ABSTRACT

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Title : ***Practical Activity-Based Learning Material in Plane Trigonometry: Its Development and Validation***

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Key Concepts : *a. Experiential Learning*

b. Practical Activity-Based

Statement of the Problem

This study aimed to develop and validate a Practical Activity-Based Learning Material in Plane Trigonometry for engineering students at De La Salle University-Dasmarinas.

Specifically, this study aimed to achieve the following objectives:

1. To identify the trigonometric concepts that could be taught using practical activity-based approach.

2. To develop a set of practical activity-based material.
3. To evaluate the developed material in terms of the following:
   a. format and design
   b. objectives
   c. content
   d. language
   e. organization and presentation
   f. usefulness
4. To find out the problems and difficulties encountered by the students in using these sets of activity-based material.
5. To determine the effectiveness of the developed material in improving students' skills in solving word problems in trigonometry.

Scope and Delimitation of the Study

This study was limited to the development, evaluation and validation of a set of instructional materials, called Practical Activity-Based Learning Material in Plane Trigonometry.

The study was limited on solving verbal problems in right triangle and oblique triangle.

Forty-seven (47) respondents coming from one section of engineering class was purposively sampled from the four (4) sections handled by the researcher during the first semester of the SY 2002-2003 to try out the material.

Methodology

There were two parts in the study. The first part was development and evaluation of activity materials using Material Evaluation Checklist. In the evaluation of the materials there were four subject specialists who checked and critiqued the developed materials. Their suggestions and comments were noted. Also, the students under the experimental group evaluated the material using the same evaluation checklist used by the mathematics professors.

The second part was experimental validation of the material anchored on the concept of experiential learning theory. There were two comparable groups used in the study in terms of IQ and mathematics ability. The experimental and control groups were both taught using the same textbooks and reference materials. The same lesson plans, the same teaching technique and teaching styles were used on both groups, only that there was an added activity given to the

experimental group. The latter used the developed activity material in which the students engaged in several actual fieldwork experiences.

Findings

The findings of the study were as follows:

1. Students had difficulty in solving word problems pertaining to right triangle and oblique triangle when these were not accompanied with figures or illustrations. Practical activity-based materials were developed in solving this dilemma.
2. There were ten activities developed that were anchored on experiential learning theory. These activities proved their usefulness in improving visualization skills and mathematical skills of students.
3. The computed weighted mean of the activity material using Material Evaluation Checklist for faculty and for students were 4.42 and 4.33, respectively. This means that the sets of activities were very acceptable. This implies that this material is a useful tool in teaching trigonometry.
4. The problems encountered by the students who used the material were the following: the problems were very tiring, the students were exposed to sunlight and if it was raining before and during the activity it was very messy to perform the activity. Moreover,

students got bored and wanted to go home early. However, after the activities were performed and when students solved problems during seatwork, group work and assignments, they realized the usefulness of the activities and they were able to relate their experiences in solving trigonometric problems. This proved the claim of the researcher that these activities would help improve students' visualization skills, hence would result in the improved students' mathematics achievement.

5. The results of the summative test show unsatisfactory performance of both groups. The result of the test did not meet at least 50% of the total score, that is only 37% for the experimental group and 12% for the control group. A dismal result of summative tests even though that there was a significant difference in the statistical result of the achievement in problem solving of the two groups. However, experimental group performed better than the control group and that the set of activities helped the experimental group improve their problem-solving skills in dealing with verbal problems involving right triangle and oblique triangle.

Conclusions

The findings of the study led to the following conclusions:

1. The developed practical activity-based material is a useful tool in improving visualization skills of students particularly on three-dimensional space, hence the experiential learning theory proves its usefulness in enhancing students' mathematics achievements.
2. Despite the difficulties observed in undertaking the activities, it does not mean that the set of activities were not workable and did not help the students in anyway in improving their skills in analyzing verbal problems in trigonometry specifically in dealing with solutions of right triangle and oblique triangle.
3. The mean gain in the summative test scores of the participants who used the activity material was significant. This implies that this material helped the students in anyway in analyzing and solving verbal problems in plane trigonometry.

Recommendations

Based on the findings and conclusions the following recommendations were formulated:

1. The developed practical activity-based learning material may be used as a tool in teaching Plane Trigonometry.
2. Similar studies may be conducted to determine further the effectiveness of the material.
3. Multiple choice type of test may be developed to determine further the effectiveness of the material.
4. Other studies employing experiential learning theory can be conducted in other areas of mathematics taught in college.
5. The developed material can be adopted by other mathematics professors in teaching Plane Trigonometry in other courses other than engineering course.
6. The developed material can be adopted in teaching Plane Trigonometry in high school with some revision related to complexity of the required tasks.