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Evaluation of the Curriculum of High School Mathematics According to CIPP Model

İsmail KESKİN[*]and Taha YAZAR[**]

Abstract

The purpose of this research is to evaluate the high school mathematics curriculum, which came into force in 2013, according to the CIPP model. In this research, it was intended to evaluate the high school mathematics curriculum, which has been implemented since 2013, based on the opinions of the teachers and survey model was adopted as a quantitative research model. The population of the research consists of mathematics teachers teaching in high schools in 2017-2018 academic year. The sample of the research included 711 mathematics teachers who were working in high schools located in fourteen cities, representing seven different regions of Turkey. In the research, 5-point Likert scale was used. The scale was developed within the framework of the CIPP assessment model considering the context, input, process and product (CIPP) dimensions. The data were collected in the spring semester of the 2017-2018 academic year. Computer-aided data analysis programs were used to analyze quantitative data. According to the results of the research, teachers' views on mathematics curriculum do not significantly differ according to gender and educational status. However, there exists a significant difference in terms of "experience" "the status of reviewing the curriculum", "having in-service training", "the faculty graduated" and "school type that the teachers work in" variables, in all dimensions.

Keywords: Mathematics course curriculum, Curriculum evaluation, CIPP evaluation model

[*]Dicle University, ZiyaGökalp Education Faculty, Turkey. Email: ikeskin@dicle.edu.tr
[**]Dicle University, ZiyaGökalp Education Faculty, Turkey. Email: taha.yazar@dicle.edu.tr

Introduction

Now a days, economic and social life is developing and changing depending on scientific developments. The welfare of the social and economic life of the countries somehow depends on their development levels in the field of science and technology (Aydın & Keskin, 2017). It is known that the science and mathematics education is effective on development of science and technology. It is also known that mathematic achievement is related to the development level of countries (Abazaoğlu, Yatağan, Yıldızhan, Arifoğlu & Umurhan, 2015).

In the Republican era, many changes have been made in the mathematics curriculum since 1924 (1927, 1931, 1934, 1949, 1952, 1956, 1970, 1976, 1987, 2005, 2011, 2013). It is clear that the mathematics curriculum, which directs the mathematics lesson, has an important role in increasing mathematics achievement (Handal & Herrington, 2003). However, the success performed in the field of mathematics today is far below the desired level according to the information given below.

According to the 2013 YGS (Transition to Higher Education Exam) results, the basic mathematics test average is 7.9. According to the 2013 LYS (Undergraduate Placement Exam) results, the math test average is 12.32 in 50 questions, while the geometry test average is 4.15 in 30 questions. According to the 2014 YGS (Transition to Higher Education Exam) results, the basic math test average is 6.1. According to the 2014 LYS (Undergraduate Placement Exam) results, the math test average is 9.72 in 50 questions, while the geometry test average is 5.47 in 30 questions. According to the results of the 2015 exam, the average of the basic math test is 5.2 in 40 questions. According to 2015 LYS results, the math test average is 9.72 in 50 questions, while the geometry test average is 3.78 in 30 questions. According to the 2016 YGS exam results, the basic Mathematics Test average is 7.8 in 40 questions. According to the 2016 LYS results, the average math test was 9.85 in 50 questions, while the geometry test average was 4.22 in 30 questions. In 2017 YGS exam, the average of mathematics test was 7.45 and decreased with respect to the previous year. When the statistics of the last five years are considered, it is seen that the averages followed a fluctuant course and occasional decreases had been encountered, but the average of success is not at the desired level (OSYM, 2013; 2014; 2015; 2016; 2017).

The success of our country is not at the desired levels in the participated international exams. As a matter of fact, the desired success could not be achieved in the PISA exam in which high school 1 and high school 2 classes attended in our country in terms of the applied age group. In the PISA exam held in 2009, 65 countries participated and the average of all countries was 465. The average of OECD was 496 while Turkey was ranked at 41^{th} row among 65 countries with 445 points. Again, students from 65 countries participated in the PISA exam in 2012, and the average of all countries was 470 through increasing compared to the previous year. The OECD average was 494 with a slight decrease. Turkey increased its point to 448 with a slight rise but placed at the 44th row at the country ranking by falling three rows back. The number of countries participating in the PISA exam in 2015 increased to 72. According to the exam results, the average of all countries had decreased to 461 compared to the previous year. The average of OECD countries decreased compared to the previous year and became 490. Turkey's score decreased to 420 which can be considered as serious fall and its row was 50 among 72 countries. There was a decline in the ranking compared to the previous year. Consequently, when Turkey's the average points in PISA mathematical literacy field handled according to years that hold, it was seen that there is a steadily decline (MoNE, 2016). Turkey Ranked at 42 in mathematics among 79 countries participating in PISA 2018, it ranks 33 among the 37 OECD countries (MoNE, 2019).

Although the attitudes of students towards mathematics are positive, it is seen that their attitude towards mathematics course is negative (Avcı, Coşkun Tuncel & İnandı, 2011). Mathematics is seen by many of the students as lessons poisoning life, exams that cause anxiety and a nightmare will be waken up after school ends (Sertöz, 1996: 1). There are many studies that reveal the relationship between mathematics achievement, anxiety and attitude (Yenilmez & Ozabaci, 2003; Tutak, Aydogdu & Ersen, 2014; Karadeniz & Karadag, 2014; Yasar, Cermik & Guner, 2014; Turanlı, Keceli & Turker, 2016). In researches, it is seen that mathematics achievement is generally affected by factors such as, attitude and mathematics anxiety. In order to increase the success of mathematics, mathematics education programs should be arranged in a way to reduce math anxiety and negative attitude towards mathematics. In some recent studies, it is seen that the attitude towards mathematics is at medium levels (Guner & Comak, 2014; Sad, Winter, Demir & Ozer, 2016). It is observed the desired level of achievement is not reached by looking at the 92-year course of mathematics curriculum and the average scores obtained from the national exams held in Turkey and the international exams in which Turkey also participated. The only way to achieve the desired success is possible through implementing educational programs consistent with the Turkey's development goals. It is accepted that teacher, curriculum, student, and environment are the basic elements of the education system. Clearly, students and teachers have great duties in the development and implementation of a curriculum. Thus, it is important to get the opinions of mathematics teachers as the practitioners of the high school mathematics curriculum on the effectiveness of the curriculum in practice. It can be said that obtaining successful gains from the curriculum depends on the correct understanding by teachers and students, adoption and correct transfer of the curriculum to practice.

