

Uses of Mathematics Textbooks for Grade (4-8) as Per Basic Concepts and Questions Levels in TIMSS Test: A Study Conducted in Kingdom of Saudi Arabia Schools

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Abstract

This study tried to explore the degree of representation of math textbooks for grades (4-8) in the Kingdom of Saudi Arabia concerning the key concepts, shape, and levels of questions used in the TIMSS test. The study population of this study includes both students and teachers from fourth grade to eighth grade. The goal of this study was associated with six key concepts including numbers and their operations, algebra, geometry, measurement, statistics and probability, and a pro-rata. The researcher analyzed the questions and exercises used in the math textbooks to identify their effectiveness and efficiency. In addition, the researcher also calculated the percentages, the levels, and the shape for each key concept. The results of the study were organized in frequency tables. In the light of those results, the researcher recommended the need to rewrite the mathematics curriculum and textbooks for grades (4-8) to focus on the level of questions and exercises used to be best fit for the students comprehending level. Furthermore, the researcher also recommended to developed questions in the form of multiple-choice focusing on the content of the main concepts (statistics and probabilities, and a pro-rata) because of its importance in the life of the student. In addition, the resented figured out the need of conducting similar studies on the analysis of the results for Saudi students in an international math test, which was conducted in 2011 and 2015.

Keywords: exercises TIMSS, key concepts maths, math textbooks, shapes and levels of questions, Saudi Arabia

1. Introduction

1.1 Background of the Study

Today, the world is witnessed a revolution in knowledge and scientific advancement in the various fields of life. This revolution has made it impossible for the human mind to absorb all the developments that occur in any branch of knowledge. Mathematics has a great role to play in the development of sciences. It has extended its uses and applications to many applied fields such as social sciences and human sciences, business administration, politics, economics and computer studies, etc. Because of this, there is a need for individuals in the community to organize things, their lives, and their transactions.

It has been identified by Sabah et al. (2014), that the skills learned by the students in their mathematics class tend to help them throughout their life in their advance stages. It was found among the curriculum that the scientific development and the technical progress of a better mathematics curriculum tends to have a high influence on the growth of a nation. It is based on the fact that, when the citizens of such nations will have good analytical and mathematical skills, the nation is more likely to produce scientists and other technical professionals. Therefore, this plays an important role in building generations, and it is evidently seen in the true record of the history of civilizations. It also serves as an indicator of the extent of scientific and technical progress (Mullis et al., 2013).

Abstract science and mathematics are considered as the main ingredients to ensure creativity of the human mind. It is part of what forms the sequence of ideas, methods, and thought patterns. Thus, the development of mathematical ideas has a direct impact on science. The relationship between the history of sports developments and other scientific developments is a trade-off. It has been identified that many mathematical ideas and thoughts have been developed to resolve many of the issues and equations. Scientists and other technical professionals have done this by just appearing in one of the chemical or physical experiments. Mathematics is considered as a

key to other sciences, but they are not in need of other sciences because they are at the peak of abstraction (Senile, 2012).

Throughout history, Mathematics has occupied a predominant place in the plans of education in the schools throughout the world. Dodeen, Abdelfattah, & Alshumrani (2014) identified it as favors analytical thinking of people. Furthermore, it was also identified that mathematics helps to break down arguments into premises. It can be used to see the relationships that exist between different variables. Moreover, the students to judge the reliability of the same benefits mental agility through the rational thinking that develops when solving a problem use it. This can then be translated into the ability to solve problems of daily life, relating the data that can be used to reach conclusions that are more logical. The most important factor is that it develops analytical thinking.

Through analytical thinking, the students can develop an ability to investigate, which allows them to better understand the world around them since truth is sought based on evidence and not on emotions. This occurs because mathematics allows reasoning through a logical formula taking the actual data that can be verified. In addition to that, it tends to foster the wisdom of students. Math, being mother of all sciences, relates to other fields of knowledge such as technology.

