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The Evaluation of Mathematics Textbooks from the Perspective of Mathematics Teachers in Jordan

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Abstract: This paper aims at investigating mathematics teachers' satisfaction with new math textbook for grades seven and ten in Jordan. A sample of (127) Jordanian mathematics teachers who teach the new textbooks replied to a questionnaire. The questionnaire consisted of (5) domains and (37) items. The results show teachers are moderately satisfied with the new textbooks, and there is a statistically significant difference ($\alpha=0.05$) in teachers' satisfaction according to gender (Male, Female) in favor of males. Also, the results show there is a statistically significant difference ($\alpha=0.05$) in teachers' satisfaction regarding teachers' experience in favor of more and moderately experienced teachers.

Keywords: Evaluation of mathematics textbooks, Teachers' satisfaction, Mathematics curriculum.

1 Introduction

In recent years, the National Center for Curriculum Development in Jordan has embarked upon a project to develop the mathematics curricula and textbooks. To ensure the overall development of the educational system, special attention was given to the enhancement of the mathematics textbook due to its integral role in providing the proper learning experience to achieve the required academic goals in the educational curriculum as a whole. In that regard, Eisner [1] emphasizes the crucial role that school textbooks play in the delineation and realization of the target goals in the educational process. In addition,

Khawaldeh [2] outlines the following basic features of the school textbook which distinguish it from other educational sources:

1. The textbook represents a genuine interpretation of the curriculum.
2. It motivates teachers to positively engage their students in classroom activities.
3. It enables students to acquire the required concepts, knowledge and values.

To guarantee the realization of such features in the Jordanian school curricula, the ministry of education in Jordan has prepared a guidebook which defines the most

significant characteristics of the school textbook. The content should be scientifically accurate and up to date. It also needs to meet the mental development of the student and relate to their daily lives [3, 4]. The presentation of the material should follow a gradual approach to motivate students to think, develop their research skills and encourage individual learning. With regard to the intended outcomes of the curricula, they should focus on the mental capabilities of students as well as on their practical accomplishments outside the classroom [5,6,7].

It is hoped that the new mathematics textbooks are more student-centered in order to realize the intended learning outcomes. The updated mathematics textbooks rely on a variety of educational sources and tools; teaching strategies should include dialogue, deduction, problem-solving and self-learning [8,9,10].

In Jordan, the development of math textbooks and curricula has been granted particular attention due to the modern world's emphasis on the development of mathematics education. Mathematics curricula worldwide have undergone enormous changes; such developments have motivated educational specialists to re-evaluate the role of mathematics in the enhancement of society and its members [11,12,13].

In light of the increased interest in mathematics curricula, Abu al-Ajeen [14] stressed that evaluating the content and reviewing the curriculum represents the first and foremost

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step in developing the curriculum and addressing any shortcomings in the textbooks. Furthermore, Geet [15] sought to study the advantages and disadvantages of three mathematics textbooks within three criteria.

Other relevant research in the area of mathematics textbooks and curricula include Al-Assi [16] whose study aimed at pinpointing to what extent the updated mathematics textbooks for grades 3 and 4 accomplish the criteria set by the National Council for Teachers of Mathematics (NCTM). The findings of this research indicate that the developed textbooks achieve the standards of the NCTM in a satisfactory manner.

Another relevant study conducted by Shawawreh [17] found that the mathematics textbook for grade eight is not connected to the students' daily lives. According to Bayonis [18], there is no significant statistical difference that may be attributed to sex or experience regarding the mathematics textbook from the perspective of the mathematics teachers in Saudi Arabia.

Based on the aforementioned studies, the significance of this current research lies in its in-depth evaluation of the developed mathematics textbooks in Jordan. It is the aim of this study to explore the advantages and disadvantages of these new textbooks and the role these textbooks play in developing mathematics education in Jordan.

The problem:

Jordan's Ministry of Education (MoE) has recently credited new mathematics textbooks for grades seven and ten. The reform process is continuous, and every textbook in all grades is going to change. The updated reform came to make up for the shortcomings in the old textbooks. MoE trains teachers on the implementation of the new textbooks.

