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EVALUATION OF 2018 MATHEMATICS CURRICULUM 5TH GRADE OUTCOMES IN TURKEY

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Abstract: This study seeks to evaluate the learning outcomes mentioned in the Mathematics Curriculum of the 5th grade students in Türkiye, based on certain criteria. The general survey model was adopted in the study. The study group consists of 44 mathematics teachers from 12 different regions of Türkiye who, during the 2022-2023 academic year, worked in secondary schools affiliated with the Ministry of National Education of the Republic of Türkiye in. The Evaluation Form for 5th - Grade Mathematics Curriculum Outcomes was used to assess the learning outcomes mentioned in the Mathematics Curriculum. To analyse the data, we used the multi-faceted Rasch technique. The findings revealed that the criteria used to evaluate the mathematics curriculum learning outcomes differ in terms of strictness and generosity. In addition, it was determined that mathematics teachers highly align with the learning outcomes in the programme. Based on the statements of the mathematics teachers, there were deficiencies in the program's distant goals as well as measurement and evaluation. In this context, it is recommended that the 2018 Mathematics Curriculum be reviewed by field experts, in-service mathematics teachers and assessment and evaluation experts.

Key words: 5th grade students, Math lessons, Math curriculum, learning outcomes, Rasch analysis, juries

1. Introduction

It is observed that although mathematics began to emerge with simple counting and measurement to meet the needs of society in the past, today it has become eminent among other sciences, especially technology (Işık, Ciltaş & Bekdemir, 2008). Mathematics is the basis for the development of technology and engineering, as well as the development of arts. Mathematics is used in the creation, analysis, and teaching art (fractals, algorithms, patterns, sequences, and ratios) (Schattschneider, 2006). In addition, mathematics has an effect on the recognition of the social environment and adaptation to the social environment. With their mathematical model project, Albarracín and Gorgorio (2020) scrutinized the effect of mathematics based on the recognition of the social environment and awareness of the risks in the environment. Since mathematics is a branch of science that provides benefits in a wide range of fields, teaching mathematics has gained importance. The literature review highlights that there are a plethora of studies on anxiety (Suinn, Taylor & Edwards, 1988; Evans, 2000; Wu, Barth, Amin, Malcarne & Menon, 2012; Schleepen & Van Mier, 2016; Mukamı Mutegı, 2021), fear (Hoffman, 2010; McGlynn-Stewart, 2010; Whyte & Anthony, 2012), and attitudes (Macnab & Payne, 2003; Zan & Di Martino, 2007; Alkhateeb, 2014; Göloğlu Demir & Çetin, 2012; Tabuk, 2018; Bal, 2020) in teaching mathematics. The main purpose of these studies is to make mathematics teaching easier by eliminating fear, anxiety, and negative attitudes while teaching mathematics and to ensure that students are competent in mathematics. Mathematical proficiency refers to conceptual understanding, procedural fluency, strategic competence, reasoning, and productivity, and it also has a lifelong impact on people's lives (Geary 2011). It is essential to start teaching mathematics from an early age. For children who have difficulties in mathematics in the long term, early intervention is critical for their personal, social, and professional development (Parsons & Bynner, 2005). The American National Council of Teachers of Mathematics (NCTM) reports that “in this changing world, those who understand and can do mathematics will have significantly enhanced opportunities for shaping their futures” (NCTM, 2000,

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p.50). It will be possible for students to have a positive attitude towards the mathematics lesson, and to eliminate their worries and fears, by reaching the specified outcomes through activities in and out of school in line with a goal. The basic element that ensures that education is carried out in a systematic way in and out of school is the curriculum. Saylor, Alexander and Lewis (1981) define the curriculum as "a plan to provide learning experience to learners". It is also very important that the curriculum aims to make it easier for students to learn and adapt what they have learned to new situations. In their study on a curriculum, Deano, Alfonso, Diniz, Iglesias-Sarmiento, and Das, (2023) found that the Math Modules Cognitive Training Program increases children's mathematical success in fluent calculation and that planning (number matching), simultaneous (non-verbal matrices) and attention (expressive attention and receptive attention) processes are effective in improving their functioning.