Therefore, the main objective of teaching mathematics is to effectively contribute to the preparation of individuals for life ahead, regardless of his or her aspirations in the future. On the other hand, it contributes to preparing individuals to continue with their studies in math or other subjects while in school or after graduating from school (Surgeon, 2005). The focus is on the school curriculum as an input. It plays a significant role in educational reform and for the advancement of the educational process. In addition to that, the curriculum of mathematics is completely different from other subject areas. Rizk, Attia, & Al-Jundi (2017) identified that every theory is developed after conducting a mathematical test no matter what the subject area is. Furthermore, Sabri, (2008) discussed that there are many factors affecting the learning, especially in the key stages and it also has an effect on the first experiences of learning mathematics in the future.

Mathematics is one of the main subjects of the school curriculum, and each of its sections is extremely important. Particular attention should be paid to this in the fourth to eighth grades. Ahead of these grades, the students will not only be given an in-depth notion of algebra and geometry, but a good knowledge of mathematics is also required in other subjects. According to Limbaco (2015), the standard program of the school, from fourth to sixth-grade math should include division of numbers; mathematical actions with fractions; proportions and relationships and the concept of negative numbers. If these areas of studies are involved in the curriculum, then it will help the students to acquire material and prepare for further division of the subject into different directions. In addition to that, it will also make it possible to understand many other disciplines in many ways. All of these factors are closely connected and are selected according to the program.

Van Dyken, Benson, & Gerard (2015), identified that experienced specialists of the ministry of education make them in such a way as to gradually expand the outlook of the children and their awareness of the world around them. Since the textbook is a translation of the curriculum, it occupies a key position in the educational process. However, it is the main reference, and perhaps it is reserved only for the teacher and the pupil in the mainstream in most countries. Due to the central position of the book, it should better reflect the elements of the school curriculum (Abu, 2003).

Despite the rapid development of various learning and teaching methods, the textbook is still the most important educational material that has been provided. It is considered as the most important tool for education even in this era also. To'eima (2004) stated that the textbook is considered as the most effective mediator between the teacher and the learner. It provides educational opportunities to students of different abilities. Kulm et al. (2000) asserted that the book is a valuable resource to help teachers in the teaching of mathematics. The textbook is a source of knowledge of mathematics. Many of the math books contain variety of exercises and are appropriate for students to learn mathematics. It also contains exercises that are suitable for students that are fond of mathematics.

Consequently, the increasing importance of the textbook is considered as the key variables in the collection process. The importance of analyzing the rulebook that was scheduled in any discipline and any stage of analysis is scientifically accurate, relying on scientific and educational methods. Thus, the analysis includes all aspects of the book. Its themes are beginning from the output and design throughout all the contents of scientific material that include the skills, the knowledge, and the end of the questions and exercises. Furthermore, the methods of evaluation are followed and developed.

The importance of the textbook as a major tool in the educational success has been realized throughout the world and text is used in all over the world as a basic need in the educational setting. As a result, great efforts have

been made to set to enable it to perform its role in achieving the objectives of the school curriculum. Furthermore, Khaled (2007) identified that there is the need to follow up on those books permanently and continuously, and for experts to review math books after every five or seven years. These books are continuously reviewed to ensure that it does not get outdated and to ensure that every new update in the field of mathematics is updated in the books.

The outlines of mathematics curriculum were developed in basic education to keep pace with the needs of the society in the Saudi Arabia. On the one hand, this approach is needed to prepare the citizens of the country to take the methods of scientific and mathematical thinking in solving the problems. On the other hand, Aqilan, (2000) identified that it deals with modern technology and products, to give the citizens the ability to cope and adapt in an era where change occurs rapidly.

The Trends in International Mathematics and Science Study (TIMSS), most notably in the field of math and science, aims to compare students' achievement in mathematics and science in different educational systems, cultural, economic, and social backgrounds. These achievements of students are compared to identify achievement in those systems and to measure the impact of a range of relevant factors based on the level of achievement. This means that the effectiveness of mathematics and science within the education system includes the knowledge, skills, and attitudes that the students can acquire or develop through the education system. Therefore, this approach can also be applied to the teaching methods and their relation to the collection of science for students in math and science for grades (4-8).

