

Mathematics subject in lower secondary level



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This chapter presents a literature review on major components of this research as well as related topic. The review will be briefly on education in Malaysia, mathematics subject in lower secondary level and also on students' level of performance in simplification of algebraic expression. From the review, it will lead to conclusion that will relate the components of the topics to make it clearer as a bigger picture and to stress the importance of conducting this research.

These aims of research are to investigate the students' level of performance in simplification of algebraic expression among form four students at Sekolah Menengah Teknik Shah Alam, Selangor. Besides that, this research will be conducted to identify the common errors that were made by the students in the test of algebraic expression simplification. In addition, the research also wants to see the relationship of students' performance among gender, their PMR examination grade and the grades of test in algebraic expression simplification.

2. 1 Mathematics Concepts

It is admittedly difficult to determine the level of understanding or mastery of a certain concept. So is the case in this case study which involves the level of mastery of basic concepts of Mathematics for the simplification subtopic in the topic of Algebraic Expression. However, it can be evaluated by looking at the concept of understanding and common mistakes made by students in solving Mathematical problems.

Based on the concept of comprehension, students must understand the concept of Mathematics, which is following the steps correctly in solving

Mathematical problems. Rubric should be the basis for the solving of Mathematics (Skemp, 1971). The concept of understanding is totally different than knowledge. Understanding is an ability to apply while looking for ways to achieve the targeted goals. Skemp also differentiates between 3 types of understanding, namely instrumental, understanding of relationship and logical understanding.

Based on Skemp's statement, it can be observed that in solving Mathematical problems, it requires the right steps. This can be related to the working which is undeniably the most important thing in solving Mathematical-related problems. The right and systematic working can definitely provide the accurate answer or solution as what the question requires.

Most Mathematical psychologists agree that the concept of Mathematics is hard to define (Skemp, 1971). Mathematical concepts can be divided to primary and secondary concepts. The primary concept is formed using senses and the induction method, which is to abstract through observation of similar features.

What is needed is the sources of conceptual and technical knowledge related as well as technical support in understanding the solving process.

(Schoenfeld, 1985). Students were found to use wrong concept of solve due to errors in understanding a certain concept. Understanding Mathematics requires building a clear basic concept and prediction of a certain concept being made easy should it be done hierarchically.

Cognitive psychologists are of the opinion that there exist differences between conceptual knowledge and procedural knowledge, and yet both have a critical and mutually beneficial relationship. Solid conceptual knowledge will foster learning, reduce usage of confusing procedures, making them to remember the appropriate procedures to be used and improving the quality of performing a certain problem-solving.

A model of solution involving 4 phases, namely understanding problem, planning solution, doing solution and checking the answers produced is being proposed (Polya, 1957). The first phase requires students to read, understand and decide what is required of the question. The second phase requires the relation between fact and the data thus planning for steps to solve. Students conduct solving by doing calculation and finally checking the answers produced to ensure that the question is solved correctly along with the answer.

Hiebert (1997) said that students need to master certain concepts in Mathematics where inside contain rules, procedures and principles of simple Mathematics. They also need to learn on how to use those procedures and principles to enable them to solve the Mathematical problems. However, students who managed to achieve high result in Mathematics still failed to use the knowledge and skills of Mathematics into other situations or subjects. (Schoenfeld, 1985). This shows that the understanding of concepts is very vital to achieve excellent result in true meaning.

2. 2 Students' Performance in Mathematics

In mathematics subject, the performance or achievement is important to measure students' understanding towards the concepts of mathematics. In addition, mathematics is the important subject because the good grade of mathematics subject is the green light for the students especially in Malaysia to pursue their study in local or international university. Therefore, the students must obtained a good result in mathematics in order to get a good university and course in university system. According to Piaget, (1970), youth who is good in Mathematics develop his starting perceptions of and actions in environment, thinking about them, and resulting in the performance of new actions upon the mental and/ or physical objects. According to Chan (1999) in his research on the vocational stream students found out that the level of knowledge and understanding of students on algebraic topic was at a low level and this caused misconceptions among the students. Due to the misconception among the students' performance and achievement for the algebraic topic, dwindling need to be improved to avoid big mistakes for algebraic related topics.

2. 3 Students' Performance in Mathematics among Gender

The researcher wants to investigate the students' performance in mathematics especially in simplification of algebraic expression among male and female. There are a lot of researches that measure about students' ability, performance, attitudes dan achievement among gender. In between this gender, there are many things different, such as the cognitive thinking, personality and psychological thinking. In this research, the researcher investigate between students performance in test of algebraic expression

simplification. According to Mondoh and Changeiywo, (2000) stated that the different learning styles between girls and boys and the likely effect of these on cognitive and examination achievement, particularly in mathematics.

