

## **Prediction of Elementary School Teachers' Curriculum Fidelity by Demographic Variables and Curriculum Literacy**

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This study aimed to determine whether or not curriculum fidelity can be significantly predicted by certain demographic variables and level of curriculum literacy in elementary school teachers. The study was designed as a relational survey study and involved the participation of 250 elementary school teachers. For data collection, a personal information form (PIF), the Curriculum Fidelity Scale (CFS), and Curriculum Literacy Scale (CLS) were used. The data collected were analysed using multiple hierarchical regression analysis. According to the findings, gender, seniority, class size, course load, class level, and the number of students with special educational needs (NSEN) explained 8.7% of the adherence dimension of the CFS. The reading and writing dimensions of the CLS significantly predicted the adherence dimension of the CFS at 4.6%. The predictive variables, i.e., gender, seniority, class size, course load, and NSEN, explained only 2% of the adaptation dimension of the CFS. The reading and writing dimensions of the CLS significantly predicted the adaptation dimension of the CFS at 19.2%. In summary, the elementary school teachers' adherence behaviours in terms of curriculum fidelity were mainly impacted by demographic variables, whereas their adaptation behaviours were mainly impacted by curriculum literacy.

*Keywords:* curriculum literacy, curriculum fidelity, curriculum

### **Introduction**

Curricula have four components: objective, content, methods, and assessment. Although educational psychology, educational sociology, educational philosophy, and educational economics are considered when determining these four components, the expected outcome and the actual outcome may not always coincide when implementing the curriculum. A dilemma emerges over whether the curriculum should be applied verbatim or adapted to the psychological, sociological, philosophical, or economic situations encountered in the learning environment. This dilemma entails two concepts: curriculum fidelity and curriculum adaptation.

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### **Literature Review**

Curriculum fidelity refers to the full or partial use of the curriculum, following the specifications set by the curriculum developers, by all stakeholders, such as teachers, group leaders, and curriculum experts (Breitenstein et al., 2010; Century, Rudnick, & Freeman, 2010; Pence, Justice, & Wiggins, 2008; Yasaroglu & Manav, 2015). The literature features other definitions of curriculum fidelity, including adherence to the designed form of a curriculum (Bumen, Cakar, & Yildiz, 2014), consistency between the applied curriculum and the original design (Summerfelt, 2003), and correspondence between learning outcomes and curriculum objectives (Melde, Esbensen, & Tusinski, 2006).

Within the scope of the discussions on curriculum fidelity and curriculum adaptation, some researchers have proposed a balancing third option that involves a commitment to the fundamental structure of the curriculum and the option of making adaptations to it together with all stakeholders (Daele et al., 2012). Cho (1998), who put forward positivist fidelity tendencies and post-positivist adaptation practices as the two traditional approaches, presented a third way that involved teachers and students following a constructive understanding of curriculum in the classroom. Durlak and DuPre (2008) argued that adaptation in some circumstances could improve curriculum outcomes, while in other circumstances it can hinder the success of the curriculum.

Apart from those researchers who suggest a third way and those who oppose it, there are also researchers who advocate either strict adaptation or strict fidelity. Hill, Maucione, and Hood (2007) argued that the content and structure of curricula developed for regions with different cultural characteristics can be adapted to the cultural characteristics of the students, their language, and their family structures. Similarly, Perrin et al. (2006) found better student participation in adaptation practices conducted with multicultural and low-income samples. In contrast, Larsen and Samdal (2007) reported that teachers' adaptation of a curriculum to the conditions they are in can jeopardize its outcomes, as it changes the primary purpose of the curriculum and the way it is implemented. Melde, Esbensen, and Tusinski (2006) similarly argued that some practitioners might overestimate the freedom of adaptation and thereby undervalue the merits of adherence to the original form or curriculum fidelity.

