

The Training Needs Of Mathematics Teachers In Light Of The Developed Collins Mathematics Curricula In Jordan

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Abstract

The study aimed to investigate the training needs of mathematics teachers in light of the globally developed Collins mathematics curricula. The study adopted a descriptive research methodology, and its tools included a questionnaire developed by the researcher. A total of 266 mathematics teachers from the first educational directorate in Irbid, Jordan, participated in the study, selected through stratified random sampling. The study revealed that the degree of all training needs was high, with the order of training needs fields from highest to lowest being: specialization, educational, and pedagogical. The most crucial training needs (degrees as very high) for mathematics teachers were: training on using teaching strategies suitable for the developed mathematics curricula, training on using assessment strategies suitable for the developed mathematics curricula, and understanding the mathematical concepts included in the developed mathematics curricula. The study also showed no statistically significant differences based on the variables of academic qualification and gender among mathematics teachers. The study recommended the necessity of training teachers on the identified training needs.

Keywords: Collins curricula, mathematics curricula, mathematics teachers, training needs.

INTRODUCTION

Based on the firm belief of the Hashemite Kingdom of Jordan in the importance of developing the capabilities of the Jordanian person

and arming him with science and knowledge; The National Center for Curriculum Development NCCD (an independent government center), in cooperation with the Jordanian Ministry of Education, sought to modernize and develop the curricula, to be helpful in raising students' cognitive level, and since mathematics is one of the most important academic subjects that develop students' thinking and problem-solving skills, it was keen to preparing mathematics books according to the best methods used internationally by Jordanian experts. To ensure its harmony with national values and meet the needs of students, consideration was taken in preparing mathematics curricula's to present the content in a smooth manner, and within interesting life contexts, which increases the students' desire to learn, highlight the plan for solving the problem, and dedicate independent lessons to it that allow students to practice different types of these plans. And its application in various situations. The mathematics curricula for the basic stage contained projects; To enhance and enrich students' learning of the concepts and skills contained therein (National Center for Curriculum Development, 2022).

The mechanism for updating curricula in Jordan was carried out through NCCD and in cooperation with the Ministry of Education, represented by the Directorate of Curricula and Textbooks, where planning, organizing and construction processes were determined, and all processes related to preparing the general framework for curricula and evaluation were carried out, in addition to preparing the general framework and the general and specific outcomes of the investigations. Textbooks and manuals for these investigations, and that the process proceeds in a linear manner. The mathematics curricula for the basic stage in Jordan were updated based on the international Collins curricula, which follow the modified Socratic method and study subjects with abstract content to challenge students' logic with the aim of encouraging them to the idea of discussion and developing their thinking skills. Collins is considered a famous English publishing institution in the field of writing curricula (Salah and Jwaifell, 2021).

The US National Council of Teachers of Mathematics NCTM has played a prominent role in advancing standards-based mathematics education reform efforts over three decades. The Council issued a series of documents on professional standards for mathematics education and mathematics teacher preparation

standards, which represent a long and important history in the mathematics education reform movement. It consists of four important documents in this field, the first of which was in 1991 entitled the document “Professional Standards for Teaching Mathematics,” then the principles and standards document issued by the Council in 2000 AD.

From this standpoint, the mathematics teacher needs to develop his scientific and educational competencies, and keep up with everything advanced. Any development that is not accompanied by the development of the teacher, starting with the policies and standards of his preparation in educational institutions, to the mechanisms for selecting and appointing him, ensuring his professional development according to specific standards, and involving him in all development steps, is considered weak development and cannot achieve its goals. The development of education depends on the development of the teacher (Mohammed, 2012).

The teacher is one of the basic pillars of the educational process. Plans lessons, designs the learning environment, provides multiple resources, and diversifies teaching methods to help students learn well. The greatest challenge facing the teacher is his ability to keep pace with the rapid changes in various fields that change many lifestyles, which indicates the need for the teacher to acquire new skills to follow these changes (Bishop, Berryman, Wearmouth, Peter, & Clapham, 2012). Therefore, in-service teacher training occupies a vital place in the priorities of educational policies to meet the challenges resulting from cognitive, scientific and technological changes (Goma, 2009).