When the researches are examined conducted in the country, it is possible to see that the evaluation studies increased especially after 2000's. Although it is seen in the research that purposeful models are used rather than program evaluation models (Çet, 2000; Ovez & Uyangor, 2012; Sırmacı, 2003), different models are also found as CIPP evaluation model (Abat, 2016; Aközbek, 2008; Duman & Akbaş, 2017), the difference approach (Özüdoğru, 2016). Some of the researchers examined the opinions of teachers (Çiftci & Tatar, 2015; Merter & Şan, 2012; Yurday, 2006) and students (Devlez, 2011), and did not adhere to any model in the evaluation. Some researches (Çiftçi, Akgün & Deniz, 2013; Dikbayır & Bümen, 2016) focused only on the implementation process of the curriculum. Some researches (Akkaya, 2016; Canibey, 2013; Keleş, 2006) were carried out only for the investigation of textbooks. While all elements of some curriculum are included in the research (Aksoy, 2016; Inan, 2006; Küçüktepe & Yildiz, 2016), some studies are focused on content (Konur & Atlıhan, 2012), process of education (Yazıcılar, 2016), and evaluation dimension (Bulut, 2005; Casız Aktaş & Baki, 2013; Tuncel, 2013). In researches, participants were mostly teachers and students (Aksoy, 2016; Ovez & Uyangor, 2012; Özüdoğru, 2016). In the researches, it is seen that geometry curriculums (Cailmez Aktaş, 2013; Cansız Aktaş & Aktaş, 2012) are evaluated in addition to mathematics education curriculums. Although the researches were carried out at secondary and high school levels, there are also studies involving teacher candidates (Karakuş, 2011). Qualitative, quantitative and mixed research approaches were used in the research. When the curriculum evaluation studies in this area are taken into consideration, it can be said that mathematics curriculum is not handled sufficiently and with all dimensions at high school level.

The purpose of this research is to evaluate the high school mathematics curriculum, which came into force in 2013, according to the CIPP model. For this purpose, answers to the following research questions were sought.

What are the agreement level of mathematics teachers to the views on:

1. The context assessment dimension,
2. The input evaluation dimension,
3. The Process evaluation dimension,
4. The product evaluation dimension of Secondary Education Mathematics Curriculum?

Is there a significant difference in the level of agreement of mathematics teachers to the views on the context, input, process and product evaluation dimensions of the Secondary Education Mathematics Curriculum according to the demographic variables of:

1. Gender,
2. Seniority,
3. Educational status,
4. Faculty of graduation,
5. Average class size,
6. In-service training,
7. School type?

Method

Research Design

In this research, it was aimed to evaluate the high school mathematics curriculum, which has been implemented since 2013, based on the opinions of the teachers, and survey model was adopted as a quantitative research model. Survey models are approaches that aim to describe a situation that exists in the past and still as it exists (Karasar, 2009). The main purpose of the survey method is to recognize the nature and characteristics of objects, societies, institutions, events (McMillan & Schumacher, 2014).

Population and Sample

The population of the research consists of mathematics teachers working in high schools in 2017-2018 academic year. The sample comprised 711 mathematics teachers who had been working in high schools located in fourteen cities representing seven different regions of Turkey. The demographic characteristics of the teachers are given in Table 1.

Table 1
Demographic characteristics of teachers

School Type	Gender	Seniority (years)					Total
		1-5	6-10	11-15	16-20	21 and more	
Anatolian	Female	52	19	29	17	1	344
	Male	41	76	41	44	24	
Religion Vocational High School	Female	25	12	29	20	1	163
	Male	19	20	24	7	6	
Technical Vocational High School	Female	4	6	14	2	1	137
	Male	38	36	16	12	8	
Science High School	Female	1	2	2	5	1	33
	Male	2	5	10	3	2	
Others (Sport, Social Sciences, Fine Art Schools)	Female	5	2	4	0	1	33
	Male	4	7	7	2	1	
Total		192	183	178	112	46	711

When Table 1 is examined, it is seen that the total of the sample is 711. When the literature is examined, it is seen that there are various approaches regarding the number of samples. There are 33,233 mathematics teachers in the research population (MEB, 2018). According to the formula described above, it is sufficient to select 384 samples from a 33,233 population with a 95% confidence level and 5% tolerable error. Accordingly, it can be said that the number of samples reached in the universe is sufficient.

Data collection tool

In the research, 5-point Likert scale was used. The scale was developed within the framework of the CIPP assessment model considering the "Context", "Input", "Process" and "Product" (CIPP) dimensions. During the development of the scale, related research was examined in depth and the draft items of the scales were created (Akdogdu & Usun, 2017; Aközbek, 2008; Akpur, Alci & Karatas, 2016; CGLRC, 2003; Dincer & Saracaloglu, 2017; Karatas & Fer, 2009; Karatas & Fer, 2011; MEB, 2013; Sercek & Oral, 2016; Stufflebeam, 1971; 2003; 2007; Stufflebeam, Madaus & Kellaghan, 2000; Tokmak, Baturay & Fadde, 2013; Tseng, Diez, Lou, Tsai & Tsai, 2010; Turan, 2017; Zhang et al., 2011). The scale included 95 items as drafts. In order to ensure the content validity of the created items, 13 professors (8 curriculum development specialists, 3 subject area specialists, 2 assessment and evaluation specialists) working in Dicle University Faculty of Education, 5 faculty members (5 curriculum development specialists) working in other faculties of education were consulted for expert opinion.13 faculty members working at Dicle University (8 curriculum development specialists, 3 subject area specialists, 2 assessment and evaluation specialists) and 3 faculty members (3 curriculum development specialists) at other universities returned among the applied academicians. After the feedbacks, four items were discarded from the scale, some items were rearranged in terms of understandability and bias. With the last adjustments, 92 items were included in the scale before factor analysis.