Mathematics teachers in Jordan are diverse in experience and qualification. This diversity may affect syllabus delivery. Teachers' beliefs, opinions, attitudes and experience concerning new textbooks affect the implementation process directly. If teachers have negative beliefs, opinions, or attitudes toward textbooks, they will not implement what the curriculum designer planned for.

However, there is a lack of sufficient studies that address the evaluation of the new mathematics textbooks in Jordan. This study surveys the opinions of Jordanian mathematics teachers about the quality of new mathematics textbooks. Furthermore, knowing teachers' opinions and perspectives on implemented issues, mistakes, and other issues in textbooks may aid in the development of these textbooks. In this study, we test many factors: (gender, sector and experience) and compare teachers' opinions in light of these factors. A sample of (127) Jordanian mathematics teachers who teach the new textbooks replied to a questionnaire.

The questionnaire consisted of (5) domains (domain(1) Content; domain(2) Learning activities; domain(3) Style and Address; domain(4) Implemented issues and domain(5) Evaluation) and (37) items.

Precisely, this study answers the following questions:

- 1- To what extent are mathematics teachers satisfied with the new textbooks?
- 2- Is there a statistically significant difference ($\alpha=0.05$) in teachers' satisfaction according to gender (Male, Female)?
- 3- Is there a statistically significant difference ($\alpha=0.05$) in teachers' satisfaction according to teachers' experience (short, moderate and long experience)?

Terms:

Level of Satisfaction: is defined as the average of responses to the questionnaire from mathematics teachers who teach the new textbooks. This Level of Satisfaction is categorized into three levels:

Level one (highly-satisfied): teachers' response belongs to this level if the average belongs to the following interval [3.7-5]. Also, the response in this range indicates positive points and strengths in the textbook.

Level two (medium-satisfied): teachers' response belongs to this level if the average belongs to the following interval [3-3.6]. Also, the response in this range indicates issues in the textbook to reform.

Level three (low-satisfied): teachers' response belongs to this level if the average belongs to the following interval [1-2.9]. Also, the response in this range indicates negative issues in the textbook to reconsidered.

Teaching experience: is the number of years the teacher has taught mathematics in schools. Teaching experience is divided into three categories (short experience: less than or equal to 5 years; moderate experience: more than 5 years and less than 10 years; and long experience: 10 years or more).

Delimitations:

1- In this study, we survey the evaluative estimates of a sample of mathematics teachers from the public and private sectors who teach the new textbooks. These teachers are considered the participants.

2- The study was limited to only five domains, namely, (domain(1) Content; domain(2) Learning activities; domain(3) Style and Address; domain(4) Implemented issues and domain(5) Evaluation).

The Participants: the number of mathematics teachers who use the new textbooks is (450). The questionnaire was sent electronically via google forms to (127) teachers from the public and private sectors. These teachers are considered the participants. The participants are around (28.2%) of the teachers who teach the new textbooks all

over Jordan. Table 1 shows the distribution of participants according to the sector; gender and experience.

Table 1: Distribution of participants according to gender; sector and experience.

		Frequency	%
Gender	Male	59	46.46%
	Female	68	53.54%
Sector	Public	65	51.18%
	Private	62	48.82%
experience	short	21	16.54%
	moderate	30	23.62%
	long	76	59.84%

From table1 participants are approximately evenly distributed in terms of gender and sector. For the experience, around 60% of the participants are of long experience.

The Tool:

To achieve the study's goal, researchers created a 37-item list (five Likert scales) questionnaire. It consists of (5) domains (domain(1) Content; domain(2) Learning activities; domain(3)Style and Adress; domain(4)Implemented issues and domain(5) Evaluation) and (37) items. The questionnaire was created using a review of the literature and content analysis.

Five Jordanian university professors who teach math education judged the items and provided feedback to the research. Moreover, another team of five teachers and supervisors reviewed the questionnaire. Constructive feedback helped us in adjusting the questionnaire items. We took all remarks into account and changed the items to get a proper tool.

To ensure the reliability of the questionnaire, the questionnaire was sent to a sample of (24) mathematics teachers as a pilot sample. According to Kuder Richardson Formula 20, the reliability coefficient is (0.85) for the complete tool. Moreover, it is (0.85) for Content; (0.87) for Learning activities; (0.84) for Style and Adress; (0.84) for Implemented issues and (0.85) for Evaluation). The reliability coefficients are convenient for the study aim.

