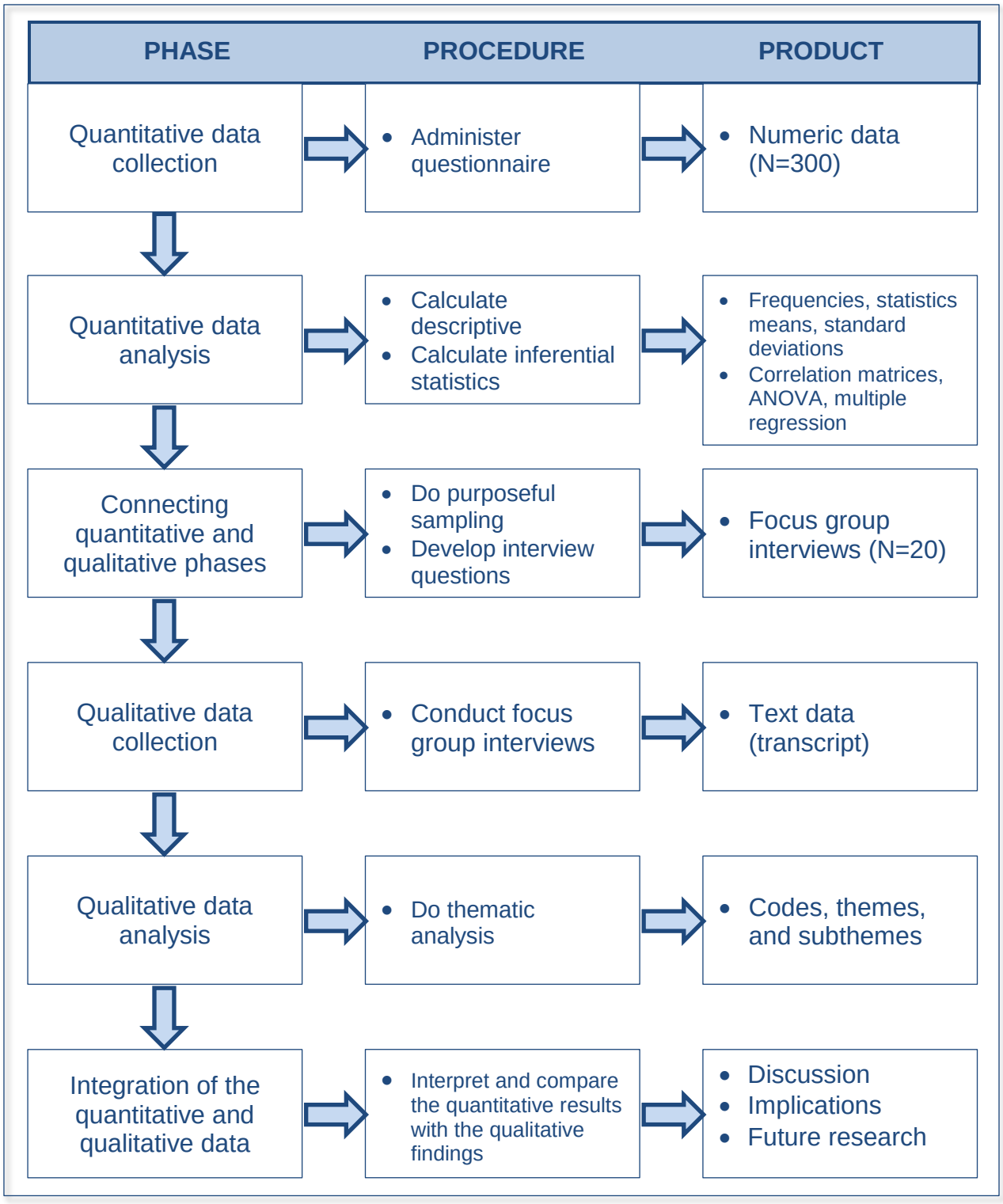

Figure 3.1: Diagram of the sequential explanatory mixed methods design procedures (adapted from Ivankova & Stick, 2007)

3.4 RESEARCH METHODOLOGY

3.4.1 Sampling

Lagos State in Nigeria has six education districts in which there are 322 public senior secondary schools. This study was conducted in two senior secondary schools drawn from two of the education districts in Lagos State. The sampling techniques for the quantitative and qualitative phases are discussed in Sections 3.4.1.1 and 3.4.1.2 respectively.

3.4.1.1 Sampling techniques for the quantitative study

In this study, sampling for the quantitative phase occurred in two parts. In the first part, I chose two education districts from the six education districts in Lagos State (Cohen, Manion, & Morrison, 2007). The two districts were selected because of their proximity to me, and one school was chosen from each district. The districts and schools were proportionally sampled in terms of size, the number of students per class, and gender. In the second part, a sample was randomly selected from the class register (class list) of each school. The names of the students were written down on separate pieces of paper, which were dropped in a hat. The sample members' names were then drawn from the hat by a person not involved in the research until the required number of students from each school had been selected. Tashakkori and Teddlie (2003, p. 73) state that probability sampling methods are used mainly in quantitative studies and that the procedure involves "selecting a relatively large number of units from a population, or from specific sub-groups (strata) of a population, in a random manner where the probability of inclusion for every number of the population is determined". The participants in the present study had an equal chance of selection. The breakdown of the 300 participants in the study is shown in Table 3.2 below.

Table 3.2: Sample participants in the quantitative study

Sample size	Male	% of male	Female	% of female	Total %
School 1					
196	102	34%	94	31.3	65.3%
School 2					
104	53	17.7%	51	17%	34.7%
Both schools					
300	155	51.7	145	48.3	100%

3.4.1.2 Sampling techniques for the qualitative study

In the qualitative research for the present study, purposive sampling was used to select the research participants. Purposive sampling helps ensure that data gathered will improve the quality of a research study and its results (Struwig & Stead, 2004). Creswell (2012) describes purposive sampling as the intentional selection of participants and research sites by a researcher in order to better focus on the phenomenon under investigation. The research sites and participants in the present study were chosen according to the richness of the information that would be obtained (Creswell, 2012). Nieuwenhuis (2010b, p. 79) states that in purposive sampling, "participants are selected because of some defining characteristics that make them the holders of the data needed for the study". Cohen et al. (2011) describe purposive sampling as a researcher's way of building up a sample that meets his or her specific research needs and that has in-depth knowledge of the particular phenomenon.

In the qualitative phase of this study, I conducted two focus group interviews to gather data from 20 participants (10 per school). These participants were purposely sampled from those who took part in the quantitative phase, based on three main categories. First, the participants were selected to include an equal number of 10 boys and 10 girls. Second, the participants were selected on the basis of their level of achievement in mathematics. The high achievers started from 65% and above while the others were categorised as non-achievers. Third, the participants were selected on the basis of their socio-economic status (SES), which was subcategorised into high and low SES. The SES was based on the participants' parents' employment status. Participants whose fathers and mothers were both employed were categorised as high SES while those with only one parent employed or both parents unemployed were categorised as low SES. The main reason for this categorisation was to facilitate a diversity of opinions regarding different questions in the focus group interviews. The profiles of the participants in the qualitative study are shown in Table 3.3.

Table 3.3: Profiles of participants in the qualitative study

Participant's Number	School A or B	Gender	Age	Socio-economic status	Level of achievement
1.	A	F	17	High	Low
2.	A	M	16	High	High
3.	A	F	16	Low	High
4.	A	F	15	High	High
5.	A	M	19	Low	Low
6.	A	M	17	Low	Low
7.	A	F	16	High	Low
8.	B	M	16	Low	High
9.	B	F	15	High	High
10.	B	M	18	High	Low
11.	B	F	14	Low	High
12.	B	M	17	Low	Low
13.	A	M	16	High	High
14.	A	F	17	Low	Low
15.	A	F	15	Low	High
16.	B	F	14	High	Low
17.	B	F	18	Low	Low
18,	B	M	18	Low	Low
19.	B	M	18	High	High
20.	B	M	16	High	High

3.4.2 Data collection instruments and procedures

The major data collection instruments for the present study were the Attributional Style Questionnaire (ASQ), four questions on the students' attitudes towards mathematics, the mathematics performance scores of the students, and focus group interviews. I administered the instruments with the help of a research assistant. The ASQ and the questions on attitudes towards mathematics were used in the quantitative study for data collection purposes. The mathematics performance scores of the senior secondary students were then formally requested and collected from the school principals. The mathematics performance scores and the students' scores regarding their attitudes towards mathematics were correlated with the subscales of the ASQ. The focus group interviews were conducted during the qualitative phase to clarify the results obtained during the quantitative phase of the study.

3.4.2.1 Questionnaire

The Attributional Style Questionnaire (ASQ) (Dykema et al., 1996) was used to elicit information from the study participants. The ASQ measures people's attributional or explanatory style. The questionnaire was adapted to suit the purpose of the present research. With a view to determining the reliability of the instrument, the Department of Statistics, University of Pretoria, approved the research questions before the pilot and main studies commenced. After the adaptation, the questionnaire comprised three sections. The first section consisted of demographic information such as the participants' age, gender, total number of family members, and the employment status of the parents. This information was used to identify differences in the educational resources and facilities available to the participants, who were then categorised into low and high socio-economic status groups. The second section covered 12 unfortunate events or negative situations the participants had reacted to. Regarding each of the events, the participants were asked to write down the causes of the negative situations and then answer two questions on the causes given. The remaining two questions measure two attributional dimensions in which the respondents are expected to indicate whether their actions are respectively stable or unstable and global or specific. An extract from the ASQ showing examples of the above is provided below.

Try to imagine yourself in the following situations.

1 … you have difficulty sleeping…
A. Write the one main cause in the box below.
B. How likely is it that the cause you gave will continue to affect you? (Circle one number).
C. Is the cause you gave something that affects sleeping only, or does it affect other areas of your life? (Circle one number).

The following statements were used in the adapted ASQ.

1 …you have trouble sleeping.
2 …you feel sick and tired most of the time.
3 …you have a serious injury.
4 …you cannot find a job after finishing school.
5 …you cannot get the job done that others expect of you.
6 … you are suspended from school activities.
7 …you do not help a friend who has a problem.
8 …you have financial problems.
9 …you do not understand what your teacher wants you to do.
10 ...a friend is very angry with you.
11 ...you are guilty of breaking the law.
12 …you have a serious argument with someone in your family.

The third part of the questionnaire comprised four Likert scale questions regarding the students' attitudes towards mathematics. The Likert scale was also on a 7-point scale so that it fitted in with the Likert scales used in the ASQ. A last question was included regarding to

what degree the students correctly reported their mathematics marks at the end of the previous term. The questionnaire ended with an open question where the students were invited to share anything else regarding the subject with the researcher.

3.4.2.2 Scale Adaptation

DeVellis' (2012) recommendations on scale development were taken into consideration during the scale adaptation process. Although the ASQ is a validated instrument that does not have to adhere strictly to the guidelines recommended by DeVellis (2012), some of this author's steps were integrated in the instrument. The first step was to ensure that the scale construction for the instrument measured the variables under investigation by relating them to a theory and broad-based research findings (Worthington & Whittaker, 2006; Clark & Watson, 1995). As discussed in Chapters 1 and 2, the underlying theory for the present study – the reformulated learned helplessness theory – had originally been applied to attributional style as a factor in depression. However, research has since revealed that attributional style is useful also in achievement and academic settings (Pansu & Jouffre, 2008). The supervisor, the statistician, and I established the appropriateness of the instrument in terms of content, language use, and instructions. Some changes were affected, but we endeavoured to maintain the real meaning and intent of the items (DeVellis, 2012). A 7-point Likert scale from 1 to 7 was designed and included in the adapted ASQ. People's opinions, attitudes, and beliefs are examples of constructs that a Likert scale can measure (Clark & Watson, 1995). Table 3.1 below shows the changes in the items from the original instrument.

Table 3.4: Changes in Items from original attributional style questionnaire (*ASQ*)

Original *ASQ*	Adapted *ASQ*
… you cannot find a job	… you cannot find a job after finishing school
… you are fired from your job	… you are suspended from school activities
… you don't understand what your boss wants you to do	… you don't understand what your teacher wants you to do

These items were changed from the original format to suit the purpose and academic context of the research. Before the questionnaire could be used – after the changes had been affected, written permission was obtained from one of the authors of the instrument.

3.4.2.3 Mathematics performance scores (criterion variable)

I used the mathematics scores (class marks) of the students as the criterion variable. These scores were measured together with the ASQ scores to demonstrate their concurrent validity

in the quantitative study. The Nigerian secondary school education system has three academic terms in a calendar year. This study was conducted in the second term of the academic year as the students were psychologically, behaviourally, and cognitively settled in their classes in this term. Using multiple regression analysis, the mathematics scores were correlated with the attributional style scores, with the scores indicating the students' attitudes towards mathematics, as well as with socio-demographic factors.

3.4.2.4 Focus group interviews

Two focus group interviews (10 participants in a group) were guided by questions dealing with the impact of attributional style on the mathematics performance of senior secondary school students. The focus group interview participants were selected through purposive sampling. According to Cohen et al. (2011, p. 409), "interviews enable participants – be they interviewers or interviewees – to discuss their interpretations of the world in which they live and to express how they regard situations from their own point of view". As an opportunity for important discussion, an interview provides avenues for learning about people's personal lives (Finley, 2008). Focus group interviews can yield rich data from participants' insights, thoughts, and experiences about a topic, which other research methods may not achieve (Nieuwenhuis, 2010b). The interview process consisted of sensitisation and the interview itself. I informed the participants about the purpose of the interview and assured them also about the confidentiality and anonymity of the research. During the sensitisation period, I discussed informed consent and the option to withdraw from the interview process at any time if the participants were not comfortable continuing with the interview. I also encouraged the participants to ask questions and request further clarification. Their responses to the predetermined questions were recorded using an audio recorder. The recordings helped me better understand the thoughts, opinions, and feelings of the participants. The interviews also helped me establish rapport with the participants, who were selected through purposive sampling from the sample used in the quantitative phase (Cohen et al., 2011). Before the commencement of the interviews, I fully explained their purpose and designed an interview schedule that ensured that the same relevant questions were posed to the participants, resulting in varied responses. The interviews were designed to obtain the participants' views on the research instrument and to gain insight into their attitudes towards mathematics. The following questions/statements were used in the focus group interviews.

i. Tell me how you reached the answers you gave to the questions in the questionnaire.
ii. Did you understand the items or statements used in the questionnaire?
iii. Did you understand the language use in the questionnaire?
iv. Tell me the things that you liked and those that you did not like about the questionnaire.

v. Can you describe your knowledge of and performance in mathematics?
vi. Do you do well in mathematics or not? Give reasons.
vii. Do you think mathematics is difficult? If yes/no, give reasons.
viii. Tell me why students do well or not well in mathematics. Give reasons.
ix. Do students show any interest in learning mathematics?
x. Do you enjoy the way your teacher teaches mathematics? Tell me more about your mathematics teacher.
xi. Do you study mathematics on your own? Tell me how you study.
xii. Do you believe you need to hard work to succeed in mathematics?
xiii. Tell me your views on the methods used in teaching mathematics.
xiv. Do you believe boys are better in mathematics than girls?
xv. Do you have enough resources to enhance your study of mathematics?
xvi. Do you get anxious when you do mathematics?

3.5 DATA ANALYSIS

Onwuegbuzie and Teddlie (2003, p. 375) state that data analysis in mixed methods research involves some or all of the following stages.

Table 3.5: Steps in mixed data analysis (adopted from Onwuegbuzie & Teddlie, 2003)

Steps		Activities of analysis
1.	Data reduction	reducing quantitative data (e.g. descriptive statistics, exploratory analysis) and qualitative data (e.g. exploratory thematic analysis)
2.	Data display	reducing quantitative data (e.g. tables, graphs) and qualitative data (e.g. matrices, charts, graphs, networks, lists, rubrics, Venn diagrams)
3.	Data transformation	qualitising and/or quantitising data (e.g. possible use of effect sizes, exploratory factor analysis); data correlation (e.g. correlating quantitative data with qualitative data)
4.	Data consolidation	combining both data types to create new or consolidated variables or data sets
5.	Data comparison	comparing data from different sources
6.	Data integration	integrating all data into a coherent whole or two separate sets (i.e. quantitative and qualitative integration into a coherent whole)

Some of the above steps were explored in this mixed methods study. For instance, data reductions for the quantitative study were done with descriptive statistics and correlational

statistics. The qualitative data were analysed thematically after reducing the content of the data collected. Data used in the two approaches were compared for purposes of clarification. Finally, the quantitative as well as the qualitative data were integrated into a coherent whole (Onwuegbuzie & Teddlie, 2003).

3.5.1 Quantitative data analysis

The ASQ (Dykema et al., 1996), the study's research instrument, was administered to all the participants and was scored according to the prescribed scoring method. The following statistical analyses were conducted by the Department of Statistics at the University of Pretoria.

- The frequency tables and descriptive statistics were based on the demographic data that emerged from the questionnaire. The two study constructs (stability and globality) and the score for attitude towards mathematics were calculated by averaging across the relevant items. Cronbach's alpha coefficients were also computed to indicate the internal reliabilities of the study constructs.
- For the inferential statistics, correlation coefficients and multiple regression analysis were used to analyse the constructs of the study in terms of their relationships. One-way analysis of variance (ANOVA) was performed to compare the subscales across gender and socio-economic status.

3.5.2 Qualitative data analysis

The aim of the qualitative data analysis, based on interpretive philosophy, was to examine all data perceived as important by the participants (Nieuwenhuis, 2010b). Ary, Jacobs, and Sorensen (2010) describe qualitative data analysis as an orderly way of collecting and arranging raw data to increase one's understanding of the data. These authors (2010, p. 127) contend that ''data analysis is the heart of qualitative research and is a process that distinguishes it from quantitative research''.

In the present study, the qualitative data were collected through the focus group interviews based on the participants' responses to the ASQ and their perceptions of mathematics as a subject. Conversation analysis was used to analyse the data. Nieuwenhuis (2010a, p. 102) stresses the importance of such analysis and states that conversation analysis studies the social organisation of 'conversation', or 'talk in interaction', through a detailed inspection of tape recordings and transcription made from such recordings, and relies much more on the patterns, structures and language used in speech and written in words than on other forms of data analysis.

In relating this to the present study, conversation analysis was used to elicit responses from the participants based on their responses to the ASQ in terms of their perceptions, feelings, and understanding of the study instrument.

When analysing the qualitative data, I followed Nieuwenhuis' (2010b) steps for qualitative data analysis.

Table 3.6: Steps in qualitative analysis (adapted from Nieuwenhuis, 2010b)

	DATA ANALYSIS STEPS	ACTION TAKEN
Step 1	Preparation of data	Data were prepared and organised for analysis All data collected were transcribed Reflexive journal was used to record ideas and insights gained from the research process
Step 2	Data coding	Data were divided into important analytical components Inductive codes that emerged from the data were used As it was a focus group interview, I analysed for the group as a whole
Step 3	Establishing themes and categories	I analysed categories inductively by labelling or identifying names for each category Categories were also verified to avoid misinterpretation of data
Step 4	Structuring analysed data	Categories were well structured in relation to each other
Step 5	Interpreting data	Analysed data were brought into context confirming existing knowledge and bringing new understanding to the body of knowledge on the subject Conversation analysis was done Conclusion and findings were drawn
Step 6	Trustworthiness	The following qualitative quality assurance criteria applied in the study. - credibility - dependability - transferability - confirmability

3.5.3 Data integration

Integrating quantitative and qualitative research outcomes has become common in mixed methods research in recent years (Bryman, 2006). Such integration may occur at different stages of the research depending on the rationale for the mixed methods research approach. The integration of the two research methods can occur at the design, data collection, data analysis, interpretation, and reporting stages of the research (Fetters, Curry, & Creswell, 2013; Ivankova et al., 2010). In the present explanatory sequential mixed methods research study,

the results from the quantitative and qualitative phases were integrated at the interpretation stage. The integration was done so that the qualitative results could be used to help understand and explain the results of the quantitative phase (Guetterman & Fetters, 2018).

3.6 QUALITY ASSURANCE

The reliability and validity of the data were discussed and confirmed separately in the two data sets of the study. In the quantitative part, reliability and validity were discussed. Trustworthiness in the qualitative part of the research was also discussed.

3.6.1 Quantitative data

3.6.1.1 Reliability

Reliability is an instrument's consistency in measuring what it sets out to measure. Pietersen and Maree (2010) describe reliability as the extent to which a research instrument can be repeated and achieve consistent results. Regarding the reliability of the ASQ, the research confirmed the internal consistency reliability of the instrument using Cronbach's alpha coefficient (Pietersen & Maree, 2010). Cronbach's alpha was used to measure the internal consistency reliability of the ASQ, with the value ranging between 0 and 1 (Tavakol & Dennick, 2011). Cronbach's alpha coefficient of reliability "provides a coefficient of inter-item correlation, that is, the correlation of each item and is useful for multi-item scales" (Cohen et al., 2007, p.148). Thus, alpha coefficient ranging measures indicate either a strong or weak correlation of a set of items in an instrument. Helms, Henze, Sass, and Mifsud (2006, p. 633) define alpha coefficient as "a group-level summary statistic in that it does not describe the consistence of individuals' score within a sample but rather the sample's response pattern as a whole". Alpha coefficient can be used dichotomously (i.e. yes or no response) or heterogeneously (i.e. Likert-type scale). In the present study, the ASQ was used heterogeneously.

3.6.1.2 Concurrent Validity

Concurrent validity is the association of an instrument with a particular criterion (Cohen et al., 2007). Concurrent validity is defined as the "degree to which a scale or test correlates with another conceptually related scale, test, or other variables measured at the same time" (Slavin, 2007, p. 182). Concurrent validity tests whether an instrument can measure a study's variables. In this study, I established a correlation between the ASQ and the mathematics performance scores of the students using concurrent validity to determine whether low or high performance in mathematics was associated with a low or high score on the instrument.

3.6.1.3 Construct Validity

Construct validity is “the extent to which a measure ‘behaves’ the way the construct it purports to measure should behave with regard to established measures of other constructs” (DeVellis, 2012, p. 64). Validity occurs when the theoretical constructs of an instrument are relevant to what they are supposed to measure (Kaplan & Saccuzzo, 2009; Cohen et al., 2007). This means that an instrument or scale should be assessed by evaluating the characteristics of the instrument based on how the theory suggests the construct should be operationalised. In addition, the instrument may be positively correlated, negatively correlated, or uncorrelated to the construct being measured (DeVellis, 2012). According to Johnson and Christensen (2012), construct validity is “the extent to which a high-order construct is accurately represented in a particular study” (p. 261). It is, however, important that the construct under investigation should be clearly defined and explained in order to establish its usefulness. In the present study, the major theoretical constructs were stability and globality attributional style. The constructs were correlated with the criterion variable (mathematics performance of the students).

3.6.2 Qualitative data

3.6.2.1 Trustworthiness

Trustworthiness in qualitative research is crucial to the integrity of the findings and is determined by the transparency of the procedures adopted in a study (Connelly, 2016). Trustworthiness involves agreed meanings between researcher and study participants (McMillan & Schumacher, 2010). Polit and Beck (2014) describe trustworthiness as the level of assurance of data collected, its interpretation, and the procedures employed to ensure the quality of a research study. Hanson, Balmer, and Giardnno (2011) argue that ‘’qualitative researchers may seek to understand the participant perspective on phenomena of interest and to convey meanings that the participants construct regarding those phenomena’’ (p. 375). In the present study, Lincoln and Guba’s (1985) criteria for trustworthiness (credibility, dependability, transferability, and confirmability) were applied to ensure the quality of the research.

3.6.2.2 Credibility

Credibility in research is the assurance that the interpretation and findings of a study are genuine and authentic. White, Oelke, and Friesen (2012) argue that credibility is essential to accepting and ascertaining trustworthiness in research, and Merriam (1998, p. 64) adds that ‘’credibility is the congruence of the findings of the study with actual reality’’. Credibility means that a researcher has confidence in the trustworthiness of the findings of a study. To ensure

credibility in the present study, the participants in the qualitative phase were selected based on their responses to the items in the study instrument (the ASQ). Similarly, the students' performances in mathematics were considered, indicating either high or low scores. As discussed in Section 3.4.1.2, the participants with mathematics scores of 65% and above were categorised as high performers while the other participants were categorised as low performers. Their responses reflected different opinions on and understanding of the study instrument and how they perceived their performance in and attitude towards mathematics. The study instrument included questions on the students' attitudes towards mathematics. The responses from the attitude component of the instrument were correlated with the ASQ subscales. As a researcher and a lecturer in a college of education, I am familiar with the secondary school system and was able to interact freely with the participants. I made use of a field journal in which I recorded progress, revisions, observations, and the importance of the research processes (Nieuwenhuis, 2010b). To ensure credibility, the data collected were checked and audited in order to ascertain that the themes identified were in line with the raw data. In addition, the participants were given the opportunity to go through the transcribed data to ensure that the research results were credible and authentic (White et al., 2012).

3.6.2.3 Dependability

Dependability in qualitative research is the extent to which research findings can be replicated by the same researcher or another researcher using the same participants and research methods (Hanson et al., 2011). Dependability can be seen as the reliability of qualitative research (Loh, 2013). In order to ensure dependability in research, an audit trail should be established by the researcher concerned (Ary et al., 2010). To ensure dependability in the present study, a research journal was used in the data collection process to record the reactions and ideas of the participants. I also ensured that all conversations during the interviews were recorded and transcribed. To avoid bias, the participants' exact words were used to substantiate the quotes.

3.6.2.4 Transferability

Transferability refers to a process whereby findings and research interpretations can be transferred or applied to other similar research contexts (Hanson et al., 2011). Transferability can also be useful to future researchers for comparing their own research settings with important dimensions of previous studies. Lietz and Zayas (2010, p. 195) contend that ''transferability is achieved when findings have applicability to another setting, to theory, to practice, or to future research''. These authors add that credibility is needed to achieve transferability, so that studies can produce reliable findings that can contribute to the body of

knowledge on a particular subject. To achieve transferability in the present study, observations were recorded in a research journal, and sufficient information was provided on the research procedures for other researchers to replicate the research. In this regard, I gave detailed descriptions of the participants' perceptions of the ASQ and their mathematics scores.

3.6.2.5 Confirmability

Ary et al. (2001) view confirmability as the extent to which the procedures and interpretations of the results of a research study are free from any bias of the researcher or are neutral. Confirmability in qualitative research also means that the findings in the research are the thoughts, words, and understandings of the participants and not the preferences and ideas of the researcher (Shenton, 2004). Hanson et al. (2011) and Ary et al. (2010) state that audit trails are an important strategy for ensuring confirmability in research as they help other researchers see that the research procedures, data analysis, and interpretations are in line with acceptable research practices. In the present study, I used an in-depth methodological procedure such as the selection of participants, focus group interviews, data transcriptions, and analysis and interpretations of results to enable scrutiny of the integrity of the research results (Shenton, 2004).

3.7 ROLE OF THE RESEARCHER

The different roles and responsibilities in the present study are detailed below.

- **Organiser** - I personally organised, conducted, and reported on the research.
- **Dual roles** – I performed dual roles in this mixed methods study. One, as an 'instrument' for data collection in the qualitative study, and two, as an administrator for data collection in the quantitative study.
- **Safety and welfare** – Care was taken to ensure the safety and welfare of the participants through the provision of refreshments to all the qualitative research participants and ensuring that we completed the focus interviews on time to enable them to return to their respective houses as soon as possible. I encouraged open and frank discussions and also encouraged them to ask questions about risk issues concerning their participations in the research.
- **Integrity** – I upheld the integrity of the research throughout the research process, especially as regards quality assurance of the data collection and analysis. The participants had access to the interview guide and, after the transcriptions, were given the opportunity to ensure that what they had said was reported accurately.

- **Respect** – I endeavoured to build a relationship of trust with the participants and respected their views. They were given the opportunity to participate in the research and also to withdraw from the research at any time.

3.8 ETHICAL CONSIDERATIONS

Ethical issues are fundamental in mixed methods research because of the different types of designs often involved, requiring different forms of compliance to ensure acceptability (Creswell, 2012). The primary goals of research ethics are one, to provide full welfare protection to participants, and two, to ensure quality assurance of the research (Wassenaar, 2006). Researchers need to consider ethical issues throughout the research process. Prior to the commencement of the present research, ethical clearance was obtained from the Ethics Committee of the Faculty of Education, University of Pretoria. From the onset, I adhered strictly to the principles guiding the conduct and reporting of research. The following ethical issues guided the study.

3.8.1 Obtaining access to research participants from 'gatekeepers', voluntary participation, and informed consent

Data collection started after obtaining ethical clearance from the Ethics Committee of the Faculty of Education, University of Pretoria. I then requested permission to conduct the research from the ministry in charge of secondary school education – the Ministry of Education, Lagos State – through the appropriate authorities in charge of each of the two education districts used in the study. Once permission had been granted, I sought the cooperation and consent of the principals of the selected schools. A similar procedure was followed to gain access to the class teachers who facilitated meetings with the groups of students. The senior secondary school students were addressed frankly and honestly in order to obtain valuable information from them. The students were informed about the nature and purpose of the research before participating in it. They were told that their participation was voluntary and that they could opt out of the process at any stage without any penalty or loss of benefit. The students were not pressurised or manipulated in any way to participate in the study.

As the participants were under-age (between 12 and 20 years), I requested the permission of their parents or guardians for them to take part in the study. The research participants also filled in and submitted informed consent forms indicating their willingness to participate in the research. The questionnaire for the study was made available to them. Throughout the research, I ensured that the participants were kept fully informed about their participation in

the study. My name, telephone number, and email address were made available to the participants and their parents and guardians to enable them to ask any questions about the research (Code of Ethics for Research, 6.2.2; Stangor, 2011; Gray, 2009; Oliver, 2003; Gregory, 2003).

3.8.2 Protection from harm and risk

Research of this nature is not likely to pose any harm to participants. The danger of physical harm to the students as a result of their participation in this research was therefore not an issue. Nevertheless, every effort was made to protect them from emotional or psychological harm although I anticipated that some might react negatively to some of the questionnaire items because of their general level of maturity or youthfulness (Oliver, 2003). In the course of collecting, analysing, reporting, and disseminating the data, I endeavoured to use only the most relevant information (Code of Ethics for Research, 6.2.1). For the participants to have absolute confidence in the research, I encouraged them to ask questions in person about risk issues or to contact me by email or telephone. The protection of the participants was ensured through constant evaluation and the supervisory roles that were sustained by the supervisor and the Ethics Committee of the Faculty of Education in accordance with the ethics policy of the University of Pretoria (Gregory, 2003; Oliver, 2003; Stangor, 2011).

3.8.3 Privacy and confidentiality

I ensured that the participants' right to privacy and confidentiality of information was protected throughout the research. The names or identities of the participants were not attached to any information collected during the reporting stage. A confidential relationship developed between the participants and I (Gregory, 2003; Code of Ethics for Research, 6.2.4). The participants were assured also that data collected would be safeguarded and kept safely by the research supervisor. In addition, I informed them about the individuals who would have access to the data obtained during the research (Oliver, 2003).

3.9 CONCLUSION

This chapter discussed the research methodology of the study. The chapter sections included research design, methodology, data analysis, and interpretation of the results from the two data sets (quantitative and qualitative). The quality assurance for both data sets was also covered, and the chapter ended with a discussion of ethical considerations. The next chapter deals with the quantitative results.

CHAPTER 4
QUANTITATIVE ANALYSIS

4.1 INTRODUCTION

This chapter covers the quantitative analysis of the present study and shows how attributional style was related to the mathematics performance of the senior secondary school students in the study. An adapted version of the Attributional Style Questionnaire (ASQ) (Dykema et al., 1996) was used to gather data for the main study. Quantitative research was used to answer the research questions and to prove or disprove the hypothesis for the study.

Primary research question

How does attributional style relate to mathematics performance in Nigerian senior secondary school over and above socio-demographic and attitudinal factors?

Secondary research questions

1. How do stability and globality attributional style relate to mathematics performance?
2. How well do stability and globality as well as gender and socio-economic factors predict mathematics performance?
3. What is the influence of socio-demographic and attitudinal factors on mathematics performance?

All in all, there were 300 participants from two schools. In the quantitative analysis, the first section provides descriptive statistics regarding the demographic information of the participants and their attitude towards mathematics. The second section explains the inferential statistics of the study variables, attributional style (stability and globality), gender and socio-economic factors, and the mathematics performance and attitudes towards mathematics of the senior secondary school students. A staff member of the Department of Statistics at the University of Pretoria assisted with the data analysis using IBM SPSS statistics 25 (Corp IBM, 2019).

4.1.1 Blending the Findings (results) and Discussion sections

I am aware that it is more customary to separate the Findings and Discussion sections of a research report. However, for various reasons, including saving space, my supervisor, the statistician, and I decided rather to merge the two sections. This helped to

a. promote the continuity and logical flow of ideas;

b. advance the immediacy of my explanations of the findings and relate these explanations to the findings of other researchers as supportive narratives from the literature; and
c. enhance a sense of cohesion by presenting the statistical and qualitative analyses and findings and relating them to the findings and arguments of other researchers.

It should be noted that I could not find any studies on the effects of attributional style on the mathematics performance of senior secondary school students that related satisfactorily to my own research. There were very few, if any, studies that I could realistically use as benchmarks. In relating my findings to those in the literature (evaluating the findings of other researchers), I focused on assessing and relating, first, the quantitative outcomes of this study in the current chapter and, second, the qualitative findings in Chapter 5 to the findings of other researchers.