Data Collection Process

The data were collected in the spring semester of the 2017-2018 academic year. Data was collected from the fourteen different cities (Malatya, Izmir, Erzurum, Sivas, Osmaniye, Bursa, Rize, Bursa, Samsun, Antalya, Diyarbakır, Ankara, Gaziantep, and Istanbul) which was thought sufficient to represent Turkey's seven geographical regions. In the application, before applying data collection tools, the participants were informed about the purpose of the research, the scale and how to fill the scale, and only volunteers were asked to answer the scale. The scale applied by the researcher was applied between the classes in a way that does not disrupt the instruction. The response time of the scales took an average of 15-20 minutes.

Data Analysis

Computer-aided data analysis programs (SPSS) were used to analyze quantitative data. First, the collected data, through this research, was arranged to be processed in the SPSS. Before proceeding to the analysis of quantitative data, necessary analyzes were carried out to test the normal distribution assumptions for the independent variables for making decision to use parametric or nonparametric tests. Pallant (2013: 63) and Büyüköztürk (2010: 40) stated that looking at graphs such as the Q-Q graph, which shows the distribution of normality in studies with 20 or more samples, will yield healthier results. In this context, the normal Q-Q graph and the normal distribution graph of the scores were examined in the examination of the normality. According to Büyüköztürk (2010), in the Q-Q chart, if the points are above the 45-degree line or in a near state, normality can be mentioned. Q-Q graph and normal distribution graph of teacher scale are given in Figure 1.

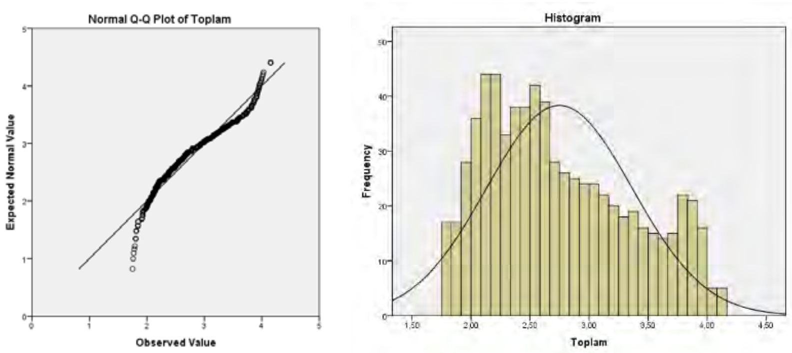

Figure 1. *Teacher scale Q-Q chart and normal distribution chart*

When the Q-Q Graph and Normal Distribution Graph of the teacher scale scores are examined in Figure 1, it can be interpreted that the data are normally distributed. In addition, it is stated by the researchers that if the scores obtained from a continuous variable show normal distribution, the skewness and kurtosis coefficients can be examined, and if the skewness and kurtosis coefficient is between ± 1, the scores can be interpreted as normal distribution (Büyüköztürk, 2010: 40; Tabachnick & Fidell, 2015: 78-80). Therefore, the skewness and kurtosis coefficients of the scores were also examined. When examines, it was observed that the skewness coefficient was 0.47 and the kurtosis coefficient was -0.8. Accordingly, it can be interpreted that the scores are normally distributed. Since it would be appropriate to use parametric tests in the analysis of data with normal distribution, t test was used for independent samples for variables consisting of two categories, while ANOVA test was performed for variables with three or more categories.

Findings

Findings Related to the First Question of the Research

Findings related to the first question of the research, "What are the agreement level of mathematics teachers to the views on the context assessment dimension, the input evaluation dimension, the Process evaluation dimension, the product evaluation dimension of Secondary Education Mathematics Curriculum?" are given in table 2.

Table 2
Standard deviation and average values of teachers regarding context, input, process and product (CIPP) dimension

Dimension	N	$\bar{X}$	SS
Context	711	2.67	0.52
Input	711	2.61	0.58
Process	711	2.57	0.65
Product	711	2.21	0.67

When Table 2 is examined, it can be seen that the average of the context dimension of the teachers' scores is 2.67, the average of the input dimension is 2.61, the average of the process dimension is 2.57 and the average of the product dimension is 2.21. Thus, it was seen that the average was at the lowest point at the product dimension and was at the "disagree" level.

Findings Related to the Second Question of the Research

Findings Related to the Gender Variable

Table 3
T-Test Results for independent groups of teachers scores regarding the context, input, process and product (CIPP) dimension of the mathematics curriculum according to gender

"Dimension	Gender	N	$\bar{X}$	SS	Sd	t	p
Context	Female	251	2.66	0.560	709	0.433	0.66
	Male	460	2.67	0.499			
Input	Female	251	2.56	0.621	709	1.265	0.20
	Male	460	2.62	0.557			
Process	Female	251	2.50	0.638	709	1.865	0.92
	Male	460	2.59	0.651			
Product	Female	251	2.20	0.658	709	0.487	0.62"
	Male	460	2.22	0.674			

According to Table 3, t test was applied for independent samples to determine whether teachers' level of agreeing differ significantly by gender variable in terms of the context, input, process and product dimensions of Mathematics curriculum. The difference between the test results is not significant ($p > .05$).

Findings Related to Seniority

Table 4
ANOVA test results for independent groups of teachers scores regarding the CIPP dimension of the mathematics curriculum according to seniority

Dimension	Seniority year(s)	N	$\bar{X}$	SD	DF	F	p	Statistically Significant Difference* (SSD)
	1-5	192	2.36	.317				J-K
	6-10	183	2.63	.435				K-L,K- M
Context	11-15	178	2.84	.597	706	32.740	0.00	J- L
	16-20	112	2.90	.540				J- M
	21 and over	46	2.81	.546				J- N
	1-5	192	2.34	.405				J-K
	6-10	183	2.55	.498				K- L, K- M
Input	11-15	178	2.75	.616	706	20.465	0.00	J- L
	16-20	112	2.85	.669				J- M
	21 and over	46	2.71	.683				J- N, K - N
	1-5	192	2.30	.482				J- K
	6-10	183	2.49	.573				K - L, K-M
Process	11-15	178	2.73	.632	706	16.430	0.00	J- L
	16-20	112	2.70	.821				J- M
	21 and over	46	2.86	.702				J- N, K - N
	1-5	192	1.95	.447				J- K
	6-10	183	2.18	.651				B- L, K- M
Product	11-15	178	2.35	.715	706	14.615	0.00	J- L
	16-20	112	2.46	.767				J- M
	21 and over	46	2.34	.690				J- N

*J: 1-5, K: 6-10, L: 11-15, M: 16-20, N: 21 and over

When Table 4 is examined, the Single Factor ANOVA test was conducted to determine whether the agreeing level of teachers in the Context, Input, Process and Product (CIPP) dimensions of the Mathematics Teaching Program varies significantly in terms of seniority. Because of the test, the difference is significant in all dimensions according to seniority ($p < 0.05$). “Tukey Test”, which is one of the multiple comparison tests, was performed in order to control between which groups the difference occurred.