In the wake of advances in technology, the changes in the world of informatics, exams (PISA), and the development of new teaching models (STEM) also have changed the curricula taught in the process. A curriculum is a structured framework encompassing knowledge, skills, attitudes, and values intended for student acquisition within a specific subject or educational level (Kurangi et al., 2017). Typically, these programs comprise educational goals, subject matter, instructional approaches, resources, and assessment techniques. They are designed to foster student growth throughout the learning journey (Willis, 1994).Nowak (1970) argued that curriculum reform should consider all learning experiences at school. Hauenstein (1975) further proposed that the curriculum should be structured based on its constituent elements. He emphasized that this structure should align with the curriculum's objectives.

In Türkiye, the Ministry of National Education (MEB) has made different legal regulations on various dates in order to keep up with the developments in the world, to solve the problems in the education system, to transform the system into a settled form, and to respond to these expectations (Berkant & İncecik, 2018). A radical change in education programs was made by the Ministry of National Education in 2005. The curriculum, which was changed in 2005, was prepared on the basis of the constructivist philosophy approach. Constructivism is based on the conception that we learn by relating new experiences to our prior knowledge; we construct new understandings based on what we already know (Sherman & Kurshan, 2005). Constructivism fosters creative thinking and encourages the creation of enthusiastic, independent ideas (Herrer, et al., 2023).

In a study on primary school mathematics teacher candidates in the USA, Peretz (2006) reported that the curricula designed on the basis of the constructivist perspective make the subjects more concrete, give the students the opportunity to learn easily and permanently and also provide flexibility to the teacher during the implementation. With the change in 2005, education was implemented in the form of 5+3 eight years, and in an uninterrupted and compulsory way. The first 5 years constitute education in primary schools and the next 3 years in secondary schools. Following a change made in 2013, compulsory education was increased to 12 years, during which education was separated into 4 years of primary school, 4 years of secondary school, and 4 years of high school. The 5th-grade mathematics curriculum, which was a part of the primary school curriculum until 2013, has been incorporated into the secondary school curriculum for the first time since 2013. In other words, mathematics topics that were once taught by classroom teachers before 2013 have started to be taught by branch teachers since 2013. With these changes made in the education system, the mathematics curriculum was also renewed. The most changes were made in the mathematics curriculum of 5^{th} graders since they were transferred from primary to secondary education (Altındağ & Korkmaz, 2019). In Türkiye, the most recent mathematics curriculum is the one which was put into practice in 2018. It is observed that the curriculum, which has been in effect as of 2018, is the same as that of 2013 in terms of its content with reductions only in the number of subjects and acquisitions (MEB, 2018).

This study seeks to contribute to the development and improvement of the secondary school 5^{th} - grade mathematics curriculum gathering the opinions of teachers who teach math to 5^{th} grade students. Teachers' opinions about Math curriculum is crucial since they implement it and are familiar with its non-functional aspects and can provide adequate feedback concerning its applicability.

2. Significance of the study

When mathematics is considered as a basis for understanding nature and existing in nature, the

importance given to mathematics from past to present is increasing day by day. Mathematics, as is widely known, plays a unique role in all natural sciences as a refined scientific language and a powerful research tool (Suslov, 2013). Mathematics education is constantly evolving, depending on the needs of the contemporary society. One indicator of the importance given to mathematics is the focus on how to best teach this discipline, which draws attention to the mathematics curriculum. As a result, curriculum development is strongly influenced by the 21st-century learning skills like critical thinking, communication, problem-solving, and collaboration (NCTM, 154, 2011) (Medová, Ovary Bulkova & Ceretkova, 2020).

The American National Council of Teachers of Mathematics (NCTM) emphasized in their publications that the main issue related to the curriculum is including information on teaching principles, methods, techniques, and assessments that the most important issue is the curriculum that covers them all (Van de Walle, Karp & Bay-Williams, 2014). In the present study, the 5th grade mathematics curriculum, which is the first year of secondary school, was discussed. The knowledge and skills acquired in the 5th grade mathematics course will contribute to students' mathematical competence in higher education levels. It will also reinforce what they've learned in this course across other disciplines.

In addition, following an analysis of the studies on the 5^{th} grade mathematics curriculum in Türkiye and in the world, the absence of a study conducted with Rasch analysis prompted us to conduct the present study. In this context, the purpose of the study is to evaluate the achievements/outcomes in the 2018 Fifth Grade Mathematics Curriculum implemented in Türkiye by the Ministry of National Education (MEB) with a multi-faceted Rasch analysis. In this context, the following research questions were addressed.