4.2 OUTCOMES OF THE QUANTITATIVE STUDY

4.2.1 Descriptive statistics: Demographic information

Table 4.1 below shows the gender distribution of the participants. Of the 300 subjects who responded to the questionnaire, 155 (51.7%) were girls and 145 (48.3) boys.

Table 4.1: Gender of participants

Gender	Frequency	Percent
Female	155	51.7
Male	145	48.3
Total	300	100.0

The minimum age of the participants was 12.08 and the maximum 20.33 years (mean age 16.25 years). The standard deviation was 1.31. Twenty-five percent (25%) of the participants were younger than 15.25 and 75% older than 15.25 years (the first quartile). Fifty percent (50%) of the participants were younger than 16.17 and 50% older than 16.17 years (the median age). Seventy-five percent (75%) of the participants were younger than 17.08 and 25% older than 17.08 years (the third quartile). These are shown in Table 4.2 below.

Table 4.2: Age in years of the participants

N	Valid	300
	Missing	0
Mean		16.25
Standard deviation		1.31
Range		8.25
Minimum		12.08
Maximum		20.33
Percentile	25	15.25
	50	16.17
	75	17.08

Table 4.2 above shows the minimum and maximum ages of 12.08 and 20.33 years respectively. The two ages fell short of the normal age range of senior secondary school Form 2 learners. The normal age range is between 15 and 17 years. The youngest participant who looked visibly younger than her classmates started her elementary school before her age peers. The oldest participant in the present study was a house helper with a family and did not have the opportunity to start school with her age peers. She started elementary school late.

Tables 4.3a and 4.3b below show the frequencies and descriptive statistics of the total number of family members of the study participants. The minimum number of family members was three while the maximum number was 12, with a mean of 6.39 and a standard deviation of 1.55 family members. The first quartile was 5, the median 6, and the third quartile seven family members per household.

Table 4.3a: Total number of family members

Valid	Frequency	Percent
3	5	1.7
4	22	7.3
5	61	20.3
6	78	26.0
7	70	23.3

Valid	Frequency	Percent
8	39	13.0
9	14	4.7
10	8	2.7
11	2	.7
12	1	.3
Total	**300**	**100.0**

Table 4.3b: Descriptive statistics of family members

N	Valid	300
	Missing	0
Mean		6.39
Standard deviation		1.55
Range		9
Minimum		3
Maximum		12
Percentile	25	5.00
	50	6.00
	75	7.00

Table 4.4 below shows the participants' responses regarding their fathers and mothers' socio-economic status. Both the fathers and mothers of 71.7% of the participants were employed while both the fathers and mothers of 9.7% of the participants were unemployed. A figure of 7.7% had only their mothers employed while 11% had only their father employed. A total of 215 participants (71.7%) had their parents employed while the remaining 85 (28.3%) had either both their fathers and/or mothers unemployed. The high socio-economic status participants were those participants whose parents (both) were employed while the low socio-economic status participants were those participants with either one parent or both parents unemployed.

Table 4.4: Socio-economic status

Valid	Frequency	Percent
Both father and mother were (or guardian was) unemployed	29	9.7
Only mother was employed (father unemployed)	23	7.7
Only father was employed (mother unemployed)	33	11.0
Low socio-economic status	85	28.3
Both father and mother were (guardian was) employed	215	71.7
High socio-economic status	215	71.7
Total	**300**	**100.0**

4.2.2 Descriptive statistics: Attitude towards mathematics

Table 4.5 shows how the participants intended to use mathematics in their future careers. A 7-point Likert scale was used in the questionnaire. In number 1 of the scale, which is 'almost never', four (1.3%) of the participants indicated that they would never (or almost never) use mathematics in any of their careers in the future. The responses graduate to number 7 of the scale, which is 'almost always', where 170 (56.7%) of the participants indicated that mathematics would be useful in their future careers. Other responses, as they graduate from 1 to 7, are shown in the table below.

Table 4.5: Mathematics use in future career

Valid	Frequency	Percent
Almost never	4	1.3
2	3	1.0
3	3	1.0
4	12	4.0
5	56	18.7
6	52	17.3
Almost always	170	56.7
Total	**300**	**100.0**

Table 4.6 shows the participants' motivation to do well in mathematics. In number 1 of the scale, which is 'almost never', two (.7%) of the participants indicated that they were not motivated to do well in mathematics. The responses graduate to number 7 of the scale, which is 'almost always', where 146 (48.7%) of the participants indicated how motivation helped them in mathematics. Other responses are also shown in the table below.

Table 4.6: Motivation to do well in mathematics

Valid	Frequency	Percent
Almost never	2	.7
2	5	1.7
3	3	1.0
4	7	2.3
5	51	17.0
6	86	28.7
Almost always	146	48.7
Total	**300**	**100.0**

In Table 4.7 below, the participants indicated the degree to which they tried to find help when they struggled with mathematics. Five (1.7%) of the participants revealed that they would not find help (almost never) when they struggled with mathematics. All told, 134 (44.7%) of the participants revealed that they knew where to find help when struggling with mathematics.

Table 4.7: Finding help when struggling with mathematics

Valid	Frequency	Percent
Almost never	5	1.7
2	7	2.3
3	5	1.7
4	9	3.0
5	50	16.7
6	90	30.0
Almost always	134	44.7
Total	**300**	**100.0**

Table 4.8 shows the participants' level of anxiety in mathematics. Twenty (6.7%) of the participants indicated that they were never anxious when doing mathematics. The anxiety level graduates to 'almost always' where 82 (27.3%) of the participants indicated their anxiety in mathematics. Other levels of responses of the participants on the 7-point Likert scale of the questionnaire are also shown in Table 4.8 below.

Table 4.8: Anxiety in mathematics

Valid	Frequency	Percent
Almost never	20	6.7
2	10	3.3
3	14	4.7
4	19	6.3
5	87	29.0
6	68	22.7
Almost always	82	27.3
Total	**300**	**100.0**

The study participants were asked to write down the mathematics marks they received at the end of the previous term, known as 'reported' mathematics marks. The actual mathematics marks are shown in Table 4.9a below. These marks were obtained from the principals of the two schools in the study. The reported and actual mathematics marks were reported together. Table 4.9a below shows that the minimum mark for reported mathematics marks was 27% while the maximum mark was 99%. The mean mark was 55.21. The first quartile was 46%, the median 50%, and the third quartile 64%. The minimum mark for the actual mathematics marks was 21% while the maximum mark was 98%. The mean mark was 52.10. The first quartile was 45%, the median 49%, and the third quartile 57%. The mean reported mark was 3.11 percent higher than the actual mark. Table 4.9b below shows a high positive correlation[5] (.78) between the mathematics marks as reported by the participants and the mathematics marks actually achieved.

[5] Pearson correlation coefficients represent effect sizes. Moreover, r = 0.1 indicates small effect, r = 0.3 medium effect, and r = 0.5 large effect. Given the many correlations mentioned in this chapter, only those that were large are elaborated on further.

Table 4.9a: Reported and actual maths marks

		Reported Maths Marks	Actual Maths Marks
N	**Valid**	**300**	**300**
	Missing	0	0
Mean		55.21	52.10
Standard deviation		13.39	12.66
Range		72	77
Minimum		27	21
Maximum		99	98
Percentile	25	46.00	45.00
	50	50.00	49.00
	75	64.00	57.00

Table 4.9b: Correlation between reported and actual mathematics marks

		Reported Maths Marks	Actual Maths Marks
Reported maths marks	Pearson correlation	1	.78**
	Sig. (2-tailed)		<0.001
	N	300	300
Actual maths marks	Pearson correlation	.78**	1
	Sig. (2-tailed)	<0.001	
	N	300	300

**: Correlation is significant at the 0.01 level (2-tailed); large effect size/ practical effect.

The reason for asking the study participants to write down their mathematics marks was to ascertain if they could remember their marks. Most of the participants wrote down the correct mathematics marks.

There could be many reasons for the discrepancy between reported mathematics marks and actual mathematics marks. Some of the study participants did not write down their previous term mathematics marks correctly possibly because they were not told to ascertain their mathematics marks prior to the administration of the study instrument. Some of the students

actually said that they were not sure what marks they had received. This discrepancy could have been averted if the participants had been told earlier to find out about their marks.

4.2.3 Correlations, reliability, and descriptive statistics of subscales of the *ASQ*

The reliability analysis below shows that Cronbach's alpha for the stability/instability subscale of the ASQ was 0.80, which indicates a high reliability value; hence it can be said that this subscale had good internal reliability.

Table 4.10: Cronbach's alpha for the stability/instability subscale of the ASQ

Cronbach's Alpha	No. of Items
.80	12

The item-total statistics in Table 4.11 show that the lowest Cronbach's alpha reliability value of 0.80 would be obtained if Item 8 (V13Br) was deleted from the 12 items, while a value of 0.80, which was the highest value, would be obtained if Item 2 (V6Br) was deleted. However, from the 12 items constructed, Items 1 (V5Br), 2 (V6Br), and 5 (V9Br) seemed to be lower than 0.40 in the item column, which indicates that the remaining nine items were good items, making the coefficient suitable. The reliability value of the 12 items would be almost unchanged if just three of the 12 items, i.e. Items 1 (V5Br), 2 (V6Br), and 5 (V9Br) were deleted from the other items. In summary, it shows that the items were highly reliable.

Table 4.11: Item-total statistics for stability/instability (No. of items = 12)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
V5B: How likely is it that the cause you gave will continue to affect you?	63.00	37.31	.35	.80
V6B: How likely is it that the cause you gave will continue to affect you?	62.96	38.02	.32	.80
V7B: How likely is it that the cause you gave will continue to affect you?	63.08	36.60	.42	.79
V8B: How likely is it that the cause you gave will continue to affect you?	62.81	35.99	.50	.78
V9B: How likely is it that the cause you gave will continue to affect you?	62.99	37.35	.39	.79

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
V10B: How likely is it that the cause you gave will continue to affect you?	62.89	35.58	.51	.78
V11B: How likely is it that the cause you gave will continue to affect you?	63.11	35.53	.46	.79
V12B: How likely is it that the cause you gave will continue to affect you?	62.73	36.33	.49	.79
V13B: How likely is it that the cause you gave will continue to affect you?	62.81	35.12	.57	.78
V14B: How likely is it that the cause you gave will continue to affect you?	63.13	35.70	.42	.79
V15B: How likely is it that the cause you gave will continue to affect you?	62.74	36.16	.49	.78
V16B: How likely is it that the cause you gave will continue to affect you?	62.82	35.95	.48	.79

[6]

The reliability analysis below shows that Cronbach's alpha for the globality/specificity scale of the ASQ was 0.80, which indicates a high reliability value; hence it can be said that this subscale had good internal reliability.

Table 4.12: Cronbach's alpha for the globality/specificity subscale of the ASQ

Cronbach's Alpha	No. of Items
.80	12

The item-total statistics in Table 4.13 show that if Item 10 (V14Cr), the lowest value in the Cronbach's alpha column and Item 1 (V5Cr), the highest value in the Cronbach's alpha column, were both deleted, Cronbach's alpha reliability value of 0.80 would still be obtained.

The reliability value of the stability/instability scale would be almost 0.80 if any given item was deleted from the other items. In summary, the finding showed that the scale was reliable.

[6] **Calculation of the globality and stability scales of the *ASQ*:** A stability scale for each participant was determined by calculating the mean (average) of the values selected for the 12 items in the *ASQ* relating to stability. Similarly, a scale for globality was computed by averaging over the values selected for the 12 items in the *ASQ* relating to globality. The stability and globality scales may vary between a minimum value of 1 and a maximum of 7.

Table 4.13: Item-total statistics for globality/specificity **(No. of items = 12)**

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
V5C: Is the cause you gave something that just affects sleeping, or does it affect other areas of your life?	63.13	46.18	.28	.80
V6C: Is the cause you gave something that just affects feeling sick and tired, or does it affect other areas of your life?	63.15	43.76	.41	.79
V7C: Is the cause you gave something that just affects injuries, or does it affect other areas of your life?	63.24	43.93	.40	.79
V8C: Is the cause you gave something that just affects not finding a job, or does it affect other areas of your life?	62.80	45.81	.36	.808
V9C: Is the cause you gave something that just affects getting work, or does it affect other areas of your life?	63.11	43.80	.43	.79
V10C: Is the cause you gave something that just affects getting suspended, or does it affect other areas of your life?	62.89	44.05	.43	.79
V11C: Is the cause you gave something that just affects helping friends, or does it affect other areas of your life?	63.13	42.57	.51	.78
V12C: Is the cause you gave something that just affects financial problems, or does it affect other areas of your life?	62.71	44.56	.43	.79
V13C: Is the cause you gave something that just affects understanding your teacher, or does it affect other areas of your life?	62.93	42.31	.56	.78
V14C: Is the cause you gave something that just affects friends being angry, or does it affect other areas of your life?	63.18	41.03	.59	.77
V15C: Is the cause you gave something that just affects breaking the law, or does it affect other areas of your life?	62.89	44.75	.43	.79

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
V16C: Is the cause you gave something that just affects a family argument, or does it affect other areas of your life?	63.03	41.83	.55	.789

The purpose of the item-total statistics in Table 4.13 above was to confirm that if any of the items did not correlate or were not consistent with other items in the scale, such item(s) would be discarded or removed from the scale and the scale would still retain its reliability value.

The reliability statistics below show that Cronbach's alpha for the inter-item reliability for the scale of attitude of students in mathematics was 0.49, which indicates a weak reliability of the four items (V17A, V17B, V17C, and V17D).

Table 4.14: Cronbach's alpha for attitude towards mathematics

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	No. of Items
0.49	0.54	4

If Cronbach's alpha items are deleted, V17D (0.64) shows good reliability, whereas V17A (0.34), V17B (0.31) and V17C, (0.40) show weak reliability. The weak relationship indicates that conclusions based on the administration of this subscale should be interpreted with the utmost caution. (See Table 4.15.)

Table 4.15: Item-total statistics for attitude towards mathematics

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
V17A: YOUR ATTITUDE TOWARDS MATHEMATICS: I will use mathematics in my career one day.	17.38	7.50	.39	.23	.34
V17B: I am motivated to do well in mathematics.	17.41	7.61	.44	.30	.31
V17C: I know where to find help when I struggle with mathematics.	17.55	7.66	.31	.17	.40
V17D: I get anxious when I do mathematics	18.30	7.65	.11	.02	.64

The reliability analysis in Table 4.16 below reveals that Cronbach's alpha for attitude towards mathematics, V17A, V17B, V17C, and V17D, when V17D was inversely coded, was 0.31, which indicates a low reliability value. Low reliability in the table indicates that the items may very well not produce the same responses from participants any time the items are used again. The weak relationship indicates that outcomes based on the administration of this subscale should be interpreted with the utmost caution.

Table 4.16: Cronbach's alpha for attitude towards mathematics

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	No. of Items
.31	.40	4

When using mean and standard deviation values as criteria for justification for the four items when V17D was inversely coded, all the four variables (V17A, V17B, 17C, and V17D) indicated positive responses from the study participants with their mean and standard deviation values shown in Table 4.17. This finding implies that the study participants accepted the fact that they would have to use mathematics in later life and that mathematics was important to them.

Table 4.17: Descriptive analysis of item statistics for attitude towards mathematics

	Mean	Std. Deviation	N
V17A: YOUR ATTITUDE TOWARDS MATHEMATICS: I will use mathematics in my career one day.	6.16	1.21	300
V17B: I am motivated to do well in mathematics.	6.14	1.12	300
V17C: I know where to find help when I struggle with mathematics.	5.99	1.30	300
V17D_R: I do not get anxious when I do mathematics	2.75	1.70	300

In terms of Cronbach's alpha, if Item V17B was deleted and V17D was inversely coded, the scale would show good reliability. The finding indicates that Items V17A, V17C, and V17D were important while item V17B was not. (See Table 4.18 below.)

Table 4.18: Item-total statistics for attitude towards mathematics

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
V17A: YOUR ATTITUDE TOWARDS MATHEMATICS: I will use mathematics in my career one day.	14.88	6.51	.25	.23	.16
V17B: I am motivated to do well in mathematics.	14.91	6.05	.40	.30	.00
V17C: I know where to find help when I struggle with mathematics.	15.05	6.09	.27	.17	.12
V17D_R: I do not get anxious when I do Mathematics	18.30	7.65	-.11	.02	.64

The reliability analysis in Table 4.19 below shows that Cronbach's alpha value for attitude towards mathematics for V17A, V17B, and V17C was 0.64, which indicates strong reliability.

Table 4.19: Reliability of scale of attitude towards mathematics 17A-C

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	No. of Items
.64	.64	3

Table 4.20 below shows that V17A, V17B, and V17C were all significant (in terms of Cronbach's alpha) if the items were deleted from a significant level at 0.01 perspective. The result indicates that the quality of the scale and items was good and that the participants would give similar responses when those deleted items were not used.

Table 4.20: Item-total statistics for attitude towards mathematics V17A-C

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
V17A: YOUR ATTITUDE TOWARDS MATHEMATICS: I will use mathematics in my career one day.	12.13	4.12	.42	.22	.58
V17B: I am motivated to do well in mathematics.	12.16	3.94	.55	.30	.40
V17C: I know where to find help when I struggle with mathematics.	12.30	3.99	.38	.17	.63

In Table 4.21 below, the value of 0.73 indicates a strong relationship between stability and globality.

Table 4.21: Correlation analysis showing relationship between globality and stability

		Stability	Globality
Stability	Pearson correlation	1	.73**
	Sig. (2-tailed)		<0.001
	N	300	300
Globality	Pearson correlation	.73**	1
	Sig. (2-tailed)	<0.001	
	N	300	300

**: Correlation is significant at the 0.01 level (2-tailed); large effect size/ practical effect.

Table 4.22 below shows the relationship among stability, globality, actual mathematics marks, and reported mathematics marks (V17E).

Table 4.22: Correlation analysis showing relationship among stability, globality, actual mathematics marks, and reported mathematics marks (V17E)

		Stability	Globality	Actual Maths_Marks	Reported Maths Marks
Stability	Pearson correlation	1	.73**	-.03	-.01
	Sig. (2-tailed)		<0.001	.643	.876
	N	300	300	300	300
Globality	Pearson correlation	.73**	1	-.08	-.04
	Sig. (2-tailed)	<0.001		.162	.508
	N	300	300	300	300
Actual maths mark	Pearson Correlation	-.03	-.08	1	.78**
	Sig. (2-tailed)	.643	.162		<0.001
	N	300	300	300	300
Reported maths mark	Pearson Correlation	-.01	-.04	.78**	1
	Sig. (2-tailed)	.876	.508	<0.001	
	N	300	300	300	300

**: Correlation is significant at the 0.01 level (2-tailed) ; large effect size/ practical effect.

Table 4.22 above indicates the following: The correlation between stability and **actual** mathematics marks was -0.03 with p-value = 0.643. In other words, the correlation was not significant. The correlation between stability and reported mathematics marks (V17E) was -0.01 with p-value = 0.876, and was not significant. The correlation between globality and **actual** mathematics marks was -0.08 with p-value 0.162 and was not significant. Likewise, the correlation between globality and reported mathematics marks (V17E) was -0.04, and was also not significant. The findings imply that there was not a significant relationship between stability and globality with either the actual or the reported mathematics marks. It can therefore be concluded that stability and globality did not affect or predict the participants' mathematics marks. However, the correlation between **actual** mathematics marks and reported mathematics marks (V17E) was strongly positive (0.78) and significant at the 0.01 level. The relationship between stability and globality attributional style was also strongly positive (0.73) and significant at the 0.01 level. (See the second part of this chapter for an explanation of this phenomenon.)

Table 4.23 below shows that the distributions of stability, globality, actual mathematics marks, and reported mathematics marks (V17E) were tested using the distribution statistics of Kolmogorov-Smirnov and Shapiro-Wilk. The tests of normality revealed significant p-values for stability, globality, actual mathematics marks, and reported mathematics marks (V17E) for the two methods used.

Table 4.23: Test of normality using Kolmogorov and Shapiro

	Kolmogorov-Smirnov[a]			**Shapiro-Wilk**		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Stability	.08	300	<0.001	.99	300	.004
Globality	.12	300	<0.001	.95	300	<0.001
Reported maths marks	.16	300	<0.001	.94	300	<0.001
Actual maths_marks	.19	300	<0.001	.91	300	<0.001

a. Lilliefors' significance correlation.

Table 23 above shows the outcomes of the Kolmogorov and Shapiro normality tests. The fact that all scores were significant means that the data were not normally distributed.

Table 4.24 below shows the correlation between actual mathematics marks, reported mathematics marks (V17E), and attitude towards mathematics. The value of 0.78 indicates a

strong positive relationship between actual mathematics marks and reported mathematics marks, which is significant at 0.01, but a low correlation value of 0.11 between actual mathematics marks and attitude towards mathematics. The table also shows a low correlation value of 0.12 between reported mathematics marks and attitude towards mathematics.

Table 4.24: Correlation analysis of actual mathematics marks, reported mathematics marks (V17E), and attitude towards mathematics

		Actual Maths Marks	Reported Maths Marks	Attitude
Actual maths marks	Pearson correlation	1	.78**	.11
	Sig. (2-tailed)		<0.001	.058
	N	300	300	300
Reported maths marks	Pearson correlation	.78**	1	.12*
	Sig. (2-tailed)	<0.001		.047
	N	300	300	300
Attitude	Pearson correlation	.11	.12*	1
	Sig. (2-tailed)	.058	.047	
	N	300	300	300

**: Correlation was significant at the 0.01 level (2-tailed) (two-tailed test was used to test the possibility of a relationship in both directions); large effect size/ practical effect.
*: Correlation was significant at the 0.05 level (2-tailed); ; large effect size/ practical effect.

Table 4.24 shows that the relationship between the actual mathematics marks and attitude was 0.11 with p-value = 0.058 (significant only at the 10% level of significance). However, the relationship between the reported mathematics marks and attitude was 0.12 with p-value = 0.047 (significant at the 5% level of significance).

In the next section, the research questions are dealt with consecutively.

4.2.4 Research questions

Primary research question

How does attributional style relate to mathematics performance in Nigerian senior secondary schools over and above socio-demographic and attitudinal factors?

Secondary research questions

1. How do stability and globality attributional styles relate to students' performance in mathematics?

2. How well do stability and globality as well as gender and socio-economic factors predict mathematics performance?
3. What is the influence of socio-demographic and attitudinal factors on mathematics performance?

The findings regarding secondary research question 1 are discussed below.

4.2.4.1 Secondary research question 1

1. How do stability and globality attributional styles relate to students' performance in mathematics?

Bivariate correlation coefficients were calculated between the two subscales stability and globality and the students' performance in mathematics. Since the sample size was large (n=300), Pearson's correlation coefficients were computed. The table with these coefficients and the corresponding p-values can be seen below.

In order to answer the first of the secondary research questions, the actual mathematics marks and correlations between the two scales (stability and globality) were calculated (see Table 4.25). As discussed earlier, the actual mathematics marks were the real mathematics marks the study participants scored in their previous term. These marks were obtained from the principals of the two schools in the study.

Table 4.25: Pearson's correlation coefficients and corresponding p-values

		Actual Maths Marks	Stability	Globality
Actual maths marks	Pearson's correlation	1	-.03	-.08
	Sig. (2-tailed)		.643	.162
	N	300	300	300
Stability	Pearson's correlation	-.03	1	.73**
	Sig. (2-tailed)	.643		<0.001
	N	300	300	300
Globality	Pearson's correlation	-.08	.73**	1
	Sig. (2-tailed)	.162	<0.001	
	N	300	300	300

**: Correlation was significant at the 0.01 level (2-tailed).

i. Correlation between actual mathematics marks and stability

Neither the correlation coefficient between the actual mathematics marks and stability (-0.03 with p-value = 0.643) nor the correlation between the actual mathematics marks and globality (-0.08 with p-value = 0.162) was significant.

The participants' performance in mathematics was above average (see Table 4.9a), and their stability and globality dimension scores were positive. The following can be seen in Table 4.25.

i. The boys achieved a mean score of 5.74 (see Table 4.26a) in the stability dimension of the ASQ. This means that the mean stability dimension score of the boys was positive.
ii. The girls achieved a mean score of 5.70 (see Table 4.26a) in the stability dimension of the ASQ. This means that the mean stability dimension score of the girls was positive.
iii. The boys achieved a mean score of 5.71 (see Table 4.26b) in the globality dimension of the ASQ. This means that the mean globality dimension score of the boys was positive.
iv. The girls achieved a mean score of 5.74 (see Table 4.26b) in the globality dimension of the ASQ. This means that the mean globality dimension score of the girls was positive.

Correlation coefficients were calculated for the boys and the girls together. The outcomes are listed below.

The correlation between their stability mean score and their mathematics performance was negative (-.03) and not significant (p = .643).

The correlation between their globality mean score and their mathematics performance was negative (-0.08) and not significant (p = 0.162).

Table 4.26a: Mean gender scores on the stability dimension of the ASQ

Gender			Statistic	Std. Error
Stability	Girls	Mean	5.70	.044
		Median	5.75	
		Variance	.30	
		Std. deviation	.54	
		Minimum	4.25	
		Maximum	7.00	
		Range	2.75	
		Inter- range	.75	

Gender		Statistic	Std. Error
Boys	Mean	5.73	
	Median	5.83	
	Variance	.29	
	Std. deviation	.542	
	Minimum	4.00	
	Maximum	7.00	
	Range	3.00	
	Inter- range	.71	

Table 4.26b: Mean gender scores on the globality dimension of the ASQ

Gender			Statistic	Std. Error
Globality	Girls	Mean	5.74	.57
		Median	5.83	
		Variance	.49	
		Std. deviation	.54	
		Minimum	4.25	
		Maximum	7.00	
		Range	3.92	
		Inter- range	.75	
	Boys	Mean	5.71	.043
		Median	5.75	
		Variance	.27	
		Std. deviation	.52	
		Minimum	4.08	
		Maximum	7.00	
		Range	2.92	
		Inter- range	.58	

Abramson et al. (1978) maintain that a negative attributional style will not improve achievement and that negative thinking increases negative expectancies. Based on the reformulated learned helplessness theory (RLHT) (Abramson et al., 1978), it is expected that positive attributional styles of students will influence their mathematics performance positively.

The adapted ASQ comprises 12 negative hypothetical statements of stability and globality dimensions. The negative statements, in turn, comprise adverse cognitive personality dispositions that reflect how people explain bad events that befall them. The reformulated learned helplessness theory (RLHT) that this study was based on predicts that an internal, stable, and global attributional style for negative events will correlate negatively with poor academic performance in mathematics (i.e. will correlate positively with good academic performance in mathematics).[7]

According to Houston (2016), an external, unstable, and specific attributional style for negative events (i.e. the opposite of the internal, stable, and global attributional style dimensions discussed in the previous paragraph) will correlate positively with good academic performance. Some studies have found negative attributional style to be a reliable predictor of poor academic performance (Maleva, Westcott, McKellop, McLaughlin, & Widman, 2014). Although some studies have found support for the predictions of the RLHT stated above, there have also been many contradictions and reports of no correlations between attributional style and the academic performance of students (Morris & Tiggerman, 2013; Yee, Pierce, Ptacek, & Modzelesky, 2003; Bridges, 2001).

A possible reason for the finding of no significant correlation between the two subscales and mathematics performance could be the type of ASQ measure (domain-specific versus domain-general) used in in the present research. Gordeeva, Sheldon, and Sychev (2019) explain that the ASQ domain-general is designed to cover all areas of life-events such as the cognitive, affective, behavioural, and motivational areas while the ASQ domain-specific is designed to focus specifically on a life-event, for instance depression (affective) or achievement (cognitive). For this reason, the adapted ASQ used in the present study was the domain-general version with negative hypothetical events. Gordeeva et al. (2019) report that the ASQ domain-general scale is less related to academic performance than the domain-specific scale, which is more appropriate for academic matters. Some scholars may question my use of the domain-general version of the scale. However, at the time of this research, the above information provided by Gordeeva et al. (2019) was not available.

[7] It should be noted that the words positive internal, stable, and global attributional style and the words internal, stable and global attributional styles for positive events are regarded as equivalent (Abramson et al., 1978). Likewise, the words negative internal, stable, and global attributional style are equivalent to the words internal, stable, and global attributional styles for negative events. The theoretical position regarding a positive internal, stable, and global attributional style implies that it will correlate positively with good academic performance. Conversely, a negative internal, stable, and global attributional style will correlate negatively with poor academic performance.

Below, the findings of secondary research question 1 are related to the findings of other studies.

Relating the findings of secondary research question 1 to the findings of previous studies and integrating the findings with literature and theory

a. General observations

The purpose of the present study was to explore the effects of attributional style on the mathematics performance of senior secondary school students. The findings of the first secondary research question indicated no significant relationship between attributional style and mathematics performance. As explained in the preceding paragraphs, the mathematics performance of the study participants was above average and their stability and globality scores were positive.

Below, I discuss previous findings that were inconsistent with my findings as well as previous findings that were consistent with my findings.

b. Previous findings that were inconsistent with my findings

It emerged that some of the findings of the present study were inconsistent with those of some earlier studies (Gordeeva, et al., 2019; Maleva et al., 2014). The participants' scores on both the stability and the globality scales were positive. This finding was corroborated by the participants' observations during the focus group interviews. Their mathematics performance, too, was above average. Had their mathematics performance been below average, with their high scores in the two scales, it would have been consistent with the RLHT. Houston (2016) and Yee et al. (2003) maintain that the relationship between attributional style (whether positive or negative) and academic performance varies according to the academic ability and/or achievement context and is not based on the mood of the students alone and that improved performance is more likely to be observed than decreased performance if students regard assignments as important. Table 4.25 shows the correlation of stability and globality with mathematics performance, and it is this table that I used to base my comment about their relationship. If I had used a domain-specific scale, the outcome could have been different from those obtained from the current study. A domain-specific scale such as the Academic Attributional Style Questionnaire (AASQ) deals directly with academic issues and was also designed for the age bracket (the adolescents) used in the present study. Some of the items in the ASQ used in the present study were adapted to suit the purpose of the study.

Gordeeva et al. (2019) found in their study that positive attributional style predicted high academic performance while negative attributional style did not. The latter finding is in line with the predictions of the RLHT (Abramson et al., 1978). The Gordeeva et al. (2019) study consisted of two parts. First, the authors found that a positive attributional style correlated positively with and predicted good academic performance. Second, they found that a negative attributional style correlated positively with poor academic performance. Both findings were in line with the RLHT. However, in the present study, I found that a negative attributional style correlated with good academic performance. This finding is not consistent with RLHT. The results of the present study do not support the findings of Gordeeva et al. (2019), namely that it is only positive attributional style that can advance good academic performance. Various reasons (whether temporary or permanent) can be given for students' success or failure. In fact, failure could be a push for them to succeed in their future academic endeavours. It is also interesting to note that in their study, Maleva et al. (2014) found a significant negative correlation between negative attributional style and the grade point average (GPA) of the undergraduate students. The difference in the findings clearly showed that students' performance in mathematics or another academic endeavour could be premised on different factors such as the attitude of students, their anxiety levels, and also their preparedness to learn, irrespective of whether their attributional thinking is positive or negative.

c. Previous findings that were consistent with my findings

It emerged that some of the findings of the present study were consistent with other previous findings (Bridges, 2001; LaForge & Cantrell, 2003; Morris & Tiggerman, 2013; Richards, 2012; Ward, 2003). For example, in an Australian study, Morris and Tiggerman (2013), using undergraduate students as the sample, found no significant relationship between attributional style and the grade point average (GPA) of the students. These findings differed from the predictions of the RLHT (Abramson et al., 1978) that a decrease in performance would occur in students who exhibited a negative attributional style. Ward's (2003) study also supported the present study's findings. Ward postulated that students with an optimistic attributional style would perform better academically than students with a pessimistic attributional style. The results of the study were contrary to the Ward's (2003) predictions and indicated no significant relationship between attributional style and GPA. A similar result emerged from the research of LaForge and Cantrell (2003) where undergraduate students with pessimistic attributional style scores performed better than their peers with optimistic attributional style scores.

The outcomes of my findings regarding secondary research question 2 are discussed below.

4.2.4.2 How well do stability and globality as well as gender and socio-economic factors predict mathematics performance?

The aim of secondary research question 2 was to explore how accurately the stability and globality scales, as well as gender and socio-economic status, predicted the mathematics marks of the students who participated in the present study. This question was explored by performing multiple regression analysis, with mathematics marks the dependent variable and the stability and globality scales, gender, and socio-economic status the explanatory or independent variables. Gender and socio-economic status were categorical variables in the study, but since both had only two categories, they could be included as explanatory variables in the regression analysis. (Gender was coded as follows: the boys were coded by '0' and the girls by '1'. High socio-economic status was coded by '0' and low socio-economic status by '1').

The multiple regression model, which included all four explanatory variables, showed a poor fit (p-value = 0.172); not one of the parameter estimates differed significantly from zero at the 5% level of significance. The explanatory variables were omitted from the regression analysis one by one, starting with the variable with the largest p-value and then rerunning the regression analysis. Based on the results, the next variable with the largest p-value was then omitted and the model rerun on the remaining two explanatory variables. The final model showed a moderate fit (p-value = 0.097), with gender the only remaining explanatory variable (p-value = 0.097). Although gender was significant only at the 10% level, it was decided to do separate analyses of the two gender groups with the stability and globality scales, as well as socio-economic status, as explanatory variables. The results are first discussed for the female and then for the male students. The two scales (stability and globality), when taken together, had very little or no predictive power regarding mathematics performance when analysed with gender and socio-economic status.

