## TABLE OF CONTENTS

Abstract	ii		
Abstrack	iii		
acknowledgements			
Table of Contents			
ist of Tables			
List of Figures			
Chapter 1: Introduction	1		
1.1 Background of the Study	1		
1.1.1 Efforts to Upgrade the Standard of Mathematics	1		
1.1.2 Shortage of Qualified Teachers in Malaysia	3		
1.1.3 Rural Schools	3		
1.1.4 Printed Texts: Prospects	4		
1.1.5 Helping Students Learn Through Programmed Instructional Materials	6		
1.2 Purpose of the Study			
1.2.1 Primary Aim and Operational Definitions	8		
1.2.2 Objectives of the Study/Research Questions	9		
1.3 Significance of the Study	9		
1.4 Limitations of the Study	11		

Chapter 2:	Review of Literature	12		
2.1	The Inadequacies of the Present Classroom Situation in the Teaching of Mathematics	12		
2.2	The Concept, Characteristics and Potential of Programmed Instruction			
2.3	Teaching Machine Terms			
2.4	Types of Programming	21		
2.5	Application of Programmed Instruction			
	2.5.1 Review of Selected Literature	23		
	2.5.2 Factors Affecting the Effectiveness of Programmed Instruction	26		
2.6	Reflection - a subset of Transformation Geometry			
	2.6.1 The Importance of Transformation Geometry	27		
	2.6.2 Problems Faced in the Teaching of Transformation Geometry	29		
2.7	Theoretical and Research Considerations			
	2.7.1 The Role of Feedback in Learning	31		
	2.7.2 Design Guidelines	33		
	2.7.3 Research Findings on Feedback	33		
Chapter 3:	Methodology	35		
3.1	Introduction	35		
3.2	Components of the Instructional Process	35		

3.3	Structure of Learn It Yourself (LIY) Reflection		
	3.3.1 Contents of Package	36	
	3.3.2 Contents of Lesson	38	
	3.3.3 Lesson Structure	39	
3.4	Design & Development of Learn It Yourself (LIY) Reflection		
	3.4.1 Defining the Goals	40	
	3.4.2 Behavioural Objectives of Each Lesson/Unit	42	
	3.4.3 Table of Specifications	42	
	3.4.4 Sequencing the Text	44	
	3.4.5 Assessment	46	
3.5	Implementation of Instrument	46	
3.6	The Sample	47	
3.7	Validity of the Text and the Tests	49	
3.8	3.8 The Pilot Test		
3.9	Scheduling and Analysis		
	3.9.1 Scheduling	53	
	3.9.2 Data Analysis	54	
Chapter 4:	Analysis of Data	55	
4.1	Introduction	55	
4.2	Performances of Pupils in the Experimental and the Control Groups	56	
	4.2.1 Comparison of Means between Post-test Scores of the Experimental and the Control Groups	60	

4.3 Pupils' Responses to the Use of Programmed Instructional Material				
	4.3.1	Time Taken to Complete the Instructional Material	65	
4.4	The Use Learning	of Programmed Instructional Material in the of Mathematics in Secondary Schools	66	
	4.4.1	Performances of Pupils	67	
	4.4.2	Feedback Questionnaire: Responses	69	
	4.4.3	Programme Duration	70	
Chapter 5:	Chapter 5: Conclusions and Recommendations			
5.1	Summar	y of the Study and Conclusions	73	
5.2	Implicati	ions and Recommendations	76	
5.3	Suggesti	ons for Further Research	78	
References				
Appendice	es			
Appendix 1: Table of Specifications				
Append	Appendix 1a: Table of Specifications of the Pre-requisite Test			
Append		ble of Specifications of the Pre-test and the st-test Unit 2	88	
Append		ble of Specifications of the Pre-test and the sst-test Unit 3	89	
Append		ble of Specifications of the Pre-test and the sst-test Unit 4	90	

237

Appendix 2: Flowchart of Programmed Instructional Material Learn It Yourself (LIY) Reflection	
Appendix 2a: Flowchart of Unit 2	91
Appendix 2b: Flowchart of Unit 4	92
Appendix 3: Learn It Yourself (LIY) Reflection ( Pantulan Tingkatan 2)	93
Unit 1: Determining the Image by Using Tracing Paper (Menentukan Imej dengan Menggunakan Kertas Surih)	
Unit 2: Determining the Axis of Reflection by Folding and Determining the Properties of Reflection (Menentukan Paksi Pantulan Secara Lipatan dan Menentukan Sifat-Sifat Pantulan)	
Unit 3: Determining the Image by Construction and Determining the Axis of Reflection by Construction (Menentukan Imej dengan Cara Pembinaan dan Menentukan Paksi Pantulan dengan Cara Pembinaan)	
Unit 4: Writing the Coordinates of the Reflective Image of a Point (Menulis Koordinat-Koordinat Imej Suatu Titik Di Bawah Suatu Pantulan)	
Appendix 4: Feedback Questionnaire (Soal Selidik)	233
Appendix 5: A List of Panel of Teachers (Judges)	236

Appendix 6: Teachers' Feedback (Maklumbalas Guru)

## List of Tables

Table		
3.1	Table of Specifications of the Pre-test and the Post-test Unit 1	43
3.2	Experimental Design	47
3.3	Number of Students in Experimental and Control Groups Categorized by Race and Sex	48
3.4	Comparison of Pre-requisite Test Performance of Experimental and Control Groups using Group t-test	49
3.5	Feedback from the Teachers/Judges	51
3.6	Time Schedule for the Study	54
4.1	Pre-test and Post-test Mean, Median, Minimum and Maximum Scores of the Experimental Group	56
4.2	Pre-test and Post-test Mean, Median, Minimum and Maximum Scores of the Control Group	57
4.3	Means and Standard Deviations of the Post-test Scores of the Experimental and the Control Groups	61
4.4	Responses from Feedback Questionnaire Regarding Programmed Instructional Material (PIM)	63
4.5	Mean Time Taken by the Pupils to Complete the Programmed Instructional Material and Mean Time Used by Teacher Teaching	65

Pupils in the Control Group

## List of Figures

_						
F	1	g	1	r	e	S

2.1	Linear and Branched Programming	23
3.1	The Component Phases of an Instructional System	35
3.2	The Sequence of Concepts Covered Under the Programmed Text	37
3.3	Lesson Structure	40
3.4	Flowchart of Unit 1	44
3.5	Flowchart of Unit 3	45