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Identification of Learning Difficulties of Students in Industrial Mathematics: Springboard for Intervention Program

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ABSTRACT:

The study determined the learning area of difficulty in Industrial Mathematics of the first year college students of Bachelor of Science in Industrial Technology (BSIT). Descriptive method of research was used wherein achievement test was administered to total of one hundred ninety-five (195) Technology Vocational Education students. The researchers used a 70-item test which equally and evenly distributed to the conceptual/vocabulary and computational/problem solving topics ability. The result revealed that the students failed to visualize the questions being described in the problem, find difficulty in the interpretation and understanding the problem. It mean further that students had encountered learning difficulty on problem solving. Hence, it became a challenge to the teachers or educators to address the learning difficulties encountered by the students.

KEYWORDS: *Industrial Mathematics, learning difficulty, mathematical vocabulary, problem solving*

INTRODUCTION

Many students struggled in understanding or acquiring the necessary skills in mathematics especially in problem-solving. However, they still need to learn mathematics because of its importance in daily life (Tambychick 2010). In real life, students need to solve problems because that is a basic way to survive in our daily life and mathematics is seen as the language. Deficiency in any of these skills could cause difficulties in mathematics skills among students (Hill 2008).

In order to address the student's learning difficulties and lack of mathematical skills, instructors should be more careful in selecting an appropriate problem-solving method to make the process of concept formation easily and effective. However, if the strategy used by the teacher is not in line with the difficulties to be solve, then, the student will lose interest and become less confident with topics studied. Henceforth, this study determined the learning difficulties of the college students in Industrial mathematics in Samar State University, Philippines so that teachers who is teaching mathematics in the tertiary level may have the insight on how to modify or improve the teaching-learning situations through a wise selection of objectives, content, activities to acquire the ability to supplement the teaching methods and techniques that are needed in relation to the abilities and potentialities of their students.

I. MATERIAL AND METHODS

This study employed a descriptive research method to identify the learning difficulty of the students in industrial mathematics. The 75-item objective type of test was consisted of 35 items for the mathematical vocabulary/conceptual skills and the other 35 items was for the computational skills. The coverage of the test were: fraction, decimal fraction, percent, ratio and proportion, perimeter, area, and volumes. The test was conducted to the 195 students enrolled in the subject in the School Year, 2017-2018. The study used the frequency counts, percentages and weighted in the analysis of the data. The answer sheets of the target respondents were corrected and given equivalent score and tallied in the table as to correct and wrong responses. The researchers computed the mean of right or wrong responses per topic and ranked according to the learning area of level of difficulty. The interpretation of level difficulty was proportionally determined by the occurrence of result of more than fifty percent (50%) of the total respondents who got the wrong responses of the particular topic in Industrial Mathematics.

Study Design: Descriptive research design

Study Location: This was a tertiary industrial mathematics subject in the College of Industrial Technology at Samar State University, Philippines.

Study Duration: November 2016 to November 2017.

Sample size: 195 students.

Sample size calculation: No sample size calculation since all students enrolled in industrial mathematics were involved in the study.

Procedure methodology

After written informed consent was obtained, a well-designed 75-item objective type of test consisting of 35 items for the mathematical vocabulary/conceptual skills and the other 35 items was for the computational skills was used to collect the data. The coverage of the test were: fraction, decimal fraction, percent, ratio and proportion, perimeter, area, and volumes. The test was conducted to the 195 students enrolled in the subject.

Statistical analysis

Data was analyzed using SPSS version 21 (SPSS Inc., Chicago, IL The study used the frequency counts, percentages and weighted in the analysis of the data. The answer sheets of the target respondents were corrected and given equivalent score and tallied in the table as to correct and wrong responses. The researchers computed the mean of right or wrong responses per topic and ranked according to the learning area of level of difficulty. The interpretation of level difficulty was proportionally determined by the occurrence of result of more than fifty percent (50%) of the total respondents who got the wrong responses of the particular topic in Industrial Mathematics.

