# TABLE OF CONTENT

APPROVAL SHEET ................................................................................................................................. ii
DECLARATION OF ORIGINALITY ......................................................................................................... i
PREFACE ...................................................................................................................................................... ii
ACKNOWLEDGEMENT ............................................................................................................................. iii
ABSTRACT .................................................................................................................................................. v
TABLE OF CONTENT .............................................................................................................................. vii
TABLE LIST ................................................................................................................................................ ix
FIGURE LIST .............................................................................................................................................. x
APPENDIX LIST ......................................................................................................................................... xi

CHAPTER I INTRODUCTION .................................................................................................................. 1
A. Research Background .............................................................................................................................. 1
B. Research Problem ................................................................................................................................. 3
C. Research Question ............................................................................................................................... 3
D. Research Objective ............................................................................................................................... 3
E. Limitation of Problem ............................................................................................................................ 4
F. Research Benefit ................................................................................................................................... 5
G. Research Paper Structure .................................................................................................................... 6

CHAPTER II TEAM ASSISTED INDIVIDUALIZED, VARK LEARNING STYLE, CONCEPTUAL UNDERSTANDING AND OPTIC CONCEPT ................................................................................................. 7
A. Team Assisted Individualized ................................................................................................................. 7
B. Learning Style ....................................................................................................................................... 10
C. Analysis of Student Conceptual Understanding in Learning Optics .................................................. 14
D. Optics Concept ..................................................................................................................................... 16
E. Relevant Research ................................................................................................................................ 21

CHAPTER III RESEARCH METHODOLOGY ......................................................................................... 23
A. Research Method .................................................................................................................................. 23
B. Research Design .................................................................................................................................... 23
C. Population and Sample ......................................................................................................................... 25
D. Operational Definition ......................................................................................................................... 25
E. Assumption ............................................................................................................................................ 26
F. Hypothesis ............................................................................................................................................ 26
G. Research Instrument ............................................................................................................................. 27
H. Instrument Analysis Result .................................................................................................................. 33
I. Data Processing Technique .................................................................................................................. 35
J. Research Procedure ............................................................................................................................... 38
TABLE LIST

Table 2.1 Meeting Activity ..............................................................................................................................................
..................................................................................................................................................................................
12
Table 2.2 Revised Bloom Taxonomy.................................................................................................................................
..................................................................................................................................................................................
14
Table 2.3 Analysis of Core Competence, Basic Competence and Learning Dimension on Optics .................................................................
..................................................................................................................................................................................
15
Table 3.1 One-Group Pre-test-Post Test Design ..............................................................................................................
..................................................................................................................................................................................
23
Table 3.2 Table of Instrument Needs of Research ...........................................................................................................
..................................................................................................................................................................................
27
Table 3.3 Observation Sheet of TAI Learning Model ........................................................................................................
..................................................................................................................................................................................
27
Table 3.4 Blue Print of Optic Concept Objective Test ....................................................................................................
..................................................................................................................................................................................
29
Table 3.5 Interpretation of Validity .................................................................................................................................
..................................................................................................................................................................................
30
Table 3.6 Interpretation of Reability ...............................................................................................................................  
..................................................................................................................................................................................
31
Table 3.7 Interpretation of Difficulty Level ....................................................................................................................
..................................................................................................................................................................................
32
Table 3.8 Interpretation of Discriminant Power ...........................................
........................................................................................................................................
33
Table 3.9 Recapitulation of Test Item for Students’ Conceptual Understanding ...........................................................
........................................................................................................................................
34
Table 3.10 Interpretation of Normalized Gain Score........................................
........................................................................................................................................
36
Table 3.11 Interpretation of Precenta..............................................................
........................................................................................................................................
38
Table 4.1 Profile of Students Learning Style ..................................................
........................................................................................................................................
41
Table 4.2 Group Determination based on Learning Style and Rate of Learning ............................................................................................................................
........................................................................................................................................
43
Table 4.3 Results of Observation Sheet during TAI Implementation.........
........................................................................................................................................
44
Table 4.4 Group Activity Scoring.................................................................
........................................................................................................................................
45
Table 4.5 Result of T-test Paired Sample Test.............................................
........................................................................................................................................
49
Table 4.6 Result of Students’ Pre Test and Post Test Conceptual Understanding ............................................................................................................................
Table 4.7 Result of Students’ Pre Test and Post Test Conceptual Understanding based on Sub Concept and Learning Style

..................................................................................................................................................

50
LIST OF FIGURE

Figure 2.1. Schematic representation of (a) specular reflection, where the reflected rays are all parallel to one another, and (b) diffuse reflection, where the reflected rays travel in random directions. (c, d) Photographs of specular and diffuse reflection, made with laser light .......................... 17
Figure 2.2 The wave under reflection model .................................................. 18
Figure 2.3 (a) The wave under refraction model. (b) Light incident on the Lucite block refracts both when it enters the block and when it leaves the block (b) moves from glass into air................................................. 18
Figure 2.4 The refraction of Light as it (a) move from air into glass and (b) moves from glass into air................................................................. 19
Figure 2.5. An image formed by reflection from a flat mirror. The image at point I is virtual. q must be taken as negative for virtual images: the object distance p, therefore, equals the absolute value of the image distance q................................. 19
Figure 2.6 A geometric construction to locate the image of an object placed in front of a flat mirror. Images Formed by Concave Mirrors........ 20
Figure 2.7 (a) A concave mirror of radius R. The center of curvature, C, is located on the principal axis. (b) A point object placed at O in front of a concave spherical mirror of radius R, where O is any point on the principal axis farther than R from the surface of the mirror, forms a real image at I. ................................................................. 20
Figure 2.8 Ray diagrams for spherical mirrors and corresponding photographs of the images of candles ................................................. 21
Figure 3.1 One-Group Pretest-Posttest Research Design ......................... 24
Figure 3.2 Research Flowchart ................................................................ 40
APPENDIX LIST

Appendix A.1 Lesson Plan Experimental Class ................................. 61
Appendix A.2 Students’s Worksheet .................................................. 99
Appendix B.1 Instrument Test Before Validation ................................. 117
Appendix B.2 Objective Test Judgement Sheet .................................... 133
Appendix B.3 Learning Style Questionnaire Judgement Sheet .................. 146
Appendix B.4 Instrument Validation Result ......................................... 155
Appendix B.5 Instrument Test After Validation .................................... 165
Appendix B.6 TAI Observation Sheet ................................................ 168
Appendix C.1 Determination of Students’ Learning Style ....................... 180
Appendix C.2 Determination of Students’ Rate of Learning ...................... 181
Appendix C.3 Grouping based on Learning Style and Rate of Learning ... 182
Appendix C.4 Recapitulation of Whole Students’ Pre-test and Post-test Result ................................................................. 183
Appendix C.5 Recapitulation of Visual Students’ Pre-test and Post-test Result ................................................................................. 184
Appendix C.6 Recapitulation of Aural/Auditory Students’ Pre-test and Post-test Result ........................................................................... 185
Appendix C.7 Recapitulation of Read/Write Students’ Pre-test and Post-test Result ............................................................................. 186
Appendix C.8 Recapitulation of Kinesthetic Students’ Pre-test and Post-test Result .............................................................................. 187
Appendix D.1 Documentation in Class .................................................. 189
Appendix D.2 Autobiography ................................................................. 190
Appendix D.3 Documentation of students’ worksheet ......................... 191
Appendix D.4 Important Letter ............................................................... 195
Appendix D.5 Documentation of Instrument Judgement Result ............. 200