

TABLE OF CONTENTS

	page
COVER	
FINAL PROJECT AUTHENTICITY STATEMENT	
FINAL PROJECT SUPERVISOR'S APPROVAL FORM	
FINAL PROJECT EXAMINER PANEL'S APPROVAL FORM	
TABLE OF CONTENTS	ix
LIST OF CHARTS	xiv
LIST OF FIGURES	xv
LIST OF TABLES	xvi
CHAPTER I INTRODUCTION	1
1.1 Background.....	1
1.2 Research Question.....	9
1.3 Purposes of Study.....	9
1.4 Benefits of Study.....	9
1.4.1 Theoretical Benefit.....	9
1.4.2 Practical Benefit.....	10
1.4.2.1 For the School.....	10
1.4.2.2 For the Mathematics Teacher.....	10
1.4.2.3 For the Researcher.....	10
1.5 Definition of Terms.....	10
1.5.1 Conceptual Understanding.....	10
1.5.2 Numbered Heads Together.....	11

CHAPTER II LITERATURE REVIEW.....12

2.1	Conceptual Understanding	12
2.1.1	Definition of Conceptual Understanding	13
2.1.2	Students' cognitive development	16
2.2	Cooperative learning	20
2.2.1	Definition of cooperative learning model	21
2.2.2	The purpose of cooperative learning.....	22
2.2.3	Basic principle of cooperative learning	23
2.2.4	Cooperative learning NHT type	24
2.2.4.1	Definition of Numbered Heads Together.....	25
2.2.4.2	Procedures of NHT method	27
2.2.4.3	The strengths and weaknesses of NHT method	28
2.3	Connection between conceptual understanding and Numbered Heads Together method.....	30

CHAPTER III RESEARCH METHODOLOGY.....33

3.1	Research Methodology	33
3.2	Research setting.....	36
3.2.1	Research Time.....	36
3.2.2	Research Location.....	37
3.2.3	Research Subject.....	38
3.3	Research Procedure	38
3.3.1	Planning	39
3.3.2	Action.....	40
3.3.3	Observation	41