The curriculum fidelity concept consists of five main components: adherence, exposure, quality of curriculum delivery, participant responsiveness, and curriculum differentiation. Adherence refers to the implementation of curriculum elements as specified by the guide; exposure refers to the amount, frequency, and duration of the curriculum content delivered to program participants (chapter, unit, module, etc.); quality of curriculum delivery refers to an evaluation of the degree to which curriculum practitioners achieve the theoretical ideal of the curriculum in terms of their willingness to apply the curriculum, their preparation, their attitude, their competency, and their continuing education efforts when it comes to delivering the curriculum content to the program participants; participant responsiveness refers to the program participants' responsiveness to curriculum activities, in terms of their attendance and willingness to learn the curriculum content; and lastly, curriculum differentiation

refers to the curriculum being clearly distinct from other curricula with its unique features and the implementation of the curriculum in a consistent and planned way (Dane & Schneider, 1998; Dusenbury, Brannigan, Falco, & Hanse, 2003; Miller & Miller, 2015). When examining curriculum fidelity, in addition to these dimensions, "curriculum access," which means delivering the curriculum according to the conditions of the groups to whom it will be applied, "curriculum size," which means the target group size, and "adaptation components," which refers to the changes made in the original design during implementation, should also be considered (Durlak & DuPre, 2008).

There are several important reasons to pay close attention to curriculum fidelity. First, after the implementation of curricula, monitoring curriculum fidelity allows for the determination of whether or not the curriculum yielded desired or undesired, expected or unexpected, and intended or unintended outcomes (Barker, Nugent, & Grandgenett, 2014; Durlak & DuPre, 2008) or for the identification of other elements, like developmental changes and preferences (Haataja et al., 2014). In other words, with curriculum fidelity, the success or failure of a curriculum can be determined (Sánchez et al., 2007). Moreover, curriculum fidelity can explain why the same curricula lead to different outcomes (Carroll et al., 2007) and can guide whether or not making changes to a curriculum is necessary (McKenna, Flower, & Ciullo, 2014). It can also be used in experimental studies to interpret findings, obtain data on external validity, and make inferences about statistical power (Maynard, Peters, Vaughn, & Sarteschi, 2013). On the whole, curriculum fidelity can shed light on the circumstances under which a curriculum is applicable (Dusenbury, Brannigan, Falco, & Hanse, 2003). Especially in the early stages of the process, the evaluation of curriculum fidelity can prevent wasting valuable teaching time (Harn, Parisi, & Stoolmiller, 2013).

### **Current Study**

As can be understood from the literature review, curriculum fidelity is an important concept. To comprehend this concept better, it is necessary to determine the variables that can predict curriculum fidelity in terms of the dimensions of adherence and adaptation. Curriculum literacy is believed to be one of these variables. According to the different definitions of curriculum literacy (Akyildiz, 2020; Cetinkaya & Tabak, 2019; Kahramanoglu, 2019; Sarigoz & Bolat, 2018; Yar Yildirim, 2020; Yildirim, 2019), it involves the recommendations made on the implementation of a curriculum, the components of that curriculum, and the knowledge, skills, and attitudes teachers need to possess for designing, applying and evaluating the results of the curriculum implementation after understanding, interpreting and analyzing the relationships between the components. For teachers to use curricula effectively and efficiently, they should be curriculum literate (Erdem & Egmir, 2018). Aslan and Gurlen (2019) stated that higher curriculum literacy helps to reduce the gap between original and applied curricula, while Akyildiz (2020) reported that the complete curriculum implementation is related to curriculum literacy. When these views are interpreted within this framework of curriculum fidelity, it is believed that

curriculum literacy facilitates implementation of the original curriculum word for word. Therefore, this study hypothesized that the skills related to curriculum literacy would significantly predict the adherence dimension of curriculum fidelity.

According to some experts, curriculum literacy does not necessarily involve applying a curriculum word for word. Nsibande and Modiba (2012), for example, argued that curriculum literacy means having the capacity to question the applicability of the official curriculum, an idea supported by the studies conducted by Steiner (2018) and Karagulle, Varki, and Hekimoglu (2019), the former of whom suggested that curriculum literacy is a skill that can be used to determine and eliminate deficiencies in a curriculum, and the latter of whom put forward that the applicability and functionality of a curriculum could be increased by building curriculum literacy. Kahramanoglu (2019) noted that curriculum-literate teachers could adjust the original curriculum according to their students' needs, and Karagulle, Varki, and Hekimoglu (2019) suggested that the applicability and functionality of a curriculum could be increased by building curriculum literacy. Ryu (2015), on the other hand, argued that a curriculum was a resource that teachers needed to reconstruct to achieve the best outcomes from it and that curriculum literacy equipped them to do this. All these views serve to demonstrate that curriculum literacy can be related to adapting a curriculum rather than to strictly adhering to it. From this point of view, the present study hypothesized that curriculum literacy skills would predict the adaptation dimension of curriculum fidelity in a meaningful and positive direction.