Furthermore, Habib (2005) identified that in science and mathematics, tests are usually designed to measure academic achievement and to promote the acquisition of the concepts and skills of scientific inquiry. It also considers the trends in teaching, the teaching calendars, as well as the study of cultural, economic and social factors that may affect the teaching of math in many countries of the world. This would make the study to have a larger and a wide coverage (Hajaji, 2012). Based on the levels of questions in the test (TIMSS), accurate measurement of the supreme skills was acquired by the learner by focusing on mental abilities and being able to understand the application, installation, and analysis down to the correct verdict. The National Council of Teacher of Mathematics (2000) identified numerous benefits of the test (TIMSS). These benefits are grouped as follows:

1.2 According to Learners

- Effectively deal with various situations.
- Make the right decision in the right direction and at the right time.
- Constructive criticism of his work or the work of others.
- Dealing with the solution and the alternative solution to the problems.
- Prioritize the most important way that the solution is of significant importance.
- Convert any knowledge given to them to a useful and functional behavior.

1.3 According to Teachers

- Development of a scientific level and ensuring consistency.
- Modernization of teaching methods.
- The use of the latest educational and technical means.
- Dealing with student's answers because of the freethinking of the human mind and the dimension of complying with the letter of the model that was answered.

International trends of mathematics were studied from different aspects in many Arab Studies. The major focus of these studies was projected presentation and analysis of some variable studies. In addition to that, the aim of these studies was to develop various criteria for measuring performance in the tests (TIMSS) conducted. A study was conducted by House (2006) to investigate the effect of teaching methods varied in achievement tests (TIMSS), while Alprusan & Tiggsh (2012) conducted a study aimed at verifying the effect of the evaluation practices used by teachers, and their relationship to the collection in the tests (TIMSS).

The study of Za'anin (2010) showed a strategy map and offered operation in the practical performance and skills contained in international TIMSS students eighth core tests. The study tools consist of a note card to monitor the operational performance of the students. The test is equivalent to TIMSS test. The results proved the existence of significant differences between the mean scores of the students regarding practical performance.

On the other hand, the study of Qahtani Study (1334 AH), aimed to analyze the textbooks of mathematics for grades (First to Fourth) in Saudi Arabia, aimed to know the degree of representation of the key concepts, shape, and levels of questions contained in the TIMSS test. The researcher used the descriptive and analytical approach. Hence, the researcher prepares three models for analysis. The first model consists of three main concepts covered in the TIMSS test, such as numbers and their operations, geometric shapes and measurement, and data display. The second model involves the three levels of questions for TIMSS that are knowledge, application, and inference.

Furthermore, the third model included various forms of questions, such as thematic and essay questions. It has been identified that the study resulted in a large focus on the field of numbers, the concentration of weak field of geometric shapes and measurements, and the mean concentration of the field of data display. The results also showed that there were deficiencies in the level of questions and exercises in the application by 50% more than what was assumed by the test (TIMSS). In addition, there were deficiencies in the level of questions and exercises in reasoning by 65% than what was assumed in the test (TIMSS).

1.4 Research Questions

In the light of the problem of the study, the following sub-questions were formulated:

- To what degree did math textbooks for grades (4-8) in the Kingdom of Saudi Arabia reflect on the main concepts of the test (TIMSS)?
- To what degree did math textbooks for grades (4-8) in the Kingdom of Saudi Arabia levels reflect on the questions of the test (TIMSS)?
- To what degree did math textbooks for grades (4-8) in the Kingdom of Saudi Arabia reflects the TIMSS course content's structure?

1.5 Aims and Objectives of the Study

The main of this study is to identify the most important influencing factors associated with low level of achievement among students, the representation of the areas of the test content, and the levels and forms of questions.

The major objectives of this study are:

- To portray representative textbook levels of topics and areas addressed by the international test (TIMSS), and also the questions and forms.
- To identify weaknesses and strengths based on the levels of the questions in the math textbooks for (4-8) grades and their types.
- To provide the recommendations and proposals that may contribute to the development and improvement of mathematics textbooks for grades (4-8) in the Kingdom of Saudi Arabia.

2. Research Methodology

2.1 Study Population

The study population consisted of students from the fourth to the eighth grade in the Kingdom of Saudi Arabia who had access to math textbooks. However, the study sample is the same as the study population.

