

# DE LA SALLE UNIVERSITY

## THE EFFECTS OF VARIOUS LABORATORY TEACHING METHODS ON STUDENTS' ACHIEVEMENT IN BIOLOGY

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In Partial Fulfillment

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Doctor of Philosophy in Science Education

Major in Biology

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by

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## TABLE OF CONTENTS

	PAGE
TITLE PAGE . . . . .	i
APPROVAL SHEET . . . . .	ii
ACKNOWLEDGEMENTS . . . . .	iii
DEDICATION . . . . .	vi
TABLE OF CONTENTS . . . . .	vii
LIST OF TABLES . . . . .	ix
LIST OF FIGURES . . . . .	xi
ABSTRACT . . . . .	xii
 <b>Chapter</b>	
<b>1</b>	
INTRODUCTION . . . . .	1
Statement of the Problem . . . . .	3
The Null Hypotheses . . . . .	3
Importance of the Study . . . . .	4
Assumptions . . . . .	4
Limitations of the Study . . . . .	5
Theoretical Framework . . . . .	6
Definition of Terms . . . . .	10
<b>2</b>	
REVIEW OF RELATED LITERATURE . . . . .	12
Foreign Articles . . . . .	12
Local (Unpublished) Masteral Theses . . . . .	13
Foreign Doctoral Dissertations . . . . .	15
Summary and Evaluation . . . . .	16



3	<b>METHODOLOGY . . . . .</b>	20
	Overall Design . . . . .	20
	Population Sample . . . . .	20
	Instrumentation . . . . .	21
	Data Collection Procedures . . . . .	37
	Research Design . . . . .	38
	Statistical Technique . . . . .	40
4.	<b>PRESENTATION, ANALYSES AND INTERPRETATION OF DATA . . . . .</b>	41
	Characteristics of the Population . . . . .	42
	Correlation of Predictor Variables . . . . .	44
	Multiple Correlation of Predictor Variables . . . . .	47
	ANCOVA Through Stepwise Regression . . . . .	55
5	<b>SUMMARY, CONCLUSION AND RECOMMENDATIONS . . . . .</b>	60
	Summary . . . . .	60
	Conclusions . . . . .	61
	Recommendations for Further Research . . . . .	62
	Recommendations for Practice . . . . .	63
	<b>BIBLIOGRAPHY . . . . .</b>	64
	<b>APPENDICES</b>	
	A. DECS Permit to Conduct Research in the Division of Dagupan City . . . . .	67
	B. Specification for the Student Ecology Test . . . . .	69
	C. Laboratory Activities (ILA, OLA, ILAOLA) . . . . .	70
	D. Student Ecology Test (SET) . . . . .	169
	E. Item Analysis of the SET . . . . .	182
	F. The P and Q Data for rKR20 . . . . .	184
	G. Computation of the rKR20 . . . . .	185
	H. Tables not Found in the Text . . . . .	186
	<b>CURRICULUM VITAE . . . . .</b>	190

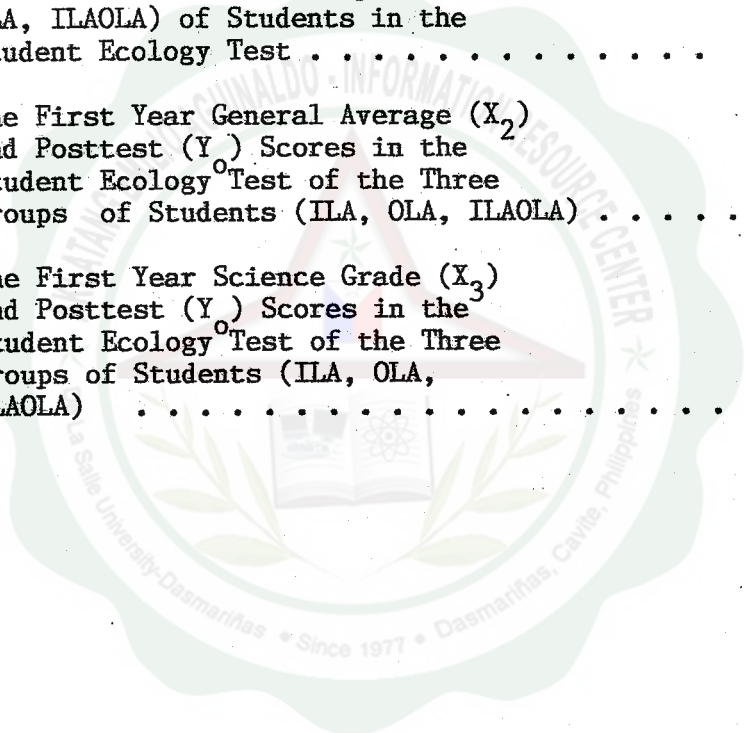


## LIST OF TABLES

Table		Page
1	Item Difficulty of the Student Ecology Test . . . . .	36
2	Index of Discrimination of the Student Ecology Test . . . . .	36
3	A Profile of the Second Year Student Population in Private Sectarian Schools in Dagupan City . . . . .	43
4	A Profile of Samples in the Treatment Groups . . . . .	44
5	Correlation Matrix of Predictor Variables . . . . .	45
6	Regression of $X_2$ (General Average) on $Y_0$ (Posttest) . . . . .	47
7	Regression of $X_1$ (Pretest) on $Y_0$ (Posttest) . . . . .	48
8	Regression of $X_4$ (Method) on $Y_0$ (Posttest) . . . . .	49
9	Regression of $X_6$ (Method/Sex) on $Y_0$ (Posttest) . . . . .	49
10	The Strength of Influence of Predictor Variables $X_2$ , $X_1$ , $X_4$ , and $X_6$ on $Y_0$ . . . . .	50
11	Equation Constant, Beta Coefficient and T-Value of the Regression Equation When $X_2$ (General Average) Operates Alone . . . . .	52
12	Equation Constant, Beta Coefficient and T-Value of the Regression Equation When $X_2$ (General Average) and $X_1$ (Pretest) Operate Jointly . . . . .	53