Within the framework of the related literature, the factors affecting curriculum fidelity include teacher, student, institution, and the curriculum. The teacher-related factors that can affect curriculum fidelity include the teacher's branch of study, self-competence perception, educational philosophy, experience, motivation, and perceptions of the curriculum; the student-related factors include the student's academic achievement, learning styles, satisfaction with the curriculum, academic attitude, and learning outcomes; the institutional factors include the institution's administrative or facilitator support, management stability, and educational support about curricula provided to teachers; and lastly, the curriculum-related factors include sufficiency of textbooks, material and manual support, level of difficulty and complexity, time use, suitability to the target group, and characteristics of the culture. In addition to these factors, regional-socio-economic and cultural characteristics, centralized educational systems, exams that shape students' future, and observations and supervision of the implementation of curricula can be included among the factors that affect curriculum fidelity (Barker, Nugent, & Grandgenett, 2014; Bay, Kahramanoglu, Dos, & Turan Ozpolat, 2017; Bumen, Cakar, & Yildiz, 2014; Carroll et al., 2007; Clements, Sarama, Wolfe, & Spitler, 2015; Dikbayir & Bumen, 2016; Harn, Parisi, & Stoolmiller, 2013; LaChausse, Clark, & Chapple, 2014; Larsen & Samdal, 2007; Little, Sussman, Sun, & Rohrbach, 2013; Mihalic, Fagan, & Argamaso, 2008; Rohrbach et al., 2006; Stahmer et al., 2015; Ruiz-Primo, 2005). The main focuses of the present study are the teacher, institution, and student factors, where under the teacher factor, gender and seniority are examined, under the student factor, grade level and the number of students with special educational needs are examined, and under the institution factor, class size and course load are examined. Regarding gender, this study hypothesized that females would tend to have lower levels of

adherence behavior, considering that they have been shown to be more innovative (Yilmaz et al., 2014). In terms of seniority, it was hypothesized that senior teachers, compared to newer teachers, would have higher levels of both adherence and adaptation behaviors. For the student- and institution-related factors, it was hypothesized that challenging situations would correspond to greater tendency to adopt adherence behavior, while non-challenging situations would correspond to greater tendency to adopt adaptation behavior. This can be interpreted to mean that challenging situations, such as teaching first-graders, teaching in crowded classrooms, teaching students with special educational needs, and having a heavy course load, would tire teachers and prompt them to avoid taking on another burden, like adaptation of the curriculum.

## **Method**

### **Model of the Study**

This study was designed as a relational survey study, a type of research conducted to identify the relationships between variables and the relative strength of these relationships (Karasar, 2012). The present study applied this design to determine the predictive relationships between adherence and adaptation behaviors in terms of curriculum fidelity and various independent variables.

### **Participants**

A total of 250 elementary school teachers from the central districts of the province of Diyarbakir, Turkey participated in the study. Of these participants, 40% were males, and 60% were females. The professional teaching experience of the teachers (i.e., seniority) ranged from one to 44 years. In terms of the distribution of the grade levels at which the teachers taught, 34% were teaching first-graders, 18% were teaching second-graders, 22% were teaching third-graders, and 26% were teaching fourth-graders.

### **Data Collection Tools**

For data collection, this study used a personal information form (PIF), the Curriculum Fidelity Scale (CFS), and the Curriculum Literacy Scale (CLS). The PIF consists of questions on the elementary teachers' gender, seniority, class size, course load, grade level, and the number of students with special educational needs they have. Among these variables, seniority (years), class size (number of students), course load (number of hours), and NSSEN (number of students with special educational needs) are quantitative and discrete variables, and teachers provided numeric responses for inquiries pertaining to these factors. Meanwhile, gender and grade level serve as categorical variables, and teachers indicated their responses by selecting the relevant options.