According to Fierros, 1999; Zhang & Manon, 2000; Johnson, 2000; Leahe & Guo, 2001; Erickan et. al. 2005, showed that no significant difference in achievement between boys and girls as they start getting acquainted with mathematics. The researches were supported with the study by Lee and Lockheed, (1990) found that no significant gender gap between mathematics score of Nigerian boys and girls once other variables were taken into account. From the previous studies by Gallagher and Kaufman, (2005) and Cleary, (1992) found that females generally scored lower than males on standardized test of mathematics. It is because male usually spend their time with doing the exercises about algebra, and quadratic equation in their free time compared to the female students.

However, their finding was opposed with Halimah and Noor Azina (n. d) that their paper is about Gender differences in mathematics learning in Malaysia. Their aim of study is to examines gender differentials in terms of the overall mathematics average achievement as well as the main content area of mathematics topics and skills, namely fraction and number sense; data representation, analysis and probability; geometry and algebra. From their finding was totally different from international researches among gender in mathematics achievement which is the female obtained better achievement compared to male in three areas of mathematics contents namely, number, algebra and data.

2. 4 The Relationship between the Performance in Test of Algebraic Expression Simplification and Mathematic PMR Examination Grade.

With the good result in Mathematics PMR examination is not necessarily the students have a good concepts in mathematics. Therefore, the researcher wants to investigate the relationship of students' performance in TAES between mathematic PMR examination in this research. According to Wong report, (1987) stated that the students' weaknesses in mathematics can cause them difficulties to master in few chapters in form 4 and 5 syllabuses in modern mathematics or additional mathematics. Therefore, the good basic concepts play the important roles for the students to understand better in algebraic expression topic. During the mathematics PMR paper, the questions usually contains very simple question in order to help the students to gain good result but the students can memorize the steps and procedures when answer the questions.

2. 5 Students' Common Errors in Test of Algebraic Expression Simplification

Previous researches found many findings related to mistakes and understanding of students in solving Mathematical problems that can be referred to in conducting this case study. Generally, mistakes are often defined as committing a misconduct unintentionally and understanding is a process to understand a certain concept.

Based on previous researches, topics in Mathematics those students often commit mistakes are:

(1) Algebraic Expression

Saripah Latipah (2000) found that students did not master the basic concepts of Algebraic Expression well and this caused misconception to occur in the basic operation of Algebra. Students were found to commit mistake in Algebraic Expression in terms of certain aspects such as simplifying fraction, algebra, factorize and expansion of two expressions (Rosli, 2000).

(2) Fraction

Research has found that the mistakes that students often commit in the fraction topic is not simplifying fraction into proper fraction. Besides that, students also made mistakes in the addition operation of fraction (Maznah Mahmood, 2000).

(3) Negative Integer

Students have misconception on the topic of Negative Integer while doing basic operation such as addition and subtraction of number (Khamsan, 1999). Haslina (1999) in her study mentioned that especially on Negative Integer, there are misconceptions in the topic of integer. The misconception covers all four skill processes, namely addition, subtraction, multiplication and division.

There are five categories of students' mistakes while answering the Mathematics questions (Newman, 1977). The mistakes are mistake in reading, mistake in understanding question, mistake in expressing, mistake in processing and mistake in stating answer are common mistakes that happen among the students.

The active to moderate groups are those who often commit carelessness. This is usually due to them rushing and assuming the question to be too easy. This carelessness mistake is usually committed by the students themselves and involve a few factors. Among others is wanting to answer the question too fast, assuming the questions to be too easy and lack of time in answering.

Three patterns of mistakes have been identified (Cox, 1974). The mistakes are systematic mistake, random mistake and carelessness mistake. In this case, systematic is based or according to system. Therefore, the systematic mistake happens when students try to solve the problem according to the steps but made a few mistakes. This is usually small mistake made unconsciously by the students. Random mistake on the other hand happens due to unsystematic working that usually happens to students. This mistake happens due to students doing working unsystematically and causes mistake to easily occur. Meanwhile, carelessness mistake is a mistake that is hard to correct. It can only be done by the students themselves by answering carefully and allocating adequate amount of time on a question so as not to rush through.

It is found that all students experience difficulty in Mathematics (Ress and Barr, 1984) and the level of difficulty depends on the age and the ability of the students themselves. The forms of mistakes are due to misconception, mastery of algorithm skills and sentencing problem.

Mistakes in learning Mathematics can be traced further to certain processes where the skill needs to be mastered first and not just from the correct

answer (Radetz and Yap, 1982). This refers to the working that is often related to in the solving of Mathematical questions.

Intensive drills and the ability to make justification on selecting of certain working to solve problems are among the ways that Dossey et. al. (2002) recommended improving their understanding in solving mathematical questions. Continuous exercises will help students to understand a certain concept or method available in the Mathematics subjects. Apart from that, students can reduce the mistakes in attempting a certain mathematical question and consequently lead to better understanding of the concepts of mathematics.

2. 6 Summary

This chapter has discussed on students' performance in mathematics, performance among gender, relationship of performance in TAES and Mathematics PMR examination grade and the students' common errors in algebraic expression simplification. Through this chapter, researcher wants to collect evidence from previous research on topic selected by researcher in completing this research. Researcher refers a lot to previous research in finding the difference in previous findings and from researcher's own reference.