In context dimension, a statistically significant difference was revealed between the “1-5 years senior teachers” and “6-10 years senior teachers” in favor of “6-10 years senior teachers”. A statistically significant difference was found between the “1-5 years senior teachers” and “11-15 years senior teachers” in favor of “11-15 years senior teachers”. A statistically significant difference was found between the “1-5 years senior teachers" and "16-20 years senior teachers" in favor of "16-20 years senior teachers". A statistically significant difference was found between the "1-5 years senior teachers" and "21 and above years senior teachers" in favor of "21 years and above year's senior teachers". A statistically significant difference was found between the "6-10 years senior teachers" and "11-15 years senior teachers" in favor of "1-15 years senior teachers". A statistically significant difference was found between "11-15 years senior teachers" and "16-20 years senior teachers" in favor of "16-20 years senior teachers".

In the input dimension, a statistically significant difference was found between the "1-5 years senior teachers" and "6-10 years senior teachers" in favor of "6-10 years senior teachers". A statistically significant difference was found between the "1-5 years senior" teachers and "11-15 years senior teachers" in favor of "11-15 years senior teachers". A statistically significant difference was found between the "1-5 years senior teachers" and "16-20 years senior teachers" in favor of "16-20 years senior teachers". A statistically significant difference was found between the "1-5 years senior teachers" and "21 and above years senior teachers" in favor of "21 and above years senior teachers". A statistically significant difference was found between "6-10 years senior teachers" and "11-15 years senior teachers" in favor of "11-15 years senior teachers". A statistically significant difference was found between "11-15 years senior teachers" and "16-20 years senior teachers" in favor of "16-20 years senior teachers". A statistically significant difference was found between the "6-10 years senior teachers" and "21 and above years senior teachers" in favor of "21 and above years senior teachers".

In the process dimension, a statistically significant difference was found between the "1-5 years senior teachers" and "6-10 years senior teachers" in favor of "6-10 years senior teachers". A significant difference was found between the "1-5 years senior teachers" and "11-15 years senior teachers" in favor of "11-15 years senior teachers". A statistically significant difference was found between the "1-5 years senior teachers" and "16-20 years senior teachers" in favor of "16-20 years senior teachers". A statistically significant difference was found between the "1-5 years senior teachers" and "21 and above years senior teachers" in favor of "21 and above years senior teachers". A significant difference was found between the "6-10 years senior teachers" and "11-15 years senior teachers" in favor of "11-15 years senior teachers". A statistically significant difference was found between "11-15 years senior teachers" and "16-20 years senior teachers" in favor of "16-20 years senior teachers". A significant difference was found between the "6-10 years senior teachers" and "21 and above years senior teachers" in favor of "21 and above years senior teachers".

In terms of product dimension, a statistically significant difference was found between the “1-5 years senior teachers” and “6-10 years senior teachers” in favor of “-10 years senior teachers”. A statistically significant difference was found between the “1-5 years senior teachers” and “11-15 years senior teachers” in favor of “11-15 years senior teachers”. A statistically significant difference was found between the “1-5 years senior teachers” and “16-20 years senior teachers” in favor of “16-20 years senior teachers”. A statistically significant difference was found between the “1-5 years senior teachers” and “21 and above years senior teachers” in favor of “21 and above years senior teachers”. A significant difference was found between the “6-10 years senior teachers” and “11-15 years senior teachers” in favor of “11-15 years senior teachers”. A statistically significant difference was found between “11-15 years senior teachers” and “16-20 years senior teachers” in favor of “16-20 years senior teachers”.

Findings Related to Education Variable

Table 5
T-test results for independent groups of teachers scores regarding the CIPP dimension of the mathematics curriculum according to education

Dimension	Education	N	$\bar{X}$	SS	Sd	t	p
Context	Undergraduate	383	2.67	.492	709	2.74	.76
	Graduate	328	2.66	.545			
Input	Undergraduate	383	2.61	.601	709	2,47	.77
	Graduate	328	2.60	.563			
Process	Undergraduate	383	2.54	.689	709	3,17	.48
	Graduate	328	2.57	.610			
Product	Undergraduate	383	2.20	.685	709	3.85	.63
	Graduate	328	2.23	.653			

When Table 5 is analyzed, t test for independent samples was applied to determine whether teachers’ level of agreeing in the mathematics curriculum context, input, process and product(CIPP) dimensions differ significantly according to the educational status variable. According to the test result, the difference was not significant in all dimensions ($p > .05$). In this research, it is seen that the number of teachers who has graduate degree is higher than expected.

Findings Related to the Graduated Faculty Variable

Table 6

ANOVA test results for independent groups of teachers scores regarding the CIPP dimension of the mathematics curriculum according to the graduated faculty

Dimension	Graduated Faculty	N	$\bar{X}$	SD	DF	F	p	SSD *
	Education	419	2.74	.602				A-B
Context	Science	120	2.57	.388	708	9.93	.00	
	Science-Literature	172	2.56	.324				A-C
	Education	407	2.77	.726				A-B
Input	Science	139	2.62	.334	708	15.40	.00	
	Science- Literature	165	2.40	.403				A-C
	Education	407	2.73	.766				A-B
Process	Science	139	2.54	.515	708	16.49	.00	
	Science- Literature	165	2.56	.483				A-C
	Education	407	2.36	.832				A-B
Product	Science	139	2.09	.492	708	17.59	.00	
	Science- Literature	165	2.05	.468				A-C