The CFS was developed by the researchers of the present study. This scale aims to measure teachers' level of curriculum fidelity in two dimensions: adherence and adaptation. The adherence dimension includes 11 items, while the adaptation dimension includes 14 items. An overall score is not calculated for the scale. Some of the items included in the adherence dimension are: "I do not make any changes to the curriculum's content." "I allot the time specified in the program for each learning outcome." "I teach the curriculum at the level of difficulty it has." Some items in the adaptation dimension are as follows: "I adapt the curriculum to the traditions and customs of the students." "I adapt the curriculum to the family structure of the students" and "I adapt the program to technological environments (EBA [Educational Informatics Network], smart/interactive board, mobile applications, etc.)"

In the design process of the scale, a pool of 30 items expressing the adherence and adaptation behaviors in terms of curriculum fidelity was created based on the relevant literature. The items were submitted to 10 experts –four faculty members from the Department of Curriculum and Instruction and six faculty members from the Department of Elementary Education– for their opinions using the Davis' (1992) technique. Four items that at least 20% of the experts found to be of little relevance and/or irrelevant were excluded from the analysis. Corrections were made to the statements associated with three items, and a new item, "I adapt the curriculum to the decisions made by my branch's board", was added to the draft scale upon the recommendation of nine experts. To conduct an exploratory factor analysis, the 27-item draft scale was administered to 224 elementary school teachers. As part of this analysis, first, the normality values of each item were investigated. Based on the examination of extreme values of items, meaning those with a skewness value outside the range of -1 to + 1 (Buyukozturk, 2010), using box-plots, it was determined that the data of 16 participants should not be included in the EFA. Next, the Mahalanobis distance values were obtained for 27 variables using SPSS software. From the "1-CDF.CHISQ(MAH\_1,27)" calculation made by considering these values, the data of five participants who had a value below .01 were also excluded from the EFA. Based on the EFA performed with the data of 203 participants, the number of factors was set to two (adherence and adaptation). The varimax rotation technique was used since a relationship was not expected between the variables. As a result of the initial analysis, one item that was determined to be cross-loading according to factor loads (Akbulut, 2010), and another item that was found not to be included in the dimension to which it theoretically belonged were excluded from the draft scale. The Kaiser-Meyer-Olkin value (KMO) was calculated as .89 according to a repeated EFA, and the result of the Bartlett sphericity test was found to be significant ( $p < .001$ ). All these values indicated that the data were suitable for factor analysis, and that the number of participants was sufficient (Secer, 2013). The sub-dimensions of the CFS, the factor loads (FL) of the items in these dimensions, and the Common Factor Variance (CFV) values are presented in Table 1:

Table 1. EFA Results for the CFS

<b>Adherence</b>	<b>FL</b>	<b>CFV</b>	<b>Adaptation</b>	<b>FL</b>	<b>CFV</b>
i1	.61	.40	i12	.64	.45
i2	.80	.64	i13	.72	.52
i3	.84	.70	i14	.75	.56
i4	.75	.57	i15	.72	.52
i5	.78	.61	i16	.76	.58
i6	.82	.68	i17	.79	.63
i7	.70	.49	i18	.79	.65
i8	.54	.30	i19	.80	.64
i9	.52	.31	i20	.79	.63
i10	.59	.37	i21	.85	.73
i11	.58	.41	i22	.61	.45
			i23	.80	.64
			i24	.63	.42
			i25	.78	.61

As seen in Table 1, most of the items in both the adherence and adaptation dimensions of the CFS have a CFV value of above .40, with only three items in the adherence dimension having a CFV value of between .30 and .37. Since the factor loads of these items were above .40 and a value of .20 or above is accepted in social sciences (Sencan, 2005), these items were not excluded from the scale. The factor loads of the items on the scale were between .52 and .84 in the adherence dimension and between .61 and .85 in the adaptation dimension, values considered to be quite good in social sciences. The two-factor structure of adherence and adaptation explained 53.96 of the total variance of the CFS, which is considered suitable for multi-dimensional scales, as it is above the rate of the variance that could not be explained (46.04%) (Buyukozturk, 2010).