1. What is the level of the content validity ratios and content validity indexes of the fifth-grade outcome criteria of the 2018 Mathematics Curriculum?
2. What is the level of the logit values and the distribution in the data calibration map as a result of the examination of the fifth-grade outcomes of the 2018 Mathematics Curriculum through the multi-faceted Rasch model?
3. What is the level of the statistical data on the strictness/generosity scores of the raters who scored the fifth-grade outcomes of the 2018 Mathematics Curriculum?
4. What is the content of the measurement report of the criteria in which the fifth-grade outcomes of the 2018 Mathematics Curriculum are evaluated?

3. Method

3. 1. Research Model

The general survey model was applied in the research. The general survey model is aimed at describing the tendencies, attitudes, or approaches of the research population quantitatively or numerically by using a predetermined population and the sample in this population (Fowler, 2009). In this study, this model was adopted since generalization was made from the population to the sample.

3.2. Study Group

The study group consists of mathematics teachers working in secondary schools in 12 different regions, determined according to Level I by the Republic of Türkiye Under secretariat of State Planning Organization and the Turkish Statistical Institute (TUIK) in the 2022-2023 academic year (Ministry of Industry and Technology [STB], 2023). Three criteria were taken into consideration while choosing the mathematics teachers who constituted the study group of the research. One of the criteria is that mathematics teachers should work in schools affiliated with the Ministry of National Education (MEB) in Türkiye, covering every year between 2018 and 2023. The second criterion is that the relevant teachers attended the fifth-grade mathematics lessons between 2018 and 2023. The other criterion is the selection of teachers from each region, taking into account the classification of statistical regional units in development planning. The distribution of teachers in the regions determined according to Level I is shown in Table 1.

3.3. Data Collection Tool

An evaluation form was created in this study by considering various criteria in the Fifth Grade Mathematics Curriculum. The criteria involved in the creation of this form are as follows: a) Relevant theoretical surveys, b) Elements of the curriculum (Target, content, educational status, and assessment and evaluation), c) Opinions of 12 field experts, and d) Opinions of two assessment and evaluation experts. There are 14 criteria in the evaluation form. Responses to the five-point Likert-type criteria were rated as "Strongly disagree", "Disagree", "Moderately agree", "Agree", and "Strongly agree", respectively, and scored from five to one.

3.4. Data Analysis

The research data were evaluated by 48 secondary school mathematics teachers, taking into account all 14 criteria. The multi-faceted Rasch analysis program (Linacre, 2015) was used to evaluate the research data. The main purpose of multi-faceted Rasch analysis is to simultaneously and independently analyse many variable (facets) sources including criteria, rater, status, etc. (Sudweeks, Reeve & Bradshaw, 2005).

4. Findings

The research data were analysed using the multi-faceted Rasch analysis program. The data analyses are shown in tables. In this context, interpretations regarding the findings were made.

Findings Regarding the First Sub-Problem

The first sub-problem of the research is the question “What is the level of the content validity indexes of the fifth-grade outcome criteria of the 2018 Mathematics Curriculum?”. The content validity ratios and indexes of the criteria in this framework are shown in Table 2.

Table 2 highlights that the outcomes in the Fifth-Grade Mathematics curriculum were evaluated by 12 faculty members in the Department of Mathematics Education at the education faculties of different universities in Türkiye according to 14 criteria. The content validity ratios of the criteria were determined as .52 according to the formula $CVC_{substance} = (N_E/N/2) - 1$ (Şencan, 2005). The data determined in this framework show that the evaluations of the faculty members demonstrate a statistically significant difference (Veneziano & Hooper, 1997).

Table 1. *Distribution of mathematics teachers*

Level I Code	Level I Name of the Region	Number of Teachers
TR1	İstanbul	4
TR2	West Marmara	4
TR3	Aegean	4
TR4	East Marmara	4
TR5	Western Anatolia	4
TR6	Mediterranean	4
TR7	Middle Anatolia	4
TR8	West Black Sea	4
TR9	East Black Sea	4
TRA	North-eastern Anatolia	4
TRB	Middle-Eastern Anatolia	4
TRC	South-eastern Anatolia	4

Table 2. *Content Validity Ratios of the Fifth Grade Outcomes of the Mathematics Curriculum*