Teachers play a role in creating or exacerbating existing innovation in the curriculum such that teachers have been known to experiment in the form of change. In other words, the curriculum can function properly through the role of teachers. Where the teacher needs to be sufficiently competent. (Kelly, 2004). Darling-Hammond, & Bransford.'s (2007) book, “Preparing Teachers for a Changing World,” suggests that teachers must be able to apply that knowledge in developing curriculum that meets students’ needs and content requirements.

There is no doubt that identifying training needs is an important process before designing training programs, and this is due to it

being the basis on which any training qualification for teachers is based, directing training to the right destination, contributing to providing the available capabilities and resources that training needs, and investing effort, money and time effectively in training. (Wageman, Anderson, Duffield, & Nyachwaya, 2018).

Most researchers differ in the concept of training needs according to the goal of the studies or their educational considerations. Some researchers consider training needs to be teacher training, others use them to indicate the existence of problems related to training and qualification, and some consider them to be the gap between the desired goal and reality (Abu AlNasr, 2008). AlTaani (2009, 30) defined training needs as “information, skills, trends, and technical and behavioral capabilities that are intended to be created, changed, modified, or developed by the teacher, to keep pace with contemporary changes or developmental aspects.”

Failure to identify training needs leads to not achieving the desired educational outcomes, and to wasting time, effort, and money. Any process of developing curricula is matched by identifying appropriate training needs with the developed curricula. Hence came the idea of this study, in which we tried to show the degree of training needs of mathematics teachers in light of the Jordanian mathematics curricula developed in accordance with the Collins standards.

Through the previous literature review, there are some studies that focused on the training needs of mathematics teachers, including: Salah and Jwaifell study's (2021) aimed to identify the extent to which the developed science curriculum (Collins) for the first and fourth grades is consistent with the standards of curriculum design and construction in Jordan. The qualitative methodology was used to determine the consistency with the standards of curriculum design and Engineering in Jordan. The study tool consisted of a semi structure-, where the validity and reliability of the study tools were verified. The study participants consisted of those in charge of developing the curricula at the NCCD. The results showed a variation in the criteria according to the results of the standardized interview, the study included a detail of the results.

AlMalaa, & AlSaadoun (2020). study aimed to identify the training needs for teaching the advanced math curriculum (McGraw-Hill) at

the Middle School by investigating the perspectives of math teachers in Al-Ahsa. The researcher used the descriptive approach and the research tool was a 34 item questionnaire. The sample of the study consisted of 97 female math teachers from Al-Ahsa middle schools in the academic year 2020/2021. After verifying the validity and reliability of the instrument and analyzing the results, the study revealed the training needs in the area of: teaching strategies and methods, cognitive aspect and school subject, and teaching aids and technologies.

The study by AlBalawi (2019) aimed to determine the training needs necessary for mathematics teachers at the secondary level from their point of view in both the specialized and educational fields, and to reveal statistically significant differences between the averages of the sample's responses attributed to academic qualification. The study was limited to public schools in Medina, Saudi Arabia, and this study was applied in the second semester of the year 2017/2018 AD. The descriptive analytical approach was used, and the study population consisted of all mathematics teachers in government secondary schools in Medina, numbering 288 teachers. The study tool was a questionnaire prepared by the researcher, and the questionnaire in its final form consisted of 58 statements distributed equally between The two areas. The results of the study indicated that the scores for each of the training needs required for mathematics teachers in the secondary stage, from their point of view, are average in both the specialized and educational fields, and that there are statistically significant differences between the averages of the sample members due to academic qualifications and in favor of a high diploma or higher.

Alotaibi study (2018) aimed to identify the training needs of mathematics teachers at the primary stage in the city of Riyadh, and to study the impact of some variables, including: academic qualification, on determining the training needs of mathematics teachers at the primary stage in the city of Riyadh. The researcher used the descriptive approach, and the study population consisted of all mathematics teachers in the upper stage (fourth, fifth, and sixth grades) and the primary stage in government schools in the city of Riyadh during the first semester of the year 2011/2012 AD. The study concluded that the teacher needs training on teaching methods and modern methods to deliver this information to students, and he needs to know more about planning, classroom

management and organization in order to be effective in environmental and classroom organization that has a positive impact on the student's personality. Mathematics teachers must be trained in different teaching methods. The teacher hears about some methods and sees their uses in other subjects, but does not know how to use them in the field of teaching mathematics. The study also showed that there were no statistical differences resulting from the academic qualification variable.