13	Equation Constant, Beta Coefficient and T-Value of the Regression Equation When $X_2$ (General Average), $X_1$ (Pretest) and $X_4$ (Methods) Operate Together . . . . .	54
14	Results of the Analysis of the Posttest Scores of Three Groups (ILA, OLA, ILAOLA) Using ANCOVA Through Stepwise Regression . . . . .	55
15	The Pretest ( $X_1$ ) and Posttest ( $Y_0$ ) Scores of the Three Groups (ILA, OLA, ILAOLA) of Students in the Student Ecology Test . . . . .	187
16	The First Year General Average ( $X_2$ ) and Posttest ( $Y_0$ ) Scores in the Student Ecology <sup>o</sup> Test of the Three Groups of Students (ILA, OLA, ILAOLA) . . . . .	188
17	The First Year Science Grade ( $X_3$ ) and Posttest ( $Y_0$ ) Scores in the Student Ecology <sup>o</sup> Test of the Three Groups of Students (ILA, OLA, ILAOLA) . . . . .	189



LIST OF FIGURES

Figure		Page
1	A Diagram Showing the Theories Forwarded . . . . .	9
2	Non-equivalent Control Group Pretest-Posttest Design . . . . .	39



## ABSTRACT

**TITLE** : The Effects of Various Laboratory Teaching Methods on Students' Achievement in Biology

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This study sought to investigate the effects of three laboratory teaching methods, namely: Indoor Laboratory Activities (ILA), Outdoor Laboratory Activities (OLA) and Combined Indoor-Outdoor Laboratory Activities (ILAOLA) on students' achievement in biology.

More specifically, it attempted to answer the following questions:

1. Do three laboratory teaching methods (ILA, OLA, ILAOLA) differ significantly in their effects on achievement in biology?
2. Do male and female biology students taught by three laboratory teaching methods (ILA, OLA, ILAOLA) differ significantly in their achievement in biology?
3. Is there interaction effect between laboratory teaching methods and sex of biology students.



Three non-equivalent intact groups of biology students from private sectarian schools, namely: ILA, OLA, and ILAOLA group with samples equal to 35, 49, and 55 respectively were used in this study. These groups were subjected to a two-month normalization period and a two-month treatment period. Testing occurred prior to and after their exposure to respective laboratory teaching method.

In addition to the pretest scores and method as covariates, other predictors such as: first year general average, first year science grades, sex and sex/method were also considered to evaluate the students' achievement in biology.

The statistical treatment of data included the Pearson Product-Moment Correlation Coefficient, Multiple Regression Analysis, and the ANCOVA through stepwise regression process. The correlation matrix was generated using the Pearson Product-Moment Correlation Coefficient to assess initially the correlation of covariates. The efficiency of the predictor variables was determined by Multiple Regression Analysis. And, the analysis of the groups' posttest was done by ANCOVA through stepwise regression process.

The results arrived at using the foregoing statistical tests led the researcher to draw the following conclusions:

- 1A. The effect of outdoor laboratory activities (OLA) was significantly greater than that of indoor laboratory activities (ILA).
- 1B. The effect of outdoor laboratory activities (OLA) was significantly greater than that of combined





indoor and outdoor laboratory activities (ILAOLA).

2. The achievement of biology students was not affected by sex.
3. The effects of laboratory teaching methods and sex did not interact with each other. No one method used (ILA, OLA, ILAOLA) was relatively better when used with male and female group of biology students.

Based on these conclusions, it is recommended that further research on different laboratory teaching methods must include or extend to:

1. Similar studies involving other concepts in biology.
2. Similar studies using other definitions of ILA, OLA, and ILAOLA.
3. Similar studies involving different outdoor laboratory teaching methods.
4. Similar studies involving different indoor laboratory teaching methods.
5. Other science subjects in the high school level.

Also, the following are recommended for practice:

1. It is suggested that outdoor laboratory activities (OLA) be used whenever ecological concepts like those included in this study are taken up in biology classes.
2. It is suggested that outdoor laboratory activities (OLA) be used whenever optimal degree of meaningfulness is desired by the biology teacher.



3. It is suggested that outdoor laboratory activities (OLA) be incorporated with biology laboratory manuals containing only indoor laboratory activities (ILA).
4. It is suggested that biology teachers pay less attention to problems related to grouping of students by sex in performing laboratory activities. Anyway, sex of biology students does not affect their achievement.
5. It is recommended that outdoor laboratory activities (OLA) be offered as viable substitute for indoor laboratory activities (ILA) if laboratory rooms, materials and equipment are inadequate.