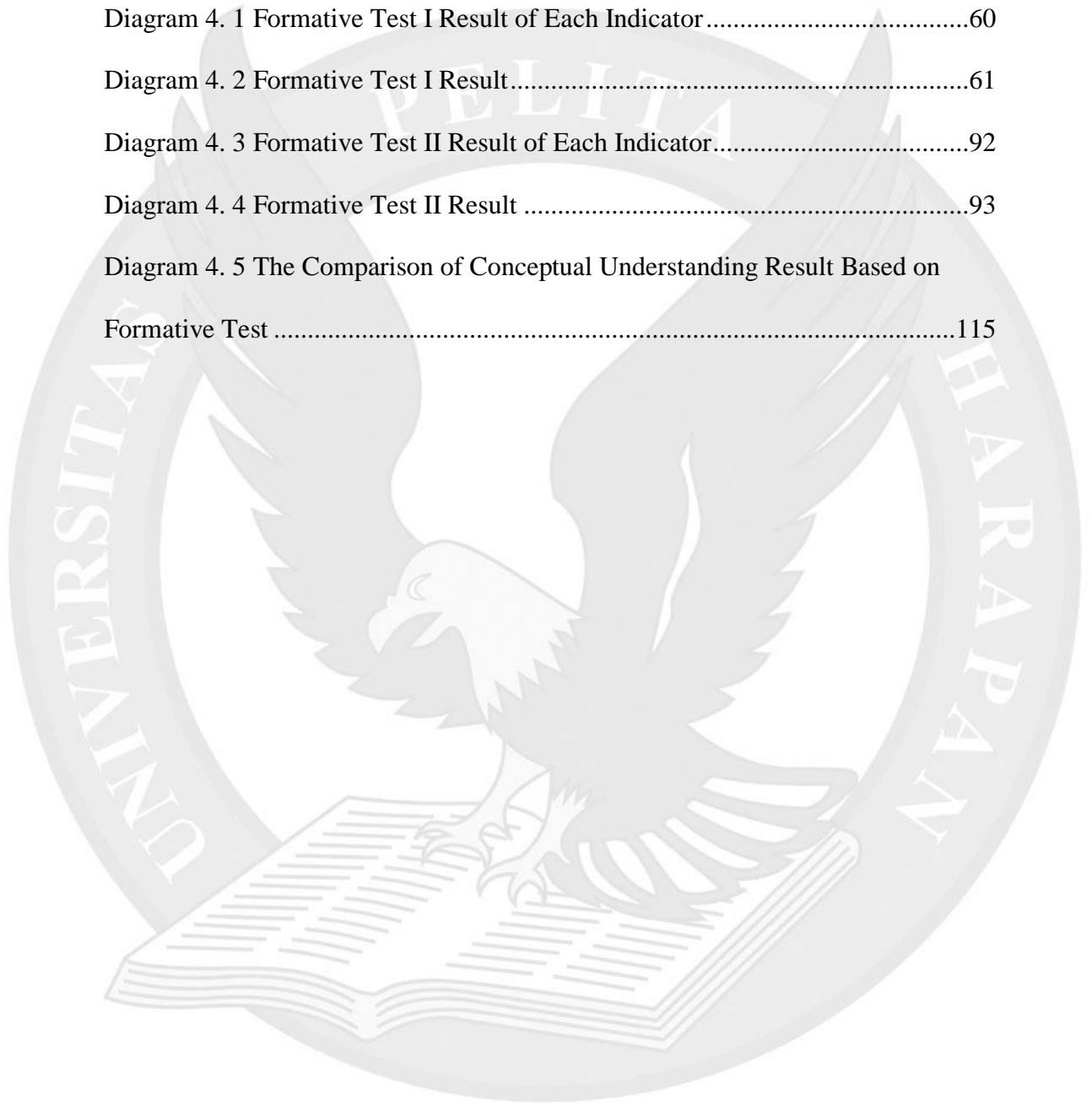
3.3.4	Reflection.....	41
3.3.5	Cycle Sustainability Criteria	41
3.4	Method of Data Collection and Research Instruments.....	42
3.4.1	Method of Data Collection.....	42
3.4.1.1	Test.....	42
3.4.1.2	Non-test.....	42
3.4.1.2.1	Questionnaire.....	42
3.4.1.2.2	Interview	43
3.4.1.2.3	Observation.....	43
3.4.1.2.4	Reflection.....	43
3.4.2	Instruments of Data Collection	44
3.4.2.1	Mentor interview Sheets	44
3.4.2.2	Mentor Feedback Sheets	44
3.4.2.3	Formative Test Sheets.....	45
3.4.2.4	Students Questionnaire	45
3.4.2.5	Students' reflection	45
3.4.2.6	Personal Reflection Journal	46
3.4.3	Indicators of Variables.....	46
3.5	Data Validation and Triangulation	49
3.6	Data analysis.....	50
1.	Data reduction.....	50
3.	Conclusion Drawing and Verification	51
CHAPTER IV ANALYSIS AND DISCUSSION		52
4.1	Pre-cycle.....	52

4.2	Description of cycle 1.....	53
4.2.1	Planning	53
4.2.2	Action.....	55
4.2.2.1	Meeting I.....	55
4.2.2.2	Meeting II.....	57
4.2.3	Observation	58
4.2.3.1	Students' conceptual understanding.....	59
4.2.3.1.1	Formative Test I.....	59
4.2.3.1.2	Students' Questionnaire.....	61
4.2.3.1.3	Mentor Interview	62
4.2.3.1.4	Personal reflection journal	63
4.2.3.1	Numbered Heads Together	64
4.2.3.1.2	Students' Questionnaire.....	64
4.2.3.2.2	Mentor Interview	65
4.2.3.2.3	Mentor Feedback	66
4.2.3.2.4	Personal Reflection Journal	67
4.2.4	Reflection	67
4.3	Analysis and Discussion of Cycle I.....	69
4.3.1	Conceptual understanding.....	69
4.3.2	Numbered Heads Together	76
4.4	Description Of Cycle II	82
4.4.1	Planning.....	82
4.4.2	Action	86
4.4.2.1	Meeting I.....	86