2 Results and Discussion

To answer the first question:

To what extent are mathematics teachers satisfied with the new textbooks?

The answer to this question is in table2 and table3.

Table 2 displays the mean and standard deviations for the five domains as well as the overall average and standard deviation. The means indicate that teachers are medium-

satisfied with the new textbooks. Domain(5) Evaluation got the highest mean where domain(3) style and address got the lowest. This result shows that teachers appreciate the

Table 2: mean and standard deviations of the five domains and the overall

	N	Mean	Std. Deviation	result
Evaluation	127	3.36	0.99	medium-satisfied
learning activities		3.31	0.95/	medium-satisfied
Content		3.21	0.87	medium-satisfied
implemented issues		3.20	0.83	medium-satisfied
style and address		3.13	0.95	medium-satisfied
Overall		3.23	0.83	medium-satisfied

quality of exercises and problems in the textbooks. But they disagree with the style, and the way textbooks address students and present knowledge. For a more detailed analysis, notice table3. This table is an elaboration on each item. The elaboration shows the items teachers disagree with it. The detailed results shed light on the aspects the curriculum author should give more attention to in future textbooks.

Results in Table 3 show that most of the items gain medium satisfaction. The only item got a high satisfaction is "the content includes important mathematics topics". This result is a good indicator of the subject matter. This result reflects the effort authors apply to write the new textbooks.

Meanwhile, seven items show low satisfaction, namely:

1. The content differentiates students' levels of achievement.
2. The content encourages self-learning.
3. The address and the style raise motivation toward learning.
4. The style is enjoyable for the student.
5. The textbook takes into account pre-requisite knowledge and skills.
6. The number of sessions allocated to teach is enough.
7. Students can achieve and practice math activities individually.

The above items are about psychological issues; self-learning skills and time for delivery. We think this is a significant result for future textbooks. Also, some teachers comment clearly about the lack of time to complete the curriculum. Such an observation is in accordance with Shawawreh's [17] results. The teachers mentioned that the time and number of sessions are not sufficient to deliver every outcome. Moreover, the authors of the textbooks do not address students' individual capabilities in

understanding math concepts and skills. Khawaldeh [2] arrives at similar conclusions.

they are minor and do not detract from the overall quality of the work.

Many teachers point out errors in the definition of corresponding angles and alternative angles. This is the outcome of the open question at the end of the questionnaire. Although there are some errors, we believe

To answer the second question "Is there a statistically significant difference ($\alpha=0.05$) in teachers' satisfaction regarding gender (Male, Female)?"

Table 3: Questionnaire domains; items; means; STD and the result for each item.

domain	Item	Mean	Std. Deviation	result
content	The content includes important mathematics topics.	3.70	0.99	High
	The content includes many real-life examples.	3.54	1.10	Medium
	The content Takes into account the latest innovations in real-life.	3.31	1.16	Medium
	The content is connected and sequential in offering math concepts.	3.21	1.08	Medium
	The content Takes into account students' needs and interests.	3.15	1.12	Medium
	The content differentiates students' levels of achievement.	2.79	1.24	low
	The content encourages self-learning.	2.74	1.31	low
Learning activities	Activities develop problem-solving skills.	3.50	1.05	Medium
	Activities satisfy high ordered levels of thinking.	3.49	1.12	Medium
	The design of the activities increases the level of students' engagement.	3.32	1.15	Medium
	Activities encourage students to collaborate.	3.25	1.20	Medium
	Activities stimulate enthusiasm toward learning.	3.15	1.20	Medium
	Activities differentiate student's levels of achievement.	3.14	1.22	Medium
Style and Address	The address and the style develop inquiry.	3.35	1.08	Medium
	The style takes into account different methods of teaching.	3.35	1.09	Medium
	The style takes into account the natural and logical order of math topics.	3.18	1.24	Medium
	The address and the style centred on students.	3.09	1.12	Medium
	The style Facilitates understanding math knowledge.	3.06	1.21	Medium
	The address and the style raise motivation toward learning.	2.98	1.20	low
	The style is enjoyable for the student.	2.93	1.22	low
Implemented issues	The textbook includes math activities that need to use technology.	3.57	0.96	Medium
	The textbook develops teacher's math knowledge.	3.55	1.08	Medium
	The textbook includes clear and specific heuristics to solve problems.	3.47	1.02	Medium
	The textbook develops communication skills.	3.40	1.15	Medium
	The textbook organization helps the teacher to teach concepts easily.	3.32	1.04	Medium
	The textbook includes rich and diverse resources for teachers.	3.27	1.06	Medium
	The textbook encourages and allows active rolls for students.	3.17	1.14	Medium
	The textbook changes teachers' role to a learning facilitator.	3.08	1.15	Medium
	The textbook takes into account pre-requisite knowledge and skills.	2.88	1.28	low
	The number of sessions allocated to teach is enough.	2.80	1.33	low
	Students can achieve and practice math activities individually.	2.72	1.08	low