Multiple regression analysis of mathematics marks for the girls – Model 1

The results of the multiple regression analysis performed on the data for the girls appear in the tables below. The model fitted the data well (F-value = 4.883, degrees of freedom = 3 and 151, p-value = 0.003). This meant that the F-value, which was significant with the p-value for the predicted model for the girls, showed that mathematics performance (dependent variable) was indeed affected by stability, globality, and socio-economic status (independent variables).

Table 4.27: Multiple regression analysis of mathematics marks for the girls – Model 1

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2041.90	3	680.63	4.883	.003[b]
	Residual	21048.33	151	139.39		
	Total	23090.22	154			

a. Dependent variable: maths marks verified.

b. Predictors: (constant), socio-economic status, stability, globality.

The estimated regression coefficients are shown in the next table.

Table 4.28: Table for the estimated regression coefficients[8]

		Unstd. Coefficients		Std. Coefficients			Collinearity Statistics	
Model		**B**	**Std. Error**	**Beta**	**T**	**Sig.**	**Tolerance**	**VIF**
1	(Constant)	47.41	10.05		4.72	<0.001	.444	2.25
	Stability	8.07	2.63	.36	3.07	.003	.442	2.26
	Globality	-7.5	2.04	-.43	-3.69	<0.001	.994	1.01
	Socio-economic status	2.35	2.13	.087	1.10	.271		

a. Dependent variable: maths marks verified.

Since the coefficient for socio-economic status was not significantly different from zero (p-value = 0.271), this variable was omitted from the model, and a final multiple regression analysis was performed.

Multiple regression analysis of mathematics marks for the girls – Model 2

The following results were obtained for Model 2.

[8] Effect sizes were calculated for all regression analyses. The R-square values were consistently very low, possibly because there were so many factors that played a role in the present study that were not taken into account because that was not the purpose of the research.

Table 4.29: Multiple regression analysis of mathematics marks for the girls – Model 2

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1872.09	2	936.04	6.71	.002[b]
	Residual	21218.13	152	139.59		
	Total	23090.22	154			

a. Dependent variable: maths marks verified.

b. Predictors: (constant), globality, stability.

The model fitted the data (F-value = 6.706, degrees of freedom = 2 and 152, p-value = 0.002). The regression coefficients are shown in the next table.

Table 4.30: Regression coefficients of mathematics marks for the girls – Model 2

		Unstd. Coefficients		Std. Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	T	Sig.	Tolerance	VIF
1	(Constant)	47.47	10.05		4.72	<0.001	.444	2.25
	Stability	8.03	2.63	.36	3.05	.003	.444	2.25
	Globality	47.47	10.05		4.72	<0.001	.444	2.25

a. Dependent variable: maths marks verified.

The equation for regression Model 2:
Mathematics marks of the girls = 47.47 + 8.03 x stability - 7.37 x globality

Both explanatory variables had statistically significant coefficients. The coefficient for the stability scale implies that if the stability scale increased by one unit, the mathematics marks of the female students would **increase** on average by 8.025 percent. On the other hand, if the globality scale increased by one unit, the mathematics marks of the female students would **decrease** on average by -7.370 percent. The results indicate that stable attributional style for negative events had a positive effect on mathematics performance while global attributional style for negative events had a negative effect on mathematics performance.

The next paragraph explores the relationship between the mathematics marks and the stability and globality scales as well as the socio-economic status of the boys.

Regression analysis of mathematics marks for the boys – Model 1

A multiple regression analysis was also performed on the data for the male students who participated in the survey. The results of the analysis can be seen in the tables below. The model fitted the data well (F-value = 3.911, degrees of freedom 3 and 141, p-value = 0.010).

Table 4.31: Multiple regression analysis of mathematics marks for the boys – Model 1

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1874.87	3	624.96	3.911	.010[b]
	Residual	22530.49	141	158.79		
	Total	24405.35	144			

a. Dependent variable: maths marks verified.

b. Predictors: (constant), socio-economic status, stability, globality.

The regression coefficients for the stability scale and socio-economic status differed significantly from zero at the 5% level of significance (p-value = 0.036 and p-value = 0.009 respectively). The regression coefficient for the globality scale differed significantly from zero at the 10% level of significance (p-value = 0.009).

Table 4.32: Regression coefficients for stability, globality, and socio-economic status for the boys – Model 1

		Unstd. Coefficients		Std. Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	T	Sig.	Tolerance	VIF
1	(Constant)	57.39	12.26		4.68	<0.001		2.14
	Stability	-6.03	2.84	-.25	-2.12	.036	.47	2.17
	Globality	5.66	2.96	.23	1.91	.058	.47	1.01
	Socio-economic status	-6.13	2.32	-.21	-2.637	.009	.99	

a. Dependent variable: maths marks verified.

The equation for regression Model 1 for the boys:

Mathematics marks for the boys = 57.39 - 6.03 x stability + 5.66 x globality – 6.127 x socio-economic status

The regression coefficient for stability shows that if the stability scale increased by one unit, the mathematics marks of the male students would decrease on average by 6.03 percent. On the other hand, if the globality scale increased by one unit, the mathematics marks of the male students would increase on average by 5.66 percent. The parameter estimate of socio-economic status was -6.13, which represents the average decrease in the mathematics marks of the male students if their socio-economic status changed from 0 (high socio-economic status) to 1 (low socio-economic status).

Below, the findings regarding secondary research question 2 are related to the findings of other studies. However, it should be noted that most previous findings reported below were partially consistent with those of this study. I searched extensively and fruitlessly for research findings that might be inconsistent with my findings (with the help of Pretoria University's academic information specialist). This was largely because the studies on attributional styles generally did not differentiate between the two subscales in terms of their predictive value regarding achievement in mathematics or in general.

Relating the findings regarding secondary research question 2 to the findings of previous studies

The purpose of secondary research question 2 was to explore in what way stability and globality, gender, and socio-economic status predicted mathematics performance. This part of the discussion on the findings covers how the stability and globality dimensions of the Attributional Style Questionnaire predicted mathematics performance in the present study. In the stability scale (see Table 4.26a), the girls as well as the boys exhibited positive stable attributional styles. The female students' stable attributional style yielded positive effects on mathematics performance while the male students' stable attributional style yielded negative effects on mathematics performance. Stated differently, the girls' stability scale predicted success in mathematics whereas the boys' stability scale did not. In the globality scale (see Table 4.26b), the girls as well as the boys exhibited positive global attributional styles. However, whereas the girls' positive global attributional style influenced their mathematics performance significantly, the opposite was found in the case of the boys. Furthermore, the findings revealed that the boys' socio-economic status emerged as a predictor of mathematics performance. In the case of the girls, though, the opposite was found (see Table 4.27). These findings are partially consistent with those of some other studies. Scant information on the topic was found because most of the studies on attributional style were not moderated by gender and socio-economic status (which were used as moderating variables in the present study). Nor did they deal with mathematics achievement specifically; most importantly, these studies used attributional style scales (stability and globality) as independent variables without

differentiating between the male and female participants. However, some of the studies on stable and global attributional styles and academic performance reported divergent results when gender was analysed separately, as explained below.

In an attributional style and self-efficacy study in Singapore, Yeo and Tan (2012) found that the female respondents displayed a more stable attributional style than the male respondents. Their study revealed that the females' stable attributional style had a more positive effect on self-efficacy than in the case of the males. Maras et al. (2014) found a gender difference in attributional style and achievement at school in that the boys exhibited a more stable attributional style than the girls when confronted with social, emotional, and behavioural problems. In addition, the boys' stable attributional score influenced their academic performance more positively than was the case with the girls. Houston's (2016) study on British male and female students revealed that the boys' as well as the girls' reported stable attributional style correlated positively with higher academic performance in high-achieving schools but not in low- achieving schools. Maras et al.'s (2014) finding (reported above) partially supports my finding on global attributional style. Likewise, my finding only partially supports Houston's (2016) finding that higher global attributional style did not predict enhanced academic performance by the boys and the girls in his study.

As stated above, both the boys' low and high socio-economic status predicted positive mathematics performance, but this was the case with the girls. One reason for this could be the nature of the family setup in some homes. Some parents daily give their female children more chores around the house (to the detriment of their studies) while the male children are generally assigned minimal household tasks or are left completely alone. In a study in Tanzania, Levison, DeGraff and Dungumaro (2018) corroborated the above assertion and reported that girls substantially participated more in-house chores than boys. This argument only partially supports Suleiman's (2016) finding that a significant positive relationship existed between the socio-economic status and academic performance of the male as well as female senior secondary students in his study on the influence of learned helplessness and home background on academic performance.

As mentioned earlier, the present study revealed (see Tables 4.26a and 4.26b) that the female as well as male students' stable attributional style emerged as predictors of mathematics performance. Yee et al. (2003) concluded that the effects of attributional style events (whether positive or negative) were moderated by the significance of the task the person engaged in (e.g. writing school examinations). I agree that enhanced performance is more likely to be observed than decreased performance if learners regard an assignment as important. In the present study, the students (the boys and the girls) stressed (see Qualitative Outcomes in

Section 5.4.3.3, Chapter 5) the importance of mathematics in their future endeavours, and most of them accordingly put more effort into achieving in mathematics to help them actualise their dreams. Moreover, their desire to do well in mathematics correlated positively with their positive stability scores.

The statistical findings of the present study in relation to secondary research question 3 are discussed below.

4.2.4.3 What is the influence of socio-demographic and attitudinal factors on mathematics performance?

Multiple regression analysis was used to explore the influence of socio-economic status and attitude on mathematics performance. The mathematics performance of the male and female students was investigated by analysing separate multiple regression models for the two groups. The variable socio-economic status has already been discussed, but the attitudinal scale needs more consideration.

Attitudinal scale

The attitude of the students towards mathematics was measured by their responses to four statements:

- I will use mathematics in my career one day.
- I am motivated to do well in mathematics.
- I know where to find help when I struggle with mathematics.
- I get anxious when I do mathematics.

Frequencies for each of the four items are listed in the following tables.

Table 4.33: Mathematics for future career

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Almost never	4	1.3	1.3	1.3
	2	3	1.0	1.0	2.3
	3	3	1.0	1.0	3.3
	4	12	4.0	4.0	7.3
	5	56	18.7	18.7	26.0
	6	52	17.3	17.3	43.3
	Almost always	170	56.7	56.7	100.0
	Total	300	100.0	100.0	

Table 4.34: Mathematics motivation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Almost never	2	.7	.7	.7
	2	5	1.7	1.7	2.3
	3	3	1.0	1.0	3.3
	4	7	2.3	2.3	5.7
	5	51	17.0	17.0	22.7
	6	86	28.7	28.7	51.3
	Almost always	146	48.7	48.7	100.0
	Total	300	100.0	100.0	

Table 4.35: Finding help when struggling with mathematics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Almost never	5	1.7	1.7	1.7
	2	7	2.3	2.3	4.0
	3	5	1.7	1.7	5.7
	4	9	3.0	3.0	8.7
	5	50	16.7	16.7	25.3
	6	90	30.0	30.0	55.3
	Almost always	134	44.7	44.7	100.0
	Total	300	100.0	100.0	

Table 4.36: Anxiety in mathematics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Almost never	20	6.7	6.7	6.7
	2	10	3.3	3.3	10.0
	3	14	4.7	4.7	14.7
	4	19	6.3	6.3	21.0
	5	87	29.0	29.0	50.0
	6	68	22.7	22.7	72.7
	Almost always	82	27.3	27.3	100.0
	Total	300	100.0	100.0	

The first step was to get an idea of the internal reliability of the attitudinal scale. Before the internal reliability of these four items could be calculated, Item 4 was reverse-coded so that it reflected a positive attitude towards mathematics. Cronbach's alpha across the four items was low (α=0.310), but further examination revealed that if Item 4 was deleted, Cronbach's alpha would increase to 0.635.

Table 4.37: Item total statistics for attitude towards mathematics

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
V17A: YOUR ATTITUDE TOWARDS MATHEMATICS: I will use mathematics in my career one day.	14.88	6.51	.25	.16
V17B: I am motivated to do well in mathematics.	14.91	6.05	.40	.00
V17C: I know where to find help when I struggle with mathematics.	15.05	6.09	.27	.12
V17D_r: I do not get anxious when I do mathematics	18.30	7.65	-.11	.64

Scores for the students' attitude towards mathematics were computed by calculating the average across the three Items 1, 2, and 3. The attitudinal score had an average of 6.1, a standard deviation of 0.92, with a minimum of 1 and a maximum of 7. Since the average of 6.1 was close to 7, the maximum of the scale, it implied that on average the students had a very positive attitude towards mathematics. The influence of the attitudinal scale and socio-economic status on mathematics marks was further explored separately for the female and the male students.

Multiple regression analysis of mathematics marks for the girls – Model 1

A multiple regression model with dependent variable mathematics marks and explanatory variables attitude towards mathematics and socio-economic status was performed on the data of the 155 female students. The results showed a poor model fit (F-value = 1.104, degrees of freedom 2 and 152, p-value = 0.334).

Table 4.38: Multiple regression analysis of mathematics marks for the girls – Model 1

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	330.58	2	165.29	1.104	.334[b]
	Residual	22759.64	152	149.73		
	Total	23090.22	154			

a. Dependent variable: maths marks verified.

b. Predictors: (constant), socio-economic status, attitude_3 items.

The regression coefficients for the attitudinal scale and socio-economic status were also not statistically significant (p-value = 0.229 and p-value = 0.417 respectively).

Table 4.39: Regression coefficients for the attitudinal scale and socio-economic status for the girls

		Unstd. Coefficients		Std. Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	T	Sig.	Tolerance	VIF
1	(Constant)	46.65	7.38		6.323	<0.001		
	Attitude _3 items	1.22	1.01	.10	1.29	.229	.998	1.0
	Socio-economic status	-1.79	2.20	-.07	-.81	.417	.998	1.0

a. Dependent variable: maths marks verified.

Following an approach similar to that followed in the statistical analysis of research objective 2, the variable with the largest p-value was omitted and the regression analysis rerun.

Simple regression analysis of mathematics marks for the girls – Model 2

After socio-economic status was omitted from the regression model, the results again indicated a poor model fit (F-value = 1.549, degrees of freedom 2 and 153, p-value = 0.215).

Table 4.40: Simple regression analysis of mathematics marks for the girls

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	231.38	1	231.38	1.55	.215[b]
	Residual	22858.84	153	149.40		
	Total	23090.22	154			

a. Dependent variable: maths marks verified.

b. Predictors: (constant), attitude_3items.

The regression coefficient for attitude towards mathematics was also not significant (p-value = 0.215).

Table 4.41: Regression coefficient for attitude towards mathematics marks

		Unstd. Coefficients		Std. Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	T	Sig.	Tolerance	VIF
1	(Constant)	43.36	6.16		7.03	.000		
	Attitude _3 items	1.26	1.01	.10	1.24	.215	1.000	1.000

a. Dependent variable: maths marks verified.

The results implied that in the case of the female students, their attitude towards mathematics was not a statistically significant predictor of their performance in mathematics.

Equation for regression Model 2:
Mathematics marks for the girls = 43.36 + 1.26 x attitudinal scale

Multiple regression analysis of mathematics marks for the boys – Model 1

The multiple regression model of mathematics marks on the attitudinal scale and socio-economic status for the 145 male students showed a good fit (F-value = 3.995, degrees of freedom 2 and 142, p-value = 0.021).

Table 4.42: Multiple regression analysis of mathematics marks for the boys – Model 1

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1300.03	2	650.06	3.995	.021[b]
	Residual	23105.32	142	162.71		
	Total	24405.35	144			

a. Dependent variable: maths marks verified.

b. Predictors: (constant), socio-economic status, attitude_3items.

The regression coefficients for the multiple regression are shown in the following table.

Table 4.43: Regression coefficients for mathematics marks for the boys

		Unstd. Coefficients		Std. Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	T	Sig.	Tolerance	VIF
1	(Constant)	35.05	8.39		4.18	<0.001		
	Attitude _3 items	1.34	1.25	.088	1.08	.283	.991	1.009
	Socio-economic status	5.86	2.35	.205	2.50	.014	.991	1.00

a. Dependent variable: maths marks verified.

The regression coefficient for the male students' attitude towards mathematics was not statistically significant (p-value = 0.283). However, the regression coefficient for socio-economic status differed significantly from zero at the 5% level of significance (p-value = 0.014).

A final regression model of performance in mathematics with socio-economic status was fitted. The results are discussed in the next section.

Simple regression analysis of mathematics marks for the boys – Model 2

The simple regression model of mathematics marks as dependent variable and socio-economic status for the male students as explanatory variable showed a good fit (F-value = 6.820, degrees of freedom 1 and 143, p-value = 0.010).

Table 4.44: Simple regression analysis of mathematics marks for the boys – Model 2

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1111.02	1	1111.011	6.820	.010[b]
	Residual	23294.34	143	162.90		
	Total	24405.35	144			

a. Dependent variable: maths marks verified.

b. Predictors: (constant), socio-economic status.

The regression coefficient for socio-economic status differed significantly from zero (p-value = 0.01). The estimated regression coefficient for socio-economic status was -6.102, representing the average decrease in the mathematics marks of the male students if their socio-economic status changed from 0 (high socio-economic status) to 1 (low socio-economic status).

Table 4.45: Regression analysis of socio-economics status for the boys

		Unstd. Coefficients		Std. Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	T	Sig.	Tolerance	VIF
1	(Constant)	55.126	1.26		43.84	<0.001		
	Socio-economic status	-6.102	2.34	-.21	-2.61	.010	1.000	1.00

a. Dependent variable: maths marks verified.

Equation for regression Model 2:

Mathematics marks for the boys = 55.13 - 6.10 x socio-economic status

The results implied that in the case of the male students, their socio-economic status was a statistically significant predictor of their performance in mathematics (p = 0.01).

Below, the findings regarding secondary research question 3 are related to the findings of other researchers.

Discussion of the third research question (What is the influence of socio-demographic and attitudinal factors on mathematics performance?) and relating the findings to other findings in the literature

The purpose of secondary research question 3 was to explore how gender, socio-economic status, and attitudinal factors influenced the mathematics performance of the study participants. The results revealed that the boys' socio-economic status had a significant positive influence on their mathematics performance but that this was not the case with the girls. I could not find any evidence to substantiate this finding. Therefore, I can only speculate on why this was the case for the reasons given below, based on my own personal experiences as well as the general observations of university colleagues and senior mathematics teachers in Nigeria.

1. In Nigeria, based on their culture or religion, some families sometimes deprive their female children of the benefits their male children enjoy. Parents at times give more attention to boys than girls believing that girls' education ends in the 'kitchen', and accordingly they invest more in the education of their male than in the education of their female children. Female children also engage more in domestic work (when they could be studying) than the male children. As a result, boys tend to be more serious about doing well in mathematics than girls (Levison et al., 2018).
2. Fear of failure in mathematics is more common among girls than boys with the result that fewer girls than boys are interested in studying mathematics.
3. Male children tend to engage more readily in educational technological-related activities than female children, which may have a positive influence on their study of mathematics.

a. General comments

The findings reported here are to some extent consistent with the findings of other studies (Andamon & Tan, 2018; Ch, Malik, Fatima, & Abid, 2017). For example, Ch et al.'s (2017) study partially supports the current findings. These authors found that the socio-economic status of the male and female secondary school students in their research was not statistically significant enough to influence learners' mathematics self-concept. However, in their study on conceptual understanding of and attitude towards mathematics, Andamon and Tan (2018) found that the socio-economic status of the male and female students in their research did not relate significantly to either their performance in mathematics or to their conceptual understanding of mathematics. These authors also reported that, unlike the findings of the present study, attitude towards mathematics strongly predicted the students' performance in mathematics.

Below, I discuss previous findings that were inconsistent with my findings as well as previous findings that were consistent with my findings

b. Previous findings that were inconsistent with my findings

Some earlier studies contradicted the findings of this study in that they found that attitude towards mathematics influenced the students' achievement in mathematics positively (Tuncer & Yilmaz, 2020; Turkmen & Soybas, 2019; Chen et al., 2018; Adebule & Aborisade, 2014). In a pre-test and post-test study, Turkmen and Soybas (2019) found a higher attitudinal score for the Grade 5 boys than for the girls, with both gender attitudinal scores influencing the students' mathematics performance positively. Chen et al.'s (2018) study on behavioural and neurocognitive mechanisms revealed that positive attitudes towards mathematics influenced and promoted mathematics learning and performance. Regarding mathematics anxiety and mathematics attitude, Tuncer and Yilmaz's (2020) study, too, revealed that the male as well as the female junior secondary school students' attitude related to and influenced their mathematics performance positively. A similar finding was reported by Adebule and Aborisade (2014). Chen et al. (2018) maintain that attitude towards mathematics is a significant variable in mathematics performance, bearing in mind the cognitive and emotional factors that predict success in mathematics.

The findings of some other studies were also inconsistent with the responses to secondary research question 3 in the present study regarding socio-economic status (Wang, Li, & Li, 2014; Hernandez, 2014; Ojimba, 2013; Turker-Drob & Harden, 2012). Wang et al. (2014) in a Chinese study reported that the socio-economic status of the male and female secondary school students in their research significantly influenced their mathematics performance. These authors added that the significant influence on mathematics performance could be attributed to the unique mathematics curriculum followed in their research context. Ojimba's (2013) findings, too, were not consistent with those of the present study in that he reported a significant relationship between the socio-economic status of the male and female students in his research and their mathematics performance.

In the case of the female students especially, Atalmis, Yilmaz, and Saatcioglu (2016) and Ojimba (2013) in their research confirmed the importance of supportive, stable, and well-resourced home environments in students' achievement in mathematics.

The findings of the present study on socio-economic status, especially regarding the female students whose socio-economic status did not influence their mathematics performance, revealed the significance of the home environment and parental support in the students' achievement in mathematics. The girls' socio-economic status did not influence their performance in mathematics. (Also see the discussion of research question 2 on the difference between the male and female children's engagement in household chores.)

c. Previous findings that were consistent with my findings

A number of other studies reported findings that were consistent with those of the present study (Celik, 2018; George & Adu, 2018; Kontas, 2016). Kontas (2016), too, found that attitude was not a statistically significant predictor of mathematics performance. Celik's (2018) study revealed a low attitudinal score for mathematics for the male as well as the female Grade 6 students in an intervention study. This author also found that the attitudes of both genders did not influence their mathematics performance. In their study, George and Adu (2018) reported a negative attitude towards mathematics in the male and female Grade 9 students. Contradictory to my argument, these authors added that the boys and the girls lacked the motivation to take the subject, which invariably led to their poor performance. The findings of Escalera-Chávez, Moreno-Garcia, and Rojas-Kramer (2019) revealed that the students in their study had a positive attitude towards mathematics but were not enthusiastic about the subject because of the anxiety it caused them. In sum, these authors concluded that attitude did not influence the students' mathematics performance. In a related research project, Nicolaidou and Philippou (2003) found that the negative attitude of the students towards mathematics occurred as a result of recurring poor performances in mathematics examinations and that this negativity could linger for a long time if the teachers were not positively disposed towards teaching the subject and addressing the strain the students experienced in having to perform well in mathematics.

4.3 CONCLUSION

The findings of the quantitative study and their interpretation and explanation were presented in this chapter. The descriptive statistics were calculated, and the internal consistency of the study's subscales were confirmed with Cronbach's coefficient alpha values. The Pearson product moment correlation coefficient and multiple regression analysis were calculated/done in response to the research questions raised in the study. Finally, the findings in relation to the literature review and to previous findings were discussed.

Chapter 5 covers the qualitative findings in accordance with the various themes and subthemes of the study.

CHAPTER 5
QUALITATIVE ANALYSIS

5.1 INTRODUCTION

This chapter presents the views of the participants derived from data generated through the focus group interviews on the effect of attributional style on the mathematics performance of senior secondary students. Focus group interviews were used in order to clarify, confirm, and understand the results of the quantitative study previously conducted with the participants. As earlier stated in Section 3.5.2, the data analysis style used for analysing the qualitative data was conversation analysis (Nieuwenhuis, 2010a). The profile of the study participants is shown in Table 3.3. In the qualitative study, I implemented a deductive-inductive analytic style. The deductive-inductive analysis provides an exhaustive approach to analysing qualitative data by engaging the researcher in the data reading and digesting in order to enable him or her to comprehend the set of data better (Tjora, 2018). The research questions are restated below for ease of reference.

Primary research question

How does attributional style relate to mathematics performance in Nigerian senior secondary school over and above socio-demographic and attitudinal factors?

Secondary research questions

1. How do stability and globality attributional style relate to mathematics performance?
2. How well do stability and globality as well as gender and socio-economic factors predict mathematics performance?
3. What is the influence of socio-demographic and attitudinal factors on mathematics performance?

The data generated pertained to four a priori determined main themes, namely the participants' perceptions of the Attributional Style Questionnaire (ASQ), their perceptions of mathematics, their perceptions of attributions for mathematics performance, and their perceptions of mathematics performance, and socio-demographic factors. For the purposes of this study, perceptions of attributional style relate to how the participants (students) interpreted the ASQ during the quantitative phase's exploration. Perceptions of mathematics refers to how the participants viewed mathematics as a subject. Attributions for mathematics

refers to factors that contribute to success and/or failure in mathematics. The mathematics performance of the participants was compared and related to socio-demographic factors such as gender and socio-economic status. The data generated were manually coded, categorised, analysed, and organised into themes. It is important to note that the majority of the learners were from high SES backgrounds.

Table 5.1 below shows the three-digit coding system used to substantiate and reference citations. Data were gathered from two focus group interviews. Specific comments from the participants were referenced by page and line numbers from the data. Data references have three indicators, for example, F1;23;40-50 where F1 refers to Focus group 1, 23 refers to the page number of the exact source, and 40-50 refers to the line numbers on that page. In the table below, there are two pairs of numbers in the page and line number columns. Each pair refers to the data of a particular focus group interview.

Table 5.1: Three-digit coding system used to reference data (transcription)

	Data source	Page No.	Line No.
1.	Introductory part of the interview		
	F1 (Focus group 2)	1	1 - 10
	F2 (Focus group 2)	1	1 - 14
2.	Participants' insights into the *ASQ*		
	F1 (Focus group 1)	1 - 9	11 - 205
	F2 (Focus group 2)	1 - 8	15 - 188
3.	Participants' insights into mathematics		
	F1 (Focus group 1)	9 - 36	206 - 890
	F2 (Focus group 2)	8 - 27	188 - 655
4.	Concluding session		
	F1 (Focus group 1)	36 - 37	891 - 900
	F2 (Focus group 2)	27 - 28	656 - 668

The next table below shows the themes and subthemes of the qualitative analysis.

Table 5.2: Themes and subthemes from the data analysis

THEMES	SUBTHEMES	SUB-SUBTHEMES
Theme 1: Perception of Attributional Style Questionnaire (ASQ)	1. Mastery of subject matter	
	2. Language use	
	3. Preferred situations in the *ASQ*	
Theme 2: Perception of mathematics	1. Mathematics difficulty	1. Teaching style 2. Lack of interest in mathematics
	2. Mathematics preparedness	1. Home study 2. Negative perception of mathematics
Theme 3: Attributions for mathematics	1. Success factors	1. Internal factors 2. External factors
	2. Failure factors	1. Internal factors 2. External factors
Theme 3: Attributions for mathematics	3. Interest in mathematics	1. Perceptions of mathematics 2. Teachers' professional etiquette and qualifications 3. Students' academic ability, attitude, and behaviour
	4. Teachers' attitude and teaching methods	1. Teachers' personality 2. Teachers' methods
	5. Mathematics anxiety	1. External factors (teacher-related behaviour) 2. Internal factors
Theme 4: Mathematics performance and socio-demographic factors	1. Gender	1. Boys' performance 2. Girls' performance
	2. Socio-economic status	1. Support by family members and acquaintances 2. Lack of support by family members and acquaintances

5.2 THEME ONE: PERCEPTION OF THE *ASQ*

Perception refers to the way information is recognised, organised, and interpreted in a given circumstance (Vetter & Newen, 2014). Additionally, it is the way information is interpreted and acted on in a particular environment. In the present study, I wanted to triangulate the results obtained from the quantitative part of the research with the qualitative outcomes, hence my efforts to determine qualitatively the perceptions of the senior secondary students regarding their attributional style as measured by the ASQ. The questions I asked about these perceptions were responded to diversely but were generally positive. The participants eagerly shared their impressions of, opinions on, and reactions to the items in the questionnaire (ASQ). The discussion on the first theme, namely perception of the ASQ, focused on the following subthemes: mastery of the subject matter, use of language, and preference for different situations or options in the ASQ. The responses were in line with the subthemes that emerged from the qualitative analysis. All the participants responded positively on their understanding of the subject matter regarding attributional style. Eighteen participants gave affirmative responses and said that the language in the instrument was simple and straightforward. Two participants said that the language was a bit difficult to understand. Regarding the situation or option preferences in the ASQ, most of the participants said that the questionnaire was well structured. However, three of the participants disliked the questionnaire as they thought the questions were too personal. All the participants said that the questionnaire led them to express their inner feelings and also to reflect on and reconsider things that affected their daily lives.

Table 5.3: Theme one (with subthemes)

THEME ONE: PERCEPTION OF THE ASQ		
Subthemes	**Inclusion criteria**	**Exclusion criteria**
Subtheme 1: Mastery of subject matter	This subtheme includes data associated with mastery of the subject matter	This subtheme excludes data not associated with mastery of the subject matter
Subtheme 2: Language use	This subtheme includes data associated with language use	This subtheme excludes data not associated with language use
Subtheme 3: Preferred situations in the *ASQ*	This subtheme includes data associated with preferred situations in the *ASQ*	This subtheme excludes data not associated with preferred situations in the ASQ

5.2.1 Mastery of subject matter

Mastery of subject matter refers to what extent the participants were able to understand all the questions and information in the *ASQ*. A major requirement of the present research was that the participants should fully understand the questionnaire as it was the primary research instrument in the study. As confirmed by perusal of the backgrounds of the study participants, who were in Senior Secondary School 2 (equivalent to Basic 11), English language, the participants had the required abilities and skills to adequately understand the language in the ASQ[9]. These abilities and skills were reflected in their responses. The subtheme (mastery of subject matter) refers to establishing to what extent mastery of the subject matter enhanced the participants' comprehension and interpretation of the *ASQ*. All the study participants stated that the questionnaire was not difficult to understand. Different reasons were given for satisfaction with the questionnaire. For instance, Samson (pseudonym[10]) said that the questionnaire helped him express his feelings by writing them down. According to him, he was a shy person and found it difficult to talk openly about his feelings. Samson also believed that the questions or situations in the questionnaire were straightforward and easy to answer because some of the situations were what he experienced on a daily basis. Also affirming the acceptability of the questionnaire, Oluwaseun[11] asserted that it helped him understand how other people felt about real-life situations. Precious said that the questionnaire gave her insight into the problems she was facing at school:

The way I responded to the questions was how I felt because the questionnaire really gave me an insight on the problems I am facing in school; it was able to make me expose how I felt, because most times, I find it difficult to express myself or even say things to my teachers. So the questionnaire really brought about my feeling and I was able to present my questions according to how I felt. (F2;1-2;26-30)

According to Mary, personal experience helped her understand the questionnaire:

I came about the answer I gave to the questions according to the experience I have already had. (F2;2;38-39)

Rosemary said that it was through the explanations given in the *ASQ* and through her own imagination that she was able to understand the questionnaire:

[9] The students were in Senior Secondary School 2. English was the official language and had been the medium of instruction in their previous classes.
[10] Pseudonyms are used in all instances. Written informed consent and assent (where applicable) was obtained from all stakeholders. Confidentiality was guaranteed, and the participants were invited to authorise or de-authorise all the information obtained during research.
[11] The responses of the participants are verbatim with only very light editing in order to preserve the authenticity of the responses.

How I understood the items in the questionnaire was through the examples given. Then going through the questionnaire, one by one like 1a, b and c, the questions following them, I imagined it being happening now, and then I put it in place that is happening now, so I used that knowledge to write it down. The B part of it is given 1,2,3…7 and said how likely it will affect us. So I understood by ticking the right ones. (F2;4;103-108)

According to Ibrahim:
I came to the answer in the questionnaire through the explanation and for us to just imagine it happening in our lives and for us to express our feelings. (F2;3;56-57)

Daniel responded that the questionnaire gave him the opportunity to express his emotions:
Actually, the questionnaire made me express what I am going through because the questionnaire is exactly what I'm going through and I was able to attend to it because it is very easy for me to express my emotions. (F1;2;49-51)

Ruth responded similarly:
So I came to the answer through the way I felt, and the questionnaire was able to bring about something I would not like to discuss personally with some of my teachers and some of my mates. So, filling it here [her responses to the items in the questionnaire] *really helped me to bring it out physically. (F1;4;92-95)*

Some of the participants said that they understood the items in the questionnaire through the explanations provided. Some of their responses in this regard are given below.