4.4.2.2 Meeting II.....	90
4.4.3 Observation	91
4.4.3.1 Students' conceptual understanding.....	91
4.4.3.1.1 Students' test.....	91
4.4.3.1.2 Students Questionnaire	93
4.4.3.1.3 Mentor Interview	94
4.4.3.1.4 Personal Reflection Journal	96
4.4.3.1.5 Students' Reflection.....	97
4.4.3.2 Numbered Heads Together	97
4.4.3.2.1 Students' questionnaire.....	97
4.4.3.2.2 Students' reflection.....	98
4.4.3.2.3 Mentor interview	99
4.4.3.2.4 Mentor feedback	100
4.4.3.2.5 Personal reflection journal.....	101
4.4.4 Reflection	101
4.5 Analysis and Discussion of Cycle II	102
4.5.1 Conceptual Understanding	102
4.5.2 Numbered Heads Together	109
4.6 Final Discussion	114
CHAPTER V CONCLUSION AND RECOMMENDATION.....	120
5.1 Conclusion.....	120
5.2 Recommendations	122
REFERENCES.....	124
APPENDICES	

LIST OF CHARTS

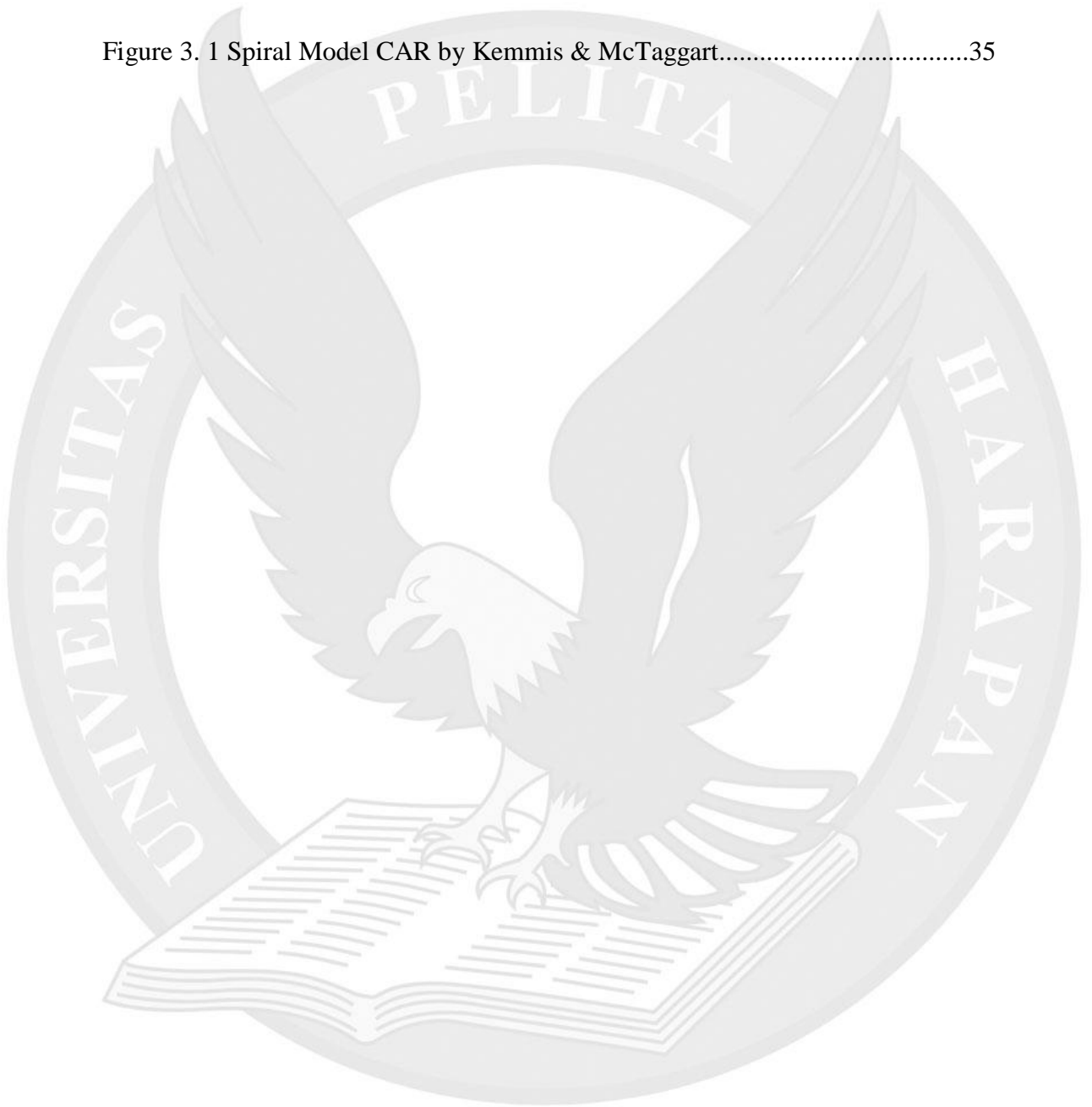
	Page
Diagram 4. 1 Formative Test I Result of Each Indicator.....	60
Diagram 4. 2 Formative Test I Result.....	61
Diagram 4. 3 Formative Test II Result of Each Indicator.....	92
Diagram 4. 4 Formative Test II Result	93
Diagram 4. 5 The Comparison of Conceptual Understanding Result Based on Formative Test	115