The study Alsmadi and AlKilani (2017) aimed at identifying the training needs of the mathematics teachers at the primary stage in light of the requirements of achieving the objectives of the developed mathematics curricula from the educational series of McGraw-Hill at the primary stage, the researchers used the descriptive approach, a questionnaire included 30 needs was developed distributed on four fields. The study reached a number of findings as: the degree of training needs of the mathematics teachers at the primary stage in general (total grade) was moderate. The arrangement of training needs fields was as follows: "evaluation of students' learning, teaching methods", in high degree of needs. Then came the field of activities and teaching aids, planning for teaching, in a moderate degree of needs. The results showed that there were no statistically significant differences at the level of significance ($\alpha=0.05$) in the training needs of the mathematics teachers at the stage according to the variables scientific qualification.

The study of Aly, H.S., & Abdulhakeem, H.D. (2016) to evaluate training programs for mathematics teachers in the primary stage on the developed curricula and attitudes towards teaching in the Najran Educational Administration in the Kingdom of Saudi Arabia. To achieve this goal, two tools were developed, one of which measures mathematics teachers' opinions about training programs and the other measures their attitudes toward teaching the developed curricula, and they were distributed to 72 mathematics teachers in the primary stage. The results showed that training programs for mathematics teachers are highly efficient in covering the theoretical background of the mathematics development project, content, teaching methods, educational activities and methods, evaluation, and quality of training. The results also showed that mathematics teachers have positive attitudes towards teaching the developed curricula, and

found that there were statistically significant differences due to gender in favor of female teachers.

AlKhamis study (2013) aimed to find out the training needs needed to teach the developed mathematics curricula from the point of view of mathematics teachers in the Qassim region. The researcher used the descriptive approach, and the questionnaire was a tool in determining those needs. The study included three areas: planning for teaching, implementing Teaching and teaching evaluation. The study tool consisted of 79 statements representing training needs. Among the results of the study were that among the most prominent training needs from the teachers' point of view are: effective use of the mathematics textbook, the teacher's guide, and the exercise book. And taking into account individual differences among students with regard to evaluating mathematics learning. The study also showed that there were statistically significant differences in mathematics teachers' responses due to academic qualifications and in favor of those with a bachelor's degree.

Iloh (2004) conducted a study to investigate the training needs of primary mathematics teachers in Bendal State, Nigeria. The study used the descriptive approach, and the study tool (the questionnaire) consisted of the following areas: curricula, teaching strategies, and evaluation procedures. The study sample consisted of 144 teachers. The results of the study revealed that the degree of training needs for mathematics teachers is high in the curricula.

All of these studies were conducted on curricula developed outside Jordan. And previous studies used the descriptive approach in identifying the most important training needs for mathematics teachers in light of the mathematics curricula developed by Collins in Jordan. Previous studies also focused on different educational stages, including: the primary stage, such as the study of Alsmadi and AlKilani (2017) (2021) and the study of Alotaibi (2018), and the primary stage. Middle school, such as the study of AlMalaa, & AlSaadoun (2020), and the secondary stage, such as the study of AlBalawi (2019). Previous studies also investigated the effect of gender, such as the study of Aly, H.S., & Abdulhakeem, H.D. (2016), and the educational qualification variable, such as the study of AlBalawi (2019), the study of Alsmadi and Alkilani (2017), and the study of AlKhamis (2013).

Therefore, This study is considered one of the few studies in Jordan that focused on the training needs of mathematics teachers in light of the developed curricula, so this study came to identify the most important training needs for mathematics teachers in light of the mathematics curricula developed by Collins in Jordan at the basic stage (from the first to the tenth grade). And to study the impact of the study variables: gender (male, female), and educational qualification (bachelor's degree or less, higher diploma or above).