Amidat:
I came about the answer I gave to the question based on the questions and explanations given to us, and I imagined as if I am the one the things are happening to. (F2;2;34-35)

Mujeeb:
I came about the questions through the explanations the questionnaire gave to us, so I got the answers. They are straightforward. (F2;3;59-60)

Marvelous claimed that her constant use of the dictionary helped her respond well to the questionnaire:
I understand the questions through the view the questionnaire gave to me and my familiarity with the dictionary. (F2;3;76-77)

Gideon responded to the questionnaire by reflecting on his life experiences:
I came about answering the questions by thinking very well about my life, and I thought very well, and I answered the questions positively. (F2;3;53-54)

Mastery of subject matter in the present study required abilities and skills on the part of the participants to understand the instrument used (the *ASQ*). The various responses of the participants indicated that their reflections on questions enhanced their comprehension of the *ASQ*. The research instrument was thus straightforward and easy for them to understand. Houston's (2016) study with secondary school students in the 11th grade (the same grade level as that of the participants in the present study) in the United Kingdom also reported the participants' adequate understanding of the *ASQ.* Houston's (2016) study correlated the attributional style and academic performance of the students.

5.2.2 Language use

I wanted to know whether the language used in the questionnaire (the *ASQ)* was clear enough for the participants to express themselves adequately and whether the information provided was also clear. As the *ASQ* is an adapted instrument from a different geographical location, it was particularly important to establish whether the participants adequately understood the language used in it. The data analysis revealed that most of the participants found the language clear and unambiguous. Only two of the participants (Bassey and Hassan) said that the language was a bit too difficult for them to understand the questionnaire fully. Precious, however, stated that the language was simple, direct, and straightforward. She added that the simplicity of the language made it unnecessary for her to think too much before answering the questions. Dorcas, too, mentioned the clarity of the language:

Sir, the language was very simple and easy to understand even with the instructions written on the questionnaire. So it actually made me know how to understand and answer the questions. (F2;5;112-114)

Gideon:

I understood the language used in the questionnaire because the questionnaire asked us that we should think and answer the questions in the questionnaire, and I used my own understanding of being an art student. I have done it. So I understood the question by doing that. (F2;5;114-117)

Precious:

The language use in the questionnaire was very simple. It was direct and straight-forward and it made me attempt the questions without thinking too much because that's how I felt because it was able to answer very fast and easily. (F1;4;105-107)

Mary stated that the language used in the questionnaire was clear and that the questions were clearly explained and straightforward. The same view was expressed by Oluwaseun:
I understood the questionnaire because it is in the English language, which is our official language and, due to my experience, I can express it. (F2;6;149-150)

However, two of the participants found the language a bit difficult. For example, according to Bassey:
Alright, like my colleagues have rightly said, the language was simple but the truth of the matter is looking at the language very well, though simple, but it requires one to think better and to reason more before giving any response. So it is a bit difficult but not too difficult for an average student to understand. (F1;5;117-120)

Hassan also thought that the language was a bit difficult:
The language used in the questionnaire is boldly written in the English language and difficult somehow. If you don't read and understand the questions very well, you will find it difficult to answer … I did not get it completely right, but I have to read and read all over again. (F1;5-6;122-127)

Lust (2006) believes that language should comprise a system of signs, words, patterns, or sentences that can enable human beings to communicate or express their thoughts, ideas, and feelings to each other. The language used in the questionnaire met Lust's (2006) research criteria and accordingly enabled the participants to express their ideas and feelings in a clear and uncomplicated manner.

5.2.3 Preferred situations in the *ASQ*

The participants were asked about their preferred situations or options in the questionnaire. They were also asked to describe their understanding and perception of the situations or options given in the *ASQ*. Most of the participants liked some of the situations while others disliked specific situations. Most of the participants described the situations in the questionnaire as interesting. For instance, Mujeeb said that he liked the situations in the questionnaire because they were written in English and gave the participants the opportunity to imagine situations they could find themselves in. Oluwaseun added:
Everything in the questionnaire I like fully because they are those things that can affect us, so I imagine it, if they can affect us financially or they can affect us continuously. (F2;7;172-174)

Daniel expressed his preferred situations or options in the questionnaire, adding:
Actually, I liked the way the questionnaire put it down in words by allowing us to express what is happening here. What is written here is what two or three students pass through every day. (F1;7;168-170)

Dorcas said that the situations in the questionnaire cast light on some personal problems she had:
Thank you very much sir. I like everything about the questionnaire truthfully, especially the main thing I like there is you actually gave us the opportunity to write what we feel personally apart from the questions alone. I was able to write what is bothering me presently. (F1;6;146-149)

Aminat contended that everything in the questionnaire concerned what people needed to know. Gift also showed her liking for the situations given in the questionnaire:
I really like the questionnaire because it really talks about my problem and those things I was trying to keep for myself, not letting anybody know what I am going through. But through the questionnaire, I am able to express my feelings. (F1;8;182-184)

According to Precious:
Well I won't say I don't like anything. The questionnaire was very okay to me. Everything in the questionnaire I like it because it was able to tell me about or show me the problem I actually facing presently, so I won't say I don't like anything in the questionnaire. (F1;7;161-164)

The participants who disliked some of the situations in the questionnaire attributed their dislike to personal reasons, not to the structure of the questionnaire. They believed some of the situations were too personal. Bassey claimed that the situations in the questionnaire were good and interesting but probed too deeply into personal issues:
Though the questions there are very good, not affecting myself alone but what every average student is passing through. So the questions are nice. But one thing about the questionnaire that I don't like is that the questionnaire is trying to know deep down about me. There are some questions that I want to give that are truth and sincere, but the other part of the question will always want to know more even when I have given the true answer; the question wants to know more. It is digging too deep into my personal life. (F1;8-9;199-205)

Toheeb said that he liked the situations or options in the questionnaire, but he did not like the Likert scale type of responses:
Actually, I love the way they wrote the questionnaire based on the language they used, but actually more so; only thing I don't like in the questionnaire is the calculation aspect there. If

there are no instructions about this questionnaire, the student will not be able to know what the 'B' and 'C' is talking about in the questionnaire. Because the question says, will never affect, will always affect me, so 1,2,3,4,5,6,7 that is there make me to ... it gave me little bit of confusion about interpreting, so I based my knowledge on the English aspect there, not based my knowledge on the calculation aspect. That is the only little thing that is difficult there. (F1;6;133-142)

Rosemary said that she did not like the inclusion of the years and months of the participants in the demographic section of the questionnaire, but claimed that she nevertheless liked the situations:

The thing I don't like in the questionnaire is the addition of the years and months because my belief is that, to me, the person answering it may not likely to put the right age or the month of the person. The other part, what I like in it is that it makes us understand that life is not all about eating cakes, and secondly, it's the last part of, which says "is there anything that you like to share?" I believe that I wrote there last time, when the examiner will go through it, he will come and tell or help me and call my attention. That's what I like about it. (F2;8;182-188)

Hassan also disliked aspects of the questionnaire:

What I don't like about the questionnaire is actually asking some questions I feel should be personal to me alone and what I should ever express to anybody like the family issue. I think those kinds of things should be personal and that's what I don't like about the questionnaire. (F1;7;151-154)

Human beings have preferences and options in their daily interactions. This was evident in this study as many of the participants liked some of the situations while others did not. However, most of the participants described the situations as interesting. Moreover, the situations gave them the opportunity to imagine whether they would encounter such situations themselves or not. Some studies that have used the attributional style questionnaire with students as participants have reported that the participants' understanding of and preference for the situations of the instrument had affected their perceptions as regards how these situations could be navigated in the future (Houston, 2016; Rostamoghli, Talebi, & Porzoor, 2015).

5.3 THEME TWO: PERCEPTION OF MATHEMATICS

The perception of mathematics in the present study dealt with how the participants viewed mathematics as a subject. Generally speaking, I found that the participants perceived mathematics as a difficult subject even though mathematics is a core subject in the transition

from secondary school to tertiary institutions and in general social, economic, and technological advancement. They believed that success in mathematics required innate ability, which was why some of the students did mathematics calculations easily while others struggled. The above view is directly linked to the two subthemes (mathematics difficulty and mathematics preparedness) that emerged in the study.

Table 5.4: Theme two and subthemes

THEME TWO: PERCEPTION OF MATHEMATICS			
Subtheme	**Sub-subthemes**	**Inclusion criteria**	**Exclusion criteria**
Subtheme 1: Mathematics difficulty	1. Teaching style 2. Lack of interest	This subtheme and sub-subthemes include data associated with mathematics difficulty	This subtheme excludes data not associated with mathematics difficulty
Subtheme 2: Mathematics preparedness	1. Home study 2. Negative perception of Mathematics 3. Effort and hard work	This subtheme and sub-subthemes include data associated with mathematics preparedness	This subtheme excludes data not associated with mathematics preparedness

5.3.1 Mathematics difficulty

Most of the participants who considered mathematics a difficult subject said that they lacked interest in the subject and consequently did not put more effort into mastering the subject. Rosemary believed that mathematics was a difficult subject because the higher one moved from one grade to the next, the more difficult the new mathematics topics became. She said that all the different calculations made her shy away from mathematics. She also attributed her low performance in mathematics to insufficient time allocated to mathematics teaching. Gideon expressed his dislike of mathematics as a subject:

My knowledge and performance in mathematics last term was very average because I am a student who despises mathematics. I don't like being in the mathematics class because I believe mathematics is a very difficult subject to learn and adapt to. (F2;9;213-215)

Oluwaseun, an average student in mathematics, agreed with Gideon that mathematics was a difficult subject:

My knowledge and performance in mathematics is average. I am an average student in mathematics, but mathematics is a subject that deals with our lifetime. I think mathematics is hard so, that's why my performance is average. (F2;10;226-228)

5.3.1.1 Teaching style

Some of the participants reported that the style, attitude, and methodology of the mathematics teacher made mathematics more difficult for them compared to other subjects. Ruth confirmed this:

My performance in mathematics is poor. When I see a better teacher, when I see a teacher that encourages his or her students, I believe that my performance will improve. (F2;10;242-244)

Gift expressed a similar view:

My knowledge of mathematics is very average, and I think it's because I don't understand the way my mathematics teacher normally teaches, and the way the teacher explains mathematics. Because she normally faces the people that are more intelligent in the class, and she does not know if other people are lagging behind. (F1;10;237-240)

Precious added:

My performance in mathematics is poor. That is what I would say. Because I find it hard to really follow up during mathematics class. It is very poor for me. (F1;11;256-258)

5.3.1.2 Lack of interest

Samson said that mathematics was boring and that he had little interest in the subject, hence his poor performance. Similarly, Daniel expressed his concern about his average performance in mathematics:

My knowledge in mathematics is not too deep but I take an interest in the subject, and I am an average student in mathematics. I score less than 50. My knowledge about mathematics is that I wish to know more because it is interesting and encouraging sometimes when my teacher is teaching us. (F1;11;252-255)

Dorcas attributed her average performance in mathematics to her emotional state in the mathematics class and when she was given assignments to do:

I get scared easily when it comes to mathematics. So it makes me forget the method when I am tense I forget the method. Although I am interested in mathematics, until I am able to calm myself before I can still remember what my teacher has taught me. (F1;11;276-279)

However, other participants did not consider mathematics a difficult subject, and that their knowledge of and performance in mathematics were above average. Hassan said that he had good knowledge of mathematics and did well in the subject. Bassey said the following about his good performance in mathematics:

Yes, on my own part, I will say I am better because I am above average. I will not say I am too good because there is no one that is too good. Yet, I am interested in the subject. Let me just say my performance in mathematics is better. I am a bit on the high side. My view about mathematics is that mathematics is interesting, it only makes you to have interest in it. So that's my knowledge about mathematics. (F1;10;229-234)

Marvelous talked about the importance of mathematics in our daily lives:
Actually my knowledge in mathematics is quite simple. I like mathematics because it talks about everything that happens to us, that we do in our daily life we do mathematics and formulas are always given to us, and I am an average performing student. (F2;8;192-194)

Because many of the study participants considered mathematics a difficult subject, they did not show an interest in it or put more effort into mastering it. Analysis of the data on mathematics difficulty revealed that

a. some of the participants did not enjoy the teaching style of the mathematics teachers, which prevented them from enjoying mathematics lessons;
b. lack of understanding by the participants occurred, especially when mathematics concepts were not adequately explained by their teachers;
c. some of the participants found it difficult to follow all the steps involved in mathematics calculations;
d. some of the participants attributed their difficulty in mathematics to insufficient time allocated to mathematics teaching.

The findings also revealed that

a. some of the participants did not consider mathematics difficult because of their interest in mastering the subject; and
b. some of the participants were aware of the importance of mathematics for their future undertakings. Some believed also that success in mathematics, especially in their final year examination, would facilitate their transition to higher institutions, especially for courses requiring a credit pass in mathematics.

The participants were able to express themselves freely on how they perceived mathematics as a subject. Because they could report on their preferred situations in the ASQ and on mastery of the subject matter as covered in Theme one, a diversity of mathematics difficulties emerged. The qualitative study revealed that the participants understood the questions put to them and were able to express themselves verbally (as seen in the various extracts used in the study). In a related study, Gafoor and Kurukkan (2015) reported that a high percentage (88%) of their study participants disliked mathematics because of the difficulty of the subject

and the way the teachers taught the subject. The same point was reported by Popoola (2010) that among other factors, lack of interest in mathematics is contributory to poor performance in mathematics.

5.3.2 Mathematics preparedness

The participants stressed the importance of preparation and readiness in learning mathematics. Some of the participants admitted that they did not study mathematics on their own, as they were expected to. Others said that they did mathematics exercises for examination purposes and studied mathematics on their own and at times with their parents and friends. Some of the participants added that they liked to study mathematics in a conducive environment.

5.3.2.1 Home study

Daniel said that he studied mathematics alone at home because of his interest in the subject: *Yes, I study mathematics at home though I find it difficult sometimes, but I have an interest in it and am trying to increase my grade from average to high. I study at home all the time. And I have an uncle that puts me through in mathematics at home. (F1;26;646-648)*

Gift reported that she studied mathematics at home because she and her mother realised she had difficulties with the subject. Apart from home study, her mother organised tutorial classes for her after school. Similarly, Hassan revealed that he studied mathematics at home with the encouragement of his father who was good in science subjects:
I study mathematics on my own either in the school or at home. My dad encourages me. I have different books to work on and any time when I am at home, when I am less busy, the next thing I do is to take my mathematics textbook and solve problems. (F1;26;630-636)

Bassey said that whenever he had the opportunity to work at home, he studied mathematics. According to him, he made it a rule to go through the topics he had been taught in mathematics on a daily basis. Ibrahim revealed that he loved studying mathematics where there were no distractions. He believed that mathematics was a subject that required his full attention. The importance of studying mathematics in a quiet environment was also mentioned by Rosemary: *Yes, I study mathematics on my own with my textbook and mathematics notes in a quiet environment, and this is how I study; I will first go through the previous topic that has been taught in the mathematics class then write it down in the jotter, then go through the textbook and help myself out and learn the steps in each formula, and then do some exercises in it on my own. (F2;18-19;448-452)*

Mary said that she enjoyed studying mathematics alone at home, especially when she encountered a mathematics task or assignment she did not understand – she would then make sure she could solve the problem. Precious reported that she tried to study mathematics on her own but was often distracted from doing so:

I tried to study mathematics on my own but it got to a point that I was not able to solve it, and I just feel like let me just leave it because it's looking too difficult for me. The ones I can do, I try to solve them. If I get to school, I still try to meet my friends so that they should help me explain it. So that's the only way I help myself to study mathematics. (F1;25;624-627)

5.3.2.2 Negative perceptions of mathematics

The participants who reported that they did not study mathematics on their own gave different reasons such as mathematics being difficult, lack of interest in mathematics, unconducive environment for studying mathematics at home, and lack of understanding of mathematics concepts. Oluwaseun said he preferred to study other subjects that he found easy rather than mathematics, which he found very difficult. Gideon similarly explained his attitude towards mathematics:

To be honest with you, I don't study mathematics on my own, because studying mathematics, I don't find much interest in it. So with that I don't go for that subject but for a subject like literature which I find very interesting. (F2;19;457-459)

Dorcas' reasons for her dislike of studying mathematics were that mathematics was boring and calculating numbers was not fun. She also revealed that her home was not conducive to studying mathematics and learning generally because of the ongoing fights between her uncle and aunt. She was not happy about the tense situation at home:

Sir, no I don't study mathematics because it is boring to me and also the house is not conducive for me ... I live with my uncle and his wife, but they are always fighting. The home is not settled for me at all and it difficult to study… and I am not happy. It affects me a lot. The house is tense. (F1;24;591-600)

Aminat also reported that she considered mathematics a difficult subject and did not derive any pleasure from studying it except if she was with friends who were good at mathematics. Precious expressed regret about her inability to solve mathematics problems but found it extremely difficult to do so. She depended on her friends at school who always helped her. Ruth revealed that she would love to study mathematics if she had someone to encourage her:

I don't study mathematics because I find it hard to study on my own, without anybody encouraging me. If I get encouraged I will be so happy to join people that encourage me and we will do it together. (F1;25;636-639)

5.3.2.3 Effort and hard work

The study participants all agreed that effort and hard work were essential to achieve success in mathematics. Oluwaseun concurred:
I believe in effort and hard work for me to succeed in mathematics by going through those topics that I don't understand and going to the teacher that is teaching us mathematics. (F2;21;500-502)

Precious added:
I believe in effort and hard work. Not only effort and hard work but also determination. If you are determined to do something, you will be able to achieve what you want. So if I put determination in attaining a mathematics grade, it is good even if I am very poor in mathematics. If I am determined, I will be able to pass. (F1;28;691-694)

In any human endeavour, there is a need for preparation, readiness, and the passion or ability to learn in order to understand a particular topic. Some of the participants in the study agreed that preparedness, a conducive environment, and interest were crucial to understanding and passing in mathematics. In summary, the findings on mathematics preparedness revealed that

a. some of the study participants derived pleasure from studying mathematics alone at home in order to keep abreast of what they had learnt at school;
b. some of the study participants exhibited seriously negative perceptions of mathematics;
c. most of the study participants believed that effort and hard work were essential for success in learning mathematics.

Kasmin, Othman, and Ahmad (2019) explored students' perceptions of mathematics, and their findings revealed that hard work and effort, exposure to the subject, and confidence increased the students' knowledge of and success in mathematics.

5.4 THEME THREE: ATTRIBUTIONS FOR MATHEMATICS PERFORMANCE

Mathematics as a compulsory subject in the secondary school curriculum in Nigeria is a cause of concern for some students either as a result of the subject itself or the way it is taught (Baştürk & Yavuz, 2010). Students generally give different reasons for their success or failure in the subject. In the present study, attributions for mathematics performance are the reasons

and explanations the participants gave for their good or poor performance in mathematics. Data analysis revealed that the participants attributed mathematics performance in terms of five major subthemes, namely success factors, failure factors, interest in mathematics, teachers' methods and attitudes, and anxiety regarding mathematics.

Table 5.5 below depicts Theme three along with its subthemes. The table also shows inclusion and exclusion criteria for the subthemes of Theme three.

Table 5.5: Theme three (attributions for mathematics performance) and subthemes

THEME THREE: ATTRIBUTIONS FOR MATHEMATICS PERFORMANCE			
Subtheme	**Sub-subthemes**	**Inclusion criteria**	**Exclusion criteria**
Subtheme 1: Success factors	1. Internal factors 2. External factors	This subtheme and sub-subthemes include data associated with success factors	This subtheme excludes data that not associated with success factors
Subtheme 2: Failure factors	1. Internal factors 2. External factors	This subtheme and sub-subthemes include data associated with failure factors	This subtheme excludes data not associated with failure factors
Subtheme 3: Interest in mathematics	1. Perceptions of mathematics 2. Teachers' professional etiquette and qualifications 3. Students' academic ability, attitude and behaviour	This subtheme and sub-subthemes include data associated with interest in mathematics	This subtheme excludes data not associated with interest in mathematics
Subtheme 4: Teachers' attitude and teaching methods	1. Teachers' personality 2. Teachers' methods	This subtheme and sub-subthemes include data associated with teachers' methods and attitude	This subtheme excludes data not associated with teachers' methods and attitude
Subtheme 5: Mathematics anxiety	1. External factors (teacher-related behaviour) 2. Internal factors	This sub-theme and sub-subthemes include information associated with mathematics anxiety	This subtheme excludes data not associated with mathematics anxiety

5.4.1 Success factors

Success factors in mathematics as revealed in this study related to the internal as well as the external factors that influenced the students' performance. In the present study, the subtheme (success factors) was divided into sub-subthemes of internal and external factors. The

participants highlighted the factors that generally led to success in mathematics. The latter was in response to the interview question on the reasons why some students do well in mathematics.

5.4.1.1 Internal factors

Internal factors in the present study concerned personal attributes relating to the students' performance in mathematics. Some of the participants stated the internal factors that helped them perform well in mathematics. Rosemary reported that some students made the effort to speak to their mathematics teacher after class. Such students also paid attention and asked questions during the mathematics class. Rosemary added that the science students showed more interest in mathematics and paid more attention in the mathematics classroom than the arts students:

In the arts class, because a large number of people in the arts class have an interest in knowing mathematics and solving, but they have this fear in them that they can't solve that problem at all times like the science students. (F2;14;343-345)

Marvelous expressed a similar view:

Students show interest in knowing mathematics because when other students get higher grade than them, they will always like to pass. They show interest especially in science and commercial classes, but in arts class, most of them do not show interest. They show interest more in English language. (F1;14;349-352)

5.4.1.2 External factors

External factors in this study concerned attributions for mathematics performance not caused or initiated by the participants themselves but encouraged or motivated from outside the participants. Some of the participants mentioned the external factors that inspired them to perform well in mathematics. Daniel said that the influence of a good mathematics teacher and home lessons helped some of the students perform better in mathematics:

Yes sir. Why I think some students perform very well in mathematics is because, firstly, it may be because they have interest in mathematics. Secondly, if they have somebody that teaches them at home, this will also help them to do very well in their performance in mathematics. (F1;15;355-359)

Gift added that the motivation and support of parents and guardians also improved mathematics performance:

Sir, to me some students do well in mathematics, and I think this is because they have interest in mathematics; also some of them attend tutorials and are also motivated by their parents, uncles or neighbours who are also good in mathematics. (F1;17;407-409)

Gideon agreed:

Some students do well in mathematics because they have the appropriate textbooks and they study and do well in the mathematics class. And when they get home, they always study mathematics. (F2;13-14;328-330)

Oluwaseun stressed the importance of students having the necessary mathematics materials and financial assistance to improve their performance in mathematics:

Students do well in mathematics when they have those necessary items and mathematics materials to work with. And students do not do well in mathematics if they lack financial assistance. Some students don't have textbooks, stationeries and some other things needed in the mathematics class. And also when the teacher is teaching, they will be doing some other things. (F2;13;315-319)

Six of the study participants confirmed the success factors as a subtheme of attributions for mathematics performance. In summary, data analysis revealed that the participants attributed success in mathematics performance to

a. internal factors such as personal effort in solving mathematics problems, passion for mathematics, inherent mathematical ability, determination to be successful in mathematics; and
b. external factors such as a good mathematics teacher, home lessons, parental support, stimulating environment, and good instructional materials.

Dauda, Jambo, and Umar's (2016) study revealed that success in mathematics performance is attributable to the positive attitude of students and their teachers, mathematics teachers' qualifications, methods of teaching, and good instructional materials.

5.4.2 Failure factors

Failure factors in this study were the factors that influenced the poor performance of the students in mathematics. The subtheme (failure factors) was divided into sub-subthemes of internal and external factors. Most of the poorly performing participants gave details of the factors responsible for their poor performance in mathematics.

5.4.2.1 Internal factors

The internal factors as a sub-subtheme of the failure factors concerned personal factors (including the situation at home) related to the participants' poor performance in mathematics. Some of the poorly performing participants gave their reasons for not performing well in mathematics. Bassey commented on the failure factor of students in mathematics:

To me, I will want to focus more on why students don't do well in mathematics. One, like my colleagues have said, based on their mind set. If you have a good mind set on the subject or the subject teacher, it helps. Then, number two, the mathematics textbooks. Most parents cannot afford to get better textbooks for their children. And as a result of that, most students find it too difficult when they have nothing to practice with; they have nothing to gain more knowledge from. Their families cannot get extra teachers for them, and at the same time they still don't have textbooks to use. So it will be difficult for them to become better in mathematics. Another thing is noise. Calculations need a quiet environment if one is to learn better. Anywhere there is noise, to concentrate better will not be easy. Another one is the classroom environment … if one struggles to concentrate, it is difficult to focus on mathematics contents. The classroom should be comfortable for teaching mathematics. (F1;17-18;420-430)

Rosemary supported Bassey by similarly reporting on the attribution for failure in mathematics:

Students that don't do well in mathematics is because they lose focus on that subject and the topic they are being taught. And also in the class, they make more noise when the teacher is teaching, and the teacher has to send them out and not to come in again, and this will make them not know what they are doing in mathematics. And during exam time, they have to copy and even copy what they don't understand and write what they don't know. And also the part-time jobs. Some students have to leave school during the exam time; they will leave school and go to their part-time job due to lack of money. Some students don't have money to buy textbooks and all of that. So these will make them not do well in mathematics. (F2;12-13;297-306)

Samson summed up the failure factors of students in mathematics:

The reason why students don't do well in mathematics is one, because some don't have interest in it, and some other students are fearful of the teacher who is taking the subject. Another reason is because for some students, it is very hard for them to understand the calculations that are in the subject. Those are the reasons. Another reason is that we are blessed with different intelligence, so some students are very good in understanding the subject while for some it's because of the extra work they put into the subject when they get home or even at school. (F1;16;381-387)

Marvelous said that lack of sufficient time at home meant that some students could not do mathematics exercises:

When some students get home, due to having been engaged in domestic work, some don't have sufficient time. (F2;12;192)

5.4.2.2 External factors

The external factors as a sub-subtheme of the failure factors were the reasons for poor performance in mathematics not attributable to the participants themselves but as a result of outside factors. Precious, for example, commented on lack of understanding and teacher's lack of effort:

Yes sir. Some reasons students don't do well in mathematics; most times it is lack of understanding when the teacher is not like trying his or her best to make sure the students are up and doing, like giving them the right calculations, and then sometimes the fault comes from the students too when they don't pay attention in class like being carried away. (F1;15;349-353)

Mujeeb mentioned bad peer influence and absenteeism as failure factors in poor performance in mathematics:

Some people are not doing well in mathematics through their friends' influence and of bad characters and not staying the class in the proper time. Some people don't like staying in the class. That's why they don't understand mathematics. (F2;12;284-286)

Marvelous supported Mujeeb's view and added that distractions by other students and teachers' failure to deal with such distractions in the class contributed to poor performance in mathematics:

And at times when the teacher is teaching some students are being distracted by other fellows. (F2;12;292)

Aminat reported that lack of instructional materials, teachers' performance and teaching style, and lack of interest by students affected mathematics performance adversely:

Actually, the reason that students do well or not in mathematics, let me just say, lack of instructional material and performance of teachers. Some teachers don't have the ideas. They will just come to the chalkboard with their textbooks or notebooks, copy and paste anything on the board and just leave the class. Some teachers do not explain the ways and steps you are supposed to follow. Most students find it difficult to have interest in mathematics. (F1;17;400-405)

Other study participants responding to failure factors in poor performance in mathematics mentioned similar reasons such as fear of mathematics, mathematics difficulty, lack of interest in mathematics, mathematics formulas, financial problems, and teachers' teaching style. In summary, the findings of the failure factor subtheme revealed[12]

a. internal factors such as fear of mathematics, lack of interest, mind set of students during the mathematics class, lack of parental support, financial problems, noise distraction, and lack of sufficient time for mathematics teaching.
b. external factors such as mathematics difficulty, financial problems, mathematics formulas, negative peer influence, absenteeism, lack of instructional materials, fear of mathematics teachers, and teachers' style of teaching.

The findings on failure factors suggested that some of the study participants were not ready to study mathematics even with the little resources (human and materials) available to them. These findings were premised on the negative attitude of some of the participants in the mathematics class regarding peer influence, noise distraction, and non-attendance of mathematics classes. The findings further revealed the study participants' dissatisfaction with the treatment they received from school management and, by extension, from their homes. This was especially the case when parents could not afford the necessary mathematics materials or meet their financial needs generally. Idowu (2016) reported that failure factors in students' mathematics performance included teachers' qualifications, overpopulated schools, school distance, and inappropriate government spending on education. A great deal of research by authors on failure factors were discussed in the literature review (Adegoke, 2011; Ajayi et al. 2012; Awofala, 2011; Arends et al. 2017; Park et al. 2014; Sa'ad et al. 2014; Salman et al. 2011).

5.4.3 Interest in mathematics

Interest in mathematics was another subtheme of attribution for mathematics performance that was revealed in this study. The study participants gave different answers during the focus group interviews regarding students' interest in mathematics. Most of the participants mentioned the role of mathematics teachers in raising or lowering interest in mathematics. Interest in mathematics was divided into three sub-subthemes, namely perceptions of mathematics, teachers' professional etiquette and qualifications, and students' academic ability, attitude, and behaviour.

[12] An almost inextricable overlap between internal and external factors emerged throughout.

5.4.3.1 Perceptions of mathematics

The study participants, aware that mathematics is a compulsory subject, viewed it differently from other subjects. Dorcas said that she had no interest in mathematics because it was a difficult subject:

In calculating mathematics its ... may be because I have little interest in mathematics. Maybe that's why I say it's a bit difficult.

Aminat commented on students' interest in mathematics:

Yes sir. The question was do students show interest in knowing mathematics. Out of the students 100% let's say 20% of the students like knowing mathematics, and 80% do not have any interest in knowing it. Because when you look at the way mathematics is, it's very hard to understand. It takes lot of courage before you know mathematics. (F1;20;497-500)

Quadri reported that mathematics was boring for some students:

Not everybody shows interest in mathematics because while teaching mathematics, you can find some students sleeping because mathematics is so boring to them. (F2;12;363-365)

5.4.3.2 Teachers' professional etiquette and qualifications

In this study, teachers' professional etiquette concerned how the mathematics teachers discharged their duties in the classroom. Some of the participants commented on how their teachers taught and related to them in class. According to Ruth:

Some students show interest in knowing mathematics due to the methods that the teacher uses while teaching mathematics. Some might be interested in seeing the teacher dramatise; some show interest in the seeing the teacher teaching them through different teaching methods. While some don't show interest at all because everything the teacher is doing looks odd to them. (F1;19;462-466)

Precious agreed with Dorcas and provided more details:

I will say some students show interest while some don't show interest in mathematics. If I say some students show interest, they are the ones that are capable of understanding what their teachers are teaching. They are able to show interest because they enjoy the teaching method. While some like myself who don't really show interest, may be because of the way the teacher is handling the class. I myself, I will say I get scared, especially when my teacher comes in with his cane, seeing the cane alone makes me lose interest. (F1;19;468-474)

Bassey complained that the school management appointed unqualified teachers. He believed that if qualified teachers were appointed, the students would have more interest in mathematics:

Another thing I observe is that the school authority has their own case in this. Because not only mathematics this time around, but any subject you want the student to be good at it, you must employ someone that knows the particular subject very well. A very good teacher should be employed to teach mathematics. Even when students don't show interest in knowing mathematics, such a teacher should encourage them to like mathematics. (F1;21;519-525)

Gideon also stressed the importance of the teaching ability of mathematics teachers (including their ability to create interest in mathematics in students):

Because some students show interest in mathematics because some teachers who are teaching are very qualified and some are not. So, it is based on the teacher. If the teacher is teaching well in class, the students will have more interest in mathematics. (F2;13;376-379)

Toheeb said some students' lack of interest in mathematics was a result of their teachers' lack of training in the didactics of mathematics:

I said it earlier because their own understanding is based on their teacher; he does not use method in the way that you are going to understand the subject easily; that's why they jump out of the window and go out of the class. (F1;21;472-474)

Dorcas reported that her dislike of mathematics had resulted from the strictness of the mathematics teacher:

Apart from that I get scared easily, once my teacher comes in the first thing is the cane. Seeing the cane alone makes me scared. (F1;18;443-444)

5.4.3.3 Students' academic ability, attitude, and behaviour

In the present study, the participants indicated their interest in mathematics through the academic ability and behaviour they demonstrated during and after the mathematics class. Ibrahim said that some of the students showed interest in mathematics because of their passion for the subject and also because they realised that mathematics was useful in their daily activities. Rosemary reported that some of the students in the arts class showed interest in mathematics, but they struggled to solve mathematics problems:

In the art class, I will say yes, because many people in the arts are interested in knowing mathematics and solving problems, but they have this fear in them that they can't solve that problem at that time. (F2;12;343-345)

Favour reported that some of the students showed interest in mathematics because they did not want to repeat the current class:
Some students show interest in mathematics because without mathematics you cannot be promoted to the next class. You will be asked to repeat. And no student will want to repeat. So they will show 'forced' interest in knowing mathematics. (F2;15;371-373)

Daniel believed that the science students needed mathematics more than the other students:
From my own observation, I think science students like mathematics more compared to arts and commercial students because they think they will need it more in their lives even when they get to university. We arts students believe that we don't need mathematics. Because of that we show very little interest in it and do not mind the methods of the teacher. Students will say let me just learn it and pass. (F1;20;491-495)

Mujeeb said some students' behaviour in class and their attitude towards mathematics led to their low or no interest in the subject:
No sir. Because some students are lazy, and they are not eager to study mathematics; even when some are inside the class, they will be sleeping and doing all sorts of rubbish inside class. They will not stay in the class and will be walking around. (F2;13;333-335)

Oluwaseun reported that some of his classmates did not appreciate the importance of mathematics in their lives:
Some students show interest, while some do not show interest. Because while they do not take mathematics as something that will go against them in their lives. And what they think is that after secondary school, they will look for other jobs, and they don't know that mathematics is very important in their lives. (F2;13;367-370)

Gift said that her interest in mathematics was as a result of encouragement from her friends who were very good in the subject:
Yes sir. Like, for me in my class, I have interest in mathematics as I have some friends that are also good in mathematics. And each time the teacher comes to the class and explains the one I don't understand, I have a friend that I always go to. And he is very good at mathematics. Even when the teacher is teaching, he will be the one to tell the teacher that the step he is taking is not right, and the teacher will go through it and correct it. I think mathematics is very good. (F1;22;498-503)

Across the board, the study participants revealed a lack of interest in mathematics. They believed that most students did mathematics because it was a compulsory subject and had to be passed before they could be promoted to the next class. However, the study revealed also that some of the students had a genuine interest in mathematics. Such students believed that

mathematics would help them in their future careers. The findings of this study on interest in mathematics are in line with those of Pantziara and Philippou (2015) who found that interest in mathematics performance was undermined by students' fear of failure, achievement goals, and negative self-efficacy beliefs.