LIST OF FIGURES

page

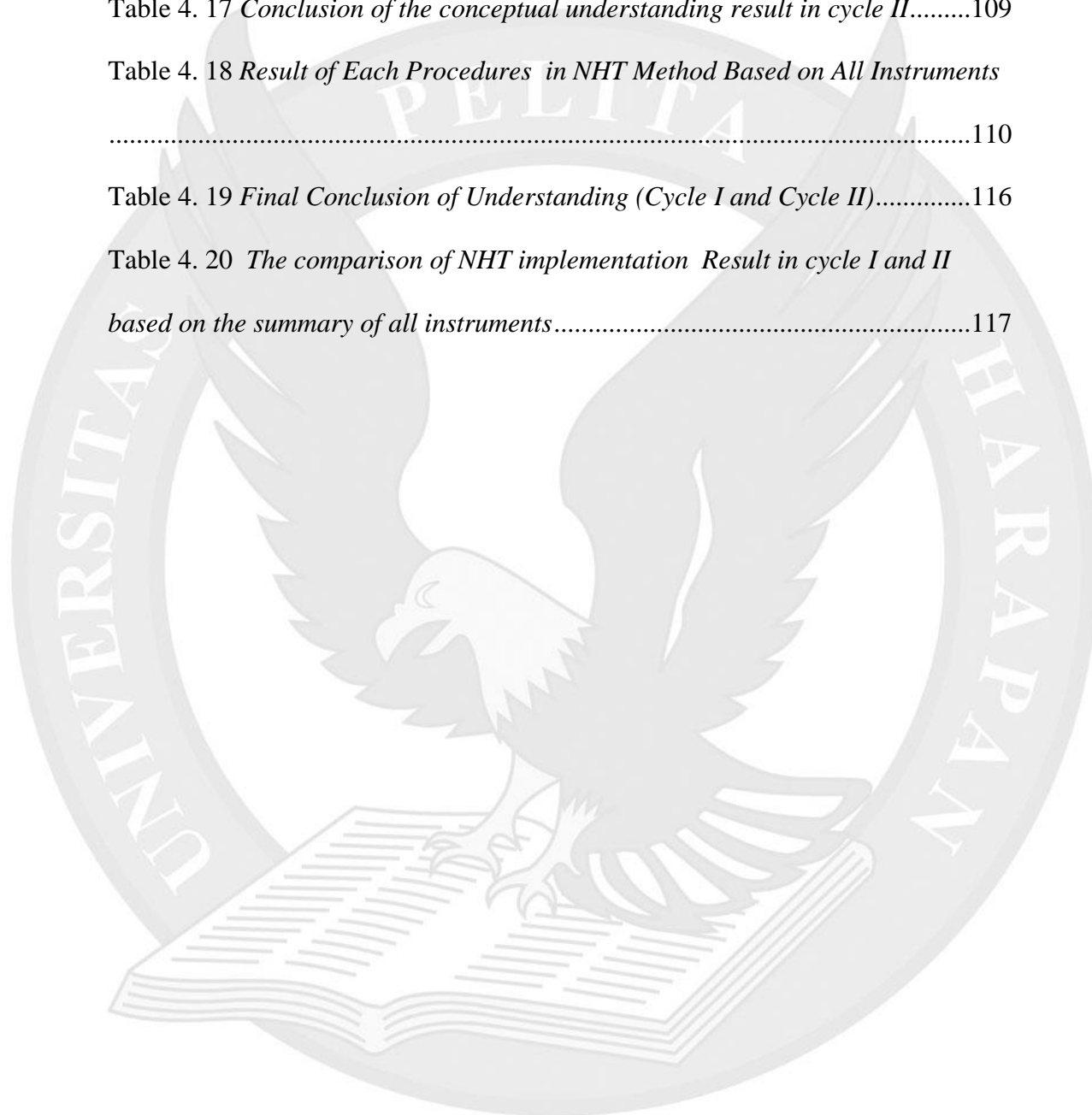
Figure 3. 1 Spiral Model CAR by Kemmis & McTaggart.....35



LIST OF TABLES

	page
Table 2. 1 Bloom's Taxonomy of Cognitive Domain	18
Table 2. 2 Piaget's Stages of Development	16
Table 3. 1 Research Cycle Time Frame	37
Table 3. 2 Variables, Indicators, procedures and Detailed Instruments	47
Table 3. 3 Coding.....	51
Table 4. 1 <i>Formative Test I Result of Each Category</i>	60
Table 4. 2 <i>Result Category of Formative Test I</i>	61
Table 4. 3 <i>Students' Questionnaire Results Toward Conceptual Understanding</i>	62
Table 4. 4 <i>Mentor Interview Toward Conceptual Understanding</i>	63
Table 4. 5 <i>Students' Questionnaire Results Toward NHT Method</i>	65
Table 4. 6 <i>Mentor Interview toward Conceptual Understanding in Cycle I</i>	66
Table 4. 7 <i>Result of Each Indicator in Conceptual Understanding Based on All Instruments</i>	70
Table 4. 8 <i>conclusion of the conceptual understanding result in cycle I</i>	76
Table 4. 9 <i>Result of Each Procedure in NHT Method Based on All Instruments</i> ..	77
Table 4. 10 <i>Formative Test II Results of Each Indicator</i>	92
Table 4. 11 <i>Result Category of Formative Test II</i>	93
Table 4. 12 <i>Students' Questionnaire Results Toward Conceptual Understanding in Cycle II</i>	94
Table 4. 13 <i>Mentor Interview Toward Conceptual Understanding in Cycle II</i>	96
Table 4. 14 <i>Students' Questionnaire Results Toward NHT Method in Cycle II</i> ...98	