2.2 Study Approach

Both descriptive and analytical approach was used in this study. Here, the researcher described how the representative of school mathematics decisions for grades (4-8) in the Kingdom of Saudi Arabia has a significant impact on key concepts, shape, and the levels of questions on the TIMSS test.

2.3 Study Tools

Consequently, three models were used for the analysis of the development of the researcher, namely:

- The first model included six key concepts that covered the test (TIMSS), namely: numbers and their operations, algebra, geometry, measurement, statistics and probability, and a pro-rata.
- The second model included four levels of test questions (TIMSS), namely: knowledge, simple routine procedures, complex routine procedures, and problem solving.
- The third model included three forms of test questions (TIMSS), namely: testing of questions with multiple answers, questions with short answers, and questions with long answers.

2.4 Study Procedures

However, the study procedures can be described below:

- Access to educational literature and contemporary trends in the field of analysis and the evaluation of textbooks.
- Special objective contained in the adoption of the teacher and the unit of analysis to answer the first question of the research questions guide; question or exercise unit of analysis to answer the second and third research questions.
- This study was classified into six key concepts. Questions and exercises within the levels form the basis of the analysis of the specific models. The percentages for each key concept, the level, and shape was calculated. Finally, the results of the study were organized in frequency tables.
- Ensure ratified analysis viewing tool on a panel of judges with jurisdiction, and the calculation of the stability analysis by compatibility transactions accounts between the researcher analysis and the analysis (11) of the supervisors and teachers. Some of them sign up for the process of international test correction (TIMSS), while others studied the rows surveyed. Through this way, the calculated ratio of compatibility was attained (92%).
- Analyze and interpret the results that have been reached
- Provide suggestions and recommendations in the light of the results that have been monitored

2.5 Statistical Methods Used

The researcher has compared the content of textbooks from grade fourth to eighth. It was conducted by using excel as a tool to compare the six key components. The researcher has presented the six key components and their percentages and averages in a table to have a better overview for the comparison. In addition to that, a standard deviation of each component was also conducted.

2.6 Definition of Key Terms

Mathematical Concepts

Afanah et al. (2007) and Huwaidi (2006) in their study defined the concepts as, “an idea or set of ideas used to tab a set of perceptions. It is always characterized by a word, phrase or symbol which becomes the name for the concept. As a structural unit of mathematics and the concept of each particular connotation associated with it, the idea of an abstract conception refers to something that has a picture in mind” (pp. 82, 24)

Trends in International Mathematics and Science Study (TIMSS)

TIMSS is an international study, which means Trends in the International Mathematics, and Science Study. It is held regularly every four years. The study was conducted under the supervision of the International Association for the Evaluation of Educational Achievement (IEA) (IEA, 2015).

School Book / Textbook

Procedurally, researchers are aware that this book is to be approved by the Ministry of Education, Saudi Arabia and is to be placed in the hands of every student to study. Also, it is to be chosen according to certain specifications. In this study, the intended textbooks are mathematics textbooks for grades (4-8).

2.7 Limitation of the Study

According to McMillan & Schumacher (2014), certain limitations exist in every research study, and it is important for a researcher to identify and acknowledge such limitations. Furthermore, once the limitations and weaknesses of a study are identified, it is important for a researcher to control such limitations. However, McMillan, & Schumacher, (2014), identified there are certain limitations of the research study which cannot be controlled by the researcher. Moreover, it was also identified that there are certain influences, conditions, and shortcomings, which are difficult for a researcher to control as these pose restrictions on the conclusion and methodology of research.

Therefore, if such limitations are existent in the study, the researcher should mention these. The limitations identified in this study include time constraint, the sample, the utilized instrument, the nature of self-reporting and analysis conducted by the researcher. There is a possibility that the researcher might leave any important aspect in the analysis; therefore, this may be considered as the limitation of the study.

Reduces Spatial: The study is limited to the study of math books as well as the evidence of teachers' assessments of the Ministry of Education and Saudi's books.

Temporal Limitation: The study was conducted in the academic year 1436/1437 AH.

Objective Limitation: The study was limited to math books for grades (4-8). In addition, it examines the extent of the representation of math textbooks for grades (4-8) in the Kingdom of Saudi Arabia. This, however, is based on the key concepts, shape, and levels of questions on the TIMSS test.