II. RESULT

The result of the conceptual vocabulary questions as answered by the participants of the study was shown in Table 1. The students find difficult in understanding conceptually with all topics in Industrial Mathematics as shown by the mean percentage of correct responses of

33.81% compared to the mean percentage of wrong responses of 66.19% of the total number of participants. Among all the topics in industrial mathematics, they find Fraction less difficult among others who got a rank of 6 in terms of difficulty level. In general, the participants really encountered difficulty of all the topics in industrial mathematics as revealed by the total mean percentage of the correct responses which is 33.81%.

Table 1: Conceptual/Vocabulary Result

Topic No.	Topics	Mean Correct Responses	%	Mean Wrong Responses	%	Rank of Difficulty
1	Fraction	76	43.43	99	56.57	6
2	Decimal Fraction	53	30.29	122	69.71	2
3	Percent	47	26.86	128	73.14	1
4	Ratio & Proportion	61	34.86	114	65.14	5
5	Perimeter, Area	58	33.14	117	66.86	3
6	Volumes	60	34.29	115	65.71	4
Total		**59**	**33.81**	**116**	**66.19**	**-**

On the other hand, the result for the computational/problem solving questions as taken by the participants, suggested that students have encountered difficulty in all topics under Industrial Mathematics as revealed by the mean percentage of wrong responses of 74.29% which was higher than the mean percentage of correct responses of 25.81% of the total number of participants. However, among all the topics, topic on percent got rank 1 in terms of difficulty. Meanwhile, topic on perimeter got rank 6. This shows further that they find more difficult the topic of percent than the topic of perimeter.

Table 2: Computational/Problem Solving

Topic No.	Topics	Mean Correct Responses	%	Mean Wrong Responses	%	Rank of Difficulty
1	Fraction	47	26.86	128	73.14	4
2	Decimal Fraction	47	26.86	128	73.14	4
3	Percent	38	21.71	137	78.29	1
4	Ratio & Proportion	41	23.43	134	76.57	2
5	Perimeter, Area	51	29.14	124	70.86	6
6	Volumes	47	26.86	128	73.14	4
Total		45	25.81	130	74.29	

III. DISCUSSION

Teachers' central role in promoting deeper learning requires them to understand and practice some of the basic principles of the conceptual learning in mathematics. These principles include teaching general knowledge or generic concepts in the subject and helping students in overcoming the difficulties they face. In the study, the students revealed low achievement

level in terms of mean percentage score in Industrial Mathematics. They encountered difficulty in understanding and visualizing the situation being described in all learning areas in both conceptual and computational/problem solving in Industrial Mathematics subject such as Fraction, Decimal Fraction, Percent, Ratio and Proportion, Perimeter and Area, and Volumes. The findings was supported by the study of Tayyba (2010) indicated that students were able to pass low-rigor items requiring simple mathematical skills. Moreover, items favoring female students in content domain belonged to knowledge of concepts to recall basic facts, terminologies, numbers, and geometric properties, items favoring male students in either domain belonged to the problem solving level.

The study was also consistent in the study of Samo (2009) stated that further showed that students performed better on items measuring rote learning and poorly on items requiring comprehension, problem solving and life skills It attribute a wide range of factors to the low level of students' achievement in Mathematics. However, teachers' academic and pedagogical competence in and their attitude towards the subject has been described as a common denominator in facilitating or hinder students' in depth learning in Mathematics.

The study of Lowden et al (2000) supported the current study that there was an estimate of between 10% and 30% of students is primarily school classroom experience difficulties with learning in mathematics.

Singha, et. al (2012) suggested that teacher should develop positive and good behavior relationship towards the students and stress classroom activities, that involve active teaching learning process and participation in the class. This meant that teachers should encourage to use the modified and simplest and most interesting method to teach mathematics such as modular instruction and by taking examples from real and daily life situation. Moreover, a remedial instruction is badly needed especially on topics where students find very difficult. And Tutorial activities are very needed in enhancing students comprehension because it provides them the challenge to decide the incorrect perception and knowledge in reasoning power on mathematics content. Gersten et. al (2000), stated in the area of Mathematical difficulties that special series as conference session, research studies and symposia can help promote an advanced discussion in the early intervention identification of students difficulty in Mathematics.

IV. CONCLUSION

Students encountered learning difficulty in understanding both conceptual and computational/problem solving in Industrial Mathematics subject.

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