Table 4. 15 <i>Interview Toward Conceptual Understanding in Cycle I</i>	100
Table 4. 16 <i>Result of Each Indicator in Conceptual Understanding Based on All Instruments</i>	103
Table 4. 17 <i>Conclusion of the conceptual understanding result in cycle II</i>	109
Table 4. 18 <i>Result of Each Procedures in NHT Method Based on All Instruments</i>	110
Table 4. 19 <i>Final Conclusion of Understanding (Cycle I and Cycle II)</i>	116
Table 4. 20 <i>The comparison of NHT implementation Result in cycle I and II based on the summary of all instruments</i>	117



LIST OF APPENDICES

	page
Appendix A- 1 Lesson Plan Pre-cycle	A-1
Appendix A- 2 Lesson Plan Cycle I meeting I	A-4
Appendix A- 3 Lesson Plan Cycle I meeting II	A-7
Appendix A- 4 Lesson Plan Cycle II meeting I	A-10
Appendix A- 5 Lesson Plan Cycle II meeting II	A-13
Appendix B- 1 Students Questionnaire Validation Sheet of Pre-cycle	B-1
Appendix B- 2 Students Questionnaire Sample of Pre-cycle	B-4
Appendix B- 3 Students Questionnaire Result of Pre-cycle	B-10
Appendix B- 4 Students Questionnaire Validation Sheet of Cycle I	B-13
Appendix B- 5 Students Questionnaire Sample of Cycle I	B-19
Appendix B- 6 Students Questionnaire Result of Cycle I	B-22
Appendix B- 7 Students Questionnaire Validation Sheet of Cycle II	B-24
Appendix B- 8 Students Questionnaire Sample of Cycle II	B-30
Appendix B- 9 Students Questionnaire Result of Cycle II	B-33
Appendix C- 1 Mentor Interview Validation Sheets of Cycle I	C-1
Appendix C- 2 Mentor Interview Result of Cycle I	C-7
Appendix C- 3 Mentor Interview Validation Sheet of Cycle II	C-9
Appendix C- 4 Mentor Interview Result of Cycle II	C-18
Appendix D- 1 Mentor Feedback Sheet of Cycle Meeting I	D-1
Appendix D- 2 Mentor Feedback Sheet of Cycle I meeting II	D-3
Appendix D- 3 Mentor Feedback Sheet of Cycle II meeting I	D-5

Appendix D- 4 Mentor Feedback Sheet of Cycle II meeting II.....	D-7
Appendix D- 5 Mentor Feedback Sheet of Pre-cycle	D-9
Appendix E- 1 Formative Test Validation Sheet of Pre-cycle.....	E-1
Appendix E- 2 Formative Test Sample of Pre-cycle	E-6
Appendix E- 3 Formative Test Result of Pre-cycle	E-9
Appendix E- 4 Formative Test I Validation sheet of Cycle I	E-10
Appendix E- 5 Formative Test I Sample of Cycle I	E-22
Appendix E- 6 Formative Test I Result of Cycle I	E-28
Appendix E- 7 Formative Test II Validation sheet of Cycle II.....	E-30
Appendix E- 8 Formative Test II Sample of Cycle II.....	E-39
Appendix E- 9 Formative Test II Result of Cycle II.....	E-42
Appendix E- 10 Table of Comparison Formative Test Result.....	E-44
Appendix F- 1 Personal Reflection Journal of Cycle I.....	F-1
Appendix F- 2 Personal Reflection Journal of Cycle II.....	F-7
Appendix F- 3 Students' Reflection	F-12
Appendix G- 1 Students Worksheet Cycle I.....	G-1
Appendix G- 2 Students Worksheet Cycle II.....	G-2
Appendix H- 1 Agreement Letter of Pre-Cycle.....	H-1
Appendix H- 2 Agreement letter after Cycle II	H-2