3. Results of the Study

3.1 The First Question

To what extent do math textbooks for grades (4-8) in the Kingdom of Saudi Arabia represent the main concepts in the test (TIMSS)?

To answer this question, the researcher has identified the percentages of each of the six key concepts in each book and then the percentage from the fourth to the eighth grades were identified. Table 1 shows the results of the study. The results showed that the main concept is the most represented in math books for the (4-8) grades of the other concepts. This can be seen in Table 1 below:

The results showed that the main concept is the most represented in math books for grades (4-8) of the other concepts. This is described as shown below:

- The highest representation of the content of mathematics textbooks for all grades from fourth through eighth is the concept of numbers and operations and the percentage of representation of 34.75%. A third of the books followed the concept of engineering and reached its representation of the math books with a percentage of 21.17%. Then, the concept of measurement (13.35%), the concept of algebra and the percentage of representation (12.82%) followed this. It was only then that the concept of statistics and probability amounted to 12.37% of its representation.
- The lowest percentage of representation is the concept of proportionality and representation which amounted to 5.54%,
- It covered the concept of numbers and operations by 58.14%. However, it drops higher by moving to the top row.
- There is no representation of the concept of proportionality in the book.
- The concepts of algebra and geometry have been the biggest representation in the book for the average first and second grade. It was less represented in the book for the sixth grade. It has been observed that the concept of measurement was the largest representation of the book for the sixth grade, and less represented in the book for the average first-grade, as well. In addition to that, it was also found that the concept of Statistics and Probability was the largest representation of the book for the average second grade. Furthermore, it was also discovered that there is a less representation in the book for the fourth grade. Nevertheless, the concept of measurement was the largest representation of him in the book for the average first-grade and less represented in the book for the fourth and fifth grade

Therefore, it is worth noting that the percentage of representation of each subject in the TIMSS test is as follow:

- Numbers and operations 38%
- Algebra 22%
- Engineering 13%
- Measurement 15%
- Statistical questions and Probability 12%

3.2 The Second Question

To what extent do math textbooks for grades (4-8) in the Kingdom of Saudi Arabia represent the levels of questions in the test (TIMSS)?

The results showed that the questions and exercises, examples, and activities in the math books for grades (4-8) in the Kingdom of Saudi Arabia described in Table 2:

There is a varied the percentage of representation for each level of the four levels of questions in the math books for grades IV to VIII. It was the highest percentage of the questions based on the level of knowledge which represented 34.23% of the total number of questions and exercises. On the other hand, the figure was the lowest on the questions of the levels of complicated routine procedures and problem-solving. This, however, amounts to

16.57% and 17.14%, respectively, as well as the total number of questions and exercises books. The questions that need to be “simple routine procedures ratio” were 32.05% of the total questions.

- It contained a written math in the IV and V grade with the least number of questions to the class; the question was included in a row in 1921 and 1922, and the math book of second-grade average includes the largest number of questions which contains about 2649 question.
- The proportion of questions ranges from the knowledge level of 33.19% in the first-grade average and 36.89% in the fifth grade. In addition, the convergence ratios were noted. The percentage questions on the level of action routine statistics were between 27.82% in the second-grade average and 35.38% in the sixth grade. In addition, the convergence of descent was noted, while the percentage of questions from the level of the complex procedures routine ranged from 12.55% in the fourth grade and 20.88% in the sixth grade. However, the level of a solution has representation ratios that ranged from 14.00 in the fifth grade to 18.79 in the fourth grade. The convergence ratios were also noted.
- The ratios levels of the questions in the TIMSS test are as follows:
 - Knowledge 19%
 - A simple routine procedures 23%
 - A complex routine measures 24%
 - Resolving the issue 31%

3.3 The Third Question

To what extent do math textbooks for grades (4-8) in the Kingdom of Saudi Arabia represent the form of questions test (TIMSS)?”