Statement of the Problem

The study aimed to determine the training needs that mathematics teachers need to teach the developed Collins mathematics curricula for the basic stage, which were updated by the National Curriculum Center in Jordan. Modernization of the mathematics curricula for the basic stage began in 2019 according to the Collins International Series in stages, starting with updating the mathematics curricula for the first basic grade. And the fourth basic grade together, then the rest of the grades were updated in successive and sequential stages. This is due to the importance of sports curricula in the educational process in Jordan. Some studies recommended studying the training needs of mathematics teachers, such as the study of the Jordanian Ministry of Education (2021). Specifically, the study attempted to answer the following questions:

1. What are the most important training needs for mathematics teachers in light of the Collins mathematics curricula developed in Jordan.
2. Are there statistically significant differences ($\alpha = 0.05$) in the training needs of mathematics teachers in light of the developed Collins mathematics curricula in Jordan depending on the gender variable and the academic qualifications of mathematics teachers?

Significance of the study

The importance of this study came from the modernization and development conducted by the National Curriculum Center in Jordan on mathematics curricula for the basic stage, which requires the availability of a set of training needs that mathematics teachers must possess to teach mathematics effectively. The results of the study help mathematics teachers to qualify themselves or participate in qualification courses that raise their efficiency in line with the developed Collins mathematics curricula. It also helps curriculum planners and educational leaders with

regard to the necessary training needs of mathematics teachers in line with the development and modernization that has taken place in mathematics curricula, in order to benefit from them in providing all the means and capabilities that mathematics teachers need, and to provide appropriate qualification courses for them, due to the importance of preparation and Educational qualification for mathematics teachers in Jordan.

Procedural Concepts

Training needs: The degree of training needs for mathematics teachers in light of the mathematics curricula developed by Collins in Jordan, and came in three areas: Cognitive, Specialized and Educational..

Developed Jordanian mathematics curricula for the basic stage: Mathematics curricula for the basic stage that were developed by the National Curriculum Center in Jordan in accordance with Collins International Standards, and which were decided to be taught since 2019.

Study Delimitations:

This study was limited to all mathematics teachers who teach mathematics curricula developed according to the Collins standards for the basic stage in all public schools affiliated with the First Directorate of Education in Irbid Governorate in Jordan, in the second academic year of 2023-2024 AD. The number of mathematics teachers in that directorate reached (474). The study was also limited to a questionnaire prepared by the researcher in light of the study's literature, and the study attempted to verify the training needs of mathematics teachers in light of the mathematics curricula developed in Jordan. The study was limited to answers given by mathematics teachers according to gender (male, female) and academic qualification (bachelor's degree or less, higher diploma or higher).

Study methodology:

In his study, the researcher followed a descriptive research methodology, by distributing a questionnaire to determine the degrees of training needs of mathematics teachers in light of the Collins mathematics curricula developed in Jordan. Calculating frequencies and averages of mathematics teachers' response values. Descriptive research is used in field research and helps determine the degree of training needs accurately and clearly. In

addition, the size of the study population is (474) teachers. Abu Saleh & Awad (2012) indicated that Quantitative data can be generalized to all members of society, and the results of the study are highly reliable.

Study population and its sample:

The study population consisted of all mathematics teachers who teach the Collins developed mathematics curricula for the basic stage in the First Directorate of Education in Irbid Governorate for the academic year 2023-2024 AD, where the number of mathematics teachers was (447) according to the directorate's data. Among them are (240) male teachers, and (234) female teachers. The study sample consisted of (266) teachers (Male, 137. Female, 129). They were selected according to the stratified random sampling method, and Abu Saleh and Awad (2012) indicated that the larger the sample percentage, the better its representation of the community.

Study Instruments

The researcher developed the study questionnaire in light of study literature such as Alsmadi and AlKilani's study (2017), Salah and Jwaifell's study (2021), and AlMalaa, & AlSaadoun's study (2020), where the questionnaire consisted of (30) items, in order to determine the degree of training needs of teachers. Mathematics in light of the mathematics curricula developed by Collins in Jordan. The questionnaire was of the Likert Five Scale type, where the teachers' response to the questionnaire items was as follows: very high and (5) marks were given to it, high and (4) marks were given to it, moderate. I gave her (3) marks, a few and I gave her two marks, and a very few and I gave her one mark.