**A: Yes, *B: Partially, *C: No*

When Table 6 is examined, the Single Factor "ANOVA" Test was conducted in order to find whether the agree level of teachers in the Context, Input, Process and Product (CIPP) dimensions of mathematics curriculum differed significantly according to the graduated faculty variable. The difference in all dimensions was significant according to the test result ($p < 0.05$). "Tukey Test", which is one of the multiple comparison tests, was applied in order to determine between which groups the difference occurred. Accordingly, in terms of context, a statistically significant difference was determined between the teacher graduates of the Faculty of Education and teacher graduates of the Faculty of Science and Science-Literature in favor of the teacher graduates of Education Faculty. A statistically significant difference was found in the input dimension between the teacher graduates of the Education Faculty and the teacher graduates of the Faculty of Science and Science-Literature in favor of the graduates of the Education Faculty. In the process dimension, a statistically significant difference was determined between the teacher graduates of the Education Faculty and teacher graduates of the Faculty of Science and Science-Literature in favor of the graduates of Education Faculty. A statistically significant difference was determined between the teacher graduates of the Education Faculty and teacher graduates of the Science Faculty and Science-Literature Faculty in favor of the Education Faculty.

Findings Related to Average Class Size Variable

Table 7

ANOVA test for independent groups of teachers scores regarding the CIPP dimension of the mathematics curriculum in terms of average class size

Dimension	Average Class Size	N	$\bar{X}$	SD	DF	F	p	SSD *
Context	15 and below	37	2.67	.467	707	.975	0.40	
	16-30	322	2.70	.582				
	31-45	292	2.63	.475				
	46-60	60	2.64	.402				
Input	15 and below	37	2.49	.465	707	7.13	0.00	B-C
	16-30	322	2.70	.670				
	31-45	292	250	.500				
	46-60	60	2.63	.365				
Process	15 and below	37	2.45	.529	707	10.39	0.00	B-C
	16-30	322	2.69	.753				
	31-45	292	2.41	.538				
	46-60	60	2.56	.376				
Product	15 and below	37	2.06	.610	707	3.77	0.10	
	16-30	322	2.30	.758				
	31-45	292	2.17	.606				
	46-60	60	2.08	.341				

A: 15 and below, B: 16-30, C: 31-45, D: 46-60

When Table 7 is examined, the Single Factor ANOVA test was applied to find whether the level of agreeing of the teachers in the Context, Input, Process and Product dimension of the mathematics curriculum varies significantly according to the average size of the classes. According to the test result, the difference is significant in input and process dimensions ($p > 0.05$), but not in context and product dimensions ($p > 0.05$). "Tukey Test", one of the multiple comparison tests, was applied to determine between which groups the difference in input and process dimensions occurred. Accordingly, a statistically significant difference was determined between the "16-30 group" and the "31-45 group" in favor of the "16-30 group" in the input dimension. A statistically significant difference was determined between the "16-30 group" and the "31-45group" in favor of "16-30 group" in the process dimension.

Findings Related to In-Service Training Status Variable

Table 8
T-test results for independent groups of teachers scores regarding the CIPP dimension of the mathematics curriculum regarding in-service training status

"Dimension	In-service Training"	N	$\bar{X}$	SD	DF	t	p"
Context	Yes	290	2.87	.644	709	9.10	.00
	No	421	2.53	.354			
Input	Yes	290	2.79	.739	709	7.50	.00
	No	421	2.47	.389			
Process	Yes	290	2.76	.776	709	7.39	.00
	No	421	2.41	.493			
Product	Yes	290	2.39	.850	709	5.82	.00
	No	421	2.10	.472			

When Table 8 is examined, t test was applied for independent samples to determine whether the level of agreeing of teachers in the context, input, process and product (CIPP) dimensions of the mathematics curriculum varies significantly according to the in-service training variable. According to the test result, the difference was found to be significant in favor of the in-service training in all dimensions ($p < 0.05$).

Findings Related to School Type Variable

Table 9
ANOVA Test Results for independent groups of teachers scores regarding the CIPP dimension of the mathematics curriculum in terms of school type

Dimension	School Type	N	$\bar{X}$	SD	DF	F	p	SSD *
Context	Anatolian	344	2.80	.458	706	56.07	.00	J-K,J-M
	Religious Vocational	164	2.44	.423				J-L, M-K
	Vocational Technical	138	2.45	.445				
	Science	33	3.53	.677				M-N,M-L
	Other	32	2.47	.323				J-N
Input	Anatolian	344	2.72	.584	706	40.50	.00	J-K,J-M
	Religious Vocational	164	2.35	.462				J-L, M-K
	Vocational Technical	138	2.46	,387				
	Science	33	3.46	.746				M-N,M-L
	Other	32	2.33	.382				J-N
Process	Anatolian	344	2.68	.593	706	42.77	.00	J-K,J-M
	Religious Vocational	164	2.24	.584				J-L, M-K
	Vocational Technical	138	2.46	.539				
	Science	33	3.55	.732				M-N,M-L
	Other	32	2.26	.447				J-N

Product	Anatolian	344	2.22	.687	706	29.14	.00	J-K,J-M
	Religious Vocational	164	2.04	.586				J-L,
	Vocational Technical	138	2.21	.497				
	Science	33	3.28	.719				
	Other	32	1.93	.329				J-N"

J: Anatolian, K: Religious Vocational, L: Occupational Technic, M: Science, N: Other (Sport, Social Sciences, Fine Arts)

When Table 9 is examined, the Single Factor "ANOVA" test was applied to find whether the level of agreeing of teachers in the context, input, process and product (CIPP) dimensions of the mathematics curriculum varies significantly according to the school type variable. According to the obtained values, the difference among groups in all dimensions was found to be significant F (706) = 56.07, $p < 0.05$). "Tukey Test", one of the multiple comparison tests, was applied in order to determine between which groups the difference occurred. Accordingly, there was a statistically significant difference in terms of context between "Science High School" and all other groups in favor of "Science High School". A statistically significant difference was determined between "Anatolian High School" and "Religious Vocational", "Vocational Technical High School" and "Other High Schools (Sports, Social Sciences and Fine Arts)"in favor of "Anatolian High school". There was a statistically significant difference in input dimension between "Science High School" and all other groups in favor of "Science High School". A statistically significant difference was determined between "Anatolian High School" and "Religious Vocational", "Vocational Technical High School" and "Other High Schools (Sports, Social Sciences and Fine Arts)" in favor of "Anatolian High School". In the process dimension, a statistically significant difference was determined between Science High School and all other groups in favor of "Science High School". A statistically significant difference was determined between "Anatolian High School" and "Religious Vocational", "Vocational Technical High School" and "Other High Schools (Sports, Social Sciences and Fine Arts)" in favor of "Anatolian High School". In product dimension, a statistically significant difference was determined between "Science High School" and all other groups in favor of "Science High School".