The CLS was developed by Bolat (2017) and has two sub-dimensions: reading and writing. In the reading dimension, there are items such as "I can detect the consistency of learning goals with each other." and "I can interpret the results of the measurement-evaluation process". In the writing dimension, there are items such as "I can design educational material suitable for learning-teaching processes." and "I can design educational activities suitable for learning-teaching processes." The scale was originally developed for use on preservice teachers. Therefore, the data collected from the teachers in the present study were subjected to EFA. According to the EFA performed after testing the normality assumption, the KMO value was .95, which indicated that the Bartlett test had significant results. The CFV value was found to be at least .43 for the reading dimension and .53 for the writing dimension. The factor loads ranged between .47 and .85 in the reading dimension and between .46 and .87 in the writing dimension. None of the items were cross-loading. As such, the scale was able to explain 59.77% of the total variance. All these values showed that the CLS, which was originally developed for preservice teachers, could also be used (Buyukozturk, 2010; Secer, 2013) as a valid data collection tool for elementary school teachers.

The reliability of the measures made within the scope of the study was determined with Cronbach's alpha coefficients. These coefficients were .89 for the

adherence dimension of the scale and .94 for the adaptation dimension, and .94 for the reading dimension of the CLS and .96 for the writing dimension. Considering that the lower value required for measurement reliability of a scale is .70 (Sipahi, Yurtkoru, & Cinko, 2010), the measurements made within the scope of the present study were accepted as reliable.

### Data Analysis

Two different hierarchical multi-regression analyses were used to analyze the data obtained in the present study. The first analysis tested the adherence dimension of the CFS, while the second tested the adaptation dimension of the CFS. In both analyses, gender, seniority, class size, course load, NSSEN, CL reading and CL writing dimensions were used as the predictive variables. Before presenting the findings of these analyses, necessary assumptions were tested according to the suggestions in the literature (Buyukozturk, 2010; Pallant, 2016; Secer, 2013; Tabachnick & Fidell, 2006; Stevens, 2002). Here, extreme values of the predictive and predicted variables, that is, those that deviated from the normal distribution, were first investigated with box-plots and excluded from the study one by one. Next, Mahalanobis distance values were calculated, and it was found that eight predictive variables were above 26.13, and therefore these were excluded from the dataset. As a result, the highest Mahalanobis distance value was 23.000 in the adherence dimension and 22.854 in the adaptation dimension. As such, the required assumptions about extreme values were met. After excluding the extreme values from the data set, the data from 212 teachers remained for the analyses of the adherence dimension and from 213 teachers for the analyses of the adaptation dimension. Since these numbers were more than fifteen times higher than the number of predictive variables (eight) included in the analysis, the sample size assumption of hierarchical multi-regression analyses was also met. As seen in Table 2 and Table 3, the tolerance values were above .10 in both the adherence and adaptation dimensions, the VIF (Variance Inflation Factor) values were below 10, and the relationships between the predictive variables were not .90 or above, which indicate that the present study did not have a multicollinearity problem; therefore, the study aligned with the related assumption.

*Table 2.* Correlation, Tolerance, and VIF Values Predicting the Adherence Dimension of the CFS

	1	2	3	4	5	6	7	Tolerance	VIF
1. Gender								.96	1.04
2. Seniority	-.04							.74	1.36
3. Class size	-.04	.46**						.72	1.39
4. Course load	.05	-.12*	-.19**					.79	1.26
5. Grade level	.01	-.13	-.07	.41**				.81	1.23
6. NSSEN	-.11	.03	.19**	-.07	-.11*			.94	1.06
7. CLS-Reading	-.11	.02	-.12*	.02	.03	-.01		.39	2.56
8. CLS-Writing	-.01	-.12*	-.13*	-.04	.03	.02	.76**	.39	2.55
*p<.05; **p<.01									



Table 3. Correlation, Tolerance, and VIF Values Predicting the Adaptation Dimension of the CFS