The arithmetic averages for the degree of inclusion were classified into five levels: very large, large, moderate, little, and very little, according to the following equation:

$$(\text{Highest value of answer alternatives} - \text{minimum value of answer alternatives}) \div \text{Number of levels.}$$

$$(5-1)/5=4/5=0.8$$

This value is equal to the length of the category, and therefore:

1.00-1.8 is very low

From 1.8-2.6 a few

From 2.6-3.4 medium

From 3.4-4.2 high

4.2-5.00 is very high

Validity

To ensure the validity of the study tool, the researcher presented the initial image of the tool to a group of knowledgeable and experienced arbitrators with various academic qualifications who held master's and doctoral degrees. Ten arbitrators judged the study tool. Their observations included a set of suggestions, such as reformulating some paragraphs, clarifying some paragraphs, and the paragraph should have one goal and not be complex. They also suggested linking the paragraphs to the developed Collins mathematics curricula. A modified questionnaire was then prepared according to the previous arbitrators' suggestions, and then it was presented again to five of the previous arbitrators. Their suggestions were limited and few, and then the researcher prepared the questionnaire in its final form.

To extract the implications of the construct validity of the scale, study extracted the correlation coefficients for each item and the total score, and between each item and its connection to the field to which it belongs, and between the fields to each other and the total score, in an exploratory sample from outside the study sample consisting of (30) teachers. The correlation coefficients of the items ranged from The tool as a whole is between (0.38-0.86), and with a range (0.38-0.87), and the following table shows that.

It should be noted that all correlation coefficients were of acceptable and statistically significant degrees, and therefore none of these items were deleted. The fields correlation coefficient with the total score and correlation coefficients between the fields were also extracted, and the following table shows this.

Table (1) Correlation coefficients between the fields with each other and with the overall degree

	Cognitive training needs	Specialized training needs	Educational training needs	Total
Cognitive training needs	1		1	
Specialized training needs	.741**	1	.73**	

Educational training needs	.752**	.73**	.938**
Total	.928**	.938**	

Table (2) shows that all correlation coefficients were of acceptable and statistically significant degrees, which indicates an appropriate degree of construct validity.

Reliability

To ensure the reliability of the study tool, it was verified using the test-retest method by applying the scale, and re-applying it after two weeks to a group from outside the study sample consisting of (30) teachers, and then the Pearson correlation coefficient was calculated between their estimates the two times.

The reliability coefficient was also calculated using the internal consistency method according to the Cronbach Alpha equation. Table (2) shows the internal consistency coefficient according to the Cronbach Alpha equation and the repetition reliability of the fields and the total score. These values were considered appropriate for the purposes of this study.

Table (2) Cronbach's alpha internal consistency coefficient and repeat reliability of the fields and the total score

Fields	Repeat Reliability	Consistency Coefficient
Cognitive training needs	0.87	0.82
Specialized training needs	0.86	0.81
Educational training needs	0.89	0.86
Total	0.88	0.89

STUDY PROCEDURES

Review previous literature related to the training needs of teachers related to school curricula, and review the developed Jordanian curricula. The study tool (questionnaire) was designed by the researcher after ensuring its psychometric properties. Then determine the study population and the sample size that represents the community. Determine the characteristics of the study sample members in terms of gender and academic qualifications. The study questionnaire was distributed electronically through the use of a Google document, and the distribution process took 5 days. Then, the validity, integrity, and analyzability of all questionnaires were confirmed. The data results

were transcribed, the data were analyzed using SPSS, and answering the study questions.

FINDING

The study presents its results, as the number of study questions was two, and they were answered through the questionnaire prepared for this study.

The first question: What are the most important training needs for mathematics teachers in light of the developed Collins mathematics curricula in Jordan?

