

TABLE OF CONTENT

PREFACE	i
DECLARATION	ii
ACKNOELEDGEMENTS	iii
ABSTRACT	iv
TABLE OF CONTENTS	v
LIST OF TABLES	vii
LIST OF FIGURES	viii
CHAPTER I INTRODUCTION	1
A. Research Background.....	1
B. Problem Identification and Research Questions.....	5
C. Purpose of the Research	5
D. Significance and Benefits of the Research	5
E. Outline of the Research	7
CHAPTER II REVIEW OF LITERATURE.....	8
A. Experiment Method in Teaching Learning process	8
B. Virtual laboratory and Virtual Experiment.....	9
C. <i>PhET</i> Interactive Simulations	10
D. Combination of Virtual and Physical Experiment	12
E. The Framework of Blended Virtual and Physical Manipulative.....	13
F. Understanding Based on Revised of Bloom Taxonomy.....	15
G. Electricity	19
CHAPTER III RESEARCH METHODOLOGY	21
A. Location, Population and Sample	21
B. Research Design	22
C. Research Method	22
D. Operational Definition.....	26
E. Instructional Tools and Research Instrument	27
F. The Process of Instrument Validation	29
G. Data Collection Techniques	29
H. Data Analysis	30
CHAPTER IV FINDINGS AND DISCUSSION	32
A. Research's Findings.....	32
1. Findings of Students Understanding.....	32

2. Narrative of Teaching-Learning Process	37
3. The Finding of the Framework in Combining Virtual and Physical Experiment	42
4. Implementability of Teaching-Learning Activity	43
5. The Findings of Pre-Test and Post-Test	44
B. Discussion	49
1. Description of the Improvement of Students' Understanding.....	49
2. Characteristic of P-V and V-P experiment sequences.....	54
3. Combined Vs Blended Physical and Virtual Experiments Framework.....	58
4. The Framework of Sequence in Combining Physical and Virtual Experiment	59
CHAPTER V CONCLUSION, LIMITATION OF THE STUDY, AND SUGGESTIONS	61
A. Conclusion	61
C. Suggestions	61
BIBLIOGRAPHY	62
APPENDICES	64
Appendix A: Instructional Tools.....	64
Appendix B: Research Instruments	78
Appendix C: Research Instrument Analysis.....	97

LIST OF TABLES

Table

2.1.	Definition of Each Category of Understanding According to Anderson, 2001	15
3.1.	Category of Normal Gain	31
4.1.	Description of Students' Worksheet on Static Electricity	33
4.2.	Description of Students' Worksheet on Dynamic Electricity 1	34
4.3.	Description of Students' Worksheet on Dynamic Electricity 2	36
4.4.	Characteristic of Physical-Virtual Experiment Sequence	55
4.5.	Characteristic of Virtual-Physical Experiment Sequence	57



LIST OF FIGURES

Figure

1.1.	The Outline of the Research Paper.....	7
2.1	<i>PhET</i> Virtual Laboratory of Static Electricity	11
2.2	<i>PhET</i> Virtual Laboratory of Dynamic Electricity.....	11
2.3	The Framework of Blended of Physical and Virtual Manipulative	14
3.1	Triangulation of Research Data Resources	22
3.2.	Flowchart of Implemented Research Procedure	23
3.3.	Adaptation of Experimental Design Based on Jaquelin.....	25
4.1	The Finding of the Framework in Combining Virtual and Physical Experiment.....	42
4.2.	Diagram of Percentage of Teaching-Learning Activities	43
4.3.	Students' Achievement in Explaining.....	45
4.4.	Students' Achievement in Interpreting	46
4.5.	Students' Achievement in Inferring.....	47
4.6.	Diagram of the Overall of Students Conceptual Achievement.....	48

LIST OF APPENDICIES

Appendix A.1 Lesson Plan.....	65
Appendix A.2 Students Worksheet.....	75
Appendix B.1 Blueprint of Pre-Test and Post-Test	79
Appendix B.2 Observational Sheet.....	93
Appendix C.1 Recapitulation of Students Worksheet.....	98
Appendix C.2 Recapitulation of Implemented Teaching-Learning Activity.....	111
Appendix C.3 Recapitulation of Pre-Test and Post-Test	115
Appendix C.4 Table of N-Gain.....	121