The results showed that the questions and exercises in math books for grades (4-8) in the Kingdom of Saudi Arabia regarding shape are described as shown in the Table 3:

Subsequently, through studying Table 3, the following was noted:

- Lack of concentration of math books for grades (IV to VIII) in her questions and exercises to form multiple-choice. The total questions form 374 and only a question out of the 7192 question represents the sum of books and questions at the rate of only 5.20%.
- The average first-grade book focuses on the multiple-choice questions, as the proportion of questions from this figure amounted to 8.85% of the total book questions. On the other hand, the book that focuses less on this form in questions is the fifth grade primary and the sixth at the ratio of 1.90% and 1.94%, respectively out of the total book questions.
- For math books for the fourth through the eighth grade that focuses on the questions that need simple answers, we note that 62.68% of the questions you need answers to is simple compared to 32.12% of the questions that require long answers of the total questions in the book.
- In all the math books, it was noted that the sum of the questions need to be higher than the short answers to the questions.

4. Conclusion

The focus of this paper was to analyze on mathematics School textbooks to find out the degree of representation of the key concepts, shape, and the levels of questions in TIMSS test for grades (4-8) in the Kingdom of Saudi Arabia. The questions that were answered in this study were:

- To what extent do math textbooks for grades (4-8) in the Kingdom of Saudi Arabia represent the main concepts in the test (TIMSS)?
- To what extent do math textbooks for grades (4-8) in the Kingdom of Saudi Arabia represent the levels of questions in the test (TIMSS)?
- To what extent do math textbooks for grades (4-8) in the Kingdom of Saudi Arabia represent the form of questions test (TIMSS)?

The highest representation of the content of mathematics textbooks for all grades from fourth through eighth is the concept of numbers and operations. After the concept of numbers and operations, the second major content was related to the concept of engineering. However, the concepts of measurement, the concept of algebra and the concept of statistics and probability were also seen to some extent. Furthermore, the researcher has also

highlighted the content of this concept regarding percentages in which numbers and operations were observed to be on highest percentage and statistical questions and probability was observed to be on lowest percentage. In addition to that, the researcher has also highlighted the ratios levels of the questions in the TIMSS test, and it was identified that the questions that are based on knowledge are 19%, simple routine procedures are of 23%, complex routine measures are of 24% and resolving the issue was of 31%.

5. Recommendations

There is a need to rewrite the mathematics curricula and textbooks for grades (4-8) to focus on questions and exercises level to resolve the issue as well as multiple-choice questions; in addition, the content of the main concepts (statistics and probabilities, and a pro-rata) should be focused on due to its significant importance in the life of students. Furthermore, there is also need to conduct similar studies on the analysis of the results for Saudi students in international math test conducted in 2011 and 2015, respectively. In addition to that, the attention of the National Center for Measurement and Evaluation in Higher Education is required to align the mathematics content standards with the main requirements of the tests (TIMSS). Conducting similar studies in the present study and other decisions of mathematics at different levels; also, conducting further analytical studies and stand on the various causes leading to low achievement of the pupil in mathematics.

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Appendix A

The First Model

The analysis of six key concepts to see how the representation of math textbooks for grades (4-8) concepts is contained in the test (TIMSS)

Classroom	Total Concepts/ Textbook Writers	Key Concepts Numbers and Operations	Measurements	Algebra	Engineering	Data & the Possibilities	Pro-rata
Fourth							
Fifth							
Sixth							
Seventh							
Eighth							
Total							
Total							
Proportion							

The Second Model

To analyze the four levels to show the representation of math textbooks for grades (4-8) Levels of the questions in the test (TIMSS).

Classroom	Total level of questions and exercises	Types of Questions Knowledge	Simple Routine Procedure	Complex Routine Procedure	Problem Solving
Fourth					
Fifth					
Sixth					
Seventh					
Eighth					
Total					
Total Proportion					

The Third Model

To see how the representation of math textbooks for grades (4-8) and the forms of the questions in the test (TIMSS).

Classroom	Total question and exercises	Types of Questions Questions with Short Answers	Questions with Long Answers	Text Question with Multiple Answers
Fourth				
Fifth				
Sixth				
Seventh				
Eighth				
Total				
Total Proportion				

What is the extent of the inclusion of the content of mathematics textbook in the fourth grade primary dimension and the cognitive processes of Mathematics in accordance with the requirements of the TIMSS?