5.4.4 Teachers' attitude and teaching methods

Teachers' attitude in the context of this study meant the mathematics teachers' approach to teaching and learning. The findings revealed how the teachers related to the students in the class and how receptive the students were to the teachers' behaviour and personality. The teachers' methods as revealed in this study were the ways in which they presented the subject content and the strategies they employed to improve teaching effectiveness in the classroom. Eleven participants did not like the attitude of their mathematics teachers while nine appreciated their teachers. At the same time, 15 study participants liked the methods used by their mathematics teachers while five did not like their methods. In the two focus group interviews, I observed that the interpersonal relationships of the two mathematics teachers with their students differed, but, according to some of the participants, these teachers were good in the subject and that contributed to students' success in the subject. In School A, the teacher was reported to be strict with the students while in School B, the teacher was reported to have a friendly disposition but still maintained disciplined. The subtheme teachers' attitude and teaching methods was divided into two sub-subthemes, namely teachers' personality and teachers' methods.

5.4.4.1 Teachers' personality

Teachers' personality as a sub-subtheme of interest in mathematics concerned how the teachers' behaviour and personality positively or negatively affected the students in the mathematics class. Rosemary described the mathematics teacher's attitude while teaching:
I enjoy the way the mathematics teacher teaches us partially. One, because when teaching he rushes some of the important formula and with this I will not be able to get that thing. And also the other part of it is that he is one of the best teachers. He explains, he uses class work and assignments and comes to do corrections in the class. (F2;17;403-407)

Mary was less positive about the mathematics teacher:
I don't really like the way our mathematics teacher teaches us mathematics … yes, because he is not enjoyable. He always likes rushing the explanation. It makes students look dull in the class. (F2;17;413-416)

Toheeb's description of his mathematics teacher was favourable:
I enjoy the way my mathematics teacher teaches in the class because he is friendly, and when it comes to teaching mathematics, he believes that the simplest way to teach mathematics is be friendly to the students so that they will know more about mathematics. (F1;22;534-537)

Aminat, a classmate of Toheeb, had a different view of the mathematics teacher:
Actually, I don't like the way my mathematics teacher teaches me mathematics because he is not lively; he prefers taking the brilliant students more than the average students. He does not care if you understand or not. So I don't like the way he teaches mathematics. (F1;22;539-541)

Precious, too, disliked the attitude of her mathematics teacher:
Sir, I don't even like how my mathematics teacher teaches. And again, I don't like the teacher. He just comes to the class and he just plays and he likes playing a lot and when he teaches … he just feels that he has done something when he gives us a topic, he just tries to brief it, he does not go too deep in the teaching. (F1;22;545-548)

Quadri and Amidat reported that they did not like their mathematics teacher because he did not care about them and went too fast when teaching. According to Quadri:
I do not really like the way he teaches mathematics because he is too fast. He does not care about the people sitting at the back of the class. He focuses on the students in the front of the class. (F2;17;418-421)

Amidat expressed the same view:
I don't really like the way he teaches mathematics because he is too fast. He rushes the explanation. I don't understand the way he explains sometimes. (F2;17;423-424)

5.4.4.2 Teachers' methods

Regarding the methods used in teaching mathematics, some of the participants liked their teachers' methods while others did not. Samson liked the teaching method of his teacher:
The method our mathematics teacher uses is a very good method. He plays with us and he is a disciplinarian. It shows on every student; we have very poor students in mathematics compared to other subjects. (F1;30;733-735)

Gideon also liked the teaching method of his mathematics teacher:
I can say that our teacher is very good in teaching mathematics because, when he is coming to our class, he brings some examples to make sure that we understand the subject and he likes bringing it down to our own understanding. (F2;22;526-528)

Rosemary reported on the similarity in the method used by her previous mathematics teacher in the lower class and that of the present teacher:

The first method I experienced when I was in SSS 1 was that teachers have similar methods in teaching mathematics. The first one was using the life object to explain to us, so we can understand, while this present one does go to the point and at times he makes jest of the examples and with that we will be able to understand mathematics. (F2;21;520-524)

The teaching methods of the mathematics teachers did not go down well with some of the students. For instance, Dorcas said she did not like the method of being punished whenever she could not solve mathematics problems:

The method he uses in teaching is the playing method and at the same time the discipline method; when we don't get it right he beats us … I don't like being beaten, but I like the playing method. (F1;29;715-719)

Quadri also complained about the teaching methods:

I do not like some of the methods my teacher is using while teaching mathematics because while it is very long and it takes a lot of time. (F2;22;539-540)

The study participants thus gave their views on the attitude and teaching methods of their mathematics teachers. The findings also revealed how the teachers' attitude and methods affected the students' mathematics performance. In summary, the following findings emerged on the teachers' attitude and methods:

a. teachers' personality – the teachers were too fast, especially when teaching difficult formulas; explanations were inadequate; some of the participants believed the teachers were friendly while others did not;
b. teachers' methods – some of the participants enjoyed the methods of the mathematics teachers while others did not; some did not like being punished by the teachers if they made mistakes in class tasks.

In a similar research project, Yu and Singh (2018) reported that the teachers' support and instructional mathematics materials influenced the students' mathematics performance and interest. Ing et al. (2015) correlated teachers' practices (methods), students' participation in class, and students' achievement and found that the positive combination of teachers' methods and the participation of students in class predicted high student achievement in mathematics.

During the focus group interviews, I observed that one teacher was assigned to all the senior secondary students (SSS) 2. Thus, classes were very large. It was asking a lot of a teacher to

teach all the classes, prepare questions for examinations, and also mark the examination scripts. In addition, the time allocated to mathematics teaching was inadequate. Teachers not spending enough time in class was also raised by some of the study participants. Furthermore, it was revealed that the students who were interested in mathematics did not care about the attitude of the teachers or their methods. Their concern was to know and pass mathematics, unlike the other students.

5.4.5 Mathematics anxiety

Mathematics anxiety can be seen as physical and psychological signs of restlessness manifested by some students during mathematics tasks (Park et al., 2014). In the present study, the participants were asked about their level of anxiety in mathematics, and most of them admitted that they were always anxious in the mathematics class. Even some of the participants who had earlier said that they were good in mathematics expressed their anxiety about the subject. Mathematics anxiety was divided into two sub-subthemes, namely external factors (teacher-related behaviour) and internal factors.

5.4.5.1 External factors (teacher-related behaviour)

Some of the participants attributed their mathematics anxiety to their mathematics teachers' behaviour in class. They said their mathematics teachers would punish them whenever they failed in a mathematics activity. Dorcas confirmed this:
Yes I can. I get anxious because if I don't get the answers right my teacher is going to beat me. So that makes me anxious because I don't want to make mistakes. (F1;33;822-823)

Ruth said the same:
Yes sir. I get anxious when I do mathematics. I feel concerned because I really want to put in my best because I am not good in relationship with my mathematics teacher, I really put in my best effort (F1;34;829-831).

Favour added that mathematics teaching was boring for her:
I get anxious when teaching mathematics because the teaching is boring and it is not clear to me, so I will be feeling sleepy in the class. (F2;27;654-655)

5.4.5.2 Internal factors

Some students attributed their achievement in mathematics or lack thereof to internal factors. Some participants attributed their anxiety to themselves and not to the teachers or any other people. However, some of the participants claimed that they were always at ease when doing mathematics or writing mathematics examinations. They said this was because of their deep

interest in mathematics. Hassan stated that he was not at all anxious about mathematics because he practised solving mathematics problems regularly:
No I don't get anxious. It's what I do every now and then, and I find it easy to solve mathematics, so I don't get anxious. (F1;34;833-834)

Marvelous made the same point:
I do not really get anxious while solving mathematics because I do study mathematics always. (F2;26;640-641)

Rosemary reported that she derived a lot satisfaction solving mathematics problems because mathematics was her best subject:
I actually do not get anxious while doing mathematics because it is one of the best and interesting subjects for me and it's always fun when solving it, especially when you know the formula, the steps and the rules that guide them. (F2;643-645)

Gideon's view on mathematics anxiety:
I don't like mathematics as such, but I don't get anxious when doing or teaching mathematics. (F2;27;651-652)

Oluwaseun said his anxiety occurred because mathematics was a difficult subject for him:
I get anxious when I do mathematics. It is somehow difficult for me, so I don't participate in the class activities. (F2;26;620-621)
Mujeed also said mathematics made him anxious because he lacked understanding of the subject:
I get anxious when I am doing mathematics because I do not understand most of the questions in mathematics, and during examinations I will not be able to do the questions. That is why I get anxious. (F2;26;623-624)

Bassey reported that his anxiety level was high because of his need to do well in mathematics:
Yes, I get anxious because I want to perform better. (F1;34;837)

Daniel spoke about his high level of anxiety in mathematics:
Yes, I do get anxious especially any time I work; I used to be scared of not getting the answers correctly. Because I am afraid of the result that I will get if it's not correct, I feel bad. (F1;34;839-841)

Analysis of the data on mathematics anxiety revealed how anxious some of the participants were regarding mathematics teaching and learning. Most of the participants reported that their mathematics anxiety arose from their sub-sub themes poor knowledge of mathematics, fear

of the mathematics teachers, mathematics difficulties, and abstract perceptions of mathematics. At the same time, some of the participants reported that they were not anxious about mathematics because sub-sub themes of their desire to learn and master the subject. The results of this study are consistent with those of other researchers such as Asikhia (2014) and Schillinger, Vogel, Diedrich, and Grabner (2018) who found that anxiety is an important factor in secondary students' performance in mathematics.

5.5 THEME FOUR: MATHEMATICS PERFORMANCE AND SOCIO-DEMOGRAPHIC FACTORS

This theme concerned the mathematics performance and socio-demographic factors of the participants in the present study. Two subthemes were identified in the analysis of gender and socio-economic factors. Gender was analysed qualitatively in order to contribute to the literature on the controversy about who performed better in mathematics: male or female students. The socio-economic factors, according to the findings of this study, related to the effort family members and acquaintances put into improving their children's performance in mathematics in terms of their financial commitment by providing mathematics textbooks and other necessary materials. The analysis revealed that some of the parents organised home lessons for their children and wards. However, some of the study participants reported that their parents/family members could not afford to buy mathematics materials. The table below depicts Theme four along with the subthemes and sub-subthemes. Also shown in the table are the inclusion and exclusion criteria for the subthemes of Theme four.

Table 5.6: Theme four and subthemes

THEME FOUR: MATHEMATICS PERFORMANCE AND SOCIO-DEMOGRAPHIC FACORS			
Subtheme	**Sub-subtheme**	**Inclusion criteria**	**Exclusion criteria**
Subtheme 1: Gender	1. Male performance 2. Female performance	This subtheme and sub-subthemes include data associated with gender	This subtheme and sub-subthemes exclude data not associated with gender
Subtheme 2: Socio-economic status	1. Support by family members and acquaintances 2. Lack of support by family members and acquaintances	This subtheme and sub-subthemes include data associated with socio-economic factors	This subtheme and sub-subthemes exclude data not associated with socio-economic factors

5.5.1 Gender

The study participants disclosed their performance in mathematics in terms of their gender and according to their observations and grading in the class. During the interviews, I observed

the objectivity of the participants in their responses. In support of this observation, some of the female participants said that the boys were better while some of the male participants believed that the girls were better in mathematics. Gender as a subtheme was divided into two sub-subthemes of male performance and female performance.

5.5.1.1 Male performance

Gideon reported that in his class that the boys were better in mathematics than the girls:
I believe that the boys are performing better in mathematics because it is happening in my class now. There is no question in my class that Abayomi (boy) will not answer while the girls sit down and look and sometimes the girls don't even understand what the teacher is teaching. (F2;23;566-569)

Gift had a different view:
The reason I said the boys are not better than the girls is because, in my own class, the girls are far better than the boys in terms of mathematics. And each time our mathematics teacher is teaching, he concentrates on the girls because each time he calls on the boys they are either jumping out of the window or they have taken the back door outside. So I believe the girls are better than the boys. (F1;30;747-751)

Hassan related the question of supremacy in mathematics to the number boys and girls doing mathematics:
I believe boys are better than girls in mathematics due to the fact that you find more boys in science class than a lot of girls. Most of them are always in the art class because they like reading novels. And in my class, we find more boys studying mathematics than the girls. The girls like to come to the boys to teach them mathematics. (F1;31;753-757)

Dorcas (a girl) argued that the boys in the class better than the girls:
I believe that boys are better than girls. Because maybe I don't know much in mathematics, maybe that's why. But I feel boys are better; they are able to tackle things like difficult questions in the class better. So I feel boys are better than girls. (F1;31;759-761)

Precious (a girl) agreed with Dorcas:
Sir, I will be sincere. I am a girl, but I will support the boys, because they are more serious when it comes to calculations; you see them always focus their head on calculations. I believe they are better than we girls. (F1;32;782-784)

Samson was also in agreement:
Yes sir, boys are better than girls. In my class, observing from my seat, I do see more boys participating in the mathematics lesson of the day. Even when the results are released, I see more boys passing mathematics than girls. (F1;32;778-780)

5.5.1.2 Female performance

Marvelous claimed that the girls in her class were better than the boys in mathematics:
The girls are better than the boys in mathematics because right in science class, the girls are leading in mathematics very well than the boys. (F2;23;551-552)

Ibrahim (a boy) also believed that the girls were better than the boys in mathematics:
Boys are not better in mathematics because boys do not show interest, and girls really have interest in the subject. (F2;23;563-564)

Rosemary, Ruth, Oluwaseun, and Mary all stated that the boys and the girls were equal in mathematics. According to Ruth:
I think both boys and girls are the same thing. None is better, because in a case whereby a girl is determined to know something, she knows that she can do better. The same applies with boys. Once they are determined to do something, they will also do it. I feel the two of them are the same thing, except if they are not ready to learn. (F1;31;767-770)

Analysis of the data on gender as a subtheme of mathematics performance and socio-demographic factors revealed that the male and the female students achieved satisfactory marks in mathematics in general and that competition between the two gender groups were healthy. In line with the findings of this study, other studies (e.g. Ajai & Imoko, 2015; Arhin & Offoe, 2015) have also reported a current healthy rivalry in mathematics between the male and female students, as against the historical dominance of boys. However, the matter has not yet been finally settled as some studies have revealed male dominance in the subject (Contini, Di Tommaso, & Mendolia, 2017).

5.5.2 Socio-economic factors

The socio-economic status of the study participants was determined on the basis of the involvement (materially and educationally) of their family members and acquaintances in the students' mathematics endeavours. Materially in the present study referred to the extent to which they provided educational materials for their children and wards to enhance their learning of mathematics. Educationally referred to the academic support the parents and guardians gave their children outside the school. The subtheme was divided into two sub-

subthemes, namely support by family members and acquaintances, and lack of support by family members and acquaintances.

5.5.2.1 Support by family members and acquaintances

Some of the participants reported that their family members and acquaintances assisted and taught them mathematics at home. Most of the participants said that their parents bought all the required instructional materials in mathematics. According to Hassan:
I have enough materials for mathematics. The ones my dad has used previously and the present ones given to us from my school. I have enough materials to work with mathematics. (F1;32;794-796)

Mary added:
I have more than enough materials to work with mathematics. My parents bought them for me, because they want their children to study; they don't like us staying idle. (F2;25;606-607)

Daniel reported that his uncle helped him in mathematics:
Yes, I have enough materials here in school and at home. My uncle is a mathematician; he brings textbooks for me to practise more about mathematics. (F1;32;799-800)

Marvelous said that she had sufficient mathematics materials:
I have enough materials to work with mathematics because my parents make sure the materials are complete. (F2;25;603-604)

Bassey explained how he exchanged mathematics books with his friends apart from those bought by his parents:
Yes, I have enough materials to work with, not the ones bought by my parents alone. I also get from friends. The ones I have, I will give my friends that do not have and I will collect the ones they have so that's how I do it. (F1;33;815-817)

5.5.2.2 Lack of support by family members and acquaintances

Some of the participants reported that they did not have mathematics materials because they could not be afforded by their family members and acquaintances. Ibrahim said that he could not buy such materials because of a lack of money:
No sir. I don't have enough materials to work with because of financial problems. There is not enough money for me to get these materials because some of the materials are very expensive. (F2;24;586-589)

Toheeb reported that his parents could not afford mathematics textbooks:
No I don't have. The ones I am managing are borrowed because my parents are not rich. I don't have enough materials concerning mathematics. (F1;32;787-788)

Gideon also complained:
I don't have enough materials to work with mathematics due to lack of finance. I am with one parent, so my mummy doesn't have enough money like buying materials, and most of them are very expensive. (F2;25;594-596)

Rosemary commented on her inability to acquire mathematics materials:
I do not have enough materials to work with mathematics because I don't have enough money with me. And also the materials being expensive; secondly to get them will be a lot of stress because they are not within our area. We have to pay transport and all that to get them. (F2;25;598-601)

Aminat had a different view on not having mathematics materials:
No I don't have enough materials to work with mathematics. I don't have much … also, because I don't have much interest in it. I just get the little I need in the classroom. (F1;33;802-805)

The findings on socio-economic factors revealed the important influence of family members and acquaintances on the academic well-being of their children and wards. The findings also revealed that some of the participants did not know or care about the significance of mathematics education and learning as they had not been properly guided at home. Furthermore, the findings revealed the determination of some of the less privileged students to acquire the necessary knowledge and excel in mathematics despite their poor family backgrounds. Visser, Juan, and Feza (2015), in their study, also reported on the important role of the home and the environment in students' mathematics performance.

5.6 CONCLUSION

This chapter covered the qualitative results of the present study and their interpretation. Four a priori identified main themes, subthemes, and sub-subthemes were discussed based on the conversation analysis of the raw data, which were gathered through the focus group interviews. The participants' verbatim data extracts were used through a three-digit coding system to substantiate and reference citations in the study.

The concluding chapter will provide an overview of the study as well as a review of the research questions. The limitations of the study will also be discussed and recommendations made for further research.

CHAPTER 6
FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

6.1 INTRODUCTION

This chapter begins with an overview of the preceding five chapters, after which I endeavour to answer the research questions and explain the ethical considerations that guided the study. I also discuss the strengths and limitations of the study and give my recommendations for future research. I reflect on my research journey and on what I would have done differently and then conclude the thesis.

6.2 SYNOPSIS

6.2.1 Chapter 1: Orientation

This study was undertaken to explore the effects of attributional style on the mathematics performance of senior secondary school students. The purpose was to achieve a better understanding of the extent to which the attributional style (AS) of the students in the study and socio-demographic factors such as socio-economic status, gender and attitude towards mathematics could determine the quality of the students' performance in mathematics. Many reasons are advanced for failures or successes in life. The causes could be internally/externally driven, stable/unstable, and global/specific. The students in the study attributed their successes or failures to the three dimensions of attributional style listed above. Research indicates that it is in students best interest to try and cultivate a positive mindset when faced with challenges related to achievement in mathematics (Houston, 2016; Yeo & Tan, 2012). Mathematics performance in this study was measured by the students' end-of-school examination marks moderated by gender and socio-economic and attitudinal factors.

The background of the study was first discussed, highlighting the structure of Nigerian secondary schools in terms of class levels and subjects offered. Also discussed was the scrutiny of examination performance by the regional examination body (The West African Examination Council) over a period of seven years, which revealed poor performance in mathematics. The problem statement and rationale of the study were then discussed under the following subtitles: global research on attributional style; global research on attributional style and mathematics; shortcomings in some studies on attributional style and mathematics performance; mathematics education; and socio-demographic factors and mathematics performance.

The reformulated learned helplessness theory on which the study was premised was alluded to and the primary research question stated: How does attributional style relate to mathematics performance in Nigerian senior secondary schools over and above socio-demographic factors? The secondary research questions were:

- How do stability and globality attributional styles relate to mathematics performance?
- How well do stability and globality as well as gender and socio-economic factors predict mathematics performance?
- What is the influence of socio-demographic and attitudinal factors on mathematics performance?

This was followed by a discussion on the terminology used in the study, the research design and methodology, the data collection and analysis, and the quality assurance of the mixed methods research approach.

6.2.2 Chapter 2: Literature review

Chapter 2 contained a review of the literature, linking it to important aspects of the study. The chapter started with the theoretical framework and included a discussion of the reformulated learned helplessness theory (RLHT), which had originally focused on depression, but later extended to achievement setting and other areas of human endeavour. Attributional style evolved from the RLHT and was based on three dimensions, namely: internality, stability, and globality. Stability and globality were the two main independent variables of the study, with the mathematics performance of the students the dependent variable. There was also an in-depth review of the literature on gender, socio-economic status, and attitudinal factors, which were the moderating variables in the study. I finally discussed my approach to the conceptual framework of the study to illustrate how key concepts were linked.

6.2.3 Chapter 3: Research design and methodology

This chapter began by elaborating on the paradigmatic perspective that guided the study, which was anchored in a pragmatic viewpoint. The study also had a sequential explanatory mixed methods research design with a QUAN + qual frame of reference. The quantitative part of the research, which used the Attributional Style Questionnaire as the study instrument, was done first with a pilot study of 90 participants and then with the main study of 300 participants. The questionnaire yielded demographic data and attitudinal information on the basis of the participants' responses to the questions in the two subscales (stability and globality). The quantitative data were analysed using the IBM SPSS statistics 25 (IBM, 2019). In the qualitative phase of the study, data were obtained through focus group interviews with 20 participants.

The next part of the research that was discussed was the data analysis plan. The descriptive and inferential statistical analysis was done during the quantitative phase while the conversation analysis was done during the qualitative phase. This was followed by a discussion on quality assurance and the reliability and validity measures of the quantitative data. To ensure the trustworthiness of the qualitative data, criteria such as credibility, dependability, transferability, and confirmability were applied. The roles and responsibility of the researcher to ensure the safety and psychological wellbeing of the participants were then discussed, and the chapter ended with a consideration of the ethical aspects of the study.

6.2.4 Chapter 4: Quantitative results

The chapter began with the descriptive statistics of the study, focusing on attitudinal factors and the demographic data of the participants. This was followed by correlation and reliability analyses of the two subscales using Cronbach's alpha, which confirmed the internal consistency of the Attributional Style Questionnaire. Inferential statistics were calculated by means of multiple regression analysis to answer the research questions. The findings generated by the responses to each research question were related to previous studies, which either confirmed or contradicted the results of the present study.

6.2.5 Chapter 5: Qualitative results

Regarding the qualitative results, the data were coded with a three-digit coding system after they had been gathered through the focus group interviews. The data analysis related to four a priori determined main themes, namely the participants' perceptions of the Attributional Style Questionnaire (ASQ), their perceptions of mathematics, their insights into mathematics, and their mathematics performance, as well as socio-demographic factors. The themes were discussed and qualified according to inclusion and exclusion criteria. In the data interpretation, I used extracts from the participants' responses as supporting evidence to substantiate the discussion of the findings. Findings in each of the themes were corroborated with the findings in the literature review and the theoretical framework partially.

6.3 REVISITING THE RESEARCH QUESTIONS

The primary research question of the study was: How does attributional style relate to mathematics performance in Nigerian senior secondary schools over and above socio-demographic factors?

To answer the primary research question, the secondary questions were addressed first

6.3.1 Secondary research questions

6.3.1.1 How do stability and globality attributional styles relate to mathematics performance?

Mathematics performance refers to the level of students' academic capability in mathematics. This was indicated in the study by the students' marks in mathematics in end-of-term examinations. Mathematics, as a crucial subject in the secondary school syllabus, has a distinctive quality that activates either interest or lack of interest in students. In order to establish interest and success in mathematics, students should try to think positively about the subject.

With this in mind, and based on the literature review in Chapter 2, stability and globality attributional styles are hypothesised to, and actually do, relate well to mathematics performance (Khodayarifard, Brinthaupt, & Anshel, 2010). Because mathematics is a mandatory subject that has to be registered for and passed in both school and regional examinations, some students fear the subject. Students should therefore be helped to understand how their mindset determines their preparedness and success or unpreparedness and failure in mathematics. It is as a result of their mind-set that people attribute different causes to situations they find themselves in. Some students approach activities in the mathematics class in an unfocussed manner, which inhibits them from creating individual techniques to understand and manage mathematical concepts (Sakariyau et al., 2016).

As seen in the literature review, Houston (2020) maintains that stable/unstable attribution styles emerge when individuals believe that an outcome will continue either indefinitely or will be specific for a period of time. Global/Specific attribution styles relate to individuals who see outcomes as consistent and affecting many features of life activities or, conversely, who believe that outcomes are specific to a particular situation alone. From a stability and globality attributional style perspective, students' success or failure in mathematics depends on their interpretation of their particular situation vis-à-vis mathematics. As an illustration, Student A and Student B sat for a mathematics examination and both of them failed. The reason for failure for Student A could be that he was not good in mathematics and attributed his failure to other reasons that will continue indefinitely and will be consistent throughout his life. This thought will affect his future mathematics performance. But for Student B, his failure could be attributed to lack of preparation for the examination and his realisation of that will make him prepare better for future examinations. Students A and B exhibit negative and positive attributional styles towards mathematics respectively. Stability and globality attributional styles affect and relate closely to students' success or failure in mathematics. If failure in

mathematics is attributed to stable and global attributions, there will be negative consequences, but if failure is attributed to unstable and specific attributions, future prospects will be more positive.

The responses to the first secondary research question indicated no significant relationship between attributional style and mathematics performance. This finding was inconsistent with the theoretical position of the study as the RLHT, on which the study was based, predicts that an internal and/or stable and global attributional style for negative events will correlate significantly negatively with poor academic performance in mathematics. In the present study, however neither the correlation coefficient between the actual mathematics marks and stability nor the correlation between the actual mathematics marks and globality was significant. In the qualitative phase of the study, the participants confirmed their full understanding of the questionnaire, and they responded to the subscales according to how these scales affected them (see Sections 5.2.1, 5.2.2 and 5.2.3). The results imply that whether positive or negative, stability and globality attributional styles correlate positively with mathematics performance.

In the quantitative phase of the study, the stable and global attributional styles did not correlate statistically significantly with mathematics performance (see Table 4.25).

6.3.1.2 How well do stability and globality as well as gender and socio-economic factors predict mathematics performance?

The findings of the second secondary research question (on how the stability and globality dimensions of the Attributional Style Questionnaire predicted mathematics performance) revealed some interesting results. For the stability scale, the female as well as the male students' stable attributional style yielded positive effects on mathematics performance. In other words, the boys' as well as the girls' stability scale predicted success in mathematics. In the case of the globality scale, the boys as well as the girls achieved positive global attributional styles. However, whereas the girls' positive global attributional style influenced their mathematics performance significantly, the opposite was found in the case of the boys. Furthermore, the findings revealed that the boys' socio-economic status was a predictor of mathematics performance. In the case of the girls, though, the opposite was found.

Khodayarifard et al. (2010), too, found that stability and globality attributional style as well as gender and socio-economic status predicted mathematics performance of boys and girls differently. As discussed in Chapter 4 (the quantitative results), the effects of attributional style events are moderated by the significance of the task the person engages in (e.g. school examinations). Enhanced performance is more likely to occur than decreased performance if

students regard an assignment as important (Yeo & Tan, 2012). In the present study, the boys' as well as the girls' stability scores predicted success in mathematics. The girls' globality scores also predicted success in mathematics. In the qualitative results (see Section 5.4.3.3), both genders reported the significance of mathematics for their future careers; accordingly, most of them put in an extra effort to do well in mathematics. Interestingly, Wilhelm (2009) suggests that female students are now showing more interest in subjects previously predominantly popular with male students such as mathematics and science.

In the quantitative findings of the present study (see Table 4.27), the boys' socio-economic status emerged as a predictor of mathematics performance. Regarding socio-economic factors, the findings of the study revealed that the efforts made by family members and acquaintances to improve their children's performance in mathematics included their financial commitment in providing mathematical textbooks and other necessary materials for their children (see Section 5.5.2.1).

Most of the study participants reported on the positive support, both financially and materially, that they received from their different homes to improve their performance in mathematics and how it benefited them. The findings also revealed the determination of the less privileged students to acquire knowledge and excel in mathematics despite their poor family backgrounds. These findings accorded with the findings of Atalmis et al. (2016) who found that socio-economic status played a significant role in predicting the mathematics performance of the students in their research. Tucker-Drob and Harden (2012), too, maintain that mathematics performance is influenced positively by high socio-economic status. The literature also indicates that students with high socio-economic status are more likely to do better academically than those with low socio-economic status (Alordiah et al., 2015; Ewumi, 2012).

6.3.1.3 What is the influence of socio-demographic and attitudinal factors on mathematics performance?

The findings regarding the third secondary research question (on how gender, socio-economic status, and attitudinal factors influence mathematics performance) revealed the significant influence of the boys' socio-economic status on mathematics performance, unlike in the case of the girls. The results indicated that only the boys' socio-economic status influenced their mathematics performance positively (which was not the case with the girls).

Celik (2018) found in his research that gender, socio-economic status, and the attitude of students were important variables that influenced mathematics performance. Gender, socio-

economic status, and attitudinal factors were considered in this study because I wanted to establish their effect on the mathematics performance of the students. The literature also indicates the significance of these three variables in mathematics performance (George & Adu, 2018; Sakariyu et al., 2016; McConney & Perry, 2010). Goldin (2002), too, argues that in any mathematics undertaking, attitude determines the level of good or poor performance. He adds that, in a mathematics class, students may develop negative or positive attitudes, which may be stable and have affective as well as cognitive features.

Because gender and socio-economic status have already been discussed, attitude will be considered in this section. Attitudes are formed in individuals on the basis of different learning backgrounds, and, if the experiences are positive, an inspirational frame of mind can emerge.

The findings in the quantitative phase of this study, however, indicated that attitudinal factors for the boys and the girls did not influence their mathematics performance significantly. In addition, the qualitative phase of the study confirmed that many of the students (study participants) took mathematics mainly because it was a mandatory subject without considering what benefit they could derive from it in the future. In the qualitative findings, as well, some of the students were nonchalant about the subject while other students took a keen interest in it (see Section 5.4.3 of the qualitative findings).

Taking the mathematics performance of the students according to gender into consideration, their overall mathematics performance was above average. Furthermore, the qualitative findings (see Section 5.5.2) revealed that socio-economic status and, especially, parental motivation were crucial in the students' performance in mathematics. Some of the students reported that their parents either directly taught them mathematics or employed home teachers to complement class work.

6.3.2 Primary research question

The primary research question was: How does attributional style relate to mathematics performance in Nigerian senior secondary schools over and above socio-demographic and attitudinal factors?

I dealt with the three sub-questions of the primary research question by discussing each of them separately (see Sections 6.3.1.1 to 6.3.1.3). Consequently, I answer the primary question by merely providing a brief synopsis of the discussions.

Attributional style thus relates in a variety of ways to mathematics performance in Nigerian senior secondary schools over and above socio-demographic and attitudinal factors. Providing a clear answer to the primary research question is problematic for a number of reasons. First,

as has been shown, the overlap between the quantitative and the qualitative findings of the study was not perfect. Quite the opposite. Second, no significant relationship was found between attributional style and mathematics performance. Possible reasons for this were discussed in Chapter 4 especially. Third, regarding how the stability and globality dimensions of the Attributional Style Questionnaire predicted mathematics performance, the boys' and the girls' outcomes did not correlate positively at all levels. Fourth, regarding how gender, socio-economic status, and attitudinal factors can influence mathematics performance, the boys' socio-economic status had a significant influence on their mathematics performance while, in the case of the girls, socio-economic status had little influence. There could be many reasons for these findings (some of which were discussed in Chapters 4 and 5), which should be examined further in future research.

6.4 ETHICAL CONSIDERATIONS

The ethical considerations outlined in Chapter 3 were adhered to strictly in the present study. The following procedures applied.

