

# DE LA SALLE UNIVERSITY

Republic of the Philippines  
DEPARTMENT OF EDUCATION, CULTURE AND SPORTS  
National Capital Region  
Metro Manila

## THESIS ABSTRACT

TITLE: The Effectiveness of Group Educational Modules for  
a Cooperative Learning Program in Analytic  
Geometry

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SUBJECT AREA: Analytic Geometry

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MAJOR: Mathematics

### STATEMENT OF THE PROBLEM

This study aimed to develop, validate and evaluate Group Educational Modules (GEM) in Analytic Geometry designed for engineering students of Adamson University. It also aimed to examine the effects of cooperative learning techniques on the achievement and attitudes toward mathematics of the Analytic Geometry students.



# DE LA SALLE UNIVERSITY

Specifically, it aimed to answer the following questions:

1. How effective are the Group Educational Modules (GEM) designed for the Jigsaw II method in the teaching of some selected topics in Analytic Geometry?
2. How effective are the cooperative learning methods: Jigsaw II and STAD (Student Teams-Achievement Divisions) in the teaching of Analytic Geometry to engineering students?
3. What is the achievement of the students in Analytic Geometry who are exposed to the Jigsaw II, STAD and traditional methods of teaching as inferred from the answers to the following questions:
  - 3.1 Is there a significant difference in the achievement of the students before and after undergoing the
    - 3.1.1 Jigsaw II method?
    - 3.1.2 STAD method?
    - 3.1.3 traditional method?
  - 3.2 Is there a significant difference in the academic achievement of the students who underwent the Jigsaw II, STAD and



traditional methods?

4. How significant is the difference between the attitudes toward mathematics of the students who underwent the Jigsaw II, STAD and traditional methods?

## PROCEDURE

This experimental study made use of the Pretest-Posttest Control Group design where the control and experimental groups were given pretests, exposed to the different treatments and then given posttests. Three intact groups which were exposed to either the Jigsaw II, STAD or traditional method were used in this study. To test the effectiveness of the GEM materials, the Jigsaw II group which used the materials was compared to each of the STAD and traditional groups. To test the effectiveness of the cooperative learning techniques, each of the Jigsaw II and STAD groups was compared to the traditional group.

In the construction of the modules, the topics included were selected based on the results of the diagnostic test and on the responses of the students and teachers to the questionnaires prepared by the researcher.

To validate the modules, the study made use of the following assessment instruments: Feedback-based



Readability Formula, Student Involvement Index and teachers' comments and suggestions.

To determine the effects of the GEM materials and cooperative learning techniques on student's achievement, the pretest and posttest scores of the three groups were compared to one another. A method of teaching is said to have a positive effect on student's achievement if there is a significant difference between the pretest and posttest scores of the students (the posttest scores being higher than the pretest scores). One method of teaching is better than another, if the posttest scores of the group exposed to the first method is significantly better than the posttest scores of the other group exposed to another method.

To determine the effect of the cooperative learning techniques on student's attitude towards mathematics, the Mathematics Attitude Scale (MAS) was used. The MAS scores obtained by the students before the experiment were compared to the MAS scores obtained after the experiment. A significant difference between the pre-experimental and post-experimental MAS scores (the post-experimental scores being higher than the pre-experimental scores) indicates a positive effect on student's attitude towards mathematics.

The t-tests for dependent and independent samples,



ANOVA and ANCOVA (with the IQ scores as covariate) were used to test the hypotheses of the study.

## FINDINGS

The following are the findings of the study:

1. The three most difficult topics that are being discussed in the subject Analytic Geometry as shown by the results of the diagnostic test and responses to the student and teacher questionnaires were:

- 1.1 Ellipse
- 1.2 Hyperbola
- 1.3 Algebraic Curves

2. The following are the results of the validation of modules done through the use of Communication Index, Student Involvement Index and teachers' comments and suggestions:

- 2.1 Some items on the evaluation instruments need to be revised due to the possibility that students will not be able to finish the test during the class hour.
- 2.2 Additional activities and review exercises need to be constructed particularly on the topics Ellipse and Algebraic Curves.



2.3 The modules are readable based on the computed Communication Indices as reflected from the evaluation of the students on the clarity of the materials. The modules on Ellipse and Algebraic Curves were classified as "clear" while the module on Hyperbola was classified as "quite clear."

2.4 The computed Student Involvement Indices for the three GEM materials indicated that the modules contain a moderate number of activities that involve student's participation.

3. The statistical tests performed on the hypotheses yielded the following results:

3.1 There is no significant difference between the pretest scores of the students who underwent the Jigsaw II, STAD and traditional method.

3.2 There is a significant difference between the pretest and posttest scores of each of the groups — Jigsaw II, STAD and traditional.

3.3 There is a significant difference between the posttest scores of the Jigsaw II and



# DE LA SALLE UNIVERSITY

traditional groups while there are no significant differences between the posttest scores of the Jigsaw II and STAD groups and the posttest scores of the STAD and traditional groups.

3.4 There are no significant differences between the MAS scores of the students before they were exposed to the Jigsaw II, STAD and traditional methods and between the MAS scores of the students after they were exposed to the above mentioned methods.

3.5 There is a significant difference between the MAS scores obtained before and after the students were exposed to the Jigsaw II method while there are no significant differences between the MAS scores obtained before and after the students were exposed to each of the methods — STAD and traditional.

## CONCLUSIONS

Based on the results and findings of the study, the following conclusions are hereby forwarded:



1. The use of the Group Educational Modules (GEM) has no positive effect on the achievement of the students.
2. Each of the methods — Jigsaw II, STAD and traditional is an effective way of teaching Analytic Geometry.
3. The Jigsaw II method, as a cooperative learning technique, has a positive effect on the achievement of the students while the STAD method has no positive effect on the achievement of the students.
4. The Jigsaw II method has a positive effect on the attitude of the students towards mathematics.

## RECOMMENDATIONS

In the light of the findings and conclusions of this study, the following recommendations are hereby forwarded:

1. Since the Jigsaw II method has shown a positive effect on students' achievement, it may be adopted by the mathematics teachers in the teaching of Analytic Geometry.
2. Future researches may be conducted to
  - 2.1 validate the findings of the study using a





larger sample that can possibly include even the non-engineering students of Adamson University with the experiment being conducted during regular semesters.

2.2 replicate the study, but in other mathematics courses in the college level with an emphasis on the on the possible effects of cooperative learning techniques on student's behavior and a test on the effects of the elements — individual accountability and group accountability on student's achievement and behavior.