To answer this question, the arithmetic means and standard deviations were calculated for each item of the training needs of mathematics teachers in light of the developed Collins mathematics curricula, which were answered by male and female mathematics teachers. Table (3) shows the arithmetic means and standard deviations of the training needs scores.

Table (3): Arithmetic means and standard deviations for training needs scores.

Fields	No. Paragraph	Paragraph	Arithmetic Mean	Standard Deviation	Degree Needs	Ranking
Cognitive training needs	1	Practice formulating educational outcomes that are appropriate for teaching the developed mathematics curricula	3.65	0.93	high	25
	2	Training on modern scientific methods for teaching developed mathematics	3.89	0.87	high	18
	3	Practice using teaching strategies that are appropriate for teaching	4.40	0.90	very high	1
	4	Practice using assessment strategies that are appropriate for teaching	4.33	0.96	very high	2

Fields	No. Paragraph	Paragraph	Arithmetic Mean	Standard Deviation	Degree Needs	Ranking
Specialized training needs	5	Practice using enrichment activities that are appropriate for teaching	3.92	0.85	high	13
	6	Practice using therapeutic interventions that are appropriate for teaching	3.74	0.91	high	22
	7	Practice providing feedback	3.55	0.87	high	26
	8	Training on the use of e-learning in teaching developed mathematics	3.99	0.90	high	10
	9	Training on the use of multiple educational methods in teaching	4.15	0.75	high	7
	10	Training in the skills of communicating mathematical information, including developed	4.17	0.78	high	6
	TOTAL		3.97	0.87	high	SECOND
	11	Knowledge of the content of developed mathematics curricula in the field of	3.85	0.89	high	20
	12	Knowledge of the content of mathematics curricula developed in the field of algebra and operations on it	3.91	0.85	high	14

Fields	No. Paragraph	Paragraph	Arithmetic Mean	Standard Deviation	Degree Needs	Ranking
	13	Knowledge of the content of mathematics curricula developed in the field of geometry and	3.93	0.78	high	12
	14	Knowledge of the content of mathematics curricula developed in the field of probability, data analysis, and	3.91	0.83	high	15
	15	Knowledge of the content of mathematics curricula developed in the field of measurement and	3.90	0.87	high	17
	16	Knowledge of mathematical thinking skills included in the developed	4.22	0.90	very high	3
	17	Knowledge of the mathematical concepts included in the	4.27	0.96	very high	4
	18	Knowledge of mathematical generalizations included in developed mathematics curricula	3.91	1.06	high	16
	19	Knowledge of the mathematical skills included in the developed mathematics	4.20	0.89		5

Fields	No. Paragraph	Paragraph	Arithmetic Mean	Standard Deviation	Degree Needs	Ranking
	20	Knowing how to use mathematical problem solving strategies that are appropriate for teaching the	3.96	0.93		11
	TOTAL		4.00	0.89	high	FIREST
Educational training needs	21	Training to change students' negative attitudes towards Training to develop	3.76	0.89	high	21
	22	students' abilities in learning mathematics	3.27	0.85	high	30
	23	Practicing communication skills with students	3.54	0.78	high	28
	24	Training on the educational theories included in the developed mathematics Training to create	3.69	0.83	high	24
	25	positive attitudes among students Training to increase	3.45	0.89	high	29
	26	students' motivation towards mathematics	3.54	0.85	high	27
	27	Practicing students' learning styles	3.71	0.78	high	23

Fields	No. Paragraph	Paragraph	Arithmetic Mean	Standard Deviation	Degree Needs	Ranking
	28	Practice linking mathematics to real life for students	3.89	0.83	high	19
	29	Practice using students' experiences and values in teaching developed mathematics Practicing students' appreciation of mathematics teachers and	4.15	0.87	high	8
	30		4.10	0.90	high	9
TOTAL			3.71	0.84	high	THIRD
Total degree of training needs			3.89	0.86	high	

It is clear from Table (3) that the overall score for the training needs of mathematics teachers was high, and it is clear from Table (3) that the field of specialized training needs came in first place, with an arithmetic mean (4.00), and a standard deviation (0.89), and with a high degree, and it came in the rank The second is educational training needs, with a mean (3.97), and a standard deviation (0.87), and a high degree. The last place came in the field of educational training needs, with a mean (3.71), and a standard deviation (0.84), and a high degree.