Discussion and Conclusion

Discussion and Conclusion on the First Question of the Study

Discussion and Conclusion on Findings from the Teacher Scale Regarding Context Input, Process and Product (CIPP) Dimensions

According to the findings, mathematics curriculum scale scores of the teachers was determined that the average of the "Context" dimension was $\bar{X} = 2.67$, the average of the "Input" dimension was $\bar{X} = 2.61$, the average of the "Process" dimension was $\bar{X} = 2.57$ and the average of the “Product” dimension was $\bar{X}$ = 2.21. Teachers are in the medium level of “agree” in the context and input evaluation dimensions, while they are in the level of “disagree” in the process and product dimensions. According to the research conducted by Övez (2012), it was observed that the achievement level to the objectives was 0 percent in ninth grade, 9.3 percent in tenth grade, 23.8 percent in the eleventh grade and 40 percent in the eleventh grade. This result shows that the learning-teaching process is not effective at the expected level in achieving the objectives. It is concluded that mathematics curriculum is unreliable in terms of algebra learning area objectives, where high school level objectives cannot high enough as 0.75 at any grade level. In the research conducted by Sırmacı (2003), it was observed that the objectives of the high school education mathematics curriculum were not reached its objectives. In the CIPP evaluation model used research, Aközbek (2008) concluded that the result for the scale scores of teachers such as the average of the “Context” dimension was $\bar{X}$ = 3.10, the average of the "Input" dimension was $\bar{X}$ = 2.73, the average of the "Process" dimension was $\bar{X}$ = 2.78 and the average of the "Product" dimension was $\bar{X}$ = 3.25. In this research, similar results were obtained with the research in terms of input and process evaluation dimensions. On the other hand, Abat (2016) determined that 53% of the teachers responded positively to the survey questions regarding the context assessment dimension. In Basic Proficiency Test (TYT) of 2018 Higher Education Institutions Exam (YKS), the net average of the answers given by the candidates who took the exam in the final year to 40 mathematics questions asked in the field of mathematics was $\bar{X}$ = 5.9. The fact that the candidates with the correct answer number of 10 and below in this test constituted 75 percent of the whole group shows that the candidates performed low success in the Basic Mathematics Test. In the Field Proficiency Test (AYT) of the same exam, the average of 40 questions obtained by the candidates who took the test in final year was $\bar{X}$ = 4.35. The number of candidates who answered all the questions correctly in the test is 1,198 (0.07%) and the number of candidates who cannot answer any questions correctly is 185,647 (11.08%). In this test, concentration in the range of 0-7 correct answers can be interpreted as a sign that the candidates showed low success (ÖSYM, 2018). In line with the findings obtained, it can be said that the desired results could not be achieved with the mathematics curriculum, which entered into force in 2013 and gave its first graduates in 2017.

Discussion and Conclusion on the Second Question of the Research

Discussion and comments are presented here on the second research question as “Is there a significant difference at the level of agreeing of mathematics teachers to the views on the context, input, process and product evaluation dimensions of the high school mathematics curriculum according to variables of gender, seniority, educational status, graduated faculty, average class size, having in-service training, school type?”.

“Discussion and Conclusion on Gender Variable”

When the scale scores of the teachers were examined according to the gender variable, no statistically significant difference was found in any dimension of the CIPP curriculum evaluation model regarding the gender variable. It can be concluded that the gender variable has no effect on teachers’ views on Context, Input, Process and Product (CIPP) evaluation dimensions. No similar study using gender variable was found in the literature. However, it is known that gender affects the characteristics of teachers such as perception and attitude towards education. Aksu (2008) did not find a statistically significant difference in terms of self-efficacy perceptions of pre-service teachers according to gender variable. Yılmaz and Çokluk-Bökeoğlu (2008) declared that teachers’ beliefs about teaching competence do not differ by gender. Azar (2012) also found that teachers’ self-efficacy beliefs do not differ by gender. Klassen and Chiu (2010) found that female teachers are more stressed during the education and training process. This can affect the implementation process of the curriculum. According to the research conducted by Cengiz (2015), mathematics teachers’ plan-program activity tendencies do not differ significantly according to gender. In the study conducted in Budak (2011), it was concluded that the opinions of teachers regarding mathematics curriculum did not differ according to gender. In the research conducted by Tekeş (2008), it was concluded that the scores of the Mathematics curriculum Scale did not differ significantly according to the gender variable.

Discussion and Conclusion on Seniority Variable

When the scale scores of the teachers are evaluated according to the seniority variable, it is seen that the scores significantly differ in all dimensions of the CIPP evaluation model. When the averages are examined, it is observed that as the seniority increases, the scale scores increase in all dimensions. This situation shows that the experience is important in perception and implementation of the curriculum. While no study was found in the literature using CIPP model and severance variable, it is known that severance variable affects teachers’ competencies, opinions and perceptions in many subjects. In the research carried out by Budak (2011), it was determined that the opinions of the teachers regarding the mathematics curriculum differ according to the variable of the professional seniority, that is, the opinions of senior teachers about the curriculum are more positive. Gürbüz and Durmuş (2009) came to the conclusion that senior teachers are more sufficient in some subjects in geometry. In the research conducted by Cengiz (2015), the plan program activity tendencies of senior mathematics teachers differ significantly and in favor of seniors compared to less senior teachers. In the research conducted by Akyüz (2006), the classes of teachers with more professional experience were found to be more successful. However, Yılmaz and Çokluk-Bökeoğlu (2008) concluded that teachers’ self-efficacy beliefs are not affected by seniority. In a research carried by Bulut (2006), no change was detected within the opinions of mathematics teachers about mathematics curriculum in terms of the variable of seniority. In the study carried out by Inan (2006), no statistically significant difference was found between the opinions of the teachers regarding the overall curriculum according to their professional seniority. Contrary to the findings in hand, it is seen in the study conducted by Merter and Şan (2012) that the seniority variable has changed the opinions of the teachers about the curriculum to a great extent and the opinions of the teachers turn positive as the seniority decreases. In the research conducted by Tekeş (2008), the conclusion was that no statistically significant difference was observed between the scores of the mathematics curriculum scale when the age and seniority variables were taken into consideration. In his research, Aközbek (2008) does not mention about a statistically significant difference between teachers' views regarding the context, input, process and product (CIPP) dimensions of mathematics curriculum in terms of their professional experience.