	Criterion Number	Criteria	NE	CVC	CVI
Objective	1	The objectives of the curriculum are set in accordance with the individual profile desired by the country	10	.83	.87
	2	The objectives of the curriculum are set by taking into account the interests, wishes, and expectations of the students.	10	.83	
	3	The objectives of the curriculum cover the objectives of the subject area.	10	.83	
	4	The objectives of the curriculum are suitable for the level of the student.	12	1	
Content	5	The content of the curriculum is compatible with the outcomes.	12	1	.95
	6	The content of the curriculum has a spiral structure.	12	1	
	7	The content of the curriculum has an eclectic structure.	10	.83	
Process	8	The curriculum can be implemented with strategies that overlap with the constructivist approach.	12	1	.91
	9	The curriculum can be implemented with theories that overlap with the constructivist approach.	11	.92	
	10	The curriculum can be implemented with methods that overlap with the constructivist approach.	11	.92	
	11	The activities in the curriculum are sufficient.	10	.83	
Evaluation	12	The curriculum is suitable for process-based assessment and evaluation.	12	1	.94
	13	The curriculum is suitable for outcome-based assessment and evaluation.	10	.83	
	14	The curriculum is suitable for alternative assessment and evaluation.	12	1	

Number of Experts: 12, Content validity criteria: .52, Content validity index: % 92. CVC < CV

Findings Regarding the Second Sub-Problem

The second sub-problem of the research is the question "What is the level of the logit values and data calibration map according to the multi-faceted Rasch analysis of the fifth-grade outcomes of the 2018 Mathematics Curriculum". The distribution for these is shown in Figure 1. "MC" refers to the outcomes of the 2018 Mathematics Lesson Curriculum, "J" refers to the mathematics teachers who evaluate the program, and "M" refers to the evaluation criteria in the data calibration map shown in Figure 1.

When the criteria by which the fifth-grade outcomes of the 2018 Mathematics Curriculum were evaluated according to the data calibration map, it was revealed that the twelfth items "The curriculum is suitable for process-based assessment and evaluation" and "The objectives of the curriculum are set by taking into account the interests, wishes, and expectations of the students" are difficult. The sixth item, “The content of the curriculum has a spiral structure” and the fifth one “The content of the curriculum is compatible with the outcomes” are easy items (criteria).

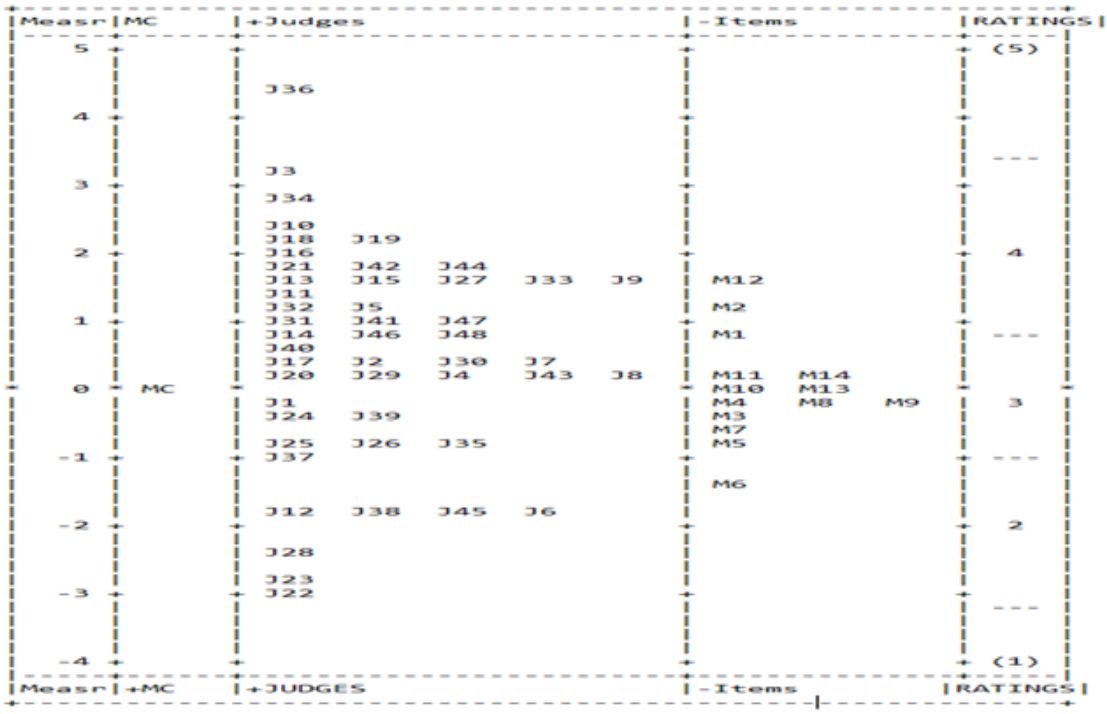

Figure 1. *Data calibration map*

Findings Regarding the Third Sub-Problem

The third sub-problem of the research consists of the question "What is the level of statistical data on the strictness/generosity of the juries who scored the fifth-grade outcomes of the 2018 Mathematics Curriculum". The analysis of the data for this question is shown in Table 3.