	1	2	3	4	5	6	7	Tolerance	VIF <sub>2</sub>
1. Gender								.96	1.04
2. Seniority	-.05							.76	1.31
3. Class size	-.03	.43**						.74	1.35
4. Course load	.05	-.11	-					.79	1.26
			.19**						
5. Grade level	.02	-.14	-.06	.41**				.81	1.23
6. NSSEN	-.10	.02	.19**	-.07	-.10*			.94	1.07
7. CLS-Reading	-.11	.03	-.12*	.03	.03	-.02		.39	2.54
8. CLS-Writing	-.01	-.11	-.13*	-.04	.03	.02	.76**	.40	2.52

\*p&lt;.05; \*\*p&lt;.01

In the present study, the histogram graphs depicted in Figures 1 and 2 were used to determine whether or not there were any problems regarding the normality and linearity assumptions. Since all the scores depicted in the histogram graphs for predicting both the adherence and adaptation dimensions of the CFS fell within the boundaries of a symmetrical bell-shaped curve, with high scores clustered around the center and low ones around the tails, it was concluded that the assumptions of normality and linearity were met.

Figure 1. Histogram for the Prediction of Adherence

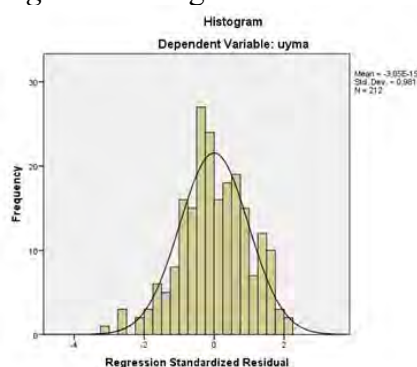
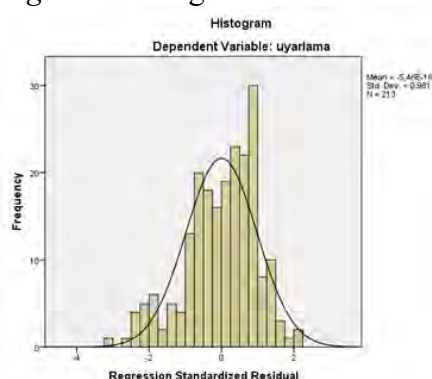


Figure 2. Histogram for the Prediction of Adaptation



After testing the assumptions of hierarchical multi-regression analysis, related analyses were conducted. In these analyses that were applied for both adherence and adaptation behaviors, first the demographic variables (gender, seniority, class size, course load, grade level, and NSSEN) were included, followed by the CL reading and writing skill variables. Since the variables of gender and grade level are categorical variables (Grotenhuis & Thijs, 2015), they have been used as dummy variables. Being female (gender) and teaching 2<sup>nd</sup>-4<sup>th</sup> graders (grade level) were used as reference categories (left out categories) and analyses were conducted based on being male and teaching 1<sup>st</sup> grade.

## Findings

### Findings on the Prediction of the Adherence Dimension of the Curriculum Fidelity Scale

Table 4 presents the extent to which the adherence dimension of the CFS was predicted by the reading and writing dimensions of the CLS after controlling for the variables of gender, seniority, class size, course load, grade level, and NSSEN.

Table 4. Summary of the Model

Model	Predictive Variables	R	R <sup>2</sup>	Variation statistics			
				$\Delta R^2$	F	Sd <sub>1/2</sub>	p
1	Gender, seniority, class size, course load, grade level, NSSEN	.295	.087	.087	3.27	6/205	.004
2	Gender, seniority, class size, course load, grade level, NSSEN, reading, writing	.365	.133	.046	5.38	2/203	.005

As seen in the first model presented in Table 4, the predictive variables, consisting of gender, seniority, class size, course load, grade level, and NSSEN, explained 8.7% of the adherence dimension of the CFS. The second model, which included the addition of the reading and writing dimensions of the CLS to the same variables as the first model, explained 13.3% of the adherence dimension of the CFS. When gender, seniority, class size, course load, grade level, and NSSEN were controlled for, the CLS reading and writing dimensions significantly explained 4.6% of the adherence dimension of the CFS ( $p < 0.01$ ).