The answer to the above question is shown in the table below:

Field	Repetition	Percentage	Ranking
Number	1196	81.9%	First
Total Numbers			
Fractions and decimal			
Numerical sentences in decimal numbers			
Numerical patterns and relationships			
Geometric shapes	199	13.4 %	Second
Points, Lines, and Angles	134	2.7 %	
Forms of two and three dimensions	479	9.5 %	
Display data	68	4.7 %	Third
Read and interpret data			
Organize and represent data			
Total	1463		

Field	Chapters		
Number	Household Value		
	Addition and Subtraction		
	Patterns and algebra		
	Multiplication in the number of number one		
	Multiplication in the number of double-digit		
	Divide by the number of number one		
	Fractions		
	Decimals		
	Collection decimals and put		
	Geometric Shapes		
	Data Display		
Field	Repetition	Percentage	Ranking
Knowledge			
	Total		
Application			
	Total		
Inference			
Total			

Appendix B

Table 1. Analysis to determine the extent of the representation of math textbooks for grades (4-8) in accordance with the concepts contained in the test (TIMSS)

Classroom Concept	Total	Key Concepts		Measurements		Algebra		Engineering		Data & the Possibilities		Pro-rata	
		Numbers & Operations	Repetition %	Repetition	%	Repetition	%	Repetition	%	Repetition	%	Repetition	%
Primary Four	215.0	125	58.14	29	13.49	20	9.30	28	13.02	13	6.05	0	0.0
Primary Five	276.0	139	50.36	47	17.03	23	8.33	45	16.30	22	7.97	0	0.0
Primary Six	215.0	92	42.79	45	20.93	14	6.51	18	8.37	25	11.63	21	9.77
The First Average	273.0	54	19.78	17	6.23	52	19.05	84	30.77	35	12.82	31	11.36
The Second Average	339.0	48	14.16	38	11.21	60	17.70	104	30.68	68	20.06	21	6.19
Total	1318.0	458	34.75	176.0	13.35	169.0	12.82	279.0	21.17	163.00	12.37	73.00	5.54
SMA	263.60	91.6000		35.200		33.8000		55.8000		32.6000		14.6000	
Standard Deviation	51.60	40.85707		12.377		20.71714		36.86733		21.29084		13.93915	
Ranking		1		3		4		2		5		6	

Table 2. Analysis to determine the extent of the representation of math textbooks for grades (4-8) according to the levels of the questions in the test (TIMSS)

Classroom	Total Questions exercise, examples and activities	TYPES OF QUESTIONS							
		Knowledge	Simple Routine Procedure		Complex Routine Procedure		Problem Solving		
Fourth Primary	1921	667	34.72	652	33.94	241	12.55	361	18.79
Fifth Primary	1922	709	36.89	614	31.95	330	17.17	269	14.00
Sixth Grade	2055	686	33.38	727	35.38	284	13.82	358	17.42
First Average	2582	857	33.19	837	32.41	436	16.89	452	17.51
Second Medium	2649	891	33.63	737	27.82	553	20.88	468	17.67
Total	11129	3810	34.23	3567	32.05	1844	16.57	1908	17.14
Summation									
SMA	2225.80	762.00		713.40		368.80		381.60	
Standard Deviation	360.68	104.01		86.12		125.97		80.75	
Ranking		1		2		4		3	

Table 3. The third model to see how the representation of math textbooks for grades (4-8) forms the questions in the test (TIMSS)

Classroom	Test Questions and Exercises	TYPES OF QUESTION					
		Questions with Short Answers		Question with Long Answers		Text Question with Multiple Answers	
Primary Four	1226	768	62.64	380	31.00	78	6.36
Primary Five	1211	758	62.59	430	35.51	23	1.90
Sixth Grade	1341	962	71.74	353	26.32	26	1.94
First Average	1695	1032	60.88	513	30.27	150	8.85
Second Medium	1719	988	57.478	634	36.89	97	5.64
Total Summation	7192	4508	62.68	2310	32.12	374	5.20
SMA	1438.40	901.60		462.00		74.80	
Standard Deviation	250.45	129.02		113.81		52.97	
Ranking		1		2		3	

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