Table 3. *Measurement Analysis of the Scoring Performance of the Juries*

Judges	Total Score	Obsvd Average	Fair Average	Model		Infit		Outfit	
				Measure	S.E.	MnSq	ZStd	MnSq	ZStd
J36	66	4.71	4.74	4.31	.59	1.45	1.0	1.73	1.3
J3	62	4.43	4.45	3.21	.48	.65	-1.0	.69	-.8
J34	60	4.29	4.30	2.78	.45	.36	-2.3	.38	-2.2
J10	58	4.14	4.16	2.39	.44	2.34	2.7	2.27	2.7
J18	57	4.07	4.09	2.20	.43	.99	.0	.95	.0
J19	57	4.07	4.09	2.20	.43	.29	-2.5	.30	-2.5
J16	56	4.00	4.01	2.02	.42	.69	-.7	.71	-.7
J21	55	3.93	3.94	1.84	.42	.35	-2.1	.36	-2.1
J42	55	3.93	3.94	1.84	.42	.35	-2.1	.36	-2.1
J44	55	3.93	3.94	1.84	.42	1.66	1.5	1.71	1.6
J9	54	3.86	3.87	1.67	.41	.58	-1.1	.61	-1.0
J15	54	3.86	3.87	1.67	.41	.44	-1.7	.43	-1.8
J27	54	3.86	3.87	1.67	.41	.74	-.6	.76	-.5
J13	53	3.79	3.80	1.51	.41	.40	-1.9	.39	-1.9
J33	53	3.79	3.80	1.51	.41	.52	-1.3	.48	-1.5
J11	52	3.71	3.73	1.34	.40	.90	-.1	.95	.0
J5	51	3.64	3.66	1.18	.40	.92	.0	.92	.0
J32	51	3.64	3.66	1.18	.40	.62	-1.0	.58	-1.1
J31	50	3.57	3.59	1.03	.39	.76	-.5	.81	-.4
J41	50	3.57	3.59	1.03	.39	1.76	1.7	1.73	1.7
J47	50	3.57	3.59	1.03	.39	1.67	1.6	1.70	1.6
J48	49	3.50	3.52	.88	.39	.82	-.3	.81	-.4

J14	48	3.43	3.45	.73	.38	.95	.0	.96	.0
J46	48	3.43	3.45	.73	.38	.89	-.1	.85	-.2
J40	47	3.36	3.37	.58	.38	1.10	.3	1.16	.5
J2	46	3.29	3.30	.44	.38	.50	-1.5	.49	-1.5
J7	46	3.29	3.30	.44	.38	5.05	5.9	5.02	5.9
J17	46	3.29	3.30	.44	.38	1.36	.9	1.47	1.2
J30	46	3.29	3.30	.44	.38	.57	-1.2	.56	-1.2
J4	45	3.21	3.23	.30	.38	.69	-.8	.70	-.7
J8	44	3.14	3.15	.16	.37	1.91	2.1	1.89	2.0
J20	44	3.14	3.15	.16	.37	.77	-1.5	.78	-.5
J29	44	3.14	3.15	.16	.37	.78	-.5	.77	-.5
J43	44	3.14	3.15	.16	.37	.82	-.4	.89	-.2
J1	41	2.93	2.93	-.25	.37	.25	-1.9	.26	-2.8
J24	40	2.86	2.86	-.39	.37	.25	-2.9	.27	-2.8
J39	40	2.86	2.86	-.39	.37	.52	-1.5	.53	-1.4
J25	37	2.64	2.64	-.79	.37	.67	-.9	.66	-.9
J26	37	2.64	2.64	-.79	.37	.74	-.6	.74	-.6
J35	37	2.64	2.64	-.79	.37	.89	-.2	.91	-.1
J37	36	2.57	2.57	-.92	.37	1.03	.1	1.02	.1
J6	30	2.14	2.12	-1.75	.38	1.69	1.7	1.63	1.6
J12	29	2.07	2.05	-1.90	.38	.59	-1.2	.81	-.4
J38	29	2.07	2.05	-1.90	.38	.59	-1.2	.81	-.4
J45	29	2.07	2.05	-1.90	.38	2.01	2.3	1.92	2.1
J28	26	1.86	1.83	-2.36	.40	1.07	.3	1.00	.1
J23	23	1.64	1.61	-2.88	.43	1.19	.6	1.18	.5
J22	22	1.57	1.53	-3.07	.45	1.13	.4	1.13	.4