Discussion and Conclusion on Variable of Educational Status

The research findings show that the scale scores of teachers in all assessment dimensions of the mathematics curriculum do not differ significantly according to the educational status variable. It is possible for these teachers to see themselves as having graduate degree since the participation in this research of five-year graduate teachers who are graduated with master degree without dissertation program. In this regard, the absence of a differentiation can considered as normally. Although there is no similar study in the literature, in the research conducted by Kılınç (2018), the opinions of teachers about mathematics curriculum do not differ significantly according to their educational status. Yılmaz and Çokluk-Bökeoğlu (2008) declared that teachers' teaching competence beliefs do not differ significantly according to educational status variable. In a research made by Akyüz (2006), not a statistically significant difference between the achievements of the classes of undergraduate teachers and graduate teachers was found. In the study conducted by Inan (2006), no statistically significant difference was observed between the opinions of teachers about the preparatory dimension of the ninth-grade mathematics curriculum which has been applied since 2005 according to their education levels. In the research conducted by Hatipoğluİyiol (2011), the opinions of teachers regarding mathematics curriculum do not differ statistically significantly according to the educational status variable. Similar results were obtained in the study conducted by Mercan (2011) and it was determined that the variable of educational status did not affect teachers' views on the mathematics curriculum. In the research conducted by Orbeyi and Güven (2008), it was concluded that there is no statistically significant difference between the opinions of the teachers about the evaluation item of the mathematics curriculum in terms of the variable of the educational status. In the research made by

Tekeş (2008), the scale scores of the teachers' mathematics curriculum do not show significant difference when the level of education (college, undergraduate, graduate) variable taken into consideration.

Discussion and Conclusion on Faculty Variable

Findings from the research show that the scale scores of teachers in all evaluation dimensions of the mathematics curriculum differ significantly according to the graduated faculty variable. When made a comparison between the graduates of the faculty of education and faculty of science and literature, it was observed that there is statistically significant difference in favor of the graduates of the education faculty. In Turkey, teachers are grown through multiple sources. These resources can be cited as faculty of education, graduate without thesis programs (Şişman, 2009) and pedagogical formation trainings for undergraduates of Faculty of Sciences and Literature. The occurrence of the mentioned difference is possible to explain with the fact that the teachers who prefer the education faculty and graduated take a vocational course for a longer period than the teachers who are graduates of science and literature faculty. In the research conducted by Aközbek (2008), it was concluded that the faculty variable has no statistically significant influence on the views of the mathematics curriculum. Gürbüz and Kişioğlu (2007) did not find a statistically significant difference in terms of attitude towards the teaching profession between the senior students of the education faculty and the students of science and literature faculty who continue the formation program. Çapri and Çelikkaleli (2008) revealed that the faculty variable did not have a statistically significant effect on the attitudes of teacher candidates towards the teaching profession. In the study conducted by Cengiz (2015), mathematics teachers' plan-program activity tendencies do not differ statistically significant in terms of the graduated faculty variable. In a research conducted by Hatipoğluİyiol (2011), a statistically significant effect on teachers' views on the mathematics curriculum was not observed in terms of the graduated faculty variable. In the research carried out by Ayhan (2006), it was determined that mathematics teachers who graduated from science and literature faculty faced the problems derived from teaching methods, lesson equipment and students regarding the mathematics teachers who graduated from education faculty.

Discussion and Conclusion on Class Size Variable

When the context, input, process and product (CIPP) dimension scores of the mathematics curriculum are evaluated according to the average class size variable, it is seen that the average class size causes a statistically significant difference in the input and process evaluation dimensions. It was concluded that the groups with a statistically significant difference were the classes with an average size of 16-30 and classes between 31-45. It can be said that this difference occurs because teachers are exposed to more stimuli about class sizes in input and process evaluation dimensions. As the average class size increases, it can be said that the teachers experience problems related to classroom management in crowded classrooms and fail to meet the curriculum requirements sufficiently. As a matter of fact, in the research of Güneş and Baki (2011), teachers emphasized that crowded classes cause problems in the implementation of the curriculum. In the research carried out by Merter and Şan (2012), a statistically significant relationship was found between the teachers' opinions about the mathematics curriculum and the average class size variable. As the class size that teachers are having increases, their views on the curriculum become negative. In the research carried out by Bakioğlu and Polat (2002) to reveal the effects of classroom size, it was emphasized that teachers could not gain attention, could not communicate with students, could not be interested in students and could not control the classroom in crowded classrooms, and faced difficulties in classroom management. In addition, the teachers stated that the time allocated by the number of students was insufficient and due to all these reasons, the quality of education might decrease. In a research made by Cemaloğlu and Şahin (2007), it was concluded that the level of the burnout syndrome among the teachers who attended in more crowded classes increased and differed significantly compared to the teachers who attended in non-crowded classes. According to the research carried out by Cengiz (2015), mathematics teachers' plan-program activity tendencies do not differ according to class size. In the study conducted by Mercan (2011), no statistically significant difference between the opinions of teachers regarding the general characteristics of the curriculum was observed according to the class size variable. However, the difference regarding the mentioned variable was found on the opinions about the teaching-learning process between 26-35 people class-size and15-25 people class-size in favor of 15-25 people class-size. Findings from Budak's research (2011) show that no difference in terms of the average class size is observed on the opinions of mathematics teachers regarding the curriculum.

In a research by Köse (1990), it was found that the educational success of the students was higher in the schools where the number of students per teacher was less. On the other hand, Tekeş (2008) found that teachers who teach in crowded classrooms have higher scores in the scale of mathematics curriculum evaluation.