- Voluntary participation and informed consent. The study participants (students) were informed about the nature and purpose of the study before taking part in it. They were told that their involvement was voluntary and that they could opt out of the process at any stage without any negative consequences. Written consent was obtained from the participants and their parents, indicating the participants' willingness to participate in the study.
- Privacy and confidentiality. The participants' right to privacy and confidentiality of information was safeguarded and protected throughout the study. They were also assured that their names or identities would be kept confidential during the study and afterwards and that the data collected would be kept safely. A confidential relationship was thus established between the participants and me.
- Adherence to ethical standards. I adhered closely to the ethical guidelines stipulated in the Ethics and Research Statement of the Faculty of Education, University of Pretoria.[13]

6.5 STRENGTHS OF THE STUDY

The following factors were considered the strengths of the study.

- The mixed methods approach increased the trustworthiness of the study (Connelly, 2016; Polit & Beck 2014) and facilitated a better understanding of the results. The study participants (students) confirmed their understanding of the questionnaire through their

[13] For more details, see Chapter 3, Section 3.

objective responses and narratives during the focus group interviews. The mixed methods approach gave me first-hand knowledge of the participants' educational experience in a natural setting.

- The quantitative research method is used mainly in studies on attributional styles and academic performance. The present study went further by giving broader perspectives about the central phenomena of the research through the mixed methods approach. In the quantitative phase of the study, use was made of the Attributional Style Questionnaire (ASQ) (Dykema et al., 1996), which had been validated and standardised and found to be a reliable assessment instrument for the study. Regarding the qualitative phase of the study, focus group interviews were conducted with the participants, resulting in the collection of detailed and comprehensive data.
- The study participants reflected the different ethnic groups in Nigeria with different languages and home backgrounds. Lagos State is inhabited by people of diverse cultures across Nigeria, and most of the children there attend the public secondary schools.
- Another strength of the study was its ability to glean the attitudes of the students towards mathematics as one of the moderating variables. To the best of my knowledge, no previous studies have related the attitude of students with different attributional styles to mathematics performance.
- As discussed in Chapters 1 and 2, attributional style and mathematics performance have not been studied extensively in Nigeria or other African countries (as well as other Global South countries). From a cross-cultural point of view, this study could be added to the international literature for comparison and other purposes.

6.6 LIMITATIONS OF THE STUDY

The following factors could be considered limitations of the study.

- The use of the ASQ domain-general instead of the domain-specific could conceivably have affected the outcomes of the study.
- The truthfulness or not of the participants (students) in completing the questionnaire could be considered a limitation.
- The study was limited to two education districts in Lagos State, and the results should therefore not be extrapolated to all education districts in Nigeria. The views expressed by the participants might or might not align with those of students in other education districts.
- The dearth of literature on attributional style and mathematics performance could have limited the depth of the discussion of my research.

6.7 RECOMMENDATIONS

6.7.1 Recommendations for improved practice

Based on the findings of this study, secondary school teachers in mathematics should endeavour to help learners develop a positive attitude that would influence their mathematics performance and perceptions of mathematics positively. Moreover, workshops aimed at enhancing teachers' professional etiquette and qualifications should be conducted frequently. Likewise, attempts should be made to bolster learners' study orientation and related aspects (including their study methods, study habits, problem-solving behaviour in mathematics, mathematics confidence, study environment in mathematics, as well as their information processing skills.

6.7.2 Recommendations for policy-makers

- Curriculum planners and policy-makers should make use of qualified mathematics teachers well-versed in subject content and instructional strategy.
- Regular training should be organised for mathematics teachers to keep them abreast of contemporary issues in education in general and mathematics education in particular.
- A classroom environment conducive to meaningful mathematics instruction should be a priority as well as the provision of more classrooms to reduce overpopulation in the classroom and enhance the quality of mathematics teaching.
- Policy-makers should incorporate into the school curriculum programmes that will help make students self-confident, emotionally stable, more motivated and resilient in whatever academic programme they engage in.
- Regular training of health professionals such as psychologists, life orientation teachers, and social workers (as well as teachers) should be organised to enable them to keep abreast of contemporary issues in education in general and to provide support to learners who experience study orientation difficulties in particular (such as learners' attitude towards mathematics, their motivation to work hard in mathematics, their mathematics confidence and anxiety, their study environment and its impact on their motivation to study mathematics, and their will to persist when struggling in mathematics, even in the face of severe environmental challenges).
- Training should be organised for the abovementioned health professionals to help them provide learning support, guidance, and counselling to learners who experience barriers to learning and achievement in mathematics.

6.7.3 Recommendations for further research

In the light of the findings of this study, the following recommendations are made for further research.

- An attributional style questionnaire that covers academic issues, such as an Academic Attributional Style Questionnaire (AASQ), should be used on a sample similar to that in the present study.
- The results of this study revealed no significant correlation between attributional style and mathematics performance. The variables used in the study should, in future research, be replicated with different samples.
- In this study, I explored three variables (gender, socio-economic status, and attitude) that moderated attributional styles and mathematics performance. Future studies should include the following variables as moderators for the attributional style and mathematics performance of students: adjustment of students to school environment, attitude of students towards school, and mathematics teacher training and experience.
- The present study was carried out in an urban centre. Future studies on attributional style and mathematics performance should be conducted in rural areas. In addition, such studies should compare the performance of rural and urban students (especially regarding the influence of being economically disadvantaged on performance in mathematics).
- A new attributional scale should be developed in a developing country context (such as Nigeria or any other African country). Such a scale could be exported to and adapted elsewhere in the world as well. Better still, the scale should be developed jointly by teams from across the world.

6.8 WHAT WOULD I HAVE DONE DIFFERENTLY?

i. I would have preferred the study to have been an intervention with an attributional retraining programme where the attributional style questionnaire would have served as the study instrument using the pre- and post-mathematics scores of the students. This would have given me greater insight into the students' performance in mathematics.
ii. It was only after the data collection that I discovered there was a domain-specific ASQ, namely an Academic Attributional Style Questionnaire (AASQ), which would have served the purpose of the research more appropriately.
iii. I would have preferred to use one school per education district in Lagos State, with its six education districts, as this would have covered the entire population of the state

6.9 POSSIBLE CONTRIBUTIONS OF THE STUDY

The study's outcomes could contribute to a greater understanding of attributional style (AS) in respect of two major AS theoretical constructs, namely stability and globality. The study could additionally add to the existing literature on the AS of students and their academic performance (Cortes-Suarez & Sandiford, 2008; Mok, Kennedy, & Moore, 2011; Toland & Boyle, 2008). The results of the study could also help in reconceptualizing the potential of AS in achieving educational goals and add to the knowledge on the extent to which students' AS could impact the quality of mathematics performance specifically and academic performance generally. The study outcomes could furthermore sensitize teachers to selecting or adapting instructional techniques that could positively impact students' causal attributions and enhance the quality of their academic performance and work habits. The results of the study could also offer important insights into the educational, cultural, and emotional challenges that students face.

In a practical sense, the outcomes of the study could add to school administrators' existing knowledge regarding students' needs, which, in turn, could help them devise policies to meet such needs. The outcomes could create awareness in public schools in Nigeria about the benefits of using AS to motivate students to study mathematics in particular and other subjects in general. The findings of the study could also help school psychologists and guidance counsellors design programmes that could assist students in achieving their life goals and living purposeful lives by bolstering their attributions.

6.10 PERSONAL REFLECTION ON THE STUDY

My PhD journey started with the desire to find the reasons for the high failure rate in mathematics among secondary school students. As a college of education lecturer, I have been inundated with complaints about failures in mathematics from lecturers teaching mathematics in the Department of General Studies of Education. This department is responsible for the general and compulsory courses (including a course in mathematics) offered to all students admitted to the college. The high failure rate in mathematics prompted me to investigate whether the failure could be traced to secondary schools where students are taught and orientated in mathematics.

Several reasons have been advanced for mathematics failure in secondary schools such as poor study habits, teacher qualifications, lack of instructional materials, large classes, inherent difficulties in mathematics, mathematics anxiety and attitude, teaching methods, learning environment, lack of concentration, lack of enthusiasm for the subject, and socio-economic

status. My awareness of these reasons or factors made me realise that I needed to think of a PhD title that would incorporate the internal as well as the external factors mentioned above in a study. Believing that these factors could be harnessed into one practicable and researchable topic, the attributional style and mathematics performance of secondary school students came to my mind.

My research journey started on a pleasant note with preliminary readings on theoretical approaches to my study. Soon, however, all the challenges faced by PhD students began to surface. Challenges such as the methodological processes of research and the adherence to the strict procedures that quantitative study is known for. The study participants articulated their needs and challenges regarding their welfare and academic issues generally and mathematics in particular. The study helped me appreciate the plight of the students and also of the teachers. The teachers' office accommodation, for example, was below standard, which could also have a negative effect on the students' academic performance.

After ten years of study, I now understand the situation of mathematics students who struggle to pass mathematics so much better. Sadly, after a period of six years of supervision by a different supervisor, and close to the time I was meant to submit my bounded copies for examination purposes, I was informed that I would not be allowed to submit my thesis because it was thought I would not pass. I was left feeling shattered and devastated. However, with the compassionate support of others, I gradually regained my motivation. I pleaded to be allowed to redo my research and resubmit my thesis. The fact that I have succeeded in this has inspired me more than I can ever say. I can therefore identify with students who have to deal with what some regard as almost insurmountable challenges in mathematics. I intend to apply what I have learned in a way that will help others benefit from my personal experiences.

6.11 CONCLUSION

This study explored the effects of attributional style on the mathematics performance of students in senior secondary schools. Based on the findings as discussed in Chapters 4 and 5, attributional style relates in a variety of ways to mathematics performance over and above socio-demographic and attitudinal factors. The participants (students) in this mixed methods study responded well to the questionnaire and also gave objective responses in the focus group interviews. This chapter summarised all the preceding chapters and discussed the answers to the research questions. This was followed by a discussion of ethical considerations, the strengths of the study and its limitations, recommendations, my personal reflections on the study, and the conclusion.

The following cannot be overemphasised: The dearth of students passing Senior Secondary School (SSS) 3 (equivalent to Grade 12) with good marks in mathematics; the trauma so many mathematics students suffer in their attempt to pass the subject; the impact that failure in mathematics has on their personal and professional lives due to the fact that the economies of all countries are driven by gateway subjects such as mathematics; and the importance of dealing with other factors in mathematics achievement (such as students' attributional style). Viewed through this lens, I hope this study will help resolve some of the challenges so many students face in their attempt to pass mathematics, qualify for fields of study that will help them not only find a job but, indeed, become employable, live successful and meaningful lives, rekindle their sense of hope, and make meaningful contributions to the economy and the social wellbeing of all citizens

LIST OF REFERENCES

Abdulahi, O. E., & Onasanya, S. A. (2010). Effects of teachers' effectiveness on Kwara State secondary school students' academic achievement in mathematics. *The Social Sciences, 5*(4), 286-292. Retrieved from http://dx.doi.org/10.3923/sscience.2010.286.292

Abramson, L. Y., Seligman, M. E. P., & Teasdale, J. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology*, *87*, 49-74. Retrieved from https://psycnet.apa.org/doi/10.1037/0021-843X.87.1.49

Adebule, S. O., & Ayoola, O. O. (2016). Impact of instructional materials on students' academic performance in mathematics in secondary schools in Ekiti State, Nigeria. *Research Journal of Educational Studies and Review*, *2*(1), 1-4. Retrieved from http://pearlresearchjournal.org/journals/rjesr/index.html

Adebule, S.O., & Aborisade, O. J. (2014). Gender comparison of attitude of senior secondary school students towards mathematics in Ekiti state, Nigeria. *European Scientific Journal*, *10*(19), 153-160. Retrieved from http://dx.doi.org/10.19044/esj.2014.v10n19p%25p

Adegoke, B. A. (2011). Effect of indirect teacher influence on dependent-prone students' learning outcome in secondary school mathematics. *Electronic Journal of Research in Educational Psychology, 9*(1), 283-308. Retrieved from http://repositorio.ual.es/bitstream/handle/10835/878/Art_23_485.pdf?sequence

Ahles, P. M., & Contento, J. M. (2006). Explaining helping behaviour in a cooperative learning classroom setting using attribution theory. *Community College Journal of Research and Practice*, *30*, 609–626. https://doi.org/10.1080/10668920500210191

Aire, J. E., & Tella, Y. (2003). The impact of motivation on student's school academic performance in Nigeria. *Journal of Personality study and group behaviour*, *23*(1), 107-114. Retrieved from www.ejmste.com/v3n2/EJMSTEv3n2Tella.pdf

Ajai, J. T., & Imoko, B. I. (2015). Gender differences in mathematics achievement and retention scores: A case of problem-based learning method. *International Journal of Research in Education and Science, 1*(1), 45-50. Retrieved from https://files.eric.ed.gov/fulltext/EJ1105194

Ajayi, K. O., Lawani, A. O., & Salomi, M. O. (2012). The influences of self-concept and academic motivation on students' attitude to mathematics in selected secondary schools in Ogun State, Nigeria. *European Journal of Scientific Research*, *67*(3), 444-455. Retrieved from http://www.europeanjournalofscientificresearch.com

Ajayi, K. O., Lawani, A.O., & Adeyanju, H. I. (2011). Effects of students' attitude and self-concept on achievement in senior secondary school mathematics in Ogun State, Nigeria. *Journal of Research in National Development, 9*(2), 202-211. Retrieved from https://www.ajol.info/index.php/jorind/article/view/91722

Akase J., Mwekaven, S. S., Awuhe, R. T., & Tombuwua, P.T. (2015). Mathematics, science and technology education: Their place in the Nigerian national transformation agenda. *International Journal of Science and Technology, 4*(5), 199-203. Retrieved from http://www.journalofsciencestechnology.org/archive/2015/mayvol4no5/78379114499826

Akinsola, M. K., & Olowojaiye, F. B. (2008). Teacher instructional methods and student attitudes towards mathematics. *International Electronic Journal of Mathematics Education, 3*(1), 60-73. Retrieved from http://www.iejme.com/download/teacher-instructional-methods-and-student-attitudes-towards-mathematics

Alloy, L. B., Peterson, C., Abramson, L. Y., & Seligman, M. E. P. (1984). Attributional style and the generality of learned helplessness. *Journal of Personality and Social Psychology*, *46*(3), 681-687. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/6707869

Alordiah, C. O., Akpadaka, G., & Oviogbodu, C. O. (2015). The Influence of gender, school location and socio-economic status on students' academic achievement in mathematics. *Journal of Education and Practice, 6*(17), 130-137. Retrieved from https://files.eric.ed.gov/fulltext/EJ1079759

Andamon, J., & Tan, D. A. (2018). Conceptual understanding, attitude and performance in mathematics of grade 7 students. *International Journal of Scientific & Technology Research*, *7*(8), 96-105. Retrieved from http://www.ijstr.org/

Aremu, A., & Tella, A. (2009). The relationship between gender, age, mental ability, anxiety, mathematics self-efficacy and achievement in mathematics. *Cypriot Journal of Educational Sciences, 4*, 113-124. Retrieved from http://www.academia.edu/34804410

Arends, F., Winnaar, L., & Mosimege, M. (2017). Teacher classroom practices and Mathematics performance in South African schools: A reflection on TIMSS 2011. South African Journal of Education, *37*(3), 1-11. https://doi.org/10.15700/saje.v37n3a1362

Arhin, A. K., & Offoe, A. K. (2015). Gender differences and mathematics achievement of senior high school students: A case of Ghana National College. *Journal of Education and Practice*, *6*(33), 67-74. Retrieved from https://files.eric.ed.gov/fulltext/EJ1083493.pdf

Ary, D., Jacobs, L. C., & Sorensen, C. K. (2010). *Introduction to research in education* (8th Ed.). Belmont, CA: Wadsworth, Cengage Learning.

Ashby, B. (2009). Exploring children's attitude towards mathematics. *Proceedings of the British Society for Research into Learning Mathematics, 29*(1), 7-12. Retrieved from https://www.researchgate.net/publication/237345708_Exploring_Children's_Attitudes_towards_Mathematics

Ashcraft, M. H., & Moore, A. M. (2009). Mathematics anxiety and the affective drop in performance. *Journal of Psychoeducational Assessment*, *27*(5), 197-205. doi:10.1177/0734282908330580.

Ashforth, B. E., & Fugate, M. (2006). Attributional style in work settings: Development of a measure. *Journal of Leadership & Organizational Studies, 12*(3), 12-29. doi:10.1177/107179190601200302

Asikhia, O. A. (2014). Effect of Cognitive restructuring on the reduction of mathematics anxiety among senior secondary school students in Ogun State, Nigeria. *International Journal of Education and Research*, *2*(2), 1-20. Retrieved from https://www.ijern.com/journal/February-2014/30.pdf

Askim, M. K. (1999). *The role of attributional explanatory style in the perceived outcomes of entrepreneurial venture failure* (Doctoral thesis, Purdue University, United States of America). Retrieved from https://docs.lib.purdue.edu/dissertations/AAI9952058/

Atalmis, E. H., Yilmaz, M., & Saatcioglu, A. (2016). How does private tutoring mediate the effects of socio-economic status on mathematics performance? Evidence from Turkey. *Policy Futures in Education*, *14*(8), 1135-1152. doi: 10.1177/1478210316674159

Awofala, A. O. A. (2011). Is gender a factor in mathematics performance among Nigerian senior secondary students with varying school organization and location? *International Journal of Mathematics Trends and Technology, 2*(3), 17-21. Retrieved from http://www.internationaljournalssrg.org

Baştürk, S. (2016). Secondary school mathematics student teachers' causal attribution for success and failure in mathematics. *European Journal of Science and Mathematics Education, 4*(4), 365-379. Retrieved from https://files.eric.ed.gov/fulltext/EJ1107834.pdf

Baştürk, S., & Yavuz, I. (2010). Investigating causal attributions of success and failure on mathematics instructions of students in Turkish high schools. *Social and Behavioral Sciences*, *2*, 1940-1943. doi:10.1016/j.sbspro.2010.03.260

Bempechat, J., Drago-Severson, E., & Bonlay, B. A. (2002). Attribution for success and failure in mathematics: A comparative study of Catholic and puplic schools. *Catholic education: Journal of Inquiry and Practice*, *5*(3) 357-372.

Bergman, M. M. (2010). On concepts and paradigms in mixed methods research. *Journal of Mixed Methods Research*, *4*(3), 171-175. Retrieved from https://doi.org/10.1177%2F1558689810376950

Boruchovitch, E. (2004). A study of causal attributions for success and failure in mathematics among Brazilian Students. *Inter-American Journal of Psychology, 38*(1), 53-60. Retrieved from http://repositorio.unicamp.br/bitstream/REPOSIP/94090/1/2-s2.0-33751551375

Bouchaib, B., Ahmadou, B., & Abdelkader, S. (2018). High school students' attributions of success in English Language learning. *International Journal of Instruction, 11*(2), 89-102. https://doi.org/10.12973/iji.2018.1127a

Bridges, K.R. (2001). Using attributional style to predict academic performance: How does it compare to traditional methods? *Personality and Individual Differences*, *31*(5), 723-730. doi: 10.1016/S0191-8869(00)00174-4

Brouse, C. H., Basch, C. E., LeBlanc, M., McKnight, K. R., & Lei, T. (2010). College students' academic motivation: Differences by gender, class, and source of payment. *College Quarterly*, *13*(1) 1-10. Retrieved from https://files.eric.ed.gov/fulltext/EJ912093.pdf

Bryman, A. (2006). Integrating quantitative and qualitative research: How is it done? *Qualitative Research, 6*(1), 97-113. doi:10.1177/1468794106058877

Buhagiar, M. A. (2013). Mathematics student teachers' views on tutor feedback during teaching practice. *European Journal of Teacher Education*, *36*(1), 55-67. Retrieved from https://doi.org/10.1080/02619768.2012.678484

Burden, R. (2005). *Dyslexia and Self Concept. Seeking a Dyslexic Identity*. London: Whurr Publishers.

Camgoz, S. M., Tektas, O.O., & Metin, I. (2008). Academic attributional style, self- efficacy and gender: A cross-cultural comparison. *Behaviour and Personality*, *36*(1), 97-114. https://doi.org/10.2224/sbp.2008.36.1.97

Carey, E., Hill F., Devine, A., & Szücs, D. (2016). The chicken or the egg? The Direction of the relationship between mathematics anxiety and mathematics performance. *Frontier in Psychology*, *6*, 1-6. doi: 10.3389/fpsyg.2015.01987

Casserly, A. M. (2013). The socio-emotional needs of children with dyslexia in different educational settings in Ireland. *Journal of Research in Special Educational Needs, 13*(1), 79-91. https://doi.org/10.1111/j.1471-3802.2011.01227.x

Çelik, H. C. (2018). The effects of activity based learning on sixth grade students' achievement and attitudes towards mathematics activities. *EURASIA Journal of Mathematics, Science and Technology Education*, *14*(5), 1963-1977. Retrieved from https://doi.org/10.29333/ejmste/85807

Ch, A. H., Malik, M., Fatima, G., & Abid, U. (2017). Secondary school students' socio economic status, mathematics self-concept and achievement goal orientations: A correlational investigation. *Bulletin of Education and Research*, *39*(1), 215-227. Retrieved from https://files.eric.ed.gov/fulltext/EJ1210306.pdf

Chen, L., Bae, S. R., Battista, C., Qin, S., Chen, T., Evans, T.M. & Menon, V. (2018). Positive attitude toward math supports early academic success: Behavioral evidence and neurocognitive mechanisms. *Psychological Science*, *29*(3), 390-402. Retrieved from https://doi.org/10.1177/0956797617735528

Chiu, M. M. & Xihua, Z. (2008). Family and motivation effects on mathematics achievement: Analyses of students in 41 countries. *Learning and Instruction, 18*, 321-336. Retrieved from https://doi.org/10.1016/j.learninstruc.2007.06.003

Clark, L. A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment, 7*(3), 309-319. Retrieved from http://www.bwgriffin.com/gsu/courses/edur9131/content/Clark_validity_scaledevelopment.pdf

Clinkenbeard, P. R. (2012). Motivation and gifted students: Implications of theory and research. *Psychology in the Schools, 49*(7), 622-631. doi: 10.1002/pits.21628

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education*. London: Routledge.

Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education* (7th Ed.). London: Routledge.

Combs, J. P., Slate, J. R., Moore, G. W., Bustamante, R. M., Onwuegbuzie, A.J., & Edmonson, S. L. (2010). Gender differences in college preparedness: A state wide study. *Urban Review*, *42*, 441-457. doi 10.1007/s11256-009-0138-x

Connelly, L. M. (2016). Trustworthiness in qualitative research. *Medsurg Nursing*, *25*(6), 435-437. Retrieved from https://pdfs.semanticscholar.org/b467/089d0422a83fe1d5715d837dd39d9fce4e7c.pdf

Contini, D., Di Tommaso, M. L., & Mendolia, S. (2017). The gender gap in mathematics achievement: Evidence from Italian data. *Economics of Education Review*, *58*, 32-42. Retrieved from https://doi.org/10.1016/j.econedurev.2017.03.001

Corp, IBM. (2017). *IBM SPSS statistics: Version 24* Chicago, IL: IBM Corporation.

Cortes-Suarez, G., & Sandiford, J. R. (2008).Causal attribution for success or failure of students in college algebra. *Community College Journal of Research and Practice*, *32*, 325-346. doi:10.1080/10668920701884414

Creswell, J. W. (2012). *Educational research: planning, conducting, and evaluating quantitative and qualitative research*. Boston, MA: Pearson.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative and mixed method approaches*. Thousand Oaks, CA: Sage.

Creswell, J. W., & Plano Clark, V. L. (2007). *Designing and conducting mixed methods research*. Thousand Oaks, CA: Sage.

Daggol, G. D. (2018). An Examination of Turkish college-level students' learned helplessness states in EFL context. *Journal of Higher Education and Science*, *8*(1), 145-161. doi: 10.5961/jhes.2018.257

Dasborough, M., Harvey, P., & Martinko, M. J. (2011). An introduction to attributional influences in organizations. *Group & Organization Management, 36*(4), 419-426. doi:10.1177/1059601111410563

Dauda, B., Jambo, H. E., & Umar, M. A. (2016). Students' perception of factors influencing teaching and learning of mathematics in senior secondary schools in Maiduguri metropolis, Borno State, Nigeria. *Journal of Education and Practice*, *7*(20), 114-122. Retrieved from https://files.eric.ed.gov/fulltext/EJ1109160.pdf

Davadas, S. D., & Lay, Y. F. (2018). Factors affecting student's attitude towards mathematics: A structural equation modelling approach. *, EURASIA Journal of Mathematics, Science and Technology Education, 14*(1), 517-529. doi:10.12973/ejmste/80356

Denscombe, M. (2008). Communities of practice: A research paradigm for the mixed methods approach. *Journal of Mixed Methods Research*, *2*(3), 270-283. Retrieved from https://doi.org/10.1177%2F1558689808316807

DeVellis, R. F. (2012). *Scale development: Theories and applications*. Los Angeles: SAGE Publications.

Dodeen, H. M., Abdelfattah, F., & Alshumrani, A. (2014). Test-taking skills of secondary students: The relationship with motivation, attitudes, anxiety and attitudes towards tests. *South African Journal of Education*, *34*(2), 1-18. Retrieved from http://sajournalofeducation.co.za/index.php/saje/article/viewFile/866/440

Dowker, A., Sarkar, A. & Lool, C. Y. (2016). Mathematics anxiety: What have we learned in 60 years. *Frontiers in Psychology*, *16*(508) 1-17. Retrieved from https://doi.org/10.3389/fpsyg.2016.00508

Dykema, J., Bergbower, K., Doctora, J. D., & Peterson, C. (1996). An attributional style questionnaire for general use. *Journal of Psychoeducational Assessment*, *14*, 100-108. Retrieved from https://psycnet.apa.org/doi/*10*.1177/073428299601400201

Else-Quest, N. M., Hyde, J. S., & Linn, M. C. (2010). Cross-national patterns of gender differences in mathematics: A meta-analysis. *Psychological Bulletin*, *136*(1), 103-127. doi: 10.1037/a0018053

Erdemir, N., & Bakırcı, H. (2009). The change and the development of attitudes of science teacher candidates towards branches. *Kastamonu Education Journal*, *17*(1), 161-170. Retrieved from https://dergipark.org.tr/en/download/article-file/817972

Escalera Chávez, M. E., Moreno García, E., & Rojas Kramer, C. A. (2019). Confirmatory model to measure attitude towards mathematics in higher education students: Study case in SLP Mexico. *International Electronic Journal of Mathematics Education*, *14*(1), 163-168. Retrieved from https://doi.org/10.29333/iejme/3984

Escalera-Chávez, M. E., Moreno-García, E., García-Santillán, A., & Rojas-Kramer, C. A., (2017). Factors that promote anxiety toward math on high school students. *Eurasia Journal of Mathematics, Science, and Technology Education, 13*(1), 189-199. Retrieved from https://doi.org/10.12973/eurasia.2017.00611a

Ewumi, A. M. (2012). Gender and socio-economic status as correlates of students' academic achievement in senior secondary schools. *European Scientific Journal*, *8*(4), 23-36. https://doi.org/10.19044/esj.2012.v8n4p%25p

Farid, M, F., & Iqbal, H. M. (2012). Causal attribution beliefs among school students in Pakistan. *Interdisciplinary Journal of Contemporary Research in Business*, *4*(2), 411-424. Retrieved from https://journal-archieves19.webs.com/411-424

Fasakin, P. J., (2011). Effects of Everyday Phenomena on Students' Achievement, Attitude and Practical Skills in Physics. (Masters Dissertation, University of Ibadan, Ibadan, Nigeria).

Fetters, M. D., Curry, L. A., & Creswell, J. W. (2013). Achieving integration in mixed methods designs - principles and practices. *Health Services Research*, *48*(6pt2), 2134-2156. Retrieved from https://doi.org/10.1111/1475-6773.12117

Finley, S. (2008). Critical art based inquiry. In L. M. Given (Ed.), *The Sage encyclopaedia of qualitative research method,* vol. 1 & 2 (pp. 142-145). Thousand Oaks, CA: Sage.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behaviour. An introduction to theory and research.* Reading: Addison-Wesley.

Gafoor, K. A., & Kurukkan, A. (2015). Why high school students feel mathematics difficult ? An exploration of affective beliefs. UGC Sponsored National Seminar on Pedagogy of Teacher Education- Trends and Challenges, (August), 1–6. Retrieved from http://files.eric.ed.gov/fulltext/ED560266.pdf

Geist, E. A., & King, M. (2008). Different, not better: Gender differences in mathematics learning and achievement. *Journal of Instructional Psychology*, *35*(1), 43-52. Retrieved from https://search.proquest.com/openview/a8f06976f062dfea2f12b9809cc3c7a8/1?pq-origsite=gscholar&cbl=48173

George, A., & Adu, E. O. (2018). Motivation and attitude of grade nine learners towards mathematics in King Williams Town Education District, South Africa. *Ghana Journal of Development Studies*, *15*(1), 135-150. Retrieved from http://dx.doi.org/10.4314/gjds.v15i1.7

George, R. (2000). Measuring change in students' attitudes toward science over time: An application of latent variable growth modelling. *Journal of Science Education and Technology, 9*(3), 213–215. Retrieved from https://link.springer.com/article/10.1023/A:1009491500456

Geske, A., Grinfelds, A., Dedze, I., & Zhang, Y. (2006). Family background, school quality and rural-urban disparities in student learning achievement in Latvia. *Prospects*, *36*(*4)*, 420-431. Retrieved from https://link.springer.com/article/10.1007%2Fs11125-006-9002-x

Gibb, B. E., Zhu, L., Alloy, L, B., & Abramson, L. Y. (2002). Attributional styles and academic achievement in university students: A longitudinal investigation. *Cognitive Therapy and Research, 26*(3), 309-315. Retrieved from https://link.springer.com/article/10.1023/A:1016072810255

Goldin, G. A. (2002). Affect, meta-affect, and mathematical belief structures. In *Beliefs: A hidden variable in mathematics education?* (pp. 59-72). Springer, Dordrecht. Retrieved from https://doi.org/10.1007/0-306-47958-3_4

Gordeeva, T., Sheldon, K., & Sychev, O. (2019). Linking academic performance to optimistic attributional style: Attributions following positive events matter most. *European Journal of Psychology of Education*, *35*(1), 21-48. doi: 10.1007/s10212-019-00414-y

Gray, D.E. (2009). *Doing research in the real world*. London: SAGE Publication Ltd.

Greene, J. C., Caracelli, V. J., & Graham, W. F. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis*, *11*(3), 255–274. Retrieved from https://doi.org/10.3102/01623737011003255

Gregory, I. (2003). *Ethics in research*. London, England: MPG Books.

