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THE RELATIONSHIP BETWEEN PROPORTIONAL PROBLEMS DISTRIBUTION IN MATHEMATICS TEXTBOOK AND STUDENT ACHIEVEMENT IN PROPORTIONAL REASONING AMONG SECONDARY SCHOOL STUDENTS

NOOR FAEZAH BINTI BAHARUDIN

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ABSTRACT

The purpose of this study is to investigate the relationship between the secondary school mathematical textbook and student achievement in ratio, rates and proportion topic. A total of 344 student comprising 54 of Form 1 student, 58 of Form 2 student, 133 of Form 3 student and 99 of Form 4 students participated in this study utilizing descriptive approach. Three secondary school mathematics textbook that currently used in schools has been chosen to be analysed which consist of form 1, form 2 and form 3 mathematical textbooks. Instrument named Proportional Reasoning Test (PRT) was adapted from previous research for the purpose of this study. The finding indicates missing value problem has the highest percentage in all three textbooks with 90.24% and 9.76% of numerical comparison problems. No qualitative prediction problem was found in all the textbook. In PRT score, the result shows a low level of performance in the PRT across students involved in the study according to their grade levels. The test scores were 16.9%, 21.3%, 30.0% and 32.7% respectively for Secondary 1, Secondary 2, Secondary 3 and Secondary 4 respectively. In terms of statistical difference of test scores between levels, no difference was found between Secondary 2 and Secondary 3; and Secondary 3 and Secondary 4. Secondly, the descriptive statistics indicate that male students obtained higher scores than female students across all levels except secondary 2. However, the inferential statistics analysis findings show no statistical significance across all the four levels. Thirdly, based on the textbook analysis and PRT test, it shows that the missing value has the highest composition in Secondary 1, secondary 2 and secondary 3 mathematical textbooks and the mean score for students is the highest in missing value types of problems. Hence, the higher the proportion tasks in the textbook, the higher the achievement of the students in the proportional reasoning test. Thus, considering the above condition, it is important to find the composition of proportional problem in textbook and understand the factors that influence the students' conceptual understanding in ratio, rates and proportion problem. It can help the teacher to understand the student better and provide additional learning resources for the proportional problem that does not exist in the textbook. The task given to students can involve proportional and non-proportional problems which include the context of the problem instead of merely the number structure. This can help the student apply the learning in real life as the concept of proportionality is widely used in our daily lives whether we realize it or not.

Keywords: Textbook, Ratio, Rates and Proportion, Achievement, Students Performance.

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CHAPTER 1

THE STUDY

Textbooks play an important role as a connector between teachers and pupils in the teaching and learning of mathematics and there is no doubt, that in Malaysia, it is the major source for both. Millions of ringgit are spent annually to prepare textbooks because Malaysian pupils are provided with free textbooks and activity books in all government and government aided schools. The content of a textbook is the most crucial part of a textbook for the teaching and learning process and the fundamentals for early learning comprising topics of ratio and proportion are the entry point for many topics in mathematics. This was stated by Kilpatrick, Swafford & Findell, (2001) describing "Proportional Reasoning has been described as the capstone of elementary school arithmetic and the gateway to higher mathematics, including algebra, geometry, probability, statistics, and certain aspects of discrete mathematics," (p. 241-254). Since textbook content is aligned with curriculum, it is difficult to identify the gap within the textbook and students understanding towards ratio and proportion. Thus, it's imperative to study the distribution of types of ratio and proportional problems in the latest KSSM mathematics textbooks from Secondary One to Secondary Three.

The topic of proportion and ratio knowledge plays a major role in mathematics learning and in our everyday life. Firstly, proportional reasoning, as the conduit between ratio and proportion, has a link with every area of mathematics content in the lower school syllabus from measurement, number sense, probability, algebra and patterns and sequencing. The NCTM (1989), the leading council of mathematics teachers in US outlines proportional reasoning as "of such great importance that it merits whatever time and effort must be expended to assure its careful development (p. 82)." Researchers (Lamon, 1999; Lesh & Post, 1988; Parmjit, 1998) similarly elucidated that proportional reasoning is the pillar, the crux and the crevice to greater