Discussion and Conclusion on In-Service Training Variable

As a result of evaluating the scale scores according to the in-service training variable, it is observed that in-service training is a variable that affects the teachers' scale scores in all dimensions of the CIPP evaluation model of the mathematics curriculum. In-service education is seen as a compulsory activity in the field of education due to the rapid change of technology, the publication of new curriculum, the change of expectations from teachers, and the insufficiency of candidates who have just started teaching (Aydın, 2011). Although there are no direct studies on the subject in the literature, Karacaoğlu (2008) concluded that teachers receiving in-service training have higher perceptions of teacher competence. In their research, Sarıtepeci, Durak and Seferoğlu (2016) concluded that there are in-service training deficiencies in the use of technology in education within the scope of teachers' FATİH project. Yılmaz and Gökçek (2016) determined that in-service training contributes to the development of teachers' knowledge and skills. Karataş and Aslan Tutak (2017) determined that in-service training on the use of technology had a statistically significant effect on mathematics teachers' technological pedagogical content knowledge. However, some studies show that in-service training actions in Turkey are insufficient in terms of quantity and quality in providing professional teacher development (Çağıltay, Çakiroğlu, Çağıltay & Çakiroğlu, 2001; Gonen & Kocakaya, 2006). It was concluded that the teachers who examined the research program by Kılınç (2018) were more positive towards the mathematics lesson. According to the research conducted by Hatipoğluİyiol (2011), the opinions of teachers who do not receive in-service training and teachers who do not receive education do not differ significantly.

Discussion and Interpretation on School Type Variable

The findings of the research show that the type of the employed school variable significantly differentiates the scale scores of the teachers regarding all assessment dimensions. It was found that the difference in context and input dimensions was significant between science high school and all other groups in favor of science high school and between "Anatolian High School" and "Religious Vocational High School", "Vocational Technical High School" and "Other High Schools (Sports, Social Sciences and Fine Arts)" in favor of "Anatolian High School". In the process dimension, significant differences are between "Science High School" and all other groups in favor of "Science High School" and between "Anatolian High School" and "Religious Vocational High School", "Vocational Technical High School" and "Other High Schools (Sports, Social Sciences and Fine Arts)" in favor of "Anatolian High School". In terms of product size, a statistically significant difference was determined between science "High School" and all other groups in favor of "Science High School". It is noteworthy that the teachers who work in "Science High School" have high scores in the type of school variable. However, according to the regulation published in 2015, teachers of science high schools are appointed according to their superiority among those working for three years (MEB, 2015). Before 2015, in addition to these conditions, a field examination was held for teachers. This means that experienced and specialized teachers will be appointed to science high schools. This may be the reason for the high score of science high school teachers. In the research carried out by Aközbek (2008), there was a statistically significant difference only in the process dimension between the scale scores of the teachers according to the high school type variable, and no difference was observed in the other dimensions as context, input and product dimensions. Mathematics success and attitude towards mathematics among high school types have been revealed by many researches. According to the research conducted by Avcı et al. (2011), Anatolian high school students have more positive attitudes towards mathematics than general high schools and general high school students have more positive attitudes towards mathematics than vocational high schools. The results of the research conducted by Üstüner, Demirtaş, Cömert and Özer (2009) show that teachers working in Anatolian and Science High Schools consider themselves more adequate than teachers working in other schools. On the other hand, there are studies concluding that the school type variable does not cause a statistically significant difference among the opinions of teachers (Aközbek, 2008; İnan, 2006; Merter & Şan, 2012). The results obtained from the research conducted by Devlez (2011) showed that objective achievement level of science high school students is higher than the students studying in other schools. In addition, it shows that Anatolian High School and vocational high school students have low objective achievement levels. In the study of Mumcu, Mumcu and Aktaş (2012), vocational high school students attributed their failures in mathematics lessons to their dislike and stated that the future of mathematics did not affect them. According to YKS results of 2018, the most successful high schools are Science High Schools, followed by Anatolian high schools, religious vocational schools and vocational high schools (ÖSYM, 2018).

Recommendations

Based on the results obtained from the research, some suggestions have been made for curriculum implementers, education politicians and researchers in below.

- In the research, it is seen that seniority positively affects the opinions of the curriculum. From this point of view, it can be suggested that young teachers benefit from the experiences of senior teachers in seminars and in-service training activities.
- Based on the conclusion that the graduated faculty affects the opinions of teachers; it can be ensured that teachers who are graduates of education faculties are appointed as a priority in teacher appointments.
- Research results show that crowded classes at high school level make it difficult to implement the curriculum. Class size planning should be done correctly in schools and class sizes should be distributed equally. In this way, the negativities created by crowded classes can be prevented during the implementation of the curriculum.
- In-service training activities are among the most important Ministry of National Education (MoNE) activities that ensure the professional development of teachers. In the teaching program change process, the promotion of the curriculum to the teachers is made through in-service training activities. The

results of the research show that the in-service training given about the program positively affects the opinions of the teachers about the curriculum. Accordingly, teachers can participate in these activities and in-service trainings can be given to perform the necessary works and processes in the implementation process as well as the introduction of the curriculum.

- The results of the research show that there are differences between the opinions of teachers towards mathematic teaching curriculum according to different high school types. Curriculums can be individually developed taking into account the different high school types and the goals of each high school type. It may be suggested to develop curriculums specific to Vocational and Anatolian high schools such as science high school curriculums.
- Curriculum evaluation research should be carried out with the participation of more stakeholders. It is thought that taking the opinions of individuals and institutions that are parties to the curriculum will enrich the curriculum development activities. This research is based on teachers and students. However, different stakeholders of the subject, such as education managers and parents, can also be included in curriculum evaluation research.
- Considering the researches in recent years, it is seen that primary and secondary school mathematics curriculum are evaluated in most. Studies evaluating high school mathematics curriculum are limited. From this point of view, it can be suggested to carry out extensive researches on the evaluation of high school mathematics curriculum from various aspects.
- Carrying out curriculum evaluation studies in which different methods are employed by researchers can provide more information to the decision makers about the curriculum. In this context, mixed researches can be suggested in which different data collection tools are employed.

Information

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