Evaluation	Questions and problems in the textbook develop high order thinking skills.	3.54	1.15	Medium
	Evaluation activities are diverse.	3.48	1.03	Medium
	Evaluation activities aim at improving learning.	3.39	1.17	Medium
	The textbook integrates learning and evaluation activities.	3.31	1.17	Medium
	Evaluation activities connect students' tasks in real-life situations.	3.24	1.02	Medium
	Evaluation activities include important tasks and problems that develop students' understanding.	3.21	1.19	Medium

Table 4: Independent Samples Test t-test for Equality of Means related to gender.

Domain	gender	N	Mean	Std. Deviation	T	Df	Sig. (2-tailed)
content	Male	59	3.37	0.82	2.00	125	0.048
	Female	68	3.07	0.89			
learning activities	Male	59	3.40	0.82	1.05	125	0.297
	Female	68	3.23	1.04			
style and address	Male	59	3.28	0.91	1.56	125	0.122
	Female	68	3.01	0.98			
implemented issues	Male	59	3.47	0.66	3.55	125	0.001
	Female	68	2.97	0.90			
evaluation	Male	59	3.55	0.90	2.02	125	0.045
	Female	68	3.20	1.04			
overall	Male	59	3.41	0.73	2.33	125	0.021
	Female	68	3.07	0.89			

Table 4 shows a significant difference between means of responses according to gender (male, female) favouring males. The difference appears in the content; implementation issues and evaluation. The most remarkable difference appears in implementation issues. The explanation of this result may seem due to the male nature. Males don't concentrate on details and can summarize the content effectively. Such a conclusion concurs with Nemrawi's [5] study.

To answer the third question, "Is there a statistically significant difference ($\alpha=0.05$) in teachers' satisfaction regarding teachers' experience (short; medium and long)?

To discover if there is a that significant difference due to experience we apply a one-way ANOVA test.

Table 6 shows a significant difference in the means related to experience. Moreover, we use Scheffe's test as a post hoc test to see the difference in favor of which group. Scheffe's test shows that teachers with long and medium experience significantly deferred from those with short experience.

This could be explained by the prior knowledge and skills that these teachers possessed from their previous teaching experiences.

Table 5: means and standard deviation of teachers satisfaction related to the experience.

Expeience	number	mean	Std. Deviation
5 years or less	26	3.58	0.72
more than 5 and less than 10	30	3.05	0.77
10 or more	71	2.91	0.71
Total	127	3.08	0.77

Table 6: one-way ANOVA test for experience.

		Sum of Squares	df	Mean Square	F	Sig.
average content	Between Groups	13.920	2	6.960	12.880	0.000
	Within Groups	67.008	124	0.540		
	Total	80.929	126			
average learning activities	Between Groups	6.753	2	3.376	4.234	0.017
	Within Groups	98.876	124	0.797		
	Total	105.629	126			
average style and address	Between Groups	5.484	2	2.742	3.318	0.039
	Within Groups	102.468	124	0.826		
	Total	107.952	126			
average implemented	Between Groups	8.805	2	4.403	8.396	0.000
	Within Groups	65.026	124	0.524		
	Total	73.831	126			
average evaluation	Between Groups	9.589	2	4.795	7.090	0.001
	Within Groups	83.860	124	0.676		
	Total	93.449	126			
average total	Between Groups	8.606	2	4.303	8.116	0.000
	Within Groups	65.742	124	0.530		
	Total	74.348	126			

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