Gresham, G. (2018). Preservice to in-service: Does mathematics anxiety change with teaching experience? *Journal of Teacher Education*, *69*(1), 90-107. Retrieved from https://doi.org/10.1177%2F0022487117702580

Guetterman, T. C., & Fetters, M. D. (2018). Two methodological approaches to the integration of mixed methods and case study designs: A systematic review. *American Behavioral Scientist, 62*(7), 900-918. Retrieved from https://doi.org/10.1177%2F0002764218772641

Gurland, S. T., Grolnick, W. S., & Friendly, R. W. (2012). The role of expectations in children's experience of novel events. *Journal of Experimental Child Psychology, 113*(3), 305-321. https://doi.org/10.1016/j.jecp.2012.06.010

Halat, E., Jakubowski, E., & Aydin, N. (2008). Reform-based curriculum and motivation in geometry. *Eurasia Journal of Mathematics, Science & Technology Education*, *4*(3), 285-292. https://doi.org/10.12973/ejmste/75351

Hall, C., Goodwin, D., Heleski, C., Randle, H., & Waran, N. (2008). Is there evidence of learned helplessness in horses? *Journal of Applied Animal Welfare Science, 11*(3), 249-266. https://doi.org/10.1080/10888700802101130

Hanson, J. L., Balmer, D. F., & Giardino, A. P. (2011). Qualitative research methods for medical educators. *Academic Pediatrics*, *11*(5), 375-386. Retrieved from https://doi.org/10.1016/j.acap.2011.05.001

Hardré, P. L., Chen, C. H., Huang, S. H., Chiang, C. T., Jen, F. L & Warden, L. (2006) Factors affecting high school students' academic motivation in Taiwan. *Asia Pacific Journal of Education*, *26*(2), 189-207. Retrieved from https://doi.org/10.1080/02188790600937326

Harris, A., & Goodall, J. (2008). Do parents know they matter? Engaging all parents in learning. *Educational research*, *50*(3), 277-289. Retrieved from https://doi.org/10.1080/00131880802309424

Hart, L. (1989). Describing the affective domain saying what we mean. In: *D. McLeod & V. Adams (Eds.). Affect and mathematical problem solving* (pp. 37-45). New York, Springer-Verlag. Retrieved from https://link.springer.com/chapter/10.1007/978-1-4612-3614-6_3

Harvey, P., Martinko, M. J., & Gardner, W. L. (2006).Promoting authentic behaviour in organizations: An attributional perspective. *Journal of Leadership & Organizational Studies,10*(3), 1-11. doi:10.1177/107179190601200301

Haugen, R., Lund, T. & Ommundsen, Y. (2008).Personality dispositions, expectancy and context in attributional thinking. *Scandinavian Journal of Educational Research, 52*(2), 171-185. Retrieved from https://doi.org/10.1080/00313830801915804

Haynes Stewart, T. L., Clifton, R. A., Daniels, L. M., Perry, R. P., Chipperfield, J. G., & Ruthig, J. C. (2011). Attributional retraining: Reducing the likelihood of failure. *Journal of Social Psychology of Education*, *14*, 75–92. doi 10.1007/s11218-010-9130-2

Helms, J. E., Henze, K. T., Sass, T, L., & Mifsud, V. A. (2006). Treating Cronbach's alpha reliability coefficients as data in counselling research. *The Counseling Psychologist, 34*, 630-660. doi: 10.1177/0011000006288308

Hernandez, M. (2014). The Relationship between mathematics achievement and socio-economic status. eJEP: *eJournal of Education Policy*, 1-9. Retrieved from https://files.eric.ed.gov/fulltext/EJ1158606.pdf

Hindi, S. (2000). An interest researcher's perspective on the effects of extrinsic and intrinsic factors on motivation. In C. Sansone & J. M. Harackiewicz (Eds.), *Intrinsic and extrinsic motivation: The search for optimum motivation and performance* (pp. 309-339). San Diego, CA: Academic Press. Retrieved from https://doi.org/10.1016/B978-012619070-0/50033-7

Higgins, N. C., & LaPointe, M. R. P. (2012). An individual differences measure of attributions that affect achievement behaviour: Factor structure and predictive validity of the academic attributional style questionnaire. *SAGE Open*, 1-15. doi:10.1177/2158244012470110

Houston, D. M. (2016). Revisiting the relationship between attributional style and academic performance. *Journal of Applied Social Psychology, 46*, 192-200. doi:10.1111/jasp.12356

Houston, E. (2020-06-08). *What are attributional and explanatory styles in psychology*? Retrieved from https://positivepsychology.com/explanatory-styles-optimism/

Hsieh, P. H., & Kang, H. S. (2010). Attribution and self-efficacy and their interrelationship in the Korean EFL context. *Language Learning*, *60*(3), 606-627. doi:10.1111/j.1467-9922.2010.00570.x

Idowu, O. O. (2016). An investigation of mathematics performance of high School students in Lagos State, Nigeria: external factors. *Urban Education Research & Policy Annuals*, *4*(1), 178-188. Retrieved from https://journals.uncc.edu/urbaned/article/view/431

Ifamuyiwa, S. A., & Akinsola, M. K. (2008).Improving senior secondary school students' attitude towards mathematics through self and cooperative-instructional strategies. *International Journal of Mathematical Education in Science and Technology*, *39*(5), 569-585. Retrieved from https://doi.org/10.1080/00207390801986874

Imasuen, K., & Omorogbe, D. E. A. (2016). The influence of gender on junior secondary school students' attitude towards mathematics in Ovia north east local government area of Edo State. *African Research Review*, *10*(4), 115-126. Retrieved from https://www.ajol.info/index.php/afrrev/article/view/145252

Imms, W., & Byers, T. (2017). Impact of classroom design on teacher pedagogy and student engagement and performance in mathematics. *Learning Environment Research, 20,* 139-152. doi 10.1007/s10984-016-9210-0

Ing, M., Webb, N. M., Franke, M. L., Turrou, A. C., Wong, J., Shin, N., & Fernandez, C. H. (2015). Student participation in elementary mathematics classrooms: the missing link between teacher practices and student achievement? *Educational Studies in Mathematics*, *90*(3), 341-356. https://doi.org/10.1007/s10649-015-9625-z

Ivankova, N. V., & Stick, S. L. (2007). Students' persistence in a distributed doctoral program in educational leadership in higher education: A mixed methods study. *Research in Higher Education, 48*(1), 93-135. doi: 10.1007/s11162-006-9025-4

Ivankova, N. V., Creswell, J. W., & Plano Clark, V. L. (2010). Foundations and approaches to mixed methods research. In K. Maree (Ed.), *First steps in research* (pp. 255-284). Pretoria: Van Schaik Publishers.

Ivankova, N. V., Creswell, J. W., & Stick, S. L. (2006). Using mixed-methods sequential explanatory design: from theory to practice. *Field Methods, 18*(1), 3-20. https://doi.org/10.1177%2F1525822X05282260

James, T. O. (2009). Attitude of post-primary school students towards mathematics in some schools in Sokoto. *Continental Journal of Education Research*, *2*, 1-5. Retrieved from http://www.wiloludjournal.com

Johnson, B., & Christensen, L. (2012). *Educational research: Quantitative, qualitative, and mixed approach*. Los Angeles: SAGE Publications.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher, 33*(7), 14-26. Retrieved from http://www.jstor.org/stable/3700093

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, *1*(2), 112-133. doi:10.1177/1558689806298224

Kaplan, R. M., & Saccuzzo, D. P. (2009). *Psychological testing: Principles applications and issues*. Belmont, CA: Wadsworth Publishing.

Kasmin, F., Othman, Z., & Ahmad, S. S. S. (2019). Improving students' perception towards learning mathematics: Impact of teaching application of mathematics. *EDUCATUM Journal of Science, Mathematics and Technology, 6*(1), 29-34. Retrieved from https://doi.org/10.37134/ejsmt.vol6.1.4.2019

Khodayarifard, M., Anshel, M. H., & Brinthaupt, T. M. (2006). Relationships between attributional style and trait anxiety for preadolescent Australian boys and girls. *Australian Journal of Educational & Developmental Psychology*, *6*, 26-38. Retrieved from http://www.newcastle.edu.au/group/ajedp/

Khodayarifard, M., Brinthaupt, T. M., & Anshel, M. H. (2010). Relationships of parents' and child's general attributional styles to academic performance. *Social Psychology of Education*, 13(3), 351-365. doi 10.1007/s11218-010-9114-2

KIoosterman, P. (1984). Attribution theory and mathematics education. Paper presented at the annual meeting of the American Educational Research Association; New Orleans. Retrieved from https://files.eric.ed.gov/fulltext/ED244830.pdf

Kleiman, E. M., Chiara, A. M., Liu, R. T., Jager-Hyman, S. G., Choi, J. Y., & Alloy, L. B. (2017). Optimism and well-being: A prospective multi-method and multidimensional examination of optimism as a resilience factor following the occurrence of stressful life events. *Cognition and Emotion, 31*(2) 269–283. doi:10.1080/02699931.2015.1108284.

Klingner, J. K., & Boardman, A. (2011). Addressing the "research gap" in special education through mixed methods. *Learning Disability Quarterly, 34*(3) 208-218. doi:10.1177/0731948711417559

Kniveton, B. H. (2006). Gender and achievement among A-level students working alone or in pairs. *Research in Education*, *75*, 29-39. Retrieved from https://search.proquest.com/openview/17bcd67fc84f1e20ffb9a48db38c2db0/1?pq-origsite=gscholar&cbl=37654

Kontas, H. (2016). The Effect of manipulatives on mathematics achievement and attitudes of secondary school students. *Journal of Education and Learning*, *5*(3), 10-20. Retrieved from http://dx.doi.org/10.5539/jel.v5n3p10

Korn, C. W., Rosenblau, G., Rodriguez Buritica, J. M., & Heekeren, H. R. (2016) Performance feedback processing is positively biased as predicted by attribution theory. *PLoS ONE, 11*(2), 1-19. https://doi.org/10.1371/journal.pone.0148581

LaForge, M. C., & Cantrell, S. (2003). Explanatory style and academic performance among college students beginning a major course of study. *Psychological reports*, *92*(3), 861-865. Retrieved from https://doi.org/10.2466%2Fpr0.2003.92.3.861

Lens, S., & Chris, H. (2010). Effecting Affect: Developing a positive attitude to primary mathematics learning. *Australian Primary Mathematics Classroom*, *15*(1), 18-24. Retrieved from https://files.eric.ed.gov/fulltext/EJ885816.pdf

Levison, D., DeGraff, D. S., & Dungumaro, E. W. (2018). Implications of environmental chores for schooling: Children's time fetching water and firewood in Tanzania. *The European Journal of Development Research*, *30*(2), 217-234. https://dx.doi.org/10.1057%2Fs41287-017-0079-2

Lepper, M. R., & Henderlong, J. (2000). Turning "play" into "work" and "work" into "play": 25 years of research on intrinsic versus extrinsic motivation. In *Intrinsic and extrinsic motivation* (pp. 257-307). Academic Press. Retrieved from https://doi.org/10.1016/B978-012619070-0/50032-5

Lepper, M. R., Corpus, J. H., & Iyengar, S. S. (2005). Intrinsic and extrinsic motivational orientations in the classroom: Age differences and academic correlates. *Journal of educational psychology*, *97*(2), 184-196. doi: 10.1037/0022-0663.97.2.184

Levine, S. C., Vasilyeva, M., Lourenco, S. F., Newcombe, N. S., & Huttenlocher, J. (2005). Socioeconomic status modifies the sex difference in spatial skill. *Psychological Science, 16*(11), 841-845. https://doi.org/10.1111%2Fj.1467-9280.2005.01623.x

Lietz, C. A., & Zayas, L. E. (2010). Evaluating qualitative research for social work practitioners. *Advances in Social Work*, *11*(2), 188-202. Retrieved from https://doi.org/10.18060/589

Lightsey, O. W., & Barnes, P. W. (2007). Discrimination, attributional tendencies, generalized self-efficacy, and assertiveness as predictors of psychological distress among African Americans. *Journal of Black Psychology*, *33*(1), 27-50. doi:10.1177/0095798406295098

Lincoln, Y., & Guba, E. (1985). *Naturalistic inquiry.* Beverly Hills, California: SAGE.

Lloyd, J. E. V., Walsh, J., & Yailagh, M. S. (2005). Sex differences in performance attributions, self-efficacy, and achievement in mathematics: If I'm so smart why don't I know it? *Canadian Journal of Education*, *28*(3), 384-408. https://psycnet.apa.org/doi/10.2307/4126476

Loh, J. (2013). Inquiry into issues of trustworthiness and quality in narrative studies: A perspective. *The Qualitative Report*, *18*(33), 1-15. Retrieved from https://nsuworks.nova.edu/tqr/vol18/iss33/1

Lust, B. (2006). *Child language acquisition and growth*. New York, NY: Cambridge Press.

Maleva, V., Westcott, K., McKellop, M., McLaughlin, R., & Widman, D. (2014). Optimism and college grades: predicting GPA from explanatory style. *Psi Chi Journal of Psychological Research, 19*(3), 129-135.

Maloney, E. A., Risko, E. F., Ansari, D., & Fugelsang, J. (2010). Mathematics anxiety affects counting but not subitizing during visual enumeration. *Cognition*, *114*(2), 293-297. Retrieved from https://doi.org/10.1016/j.cognition.2009.09.013

Maras, P. F., Moon, A., & Gridley, N (2014). Attribution style of adolescents with school-reported social, emotional and behavioural difficulties. *Emotional and Behavioural Difficulties, 19*(4), 426-439. http://dx.doi.org/10.1080/13632752.2014.913760

Marchis, J. (2011). Factors that influence secondary school students' attitude to mathematics. *Procedia - Social and Behavioral Sciences 29*, 786-793. Retrieved from https://doi.org/10.1016/j.sbspro.2011.11.306

Martin, A. J., & Dowson, M. (2009). Interpersonal relationships, motivation engagement, and achievement: Yields for theory, current issues, and educational practice. *Review of Educational Research, 79*(1), 327-365. https://doi.org/10.3102%2F0034654308325583

Martinot, D., & Désert, M. (2007). Awareness of a gender stereotype, personal belief and self-perceptions regarding math ability: when boys do not surpass girls. *Social Psychology Education*, *10*, 455-471. doi 10.1007/s11218-007-9028-9

Mata, M. L., Monteiro, V., & Peixoto, F. (2012). Attitudes towards mathematics: Effects of individual, motivational, and social support factors. *Child Development Research*, 1-10. doi:10.1155/2012/876028

Matteucci, M., & Mignani, S. (2011). Gender differences in performance in mathematics at the end of lower secondary school in Italy. *Learning and Individual Differences, 21*(5), 543-548. https://doi.org/10.1016/j.lindif.2011.03.001

McConney, A., & Perry, L. B. (2010). Science and mathematics achievement in Australia: the role of school socioeconomic composition in educational equity and effectiveness. *International Journal of Science and Mathematics Education*, *8*, 429-452. Retrieved from https://doi.org/10.1007/s10763-010-9197-4

McMillan, J. H., & Schumacher, S. (2010). *Research in education: Evidence-based inquiry*. New Jersey: Pearson Education Inc.

Meece, J. L., Glienke, B. B., & Burg, S. (2006). Gender and motivation. *Journal of School Psychology*, *44*, 351-373. http://dx.doi.org/10.1016/j.jsp.2006.04.004

Merriam, S. B. (1998). *Qualitative research and case study application and education.* San Fransisco: Jossey-Bass.

Moenikia, M., & Zahed-Babelan, A. (2010). A study of simple and multiple relations between mathematics attitude, academic motivation and intelligence quotient with mathematics achievement. *Procedia-Social and Behavioral Sciences*, *2*(2), 1537-1542. Retrieved from https://doi.org/10.1016/j.sbspro.2010.03.231

Mohanty, A., Pradhan, R. K., & Jena, L. K. (2015). Learned helplessness and socialization: A reflective analysis. *Psychology*, *6*, 885-895. http://dx.doi.org/10.4236/psych.2015.67087

Mok, M. M. C., Kennedy, K. J., & Moore, P. J. (2011). Academic attribution of secondary students: gender, year level and achievement level. *Educational Psychology*, *31*(1), 87-104. Retrieved from http://dx.doi.org/10.1080/01443410.2010.518596

Moreno-García, E., García-Santillán, A., Molchanova, V. S., & Larracilla-Salazar, N. (2017). From Anxiety as a Psychological and Biological Phenomenon to Mathematics Anxiety: A Theoretical Approach. *European Journal of Contemporary Education*, *6*(4), 757-774. Retrieved from https://eric.ed.gov/?id=EJ1164016

Morgan, D. L. (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research*, *1*(1), 48-76. Retrieved from https://doi.org/10.1177%2F2345678906292462

Morris, M., & Tiggerman, M. (2013). The impact of attributions on academic performance: A test of the reformulated learned helplessness model. *Social Sciences Directory, 2*(2) 3-15. Retrieved from https://pdfs.semanticscholar.org/2437/435472408486e6ec88857f0fb682c57716ce

Musa, A. K., Dauda, B., & Umar, M. A. (2016). Gender Differences in Achievement Goals and Performances in English Language and Mathematics of Senior Secondary Schools Students in Borno State, Nigeria. *Journal of Education and Practice*, *7*(27), 165-175. Retrieved from https://eric.ed.gov/?id=EJ1115862

Muwonge, C. M., & Ssenyonga, J. (2015). Academic performance, causal attributions and hope to complete studies among University students. *Journal of Education, Psychology and Social Sciences,* *3*(1), 50-56. Retrieved from: https://www.researchgate.net/publication/325818981

Nenty, H. J. (2010). Analysis of some factors that influence causal attribution of mathematics performance among secondary school students in Lesotho. *Journal of Social Science*, *22*(2), 93-99. Retrieved from https://doi.org/10.1080/09718923.2010.11892788

Nicolaidou, M., & Philippou, G. (2003). Attitudes towards mathematics, self-efficacy and achievement in problem solving. *European Research in Mathematics III,* 1-11 Retrieved from https://www.mathematik.uni-dortmund.de/~erme/CERME3/Groups/TG2/TG2_nicolaidou_cerme3.pdf

Nieuwenhuis, J. (2010a). Analysing qualitative data. In K. Maree (Ed.), *First steps in research* (pp. 99-122). Pretoria: Van Schaik Publishers.

Nieuwenhuis, J. (2010b). Qualitative research design and data gathering techniques. In K. Maree (Ed.), *First steps in research* (pp. 70-97). Pretoria: Van Schaik Publishers.

Nokelainen, P., Tirri, K., & Merenti-Välimäki, H. L. (2007). Investigating the influence of attribution styles on the development of mathematics talent. *Gifted Child Quarterly*, *51*(1), 64-81. doi:10.1177/0016986206296659

Nurmi, J. E. (2001). Cross-cultural difference in self-serving bias: Responses to the attributional style questionnaire by American and Finnish students. *The Journal of Social Psychology*, *32*(1), 69-72. https://doi.org/10.1080/00224545.1992.9924689

Nuttall, J. (2016). Relationship between motivation, attribution and performance expectancy in children's reading. *The Plymouth Student Scientist, 9*(1), 214-228. Retrieved from http://hdl.handle.net/10026.1/14122

O'Sullivan, D. J., O'Sullivan, M. E., O'Connell, B. D., O'Reilly, K., & Sarma, K. M. (2018). Attributional style and depressive symptoms in a male prison sample. *PLoS One*, *13*(2) 1-14, doi:10.1371/journal.pone.0190394

Ojimba, D. P. (2013). Home background and senior secondary school students' achievement in mathematics in Rivers State, Nigeria. *Academic Research International*, *4*(3), 283-294. doi:10.5901/jesr.2013.v3n2p283. Retrieved from https://psycnet.apa.org/record/2014-37178-005

Olasheinde, K. J., & Olatoye, R. A. (2014). Scientific attitude, attitude to science and science achievement of senior secondary school students in Katsina State, Nigeria. *Journal of Educational and Social Research, 4*(1), 445-452. Retrieved from http://dx.doi.org/10.5901/jesr.2014.v4n1p445

Olatunde, Y. P. (2010). Class size and students' mathematics achievement in senior secondary schools in south western Nigeria. *The Social Sciences*, *5*(2), 108-112. doi:10.3923/sscience.2010.108.112

Oliver, P. (2003). *The students' guide to research ethics*. Berkshire, England: Open University Press.

Onwuegbuzie, A.J., & Teddlie, C. (2003). A framework for analysing data in mixed methods research. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioural research* (pp. 351-383). Thousand Oaks, CA: SAGE Publications.

Opara, I. M., Magnus-Arewa, E. A., & Nwaukwu, C. (2017). Predictors of students' attitude towards mathematics in Obio Akpor local government area of Rivers state, *Nigeria. International Journal of Education Learning and Development*, *5*(7), 73-85.

Orunaboka, T. T. (2011). Attitude of Nigeria secondary school students towards physical education as a predictor of achievement in the subject. *Journal of Education and Practice*, *2*(6), 71-77. Retrieved from https://www.iiste.org/Journals/index.php/JEP/article/view/529

Pansu, P., & Jouffre, S. (2008). Attributional perspectives on academic judgments. *European Journal of Psychology of Education, 23*(4), 379-384. Retrieved from http://www.jstor.com/stable/23421504

Pantziara, M., & Philippou, G. N. (2015). Students' motivation in the mathematics classroom. Revealing causes and consequences. *International Journal of Science and Mathematics Education*, *13*(2), 385-411. Retrieved from https://doi.org/10.1007/s10763-013-9502-0

Park, D., Ramirez, G., & Beilock, S. L. (2014). The Role of expressive writing in math anxiety. *Journal of Experimental Psychology*, 20(2), 103-111. Retrieved from https://psycnet.apa.org/doi/10.1037/xap0000013

Peker, M. (2009). Pre-service teachers' teaching anxiety about mathematics and their learning styles. *Eurasia Journal of Mathematics, Science & Technology Education, 5*(4), 335-345. Retrieved from https://eric.ed.gov/?id=EJ905684

Peker, M. (2016). Mathematics teaching anxiety and self-efficacy beliefs toward mathematics teaching: A path analysis. *Educational Research and Reviews, 11*(3), 97-104. Retrieved from https://eric.ed.gov/?id=EJ1091215

Perry, R. P., Stupnisky, R. H., Daniels, L. M., & Haynes, T. L. (2008). Attributional (explanatory) thinking about failure in new achievement settings. *European Journal of Psychology of Education*, *23*(4), 459-475. Retrieved from https://link.springer.com/article/10.1007/BF03172753

Peterson, C., Semmel, A., von Bayer, C., Abramson, L., Metalsky, G., & Seligman, M. E. P. (1982). The attributional style questionnaire. *Cognitive Therapy and Research*, *6*(3), 287–300. https://doi.org/10.1007/BF01173577

Pietersen, J., & Maree, K. (2010). Standardisation of a questionnaire. In K. Maree (Ed.), *First steps in research* (pp. 214-223). Pretoria: Van Schaik Publishers.

Pishghadam, R., & Abbasnejad, H. (2017). Introducing emotioncy as an invisible force controlling causal decisions: A Case of attribution theory. *Polish Psychological Bulletin, 48*(1), 129-140. doi - 10.1515/ppb-2017-0016

Polit, D. F., & Beck, C. T. (2014). *Essentials of nursing research: Appraising evidence for nursing practice* (8th Ed.). Philadelphia: Wolters Kluwer

Popoola, F. R., & Olarewaju, R. R. (2010).Factors responsible for poor performance of students in mathematics in Nigerian secondary schools. *Journal of Research in Education and Society*, *1*(2 & 3), 55-65. Retrieved from http://icidr.org/doc/ICIDR%20PDF%20contents/journal%20of%20research%20in%20education%20and%20society/JRES%20vol%201,no%201%20april%202010%20pdf/factors%20responsible

Richards, C. V. (2012). *An exploration of the relationship between optimistic explanatory style and doctoral study completion* (Doctoral dissertation, Walden University, Minneapolis, MN). Retrieved from https://search.proquest.com/openview/47c6c725578cb836b48dcefc34840e26/1?pq-origsite=gscholar&cbl=18750&diss=y

Robison-Awana, P., Kehle, T. J., Bray, M. A., Clark, E., Jenson, W. R., & Lawless, K. A. (2001). Self-esteem, gender-role perception, gender-role orientation and attributional style as a function of academic competence: Smart girls are different, but a boy is a boy is a boy. *Canadian Journal of School Psychology*, *17*(1), 46-64. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.921.4639&rep=rep1&type=pdf

Rogers, L., & Hallam, S. (2010). Gender differences in perceptions of studying for *the GCSE. International Journal of Inclusive Education, 14*(8), 795-811. https://doi.org/10.1080/13603110902721654

Rosevear, J.C. (2010). Attribution for success: Exploring the potential impact on music learning in high school. *Australian Journal of Music Education*, *1*, 17-24. Retrieved from https://files.eric.ed.gov/fulltext/EJ912412.pdf

Rostamoghli, Z., Talebi, J. M., & Porzoor, P. (2015). A comparison of attributional and resiliency style in students with specific learning disorders, blindness and normal. *Journal Of Learning Disabilities, 3 (14)*, 39-55. Retrieved from www.sid.ir/en/journal/ViewPaper.aspx?ID=441654

Rowe, J. E., & Lockhart, L. K. (2005). Relationship of cognitive attributional style and academic performance among a predominantly Hispanic college student population. *Individual Differences Research*, *3*(2), 136-140. Retrieved from https://psycnet.apa.org/record/2005-09422-006

Rueger, S. Y., & Malecki, C. K. (2011). Effects of stress, attributional style and perceived parental support on depressive symptoms in early adolescence: A prospective analysis. *Journal of Clinical Child & Adolescent Psychology*, *40*(3), 347-359. https://doi.org/10.1080/15374416.2011.563461

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, *25*(1), 54-67. https://doi.org/10.1006/ceps.1999.1020

Sa'ad, T. U., Adamu, A., & Sadiq, A. M. (2014). The causes of poor performance in mathematics among public senior secondary school students in Azare metropolis of Bauchi state, Nigeria. *Journal of Research & Method in Education, 4*(6), 32-40. Retrieved from https://pdfs.semanticscholar.org/fa47/dc53f2c7f9ef8e4cd2ad1fb27dd50dfe4741

Sakariyau, A. O., Taiwo, M. O., & Ajagbe, O. W. (2016). An investigation on secondary school students' attitude towards science in Ogun State, Nigeria. *Journal of Education and Practice*, *7*(28), 125-128. Retrieved from https://eric.ed.gov/?id=EJ1118531

Salman, M. F., Yahaya, L. A., & Adewara, A. A. (2011). Mathematics education in Nigeria: Gender and spatial dimensions of enrolment. *International Journal of Education Science*, *3*(1), 15-20. Retrieved from https://doi.org/10.1080/09751122.2011.11890004

Schatt, M. D. (2011). High school instrumental music students' attitudes and beliefs regarding practice: An application of attribution theory. *Update, 29*(2), 29-40. doi: 10.1177/8755123310396981

Schillinger, F. L., Vogel, S. E., Diedrich, J., & Grabner, R. H. ((2018). Math anxiety, intelligence, and performance in mathematics: Insights from the German adaptation of the Abbreviated Math Anxiety Scale (AMAS-G). *Learning and Individual Difference, 61*, 108-119. Retrieved from https://doi.org/10.1016/j.lindif.2017.11.014

Schillinger, F. L., Vogel, S. E., Diedrich, J., & Grabner, R. H. (2018). Math anxiety, intelligence, and performance in mathematics: Insights from the German adaptation of the Abbreviated math Anxiety Scale (AMAS-G). *Learning and Individual Difference, 61*, 108-119. Retrieved from https://doi.org/10.1016/j.lindif.2017.11.014

Schmader, T., Johns, M., & Barquissau, M. (2004). The costs of accepting gender differences: The role of stereotype endorsement in women's experience in the math domain. *Sex Roles, 50*(11/12), 835-850. Retrieved from https://link.springer.com/article/10.1023/B:SERS.0000029101.74557.a0

Schroder, K. E. E., & Ollis, L. O. (2013). The coping competence questionnaire: A measure of resilience to helplessness and depression. *Motivation and Emotion*, *37*(2) 286-302. doi: 10.1007/s11031-012-9311-8

Schulz, W. (2005*). Measuring the socio-economic background of students and its effect on achievement in PISA 2000 and PISA 2003*. Paper prepared for the Annual Meetings of the American Educational Research Association in San Francisco. Retrieved from https://files.eric.ed.gov/fulltext/ED493510.pdf

Shelley, D., & Craig, W. M. (2010). Attributions and coping styles in reducing victimization. *Canadian Journal of School Psychology, 25*(1), 84-100. doi:10.1177/0829573509357067

Shenton, A. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information, 22*(2), 63-75. doi:10.3233/EFI-2004-22201

Shmulsky, S., & Gobbo, K. (2007). Explanatory style and college students with ADHD and LD. *Journal of Attention Disorders*, *10*(3), 299-305. doi:10.1177/1087054706292103

Shores, M. L. (2011). Exploring pre-service teachers' perceptions of student attributions in mathematics. *SRATE Journal*, *20*(2), 39-47. Retrieved from https://files.eric.ed.gov/fulltext/EJ959528

Shores, M. L., & Smith, T. (2010). Attribution in Mathematics: A Review of Literature. *School Science and Mathematics, 110*(1)*, 24-30.*

Siegle, D., Rubenstein, L. D., Pollard, E., & Romey, E. (2010). Exploring the relationship of college freshmen honours students' effort and ability attribution, interest, and implicit theory of intelligence with perceived ability. *Gifted Child Quarterly, 54*(2), 92 –101. doi: 10.1177/0016986209355975

Silverman, D. (2000). *Doing qualitative research: A practical guide*. Thousand Oaks, CA: Sage Publications.

Sirmaci, N. (2010). The relationship between the attitudes towards mathematics and learning styles. *Procedia Social and Behavioral Sciences 9*, 644–648*.* Retrieved from https://doi.org/10.1016/j.sbspro.2010.12.211

Slavin, R. E. (2007). *Educational research in an age of accountability*. Boston, MA: Pearson Education, Inc.

Smith, J. L. (2006). The interplay among stereotypes, performance-avoidance goals, and women's math performance expectations. *Sex Roles*, *54*(3-4), 287-296. Retrieved from https://link.springer.com/article/10.1007%2Fs11199-006-9345-z

Sorić, I. (2009). Regulatory styles, causal attributions and academic achievement. *School Psychology International*, *30*(4), 403-420. Retrieved from https://doi.org/10.1177%2F0143034309106946

Sorić, I., & Palekčić, M. (2009). The role of students' interests in self-regulated learning: The relationship between students' interests, learning strategies and causal attributions. *European Journal of Psychology of Education, 24*(4), 545. Retrieved from https://doi.org/10.1007/BF03178767

Sorrenti, L., Filippello, P., Orecchio, S., & Buzzai, C. (2016). Learned helplessness and learning goals: role played in school refusal. A study on Italian students. *Mediterranean Journal of Clinical Psychology*, *4*(2). Retrieved from http://dx.doi.org/10.6092/2282-1619/2016.4.1235

Stangor, C. (2011). *Research methods for the behavioural sciences*. Belmont, MA: Wadsworth.

Struthers, C.W., & Perry, R. P. (1996). Attributional style, attributional retraining, and inoculation against motivational deficits. *Social Psychology of Education, 1*,171-187. Retrieved from https://link.springer.com/article/10.1007/BF02334731

Struwig, F. W., & Stead, G. B. (2004). *Planning, designing and reporting research*. Cape Town: Pearson.

Struthers, C. W., & Perry, R. P. (1996). Attributional style, attributional retraining, and inoculation against motivational deficits. *Social Psychology of Education*, *1*(2), 171-187. Retrieved from https://psycnet.apa.org/doi/10.1007/BF02334731

Suleiman, S. (2016). Influence of learned helplessness and home background on academic performance among senior secondary school students' in federal capital territory Abuja, Nigeria. (Master dissertation, Ahmadu Bello University, Zaria, Nigeria). Retrieved from: http://kubanni.abu.edu.ng/jspui/bitstream/123456789/8434/1/

Swinton, A. D., Kurtz-Costes, B., Rowley, S. J. & Okeke-Adeyanju, N. (2011). A longitudinal examination of African American adolescents' attributions about achievement outcomes. *Child Development*, *82*(5), 1486-1500. Retrieved from https://doi.org/10.1111/j.1467-8624.2011.01623.x

Tachie, S. A., & Chireshe, R. (2013). High failure rate in mathematics examinations in rural senior secondary schools in Mthatha District, Eastern Cape: Learners' attributions. *Studies of Tribes and Tribals, 11*(1), 67-73. Retrieved from https://doi.org/10.1080/0972639X.2013.11886667

Tashakkori, A., & Teddlie, C. (2003). The past and future of mixed methods research: From data triangulation to mixed model designs. In A. Tashakkori & C. Teddlie (Ed.), *Handbook of mixed methods in social and behavioural research* (pp. 671–701). Thousand Oaks, CA: Sage Publications.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's Alpha. *International Journal of Medical Education*, *2*, 53-55. Retrieved from https://dx.doi.org/10.5116%2Fijme.4dfb.8dfd

Tella, A. (2007). The impact of motivation on students' academic achievement and learning outcomes in mathematics among secondary school students in Nigeria. *Eurasia Journal of Mathematics, Science & Technology Education, 3*(2), 149-156. Retrieved from https://eric.ed.gov/?id=EJ1101862

Tennen, H., & Herzberger, S. (1986). Attributional style questionnaire. In R. C. Sweetland, & D. J. Kever (Eds.).*Test Critiques*, *5*, 20-32.

Terrell, S. (2012). Mixed-methods *research methodologies. The Qualitative Report, 17*(1)*, 254-280.* Retrieved from http://www.nova.edu/ssss/QR/QR17-1/terrell.pdf

Tirri, K., & Nokelainen, P. (2010). The influence of self-perception of abilities and attribution styles on academic choices: Implications for gifted education. *Roeper Review*, *33*(1), 26-32. https://doi.org/10.1080/02783193.2011.530204

Tjora, A. (2018). *Qualitative research as stepwise-deductive induction*. London: Routledge.

Toland, J., & Boyle, C. (2008). Applying cognitive behavioural methods to retrain children's attributions for success and failure in learning. *School Psychology International, 29(*3), 286-302. doi:10.1177/0143034308093674

Tucker-Drob, E. M., & Harden, K. P. (2012). Learning motivation mediates gene-by-socio-economic status interaction on mathematics achievement in early childhood. *Learning and Individual Differences*, *22*, 37-45. doi:10.1016/j.lindif.2011.11.015

Tulu, G. (2013). Boys' and girls' attribution of performance in learning English as a foreign language: The case of Adama high schools in Ethiopia. *Educational Research and Reviews, 8*(23), 2197-2211. Retrieved from https://academicjournals.org/journal/ERR/article-full-text-pdf/B36C6FE42356.pdf

Tuncer, M., & Yılmaz, Ö. (2020). Relations attitude towards mathematics lesson, anxiety and academic success. *REDIMAT-Journal of Research in Mathematics Education*, *9*(2), 173-195. Retrieved from http://dx.doi.org/10.17583/redimat.2020.4061

Türkmen, G. P., & Soybaş, D. (2019). The effect of gamification method on students' achievements and attitudes towards mathematics. *Bartın University Journal of Faculty of Education*, *8*(1), 258-298.

Vetter, P., & Newen, A. (2014). Varieties of cognitive penetration in visual perception. *Consciousness and Cognition*, *27*, 62-75. Retrieved from http://dx.doi.org/10.1016/j.concog.2014.04.007

Visser, M., Juan, A., & Feza, N. (2015). Home and school resources as predictors of mathematics performance in South Africa. *South African Journal of Education*, *35*(1), 1-10. Retrieved from https://doi.org/10.15700/201503062354

Vukovic, R. K., Kieffer, M. J., Bailey, S. P., & Harari, R. R. (2013). Mathematics anxiety in young children: Concurrent and longitudinal associations with mathematical performance. *Contemporary educational psychology*, *38*(1), 1-10. Retrieved from https://doi.org/10.1016/j.cedpsych.2012.09.001

Wang, L., Li, X., & Li, N. (2014). Socio-economic status and mathematics achievement in China: a review. *ZDM Mathematics Education*, *46*(7), 1051-1060. doi: 10.1007/s11858-014-0617-8

Ward, C. W. (2003). Explanatory styles among undergraduate students in a Christian and a state-supported institution of higher education. Part 2: A comparative analysis. *Christian Higher Education*, *2*(4), 353-364.