The results of the ANOVA test conducted to assess the overall significance of the models obtained for the prediction of the adherence dimension of the CFS are presented in Table 5.

Table 5. ANOVA Test Results of the Models on the Prediction of the Adherence Dimension of the CFS

Model		Sum of Squares	sd	Mean of Squares	F	p
1	Regression	11.30	6	1.88	3.27	0.004
	Residual	118.08	205	.58		
	Total	129.38	211			
2	Regression	17.24	8	2.16	3.90	0.000
	Residual	112.14	203	.55		
	Total	129.38	211			

According to Table 5, both the first model, consisting of gender, seniority, class size, course load, grade level, and NSSEN [ $F(6, 205)=3.27, p<.01$ ], and the second model, in which the reading and writing dimensions of the CLS were added to the variables included in the first model, [ $F(8, 203)=3.90, p<.001$ ] could significantly predict the adherence dimension of the CFS as a whole. Findings related to the unique contribution of each variable to the prediction of the adherence dimension of the CFS are presented in Table 6.

*Table 6. Unique Contribution of the Predictive Variables to the Prediction of the Adherence Dimension of the CFS*

	<b>B</b>	<b>Standard Error</b>	<b><math>\beta</math></b>	<b>t</b>	<b>p</b>
1. Gender	.36	.11	.22	3.34	.001
2. Seniority	.02	.01	.18	2.36	.019
3. Class size	-.02	.01	-.17	-2.19	.030
4. Course load	-.05	.05	-.08	-1.03	.303
5. Grade level	.16	.12	.10	1.38	.168
6. NSSEN	.02	.08	.02	.26	.795
7. CLS-Reading	.09	.19	.05	.47	.636
8. CLS-Writing	.23	.14	.18	1.70	.091

As seen in Table 6, course load, grade level, NSSEN, CLS-reading, and CLS-writing were each found to have no significant unique contribution to the prediction of the adherence dimension of the CFS ( $p>.05$ ). However, the variables of gender ( $\beta=.22; p<.01$ ) and seniority ( $\beta=.18; p<.05$ ) significantly predicted the adherence dimension of the CFS in a positive way, while the class size variable ( $\beta= -.17; p<.05$ ) significantly predicted the adherence dimension of the CFS in a negative way. According to the  $\beta$  values, the contribution of the related variables to the prediction of the adherence dimension of the CFS in order of greatest to lowest was gender, seniority, and class size.

The findings related to the adherence dimension of the CFS show that adherence behavior in terms of curriculum fidelity can be better explained by demographic variables than by the reading and writing dimensions of the CLS. Adherence behavior regarding curriculum fidelity increased in line with being male (gender) and having more years of teaching experience (seniority). However, when class size increased, this trend reversed; that is, adherence behavior decreased.

### **Findings on the Prediction of the Adaptation Dimension of the Curriculum Fidelity Scale**

Table 7 presents the extent to which the adaptation dimension of the CFS was predicted by the reading and writing dimension of the CLS after controlling for the variables of gender, seniority, class size, course load, grade level, and NSSEN.

Table 7. Summary of the Model

Model	Predictive Variables	R	R <sup>2</sup>	ΔR <sup>2</sup>	F	Sd <sub>1/2</sub>	p
1	Gender, seniority, class size, course load, grade level, NSSEN	.140	.020	.020	.69	6/206	.662
2	Gender, seniority, class size, course load, grade level, NSSEN, reading, writing	.460	.212	.192	24.87	2/204	.000

As seen in the first model presented in Table 7, the predictive variables of gender, seniority, class size, course load, grade level, and NSSEN explained 2% of the adaptation dimension of the CFS. The second model, in which the reading and writing dimensions of the CLS were added to those variables, explained 21.2% of the adaptation dimension of the CFS. When gender, seniority, class size, course load, grade level, and NSSEN were controlled for, the CLS reading and writing dimensions significantly explained 19.2% of the adaptation dimension of the CFS ( $p < 0.01$ ).

The results of the ANOVA test conducted to assess the overall significance of the models obtained for the prediction of the adaptation dimension of the CFS are presented in Table 8.

