

TABLE OF CONTENTS

	<i>Page</i>
MOTTO AND DEDICATION SHEET	i
APPROVAL SHEET	ii
ORIGINALITY STATEMENT SHEET	iii
PUBLICATION APPROVAL SHEET	iv
BIOGRAPHY	v
ABSTRACT	vi
PREFACE.....	vii
TABLE OF CONTENTS.....	x
LIST OF TABLES	xiii
LIST OF FIGURES	xv
LIST OF APPENDIXES	xvi
CHAPTER I.....	1
INTRODUCTION.....	1
1.1 Background of the Study	1
1.2 Problem Identification	5
1.3 Scope of Study	5
1.4 Problem Limitation	6
1.5 Research Question	6
1.6 Research Objectives.....	7
1.7 Research Benefits.....	7
CHAPTER II.....	8
LITERATURE REVIEW.....	8
2.1 Phenomenon-Based Learning.....	8
2.1.1 Definition of Phenomenon.....	8
2.1.2 Definition of Phenomenon-Based Learning	8
2.1.3 Phenomenon-Based Learning Activities.....	9
2.2 Ethnoscience	10
2.2.1 Definition of Ethnoscience	10
2.2.2 Ethnoscience in Natural Science Learning	11
2.3 Scientific literacy	11
2.3.1 Definition of Scientific literacy	11
2.3.2 Aspects of Scientific literacy	12

2.3.3 Scientific literacy Indicators	13
2.3.4 Factors Affecting Scientific Literacy	13
2.4 Scientific Argumentation	15
2.4.1 Definition of Scientific Argumentation	15
2.4.2 Indicators of Scientific Argumentation.....	15
2.4.3 The Importance of Scientific Argumentation in Learning.....	16
2.5 The Relationship of Ethnoscience Integrated Phenomenon-Based Learning with Scientific literacy and Argumentation.....	17
2.6 Temperature, Heat, and Expansion	18
2.6.1 Temperature	18
2.6.2 Heat	20
2.6.3 Thermal Expansion	20
2.7 Relevant Research.....	22
2.8 Framework of Thinking	24
2.9 Hypothesis.....	26
CHAPTER III	27
RESEARCH METHOD	27
3.1 Research Location and Time	27
3.2 Type of Research	27
3.3 Population and Sample	27
3.3.1 Population	27
3.3.2 Sample.....	27
3.4 Research Variables.....	27
3.5 Operational Definition	28
3.6 Research Design.....	28
3.7 Data Collection Tehnique	29
3.8 Research Instrument.....	30
3.8.1 Scientific Literacy Instrument Test.....	30
3.8.2 Scientific Argumentation Instrument Test.....	30
3.8.3 Scientific Argumentation Interview	33
3.8.4 Instrument Testing	33
3.9 Research Procedure.....	38
3.10 Data Analysis	40
3.10.1 Manova Test.....	41
3.10.2 N-gain Test.....	43

3.10.4 Correlation Test	44
3.10.5 Qualitative Descriptive	45
CHAPTER IV.....	46
RESULT AND DISCUSSION.....	46
4.1 Research Result.....	46
4.1.1 Research Result Description	46
4.1.2 Pretest Data for Scientific Literacy and Argumentation.....	46
4.1.3 Hypothesis Test for Scientific Literacy and Argumentation Pretest	47
4.1.4 Posttest Data of Scientific Literacy and Argumentation.....	50
4.1.5 Hypothesis Test of Posttest Scores	52
4.1.6 N-Gain Test of Scientific Literacy and Argumentation.....	54
4.1.7 Correlation of Scientific Literacy and Scientific Argumentation	56
4.1.8 Result of Scientific Argumentation Interview	56
4.2 Discusssion of Research Result	60
4.2.1 The Effect of the Ethnoscience Integrated Phenomenon-based Learning on Scientific Literacy and Argumentation.....	60
4.2.2 The Increase of Scientific Literacy and Argumentation with the Implementation of the Ethnoscience Integrated Phenomenon-Based Learning	67
4.2.3 The Correlation of Students' Scientific Literacy with Scientific Argumentation.....	69
4.2.4 Scientific Argumentation Interview	69
CHAPTER V	72
CONCLUSION AND SUGGESTION	72
5.1 Conlusion	72
5.2 Suggestion.....	72
BIBLIOGRAPHY	73
APPENDIXES	77