Wassenaar, D. R. (2006). Ethical issues in social science research. In M. Terreblanche, K. Durrheim, & D. Painter (Eds.), *Research in practice: applied methods for the social sciences* (pp. 60-79). Cape Town, South Africa: UCT Press.

West African Examination Council (WAEC). (2012-2018). *Chief examiner's report.* Lagos, Nigeria: WAEC Press.

Weiner, B. (1979). A theory of motivation for some classroom experiences. *Journal of Educational Psychology, 71*(1), 3-25. Retrieved from https://pdfs.semanticscholar.org/bd46/a85156fdeae2728fa6efb19d75ca7a0a5d87.pdf

Weiner, B. (1986). *An attributional theory of motivation and emotion*. New York: Springer-Verlag.

Weiner, B. (2000). Intrapersonal and interpersonal theories of motivation from an attributional perspective. *Educational Psychology Review*, 12(1), 1-14. doi:10.1023/A:1009017532121

Wentzel, K. R. (1998). Social relationship and motivation in middle school: The role of parents, teachers and peers. *Journal of Educational Psychology*, *90*(2), 202-209. https://psycnet.apa.org/doi/10.1037/0022-0663.90.2.202

White, D. E., Oelke, N. D., & Friesen, S. (2012). Management of a large qualitative data set: Establishing trustworthiness of the data. *International Journal of Qualitative Methods*, *11*(3), 244-258. Retrieved from https://journals.sagepub.com/doi/pdf/10.1177/160940691201100305

Wilhelm, J. (2009). Gender differences in lunar-related scientific and mathematical understandings. *International Journal of Science Education*, *31*(15), 2105-2122. https://doi.org/10.1080/09500690802483093

Williams, J. H. (2005). Cross-national variations in rural mathematics achievement: A descriptive overview. *Journal of Research in Rural Education, 20*(5), 1-18. Retrieved from http://jrre.vmhost.psu.edu/wp-content/uploads/2014/02/20-5.pdf

Worthington, R. L., & Whittaker, T. A. (2006). Scale development research: A content analysis and recommendations for best practices. *The Counseling Psychologist*, *34*(6), 806-838. Retrieved from https://doi.org/10.1177/0011000006288127

Yadav, S., & Singh, P. N. (2018). A study on mathematics anxiety and mathematics achievement of secondary school students. *International Journal of Social Sciences Arts and Humanities*, *5*(3) 52-57. Retrieved from http://www.crdeepjournal.org/wp-content/uploads/2018/01/Vol-5-3-3-IJSSAH.pdf

Yadav, S., & Singh, P. N. (2018). A Study on Mathematics Anxiety and Mathematics Achievement of Secondary School Students. *International Journal of Social Sciences Arts and Humanities*,*5*(3) 52-57. Retrieved from

Yara, P. O. (2009). Students' attitude towards mathematics and academic achievement in some selected secondary schools in Southwestern Nigeria. *European Journal of Scientific Research*, *36*(3), 336-341. Retrieved from http://.eurojournals.com/ejsr.htm

Yee, P. L., Pierce, G. R., Ptacek, J. T., & Modzelesky, K. L. (2003). Learned helplessness attributional style and examination performance: Enhancement effects are not necessarily moderated by prior failure. *Anxiety, Stress, and Coping, 16*(4), 359-373. doi: 10.1080/0003379031000140928

Yeo, L. S., & Tan, K. (2012). Attributional style and self-efficacy in Singaporean adolescents. *Australian Journal of Guidance and Counselling*, 22(1), 82-101. doi 10.1017/jgc.2012.1

Yu, R., & Singh, K. (2018). Teacher support, instructional practices, student motivation, and mathematics achievement in high school. *The Journal of Educational Research*, *111*(1), 81-94. Retrieved from https://doi.org/10.1080/00220671.2016.1204260

Zisimopoulos, D. A., & Galanaki, E. P. (2009). Academic intrinsic motivation and perceived academic competence in Greek elementary students with and without learning disabilities. *Learning Disabilities Research & Practice*, *24*(1), 33-43. doi:10.1111/j.1540-5826.2008.01275.x

APPENDIX A: GUIDELINES FOR THE INTERPRETATION OF THE NEGATIVE ATTRIBUTIONAL STYLE QUESTIONNAIRE

i. The attributional style questionnaire used in the current study comprise two scales, namely
a. **Stability** (in terms of **stable** versus **unstable**), and
b. **Globality** (in terms of **global** vs **specific**)

The Stability scale is discussed first.
Q1: What does a high score on the Stability scale imply?
High scores on the Negative Attributional Style Questionnaire indicate that assessees believe outcomes are permanent and will persist in the individual's life
Q2: What does a low score on the Stability scale imply?
Low scores on the Negative Attributional Style Questionnaire indicate that assessees believe outcomes are unstable and temporary only.
Q3: What is the distinction between stable and unstable scores?
Mean scores below 3.5 or Cronbach reliability coefficients below 0.50 are regarded as low scores.
Conversely, mean scores higher than 3.5 or Cronbach reliability coefficients above 0.50 are regarded as high.
In summary: What are the cut-off points for stable and unstable? On a scale from 1 to 7 (i.e. from unstable to stable) the average score is 3.5. Any score less than 3.5 is unstable and any score above 3.5 is stable.
Q4: Definitions of relevant constructs:
Stable refers to a belief that an outcome will persist indefinitely.
Unstable refers to the belief that an outcome is attributed to passing aspects, specific to given time periods.
Positive people believe that positive outcomes will persist indefinitely while **negative** outcomes are only due to temporary, transient factors.
Negative people believe that **positive** outcomes will not persist indefinitely while **negative** outcomes will persist and are due to permanent factors.
I now discuss the Globality scale (in terms of **global** vs **specific**).
b. The Globality scale is discussed next
Q5: What does a high score on the Globality scale imply?
A high score on the globality scale means that assessees believe outcomes are pervasive and consistent
Q6: What does a low score on the Globality scale imply?
A low score on the globality scale means that assessees believe outcomes are specific and not pervasive.
Q7: What is the distinction between the terms global and specific?
Mean scores below 3.5 or Cronbach reliability coefficients below 0.50 are regarded as low scores.
Conversely, mean scores higher than 3.5 or Cronbach reliability coefficients above 0.50 are regarded as high.
In summary, what are the cut-off points for global vs specific?

On a scale from 1 to 7 (i.e. from specific to global) the average score is 3.5. Any average score less than 3.5 is regarded as specific and any average score above 3.5 is regarded as global.

Q8: Definitions of relevant constructs:

A **global** attribution alludes to a belief that a **positive** outcome refers to factors that are consistent (despite a person's unique context).

This is also the style of people who believe that **negative** outcomes are not persistent and due to **external, unstable, and specific** factors. Moreover, this is the typical style of **positive**, optimistic people.

Conversely, a **specific** attribution alludes to a belief that a **positive** outcome refers to factors that are temporary or transient (dependent on a **specific** context). This is also the style of **negative**, pessimistic people who believe that **negative** outcomes are due to **internal, global, and stable** factors.

(Houston, 2020)

APPENDIX B: INTERVIEW QUESTIONS

1. Tell me how you reached the answers you gave to the questions in the questionnaire.
2. Did you understand the items or statements used in the questionnaire?
3. Did you understand the language use in the questionnaire?
4. Tell me the things that you liked and those that you did not like about the questionnaire.
5. Can you describe your knowledge of and performance in mathematics?
6. Do you do well in mathematics or not? Give reasons.
7. Do you think mathematics is difficult? If yes/no, give reasons.
8. Tell me why students do well or not well in mathematics. Give reasons.
9. Do students show any interest in learning mathematics?
10. Do you enjoy the way your teacher teaches mathematics? Tell me more about your mathematics teacher.
11. Do you study mathematics on your own? Tell me how you study.
12. Do you believe you need to hard work to succeed in mathematics?
13. Tell me your views on the methods used in teaching mathematics.
14. Do you believe boys are better in mathematics than girls?
15. Do you have enough resources to enhance your study of mathematics?
16. Do you get anxious when you do mathematics?

APPENDIX C: QUESTIONNAIRE

UNIVERSITY OF PRETORIA

Questionnaire

For office use only

A. DEMOGRAPHIC INFORMATION

Respondent Name V0 ☐

1. Gender

Female	1	Male	2

V1 ☐

2. How old are you? (Please give age in years and completed months)

☐ Years ☐ Months

V2A ☐
V2B ☐

3. Total number of family members (including father and mother) ☐

V3 ☐

4. Which of the following is true of your father and mother (or guardian)?

Both father and mother are (or guardian is) unemployed	1
Only mother is employed (father unemployed)	2
Only father is employed (mother unemployed)	3
Both father and mother are (or guardian is) employed	4

V4 ☐

B. ATTRIBUTIONAL STYLE QUESTIONNARE

Why do you think things happen to YOU?

Please try to imagine yourself in the situations presented in questions 1-12. If such a situation were to happen to you, what do you think might cause it? Although situations like these may have many causes, we want you to choose only one – THE MAIN CAUSE.

Please write the main cause in the box after each situation. Next, answer two questions about the cause you provided. First, how likely is it that the main cause that you gave will continue to affect you? Second, is this main cause something that just affects the situation, or does it affect other areas of your life?

To summarise, please;

1. Read each situation and vividly imagine it happening to you.
2. Decide what you feel would be the one main cause for the

situation if it actually happened to you.

3. Write down the one main cause in the box provided.

4. Answer the two questions about this main cause.

Try to imagine yourself in the following situations:

1. ... you have problems sleeping.

A Write the one main cause for this in the box below. V5A

B How likely is it that the cause you gave will continue to affect you? (Circle one number) V5B

Will never affect me	1	2	3	4	5	6	7	Will always affect me

C Is the cause you gave something that just affects sleeping, or does it affect other areas of your life? (Circle one number) V5C

Just affects sleeping	1	2	3	4	5	6	7	Affects all other areas

2. ... you feel sick and tired most of the time.

A Write the one main cause for this in the box below. V6A

B How likely is it that the cause you gave will continue to affect you? (Circle one number) V6B

Will never affect me	1	2	3	4	5	6	7	Will always affect me

C Is the cause you gave something that just affects feeling sick and

tired, or does it affect other areas of your life? (Circle one number) V6C

Just affects feeling sick and tired	1	2	3	4	5	6	7	Affects all other areas

3. ... you have a serious injury.

A Write the one main cause for this in the box below. V7A

B How likely is it that the cause you gave will continue to affect you? (Circle one number) V7B

Will never affect me	1	2	3	4	5	6	7	Will always affect me

C Is the cause you gave something that just affects injuries, or does it affect other areas of your life? (Circle one number) V7C

Just affects injuries	1	2	3	4	5	6	7	Affects all other areas

4. ... you can't find a job after finishing school.

A Write the one main cause for this in the box below. V8A

B How likely is it that the cause you gave will continue to affect you? (Circle one number) V8B

Will never affect me	1	2	3	4	5	6	7	Will always affect me

C Is the cause you gave something that just affects not finding a job, or does it affect other areas of your life? (Circle one number) V8C

Just affects finding a job	1	2	3	4	5	6	7	Affects all other areas

5. ... you can't get work done that others expect of you. V9A

A Write the one main cause for this in the box below

B How likely is it that the cause you gave will continue to affect you? V9B
(Circle one number)

Will never affect me	1	2	3	4	5	6	7	Will always affect me

C Is the cause you gave something that just affects getting work done, or does it affect other areas of your life? (Circle one number) V9C

Just affects getting work done	1	2	3	4	5	6	7	Affects all other areas

6. ... you are suspended from school activities. V10A

A Write the one main cause for this in the box below.

B How likely is it that the cause you gave will continue to affect you? V10B
(Circle one number)

Will never affect me	1	2	3	4	5	6	7	Will always affect me

C Is the cause you gave something that just affects getting V10C

suspended, or does it affect other areas of your life?
(Circle one number)

Just affects getting suspended	1	2	3	4	5	6	7	Affects all other area

7. ... you dont help a friend who has a problem. V11A ☐

A Write the one main cause for this in the box below.

B How likely is it that the cause you gave will continue to affect you? V11B ☐
(Circle one number)

Will never affect me	1	2	3	4	5	6	7	Will always affect me

C Is the cause you gave something that just affects helping friends, or does it affect other areas of your life? (Circle one number) V11C ☐

Just affects helping friends	1	2	3	4	5	6	7	Affects all other areas

8. ... you have financial problems. V12A ☐

A Write the one main cause for this in the box below.

B How likely is it that the cause you gave will continue to affect you? V12B ☐
(Circle one number)

Will never affect me	1	2	3	4	5	6	7	Will always affect me

C Is the cause you gave something that just affects financial problems, or does it affect other areas of your life? V12C ☐
(Circle one number)

Just affects financial problems	1	2	3	4	5	6	7	Affects all other areas

9. ... you don't understand what your teacher wants you to do. V13A

A Write the one main cause for this in the box below.

B How likely is it that the cause you gave will continue to affect you? V13B
(Circle one number)

Will never affect me	1	2	3	4	5	6	7	Will always affect me

C Is the cause you gave something that just affects understanding your teacher, or does it affect other areas of your life? V13C
(Circle one number)

Just affects understanding my teacher	1	2	3	4	5	6	7	Affects all other areas

10. ... a friend is very angry with you. V14A

A Write the one main cause for this in the box below.

B How likely is it that the cause you gave will continue to affect you? V14B
(Circle one number)

Will never affect me	1	2	3	4	5	6	7	Will always affect me

C Is the cause you gave something that just affects friends being angry, or does it affect other areas of your life? (Circle one number) V14C

Just affects friends being angry	1	2	3	4	5	6	7	Affects all other areas

11. ... you are guilty of breaking the law. V15A

A Write the one main cause for this in the box below.

B How likely is it that the cause you gave will continue to affect you? (Circle one number) V15B

Will never affect me	1	2	3	4	5	6	7	Will always affect me

C Is the cause you gave something that just affects breaking the law, or does it affect other areas of your life? (Circle one number) V15C

Just affects breaking the law	1	2	3	4	5	6	7	Affects all other areas

12. ... you have a serious argument with someone in your family. V16A

A Write the one main cause for this in the box below.

B How likely is it that the cause you gave will continue to affect you? (Circle one number) V16B

Will never affect me	1	2	3	4	5	6	7	Will always affect me

C Is the cause you gave something that just affects a family argument, or does it affect other areas of your life? (Circle one number) V16C

Just affects family arguments	1	2	3	4	5	6	7	Affects all other areas

C. YOUR ATTITUDE TOWARDS MATHEMATICS

a. I will use Mathematics in my career one day. V17A

Almost never	1	2	3	4	5	6	7	Almost always

b. I am motivated to do well in Mathematics. V17B

Almost never	1	2	3	4	5	6	7	Almost always

c. I know where to find help when I struggle with Mathematics. V17C

Almost never	1	2	3	4	5	6	7	Almost always

d. I get anxious when I do Mathematics. V17D

Almost never	1	2	3	4	5	6	7	Almost always

e. What was your mark in Mathematics at the end of the previous term? V17E

	%

f. Is there anything else you would like to share with me?

_____
_____
_____
_____
_____
_____

Thank you for taking the time to complete this questionnaire.

APPENDIX D: GMAIL - PERMISSION LETTER TO CHANGES MADE IN ATTRIBUTIONAL STYLE QUESTIONNAIRE

Gmail

Akolade Lapite <akoladelapite@gmail.com>

Permission letter to changes made in Attributional style questionnaire

4 messages

Akolade Lapite <akoladelapite@gmail.com> Mon, Jul 15, 2019 at 4:45 PM
To: Jennifer Dykema <dykema@ssc.wisc.edu>
Cc: Kobus Maree <kobus.maree@up.ac.za>

Dear Prof. Dykema,

Warm greetings to you.

My name is Akolade Lapite, a doctoral student of the Faculty of Education, University of Pretoria, South Africa. If you may recall in September 2014, I requested from you the *Attributional Style Questionnaire (ASQ)* developed by you and other colleagues (Dykema, Bergbower, Doctora & Peterson, 1996) of which you sent a copy to me and gave me the permission to use it. The *ASQ* is my main research instrument and I have made some changes in the items to suit my research purpose. At the instance of my supervisor, Prof. Kobus Maree (who is copied in this email) and as part of the requirement for thesis submission, I formally and humbly request that you issue me a written permission for the changes made in the questionnaire. The changes in the questionnaire are as follow:

Original *ASQ*	Adapted *ASQ*
... you cannot find a job	... you cannot find a job after finishing school
... you are fired from your job	... you are suspended from school activities
... you don't understand what your boss wants you to do	... you don't understand what your teacher wants you to do

I would really appreciate if your confirmation and approval for the changes I made to the instrument could be sent to me.

Thank you.

I look forward to hearing from you.

Kind regards,
Akolade

On Wed, Sep 10, 2014 at 5:17 PM Akolade Lapite <akoladelapite@gmail.com> wrote:
> Hello,
>
> Thank you for your support. I appreciate it a lot.
>
> Kind regards,
> Akolade
>
> On Tue, Sep 9, 2014 at 7:17 PM, Jennifer Dykema <dykema@ssc.wisc.edu> wrote:
> > Hi,
> >
> > I am not longer involved in that line of research. So sorry. I do not have a separate scoring key. I recommend following whatever instructions appear in the article. Thanks, Jen
> >
> > On 9/9/2014 1:06 PM, Akolade Lapite wrote:
> >
> > Dear Dr. Dykema,

Thank you very much for the rare privilege extended to me. I am immensely grateful. Does the instrument have a separate scoring key or should I follow the instructions in the published article?

Kind regards,
Akolade

On Tue, Sep 9, 2014 at 2:42 PM, Jennifer Dykema <dykema@ssc.wisc.edu> wrote:

> Greetings,
>
> Attached is a copy of the revised ASQ.
>
> Best of luck with your research.
>
> thanks, Jen
>
> On 9/9/2014 1:15 AM, Akolade Laplte wrote:
>
> > Dear Dr. Dykema,
> >
> > My warm greetings to you. My name is Akolade Laplte, a doctoral student in the Department of Educational Psychology, University of Pretoria, South Africa. I am working on a research study titled - Exploring the impact of attributional style on mathematics performance of senior secondary school students in Lagos State Nigeria. I did a pilot study with the old ASQ by Seligman et al but the result was not favourable because the reliabilities were low.
> >
> > It was based on this premise that I opted for the revised ASQ used in an article in Journal of Psychoeducational Assessment in 1996 written by you along with Karen Bergbower, Jocelyn D. Doctora and Professor Christopher Peterson. I learnt unfortunately, that Prof Peterson, who is the contact person in the article died in 2012.
> >
> > I humbly request if you could help me get a copy of the new ASQ and the scoring key used in the said article.
> >
> > I will be very grateful and fulfilled if my request is granted.
> >
> > Kind regards,
> > Akolade
>
> --
> **********
> Jennifer Dykema, PhD
> Senior Scientist/Survey Methodologist
> University of Wisconsin Survey Center (UWSC)
> 4308 Sterling Hall
> 475 N. Charter St.
> Madison, WI 53706-1582
> Office: 608-262-8385
> Cell: 608-556-5813
> E-mail: dykema@ssc.wisc.edu
> Web: http://www.uwsc.wisc.edu/
> http://www.uwsc.wisc.edu/dykema.php
> **********

--
****
Jennifer Dykema, PhD
Senior Scientist/Survey Methodologist
University of Wisconsin Survey Center (UWSC)
4308 Sterling Hall
475 N. Charter St.
Madison, WI 53706-1582

Office: 608-262-8385
Cell: 608-556-5813
E-mail: dykema@ssc.wisc.edu
Web: http://www.uwsc.wisc.edu/
http://www.uwsc.wisc.edu/dykema.php
****

JENNIFER L DYKEMA <dykema@ssc.wisc.edu> Mon, Jul 15, 2019 at 6:09 PM
To: Akolade Lapite <akoladelapite@gmail.com>
Cc: Kobus Maree <kobus.maree@up.ac.za>, JENNIFER L DYKEMA <dykema@ssc.wisc.edu>

Greetings Akolade,

You have my permission to use the ASQ with the changes indicated in this email.

I assume you are making these revisions to fit the population you are studying, which appears to be students. These changes seem very appropriate for that population.

Best of luck with your research!

Thanks, Jen

****

Jennifer Dykema, PhD

Distinguished Scientist/Survey Methodologist, University of Wisconsin Survey Center (UWSC)

Associate Editor, BMC Medical Research Methodology

Web: https://uwsc.wisc.edu/staff/dykema-dr-jennifer/

Office: 608-556-5813; 4308 Sterling Hall, 475 N. Charter St., Madison, WI 53706-1582

****

[Quoted text hidden]

Akolade Lapite <akoladelapite@gmail.com> Mon, Jul 15, 2019 at 6:18 PM
To: Jennifer Dykema <dykema@ssc.wisc.edu>
Cc: Kobus Maree <kobus.maree@up.ac.za>

Dear Prof Dykema,

Thank you for your prompt response and also for permitting me to use the ASQ with the changes. This is well appreciated.

Kind regards,
Akolade
[Quoted text hidden]

Kobus Maree <kobus.maree@up.ac.za> Mon, Jul 15, 2019 at 7:01 PM
To: Akolade Lapite <akoladelapite@gmail.com>
Cc: Jennifer Dykema <dykema@ssc.wisc.edu>

Dear Prof. Dykema

Thank you kindly for taking the time to reply and for giving Mr Lapite the go-ahead to make the changes and use your questionnaire in his doctoral research. This is much appreciated.

Wishing you an enjoyable day further.

Kind regards

Kobus

Have a lovely day.

Kind regards

Kobus Maree

[Quoted text hidden]

APPENDIX E: LETTER TO THE MINISTRY OF EDUCATION

February 19, 2015

The Permanent Secretary
Lagos State Ministry of Education
Alausa Ikeja
Lagos State
Nigeria

Dear Madam

REQUEST TO CONDUCT RESEARCH IN SOME SENIOR SECONDARY SCHOOLS IN LAGOS STATE

I am a PhD student in the Department of Educational Psychology, University of Pretoria. I am working on a study titled: **The effects of Attributional Style on the Mathematics Performance of Senior Secondary School Students.** I would like to request permission to conduct research in secondary schools in two districts.

The purpose of the study is to see if attributional style is predictive of, or associated with, success or failure in mathematics, as measured by the mathematics scores of students.

If you allow me to conduct the study, I will administer questionnaires and also conduct focus group interviews in two senior secondary schools to be selected through convenient sampling. In each of the two schools selected the Senior Secondary Students 2 will be study participants. At least 150 students per school will be used, bearing in mind gender specification, thereby making the entire sample to consist of 300 students.

The study will be conducted in accordance with the University of Pretoria research guidelines. The students will receive an assent form. All information provided will be treated confidentially. Data collected will be used only for academic purposes. Furthermore, any participant will be free to withdraw from the study any time he/she wishes to do so. You are kindly requested to confirm your acceptance through written feedback.

Your co-operation in this regard will be highly appreciated.

Yours sincerely

……
Akolade Lapite
Ph.D. student

……
Prof. Kobus Maree
Supervisor

APPENDIX F: LETTER TO PRINCIPLES

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Education

August 19, 2018

The Principal
.....
.....
.....

Dear Madam

REQUEST TO CONDUCT RESEARCH IN YOUR SCHOOL

I am a PhD student in the Department of Educational Psychology, University of Pretoria. I am working on a study titled: **The effects of Attributional Style on the Mathematics Performance of Senior Secondary School Students**. I would like request permission to conduct research in your school.

The purpose of the study is to see if attributional style is predictive of, or associated with, success or failure in mathematics, as measured by the mathematics scores of students.

If you allow me to conduct the study, I will administer questionnaires and also conduct focus group interview on the Senior Secondary Students 2. At least 150 students will be used, bearing in mind gender specification. The time duration will be about thirty to forty minutes and the focus group interview will be conducted after the school hours.

Your co-operation in this regard will be highly appreciated.

Yours faithfully

.....
Akolade Lapite
Ph.D. student

……..
Prof. Kobus Maree
Supervisor

APPENDIX G: LETTER TO PARENT/GUARDIAN

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Education

August 19, 2018

Dear Parent/Guardian

I am a PhD student in the Department of Educational Psychology, University of Pretoria. I am working on a study titled: **The effects of Attributional Style on the Mathematics Performance of Senior Secondary School Students**. I would like to request permission to conduct research with your child as a participant.

The purpose of the study is to explore what impact attributional style can have on senior secondary school students' performance in mathematics. I wish to conduct the study in the senior secondary classes to see if attributional style is predictive of, or associated with, success in mathematics, as measured by the mathematics scores of students.

You are cordially requested to allow your child who is in the senior secondary school class to participate in the study by responding to questionnaires about the study. Focus group interviews will be conducted after school hours and will take about thirty to forty minutes. As part of the agreement, you are kindly requested to fill out the attached consent form. You are free to ask questions concerning the study from me via the email addresses given below.

The study will be conducted in accordance with the University of Pretoria research guidelines. The students will receive an assent form. The information that will be collected will be used solely for academic purposes. No names will be used during the dissemination phase of the study. The participants' identities will be coded in order to ensure confidentiality and anonymity. Furthermore, any participant will be free to withdraw from the study any time he/she wishes to do so.

Your co-operation in this regard will be highly appreciated.

Yours faithfully,

……..
Akolade Lapite
Ph.D. student
Email: akoladelapite@yahoo.com

……
Prof. Kobus Maree
Supervisor

APPENDIX H: CONSENT FORM (PRINCIPAL)

I, _____ (your name), Principal of _____ agree/do not agree (delete what is not applicable) to allow Mr. Akolade Lapite to conduct research in this school. The title of the research is **The effects of Attributional Style on the Mathematics Performance of Senior Secondary School Students.**

I understand that ten students will be interviewed from those earlier administered with questionnaires in my school with time duration of about thirty to forty minutes or that could be longer; the interview will be conducted after school hours.

I understand that the information needed is mainly for academic purposes and that the parents or guardians will receive letters informing them about the study.
I understand that the researcher adheres to the principles of:

_ *Voluntary participation* in research, indicating that the participant will be free to withdraw from the study at any time he/she wishes to do so.
_ *Informed consent*, meaning that research participants must at all times be fully informed about the research process and purposes, and must give consent to their participation in the research.
_ *Safety in participation*; put differently, that the human respondents should not be placed at risk or harm of any kind.
_ *Privacy*, meaning that the *confidentiality* and *anonymity* of human respondents should be protected at all times.
_ *Trust*, which implies that human respondents will not respond to any acts of deception or betrayal in the research process or its published outcomes.

Signature:_____ Date: _____

APPENDIX I: LETTER OF ASSENT TO PARTICIPANTS

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Education

August 19, 2018

Dear participant,

I am a PhD student in the Department of Educational Psychology, University of Pretoria. I am working on a study titled: **The effects of Attributional Style on the Mathematics Performance of Senior Secondary School Students.** The purpose of the study is to understand how attributional style can affect senior secondary school students' performance in mathematics. I would like invite you to participate in a focus group interview.

The focus group interview will be conducted after school hours and will take about thirty to forty minutes or could be longer. As part of the agreement, you are kindly requested to fill out the attached consent form. You are free to ask questions concerning the study from me.

The focus group interview will be conducted in accordance with the University of Pretoria research guidelines. The information that will be collected will be used solely for academic purposes. No names will be used during dissemination phase of the study. The participants' identities will be coded in order to ensure confidentiality and anonymity. Furthermore, any participant will be free to withdraw from the study any time he/she wishes to do so.

Your co-operation in this regard will be highly appreciated.

Yours faithfully

……
Akolade Lapite
PhD student

……
Prof. Kobus Maree
Supervisor

APPENDIX J: ASSENT FORM (STUDENT)

I, _____ (your name), agree/do not agree (delete what is not applicable) to take part in a research titled: **The effects of Attributional Style on the Mathematics Performance of Senior Secondary School Students.**

I understand that I will be part of a focus group interview. The time duration will be about thirty to forty minutes or could be longer and the study will be conducted after school hours.

I understand that the information needed is for academic purposes and that the principal will receive a letter informing him or her about the study.
I understand that the researcher adheres to the principles of:

_ *Voluntary participation* in research, indicating that the participants will be free to withdraw from the study at any time he/she wishes to do so.

_ *Informed consent*, meaning that research participants must at all times be fully informed about the research process and purposes, and must give consent to their participation in the research.

_ *Safety in participation*; put differently, that the human respondents should not be placed at risk or harm of any kind.

_ *Privacy*, meaning that the *confidentiality* and *anonymity* of human respondents should be protected at all times.

_ *Trust*, which implies that human respondents will not respond to any acts of deception or betrayal in the research process or its published outcomes.

Signature:_____ Date: _____

APPENDIX K: CONSENT FORM (PARENT/GUARDIAN)

I, _____ (your name), parent of _____ agree/do not agree (delete what is not applicable) to allow Mr. Akolade Lapite to use my child as a participant in research to be conducted in his/her school. The title of the research **The effects of Attributional Style on the Mathematics Performance of Senior Secondary School Students.**

I understand that my child who is a senior secondary school student will participate in a focus group interview; the interview will be conducted after school hours. I understand that the time duration will be about thirty to forty minutes or could be longer.

I understand that the information needed is mainly for academic purposes. I understand that the researcher adheres to the principles of:

_ *Voluntary participation* in research, indicating that the participant will be free to withdraw from the study at any time he/she wishes to do so.

_ *Informed consent*, meaning that the participants must at all times be fully informed about the research process and purposes, and must give consent for their participation in the research.

_ *Safety in participation*, put differently, that the human respondents should not be placed at risk or harm of any kind.

_ *Privacy*, meaning that the *confidentiality* and *anonymity* of human respondents should be protected at all times.

_ *Trust*, which implies that human respondents will not respond to any acts of deception or betrayal in the research process or its published outcomes.

Signature:_____ Date: _____

APPENDIX L: INTERVIEW TRANSCRIPT EXAMPLE

Researcher: I want to use this medium to once again sincerely thank you for giving me the opportunity to interview you after you had responded to the questionnaire earlier given to you. The purpose of this interview is to find out your views, perceptions, attitudes, impression and understanding of the questionnaire that you have responded to. I also want to seek for your opinion, interest, attitude and level of anxiety about Mathematics, being a compulsory subject in Nigerian secondary school curriculum. I hope this interview and study will be of immense benefit to you in your Mathematics education and other academic subjects. I want to assure you that your identity/name will not be known to the public. That is the reason you were given names that are not your original names. You are also free to ask questions in the course of the interview.

Researcher: Now, may I ask the first question. The question is tell me how you came about the answers you gave to those questions in the questionnaire...eh, Bassey, can you give us the first shot about your response to it?

Bassey: Yes, the response given are based on the fact that the questions in the questionnaire are those am passing through day after day and my responses are the truth response I can give.

Researcher: You mean responses are the truth and what?

Bassey: The only truth about the question is on what I am passing through day after day.

Researcher: In essence, do you think the questionnaire has given you a way of talking about your problems in life?

Bassey: Yes

Researcher: Thank you very much.

Researcher: Precious, can I have your own impression about the way you responded to the questions in the questionnaire.

Precious: The way I responded to the questions was how I felt because the questionnaire really gave me an insight on the problems I am facing in school, it was able to make me expose how I felt, because most times, I find it difficult to express myself or even say things to my teachers. So the questionnaire really brought about my feeling and I was able to present my questions according to how I felt.

Researcher: Thank you very much. What about you Gift? Do you have any response to that?

Gift: The questionnaire really make me to say my feeling...it makes me to understand more of my feelings, also make me to know more about it or how to go through it.

Researcher: That is very good. Toheeb can you also share your feeling about the questionnaire? Especially the questions.

Toheeb: Actually, the questionnaire make me to pour out what is on my mind concerning what I'm experiencing day to day. That is why I was able to attend to it sincerely.

Researcher: Okay. Thank you. Dorcas, any response?

Dorcas: Yes sir, em it actually gave me an insight and it is actually what I am experiencing presently, so I was able to attempt it sincerely, sir.

Researcher: How did you get the questions, you know there are different forms of questions. The first part, the 'A' part i.e. the questions per se, the 'B' part and the 'C' part. Did you get them correctly. Did you get them very well?

Dorcas: Yes sir. I got the questions very well by reading them through. I was able to understand.

Researcher: Thank you very much. Daniel can I have your opinion?

Daniel: Yes sir. Actually, the questionnaire made me to express what I am going through because the questionnaire is exactly what I'm going through and I was able to attend to it because he is very easy for me to express my emotion.

Researcher: That is very good. Samson?

Samson: The questionnaire helped me to put out my feeling because I don't like facing people, talking to them and putting out my feeling in words, so the questionnaire help me to put it down on paper, so it was sincere answers.

Researcher: Did you get them correctly? How did you respond to the questions? You have the questionnaire with you? How did you respond to them, especially questions one, they are of the same pattern. How did you get them when you were responding to them?

Samson: The questions are straight-forward questions, so it's very simple to put out my answers, because it's something I am going through on a daily bases.

Researcher: Thank you very much. Toheeb can I have you impression about it?

Toheeb: I was able to attend to it because it's based on what I am feeling, that is happening to me.

Researcher: Okay. Thank you very much. Aminat?