Model Sample: RMSE .40, Adj (True) S.D. 1.51, Separation 3.76, Strata 5.35, Reliability: .93, Model Fixed (all same) chi-square: 644.1, d.f. :47 Significance (probability): .00

Table 3 demonstrates the evaluations of the juries regarding the outcomes in the curriculum according to certain criteria in detail. According to Table 3, the "Jury 36" coded rater has the most generous tendency among the juries. Among the juries, the rater with the code "Jury 22" provided the strictest scoring. The RMSE value, which is the standard error value calculated for all data except the extremes, was .40 regarding the scoring of the raters. The reliability coefficient regarding the scoring performance of the juries was .93. This value, which emerged from the data analysis, indicates that the juries performed their scoring with a high-reliability scoring value. In addition, the separation index of the juries regarding the scoring is 3.76 and the reliability coefficient is .93, and when the hypothesis of the fixed effect "There is no significant difference between the raters in terms of strictness/generosity" was tested with the chi-square test, the ($X^2_{(47)}$=644.1, p<.05) null hypothesis was rejected. In this context, it can be said that the juries exhibit consistent rater behaviour in evaluating the outcomes in the curriculum.

Findings Regarding the Fourth Sub-Problem

The fourth sub-problem of the research consists of the question “What is the level of the measurements regarding the criteria in which the 5thgrade outcomes of the 2018 Mathematics Curriculum are evaluated? The analysis findings related to these data are shown in Table 4.

Table 4. *Evaluation Criteria Measurement Analysis*

Criteria	Total Score	Obsvd Average	Fair Average	Model		Infit		Outfit	
				Measure	S.E.	Mnsq	ZStd	Mnsq	ZStd
M12	122	2.54	2.50	1.57	.21	1.13	.6	1.21	1.0
M2	132	2.75	2.74	1.13	.21	.92	-.3	.88	-.5
M1	142	2.96	2.97	.70	.21	1.07	.4	1.04	.2
M14	152	3.17	3.21	.27	.21	.74	-1.3	.78	-1.1.
M11	155	3.23	3.28	.13	.21	.86	-.6	86	-.6

M13	156	3.25	3.30	.09	.21	.76	-1.2	.72	-1.4
M10	158	3.29	3.34	.00	.21	.69	-1.6	.71	-1.5
M9	163	3.40	3.46	-.23	.21	.85	-.7	.87	-.5
M4	164	3.42	3.48	-.27	.21	1.11	.5	1.11	.5
M8	164	3.42	3.48	-.27	.21	1.42	1.9	1.38	1.7
M3	165	3.44	3.50	-.32	.22	.93	-.2	.94	-.2
M7	169	3.52	3.59	-.51	.22	1.02	.1	1.09	.4
M5	177	3.69	3.76	-.89	.22	.96	-.1	1.08	.4
M6	187	3.90	3.97	-1.40	.23	1.40	1.8	1.32	1.4

Model Sample RMSE: .21, Adj (True) S.D.: .71, Separation 3.30, Strata: 4.73, Reliability: .92., Model Fixed (all same) chi- squared: 164.3, d.f.:13, Significance (probability):.00

In Table 4, the measurement analyses of the items (criteria) were examined. M_{12}, M_2, and M_1 coded criteria, respectively, were evaluated by secondary school mathematics teachers as the weakest criteria in the 5thgrade mathematics curriculum. However, M_6, M_5, and M_7 coded criteria were evaluated as the strongest criteria in the curriculum, respectively. The standard error value for the evaluation criteria of the 5thgrade mathematics curriculum was determined as RMSE=.21. The corrected standard deviation calculated by considering this error value was determined as .71. The reliability coefficient of the criteria by which the curriculum is evaluated was calculated as .92. Considering these analysis data, it can be said that the criteria for the evaluation of the 5thgrade mathematics curriculum are at a good level.