The second question: Are there statistically significant differences ($\alpha = 0.05$) in the training needs of mathematics teachers in light of the developed Collins mathematics curricula in Jordan depending on the gender variable and the academic qualifications of mathematics teachers?

Arithmetic means and standard deviations were calculated for the degree of training needs of mathematics teachers according to the variables of gender and educational qualification. Table (4) shows this.

Table (4) Arithmetic means and standard deviations for the degree of training needs of mathematics teachers according to the variables of gender and educational qualification.

Variables	Categories	Arithmetic Mean	Standard Deviation	Number
academic qualification	Bachelor's degree or less	3.6	0.51	202
	Higher diploma or above	3.59	0.61	64
Gender	male	3.57	0.36	137
	female	3.49	0.24	129
male	Bachelor's degree or less	3.51	0.60	103
	Higher diploma or above	3.74	0.60	34
female	Bachelor's degree or less	3.64	0.45	99
	Higher diploma or above	3.54	0.64	30

A two-way analysis of variance test was conducted to show the effect of the variables of gender and academic qualifications of mathematics teachers on training needs, and Table (5) shows this.

Table (5) values of the binary analysis of variance test to show the effect of the variables of gender and academic qualification of mathematics teachers on training needs.

Source of variance	Sum of squares	Degree of freedom	Sum of means Value	F value	significance
Gender	0.178	1	0.178	0.89	0.44
academic qualification	0.045	1	0.045	0.79	0.69
Gender *academic qualification	0.596	1	0.596	2.98	0.15
Error	51.64	263	51.64		
Total	2350.008	266	2350.008		

Table (5) shows that there are no statistically significant differences in the training needs scores due to the variables of gender or educational qualification, as the F value reached (0.89)

at an actual significance level (0.44) for the gender variable, which is higher than the significance level ($\alpha=0.05$). The F value was (0.75) for the academic qualification variable at an actual significance level (0.69), which is higher than the significance level ($\alpha=0.05$).

DISCUSSION

Discussing the results of the first question:

The results of the study showed that the overall score for the training needs of mathematics teachers in light of the developed Collins mathematics curricula is high, meaning that mathematics teachers have many needs to teach the developed mathematics curricula in an effective and efficient manner. These training needs included a group of fields: Specialized, which relates to mathematics and the concepts, skills, and thinking it includes. Educational, related to teaching strategies, evaluation, and use of educational methods. Educational, related to developing students' positive attitudes and increasing their motivation for learning and educational theories.

The developed mathematics curricula require the availability of a wide range of training needs, as they depend on students' discussion and the development of their thinking skills. Teaching mathematics with abstract content to challenge students. Therefore, mathematics teachers must be seriously qualified and prepared to teach advanced school mathematics. These results differed from the study of AlBalawi (2019) and the study of Al-Sammadi and Al-Kilani (2017), which indicated that the overall degree of training needs for mathematics teachers was average, and this is due to the difference in the educational levels in which the study was conducted, which were the secondary and primary levels.

The results of the study showed that the field of specialized training needs was ranked first, meaning that mathematics teachers have great training needs related to the specialty of mathematics and the concepts, skills, and thinking it includes. Mathematics teachers need to know the content of mathematics curricula developed according to NCTM standards in the following areas: number and operations, algebra, geometry, probability, data analysis, and measurement. In addition to the urgent need to

know the mathematical concepts and mathematical thinking skills included in the developed mathematics curricula. The study agreed with the study of AlMalaa, & AlSaadoun (2020), which indicated that the most prominent training needs for mathematics teachers were in the specialized cognitive aspect.

The first training requirement for mathematics teachers to a very high degree was: "Practice in using teaching strategies that are appropriate for teaching the developed mathematics curricula." This demonstrates the degree to which mathematics teachers need effective and appropriate teaching strategies for the developed Collins curricula, with the aim of making optimal use of educational tools, methods, and educational methods that facilitate access to information. For students, enabling them to learn mathematics in a purposeful and meaningful way. Teaching strategies vary, such as: active learning strategies, learning through play, cooperative learning, and modern learning strategies. These results agreed with the study of AlMalaa, & AlSaadoun (2020) and the study of Iloh (2004), which indicated that mathematics teachers' knowledge of teaching strategies is one of the most important training needs.