LIST OF TABLES

	<i>Page</i>
Table 2.1. Activities in Phenomenon-based Learning	9
Table 2.2. Aspects of Scientific Literacy Assessment	12
Table 2.3. Scientific Literacy Indicators	13
Table 2.4. Comparison of Temperature Scale	19
Table 2.5. Relevant Research	22
Table 3.1. Two Group Pretest-Posttest Research Design.....	29
Table 3.2. Scientific Literacy Test Grid	30
Table 3.3. Students' Scientific Argumentation Assessment Coding.....	31
Table 3.4. Student Scientific Argumentation Assessment Guidelines	31
Table 3.5. Student's Scientific Argumentation Interpretation Value.....	32
Table 3.6. Scientific Literacy Instrument Content Validity Result	34
Table 3.7. Scientific Argumentation Instrument Content Validity Result	35
Table 3.8. Instrument Reliability Testing Criteria	36
Table 3.9. Difficulty Index	37
Table 3.10. Differentiation Power Index Categories Questions.....	38
Table 3.11. Manova Working.....	41
Table 3.12. H_0 Distribution	42
Table 3.13. N-gain Increase Category	43
Table 3.14. N-gain Score Percentage	44
Table 3.15. Scientific Literacy and Argumentation Percentage Conversion ..	44
Table 3.16. Correlation Test Categories.....	44
Table 3.17. Scientific Argumentation Level	45
Table 4.1. Frequency Distribution of Scientific Literacy Pretest.....	46
Table 4.2. Frequency Distribution of Scientific Argumentation Pretest Score	47
Table 4.3. Normality Test for Scientific Literacy and Argumentation Pretest Scores...	48
Table 4.4. Homogeneity Test for Scientific Literacy and Argumentation Pretest Scores	48
Table 4.5. Manova Test Output for Scientific Literacy and Argumentation Pretest Scores	49
Table 4.6. Test of Between-Subject Effect for Pretest Scores	50
Table 4.7. Frequency Distribution of Scientific Literacy Posttest Scores.....	50

Table 4.8. Frequency Distribution of Scientific Argumentation Posttest Scores.....	51
Table 4.9. Normality Test for Scientific Literacy and Argumentation Posttest Scores .	52
Table 4.10. Homogeneity Test for Posttest Scores	52
Table 4.11. Manova Test Output for Scientific Literacy and Argumentation Posttest.	53
Table 4.12. Tests of Between-Subjects Effects of Posttest Scores	53
Table 4.13. N-gain Percentage Increase of Scientific Literacy	54
Table 4.14. N-gain Percentage Increase of Scientific Literacy Per Indicators	55
Table 4.15. N-gain Percentage Increase of Scientific Argumentation	55
Table 4.16. N-gain Percentage Increase for Scientific Argumentation Per Indicators .	56
Table 4.17. Correlation Between Scientific Literacy and Scientific Argumentation .	56



LIST OF FIGURES

	<i>Page</i>
Figure 2.1. Lower Fixed Point and Upper Fixed Point on Temperature Scales	19
Figure 2.2. Framework of Thinking	25
Figure 3.1. Research Procedure	39
Figure 4.1. Correlation Graph of Scientific Literacy and Argumentation	57
Figure 4.2. Experimental Class Scientific Argumentation Level	59
Figure 4.3. Control Class Scientific Argumentation Level	59
Figure 4.4. Ethnoscience Phenomena about Temperature and Its Measurement	61
Figure 4.5. Argument of Group 6 for Temperature and Its Measurement Topic	63
Figure 4.6. Argument of Group 1 for Temperature and Its Measurement Topic	63
Figure 4.7. Question Related to Heat Transfer	70



LIST OF APPENDIXES

	<i>Page</i>
Appendix 1. Modul Ajar of Experiment Class.....	77
Appendix 2. Modul Ajar of Control Class	89
Appendix 3. Student Worksheet of Experiment Class.....	95
Appendix 4. Student Worksheet of Control Class	105
Appendix 5. Scientific Literacy Instrument	112
Appendix 6. Scientific Argumentation Instrument Test	133
Appendix 7. Sheet of Interview Result with Teacher	147
Appendix 8. Learning Observation Result.....	148
Appendix 9. Scientific Literacy Instrument Test	149
Appendix 10. Scientific Argumentation Validity Test.....	150
Appendix 11. Students List of Experimental Class.....	152
Appendix 12. Students List of Control Class.....	153
Appendix 13. Scientific Literacy Pretest Score Distribution of Experimental Class. 154	
Appendix 14. Scientific Literacy Pretest Score Distribution of Control Class	156
Appendix 15. Scientific Argumentation Pretest Score Distribution of Experimental Class... 158	
Appendix 16. Scientific Argumentation Pretest Score Distribution of Control Class.. 160	
Appendix 17. Scientific Literacy Posttest Score Distribution of Experimental Class 162	
Appendix 18. Scientific Literacy Posttest Score Distribution of Control Class..... 164	
Appendix 19. Scientific Argumentation Posttest Score Distribution of Experimental Class 166	
Appendix 20. Scientific Argumentation Posttest Score Distribution of Control Class 168	
Appendix 21. Normality Test Output.....	170
Appendix 22. Homogeneity Test Output	171
Appendix 23. Hypothesis Test Output	172
Appendix 24. N-gain Test Output	174
Appendix 25. Correlation Test Ouput	178
Appendix 26. Research Documentation.....	179
Appendix 27. Certificate of Instrument Validation.....	181
Appendix 28. Research Permission.....	189
Appendix 29. Research Reply	190