Analysis of Table 4 revealed no significant difference in the difficulty of criteria used by secondary school mathematics teachers to determine the quality of the 5th grade mathematics curriculum ($X^2_{(13)}$ = 164.3, p<.05). This finding suggests that the criteria teachers use to evaluate the program's outcomes effectively measure the program's features.

This finding reveals that the criteria used by the teachers to evaluate the outcomes of the curriculum can measure the features of the curriculum. In addition, it can be said that there is a statistically significant difference in terms of difficulty levels in meeting these criteria.

5. Discussion

In this study, 5thgrade outcomes of the 2018 mathematics curriculum were evaluated by mathematics teachers working in the Turkish Ministry of National Education (MEB). In this context, the outcomes of the curriculum, the strictness/generosity levels of the evaluators involved in the scoring process, and the "5thgrade mathematics curriculum outcome evaluation form" used for the research were examined in detail using the Rasch analysis model. According to the research findings, teachers face the greatest challenges with three criteria in the 5th grade mathematics curriculum. These are defined by codes [M1] (The objectives align with the country's targeted individual profile), [M2] (The objectives consider students' interests, wishes, and expectations), and [M12] (The curriculum activities are sufficient). This suggests that the 5th grade mathematics curriculum's objectives may not adequately address students' interests, wishes, and expectations, nor fully meet the country's desired outcomes for its citizens. Dedeoğlu and Polat (2021) emphasize the importance of the psychological and philosophical foundations of the primary mathematics curriculum, advocating for a more student-centered approach.This may arise from the opinions of the teachers revealing that the curriculum that has been implemented is not a student-centred program. A possible reason for this result is that teachers have different pedagogical knowledge on this subject. In addition, Aydemir and Karakuş (2022) reported that the quality of education in a country is directly related to its Curricula while it was reported by Çiftçi and Tatar (2015) that with the changes made in mathematics teaching curricula, the intensity of the subjects decreased, which was in favour of the students. It is suggested that teachers as the curriculum implementers mainly remained uninformed about the changes in the curriculum (Çiftçi, Akgün, & Deniz, 2013) and that they-should receive in-service training in such situations (Tekalmaz, 2019).”

Bilen and Çiltaş (2015) reported that the changes made in the 5thgrade mathematics curriculum are not many and that the relevant change is evident in associations with visual representation and daily life. However, it can be claimed that the activities included in the 5thgrade mathematics curriculum are not at the expected level. Aktan (2019) reported that more high-level cognitive steps should be included in the

mathematics curriculum while Reçber and Sezer (2018) reported that the activities included in the mathematics curriculum are mostly at the cognitive level. This is possible because of the fact that the teachers believe that the activities included in the curriculum should focus only on cognitive goals but should also reflect affective and psychomotor goals. The study by Domínguez-González and Delgado-Martín (2022) shows that the activities used in mathematics teaching programs have become an indispensable component of these curricula, which highlights the importance of such activities in terms of sustainability.

Another important finding in the study is that raters evaluated the [M6] coded criterion as easy. In this direction, it is revealed that the raters agreed with the criterion "The content of the curriculum has a spiral structure". This finding is also consistent with the findings of the research conducted by Özkale and Memiş (2022). The 5thgrade mathematics curriculum applied in Türkiye appears as an exemplary model for the spiral structure. The spiral approach used in curricula is especially compatible with mathematics programmes (Ireland, 2020). The spiral structures of the programmes can be used to help students understand mathematics-related topics and use their cognitive structures better (Toh, 2022). However, Aydın, Laçin, and Keskin (2018) stated in their study that teachers had difficulties in transferring their instructional activities due to the spiral structure of the mathematics curriculum.

This study also examined the effects of raters who exhibited extreme levels of strictness and generosity in the scoring process. Rater J_{22} demonstrated the most rigid attitude, while rater J_{36} showed the most lenient approach when evaluating the objectives of the fifth-grade mathematics curriculum.

A key finding from the study is teachers' criticism of the long-term goals in the fifth-grade mathematics curriculum. To address this, the curriculum could be re-evaluated by considering input from various stakeholders, allowing for a more comprehensive review and revision of these long-term objectives. The study's criteria were based on the fifth-grade mathematics curriculum, outcome assessment criteria, and raters' approaches. As an additional dimension, faculty members' perspectives could be incorporated into the study. Furthermore, a mixed-research approach, including instructors' opinions, could be used to examine the 2018 mathematics curriculum's fifth-grade outcomes in greater detail.

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