In the second place among the training needs for mathematics teachers, a very high degree was: "Practice in using assessment strategies that are appropriate for teaching the developed mathematics curricula." This shows the degree of mathematics teachers' need for effective assessment strategies that are appropriate for the developed Collins curricula, as these curricula include a wide range of Information, activities and exercises. Therefore, there is a necessary need to know the assessment methods and tools, which determine the level of student achievement in the developed Collins mathematics curricula, and the necessity of benefiting from the use of authentic assessment strategies such as performance-based assessment strategies, observation, communication, and pen-and-paper tests. In addition to using evaluation tools: correction rules, check-off lists, verbal rating scales, and numerical rating scales. These results agreed with the study of Al-Sammadi and Al-Kilani (2017), which indicated that mathematics teachers' knowledge of evaluation strategies is a training need.

As for "knowledge of the mathematical concepts included in the developed mathematics curricula," it came in third place among

the training needs for mathematics teachers with a very high degree, and this shows that the degree to which mathematics teachers need to know all the mathematical concepts included in the developed Collins curricula, as these curricula contain many concepts. Mathematical concepts, including basic and complex concepts, and sensory and abstract concepts. These curricula also focus on conceptual knowledge and procedural knowledge in learning and teaching mathematics. In addition to paying attention to students' conceptual errors, and analyzing those errors to provide immediate feedback.

Discussing the results of the second question:

The results showed that there were no statistically significant differences due to the effect of the academic qualification and gender of mathematics teachers in all fields of training needs and in the total grade.

The lack of an effect of academic qualification may be attributed to the fact that the academic qualification held by mathematics teachers did not play a role in causing differences in the training needs scores of mathematics teachers in light of the developed Collins mathematics curricula for the basic stage. This indicates that there is no effect of postgraduate programs in increasing the needs scores. This may be due to postgraduate programs and educational qualifications neglecting the applied aspect of training needs. The nature of the content of university study programs and the number of university hours that teachers receive in their university studies do not focus on training needs, noting that most of the teachers on whom this study was conducted were graduates of non-educational colleges. These results differed from the study of AlBalawi (2019), which showed that there were differences in favor of educational qualifications (diploma and above). The study agreed with the study of Alotaibi (2018) and the study of Al-Sammadi and Al-Kilani (2017), which indicated that there were no differences according to academic qualification.

As for the gender of mathematics teachers, it did not play a role in causing differences in the training needs scores in light of the developed Collins mathematics curricula for the basic stage. This indicates that there is no effect of the gender of the teacher, whether male or female, in increasing the needs scores. This may be due to the fact that all mathematics teachers, regardless of their gender, require the same training needs. These results differed

from the study of Aly, H.S., & Abdulhakeem, H.D. (2016), which showed that there were differences in favor of the gender of the female teacher.

RECOMMENDATIONS

The study presents a set of recommendations based on its results.

1. The need for teachers to provide training needs in the specialized field, such as knowledge of mathematical concepts, mathematical thinking skills, and mathematical skills included in the developed mathematics curricula.
2. The need for teachers to provide training needs in the educational field, such as training in using teaching strategies and evaluation strategies that are appropriate for teaching the developed mathematics curricula.
3. The need for teachers to provide training needs in the educational field, such as training on utilizing students' experiences and values in teaching developed mathematics curricula, and appreciating the efforts of mathematics teachers.
4. Study the effect of gender and academic qualification in determining the degree of training needs of mathematics teachers.

Acknowledging Biases and Pre-understandings:

Asking mathematics teachers to answer the questionnaire prepared for the study objectively and clearly. Aside from any personal interests regarding the degree of their needs for the mathematics curricula developed in Jordan. Informing mathematics teachers that all evidence provided is for the purposes of scientific research. It will be treated with complete confidentiality.

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