Table 8. ANOVA Test Results of the Models on the Prediction of the Adaptation Dimension of the CFS

Model		Sum of Squares	sd	Mean of Squares	F	p
1	Regression	1.38	6	.23	.69	.662
	Residual	69.36	206	.34		
	Total	70.74	212			
2	Regression	15.00	8	1.87	6.85	.000
	Residual	55.76	204	.27		
	Total	70.74	212			

According to Table 8, the first model, in which gender, seniority, class size, course load, grade level, and NSSEN were assigned as the predictive variables, was not a significant model for predicting the adaptation dimension of the CFS [ $F(6, 206) = .69$ ,  $p > .05$ ]. However, the second model, in which the reading and writing dimensions of the CLS were added to these variables, was significant [ $F(8, 204) = 6.85$ ,  $p < .001$ ]. The findings related to the unique contribution of each variable to the prediction of the adaptation dimension of the CFS are presented in Table 9.

Table 9. Unique Contribution of the Predictive Variables to the Prediction of the Adaptation Dimension of the CFS

	B	Standard Error	β	t	p
1. Gender	.13	.08	.11	1.69	.093
2. Seniority	.00	.01	-.02	-.26	.795
3. Class size	.01	.01	.12	1.64	.102
4. Course load	-.04	.03	-.09	-1.30	.195
5. Grade level	.03	.09	.02	.31	.583
6. NSSEN	-.03	.06	-.04	-.55	.754
7. CLS-Reading	.34	.13	.26	2.60	.010
8. CLS-Writing	.21	.10	.22	2.19	.030

According to Table 9, none of the demographic variables significantly predicted the adaptation dimension of the CFS ( $p > .05$ ). The reading ( $\beta = .26$ ;  $p < .05$ ) and writing ( $\beta = .22$ ;  $p < .05$ ) dimensions of the CLS, however, significantly predicted the adaptation dimension of the CFS in a positive direction. According to the  $\beta$  values, the reading dimension of the CLS, as compared to the writing dimension, was slightly more effective in predicting the adaptation dimension of the CFS.

The findings related to the adaptation dimension of the CFS revealed that the adaptation behavior in terms of curriculum fidelity had a stronger relationship to the reading and writing dimensions of the CLS than that of demographic variables. This suggests that as elementary teachers' reading and writing skills increase in terms of the CLS, they show a greater tendency to adapt the curriculum.

### Discussion and Conclusion

This study, which aimed to determine the variables that predict the adherence and adaptation dimensions of curriculum fidelity, showed that the gender of the teacher could significantly predict curriculum adherence behavior. More specifically, male teachers tended to apply curriculum word for word. This could stem from the fact that male teachers have been less open-minded in terms of reflective thinking skills than female teachers (Kaf Hasirci & Sadik, 2011). Teachers who cannot reflect on their curriculum experiences in an open-minded way are less likely to carry out changes to improve the curriculum. This finding coincides with that of another study reporting that male teachers were more traditionalist than that of female teachers (Kirkic & Topal, 2019). Furthermore, the literature shows that males tend not to apply questioning skills when managing information (Tuncer, Yanpar Yelken, & Tanriseven, 2018). Therefore, it can be argued that male teachers, who have been shown to often refrain from adjusting curriculum in terms of student level and cultural characteristics, are more inclined to apply this curriculum word for word. While in the present study, the gender variable significantly predicted the adherence behavior related to the curriculum, in the study by Little, Sussman, Sun, and Rohrbach (2013), it was reported that gender did not predict curriculum fidelity.

Burul (2018) reported that seniority did not have a significant effect on curriculum fidelity. However, the present study found that seniority, a teacher characteristic, significantly predicted adherence behavior in curriculum fidelity; that is, as the teachers' seniority increased, their tendency to show more adherence to the curriculum increased. In contrast to this, Larsen and Samdal (2007) found that as teachers' seniority increased, their tendency to strictly adhere to curriculum fidelity decreased.

In the present study's findings related to institutional characteristics, course load was found not to be a significant predictor of adherence behavior. Karakuyu and Oguz (2021), however, observed that course load could create a significant difference in curriculum fidelity in favor of teachers with a heavy course load. The present study's findings further revealed that class size could significantly predict adherence behavior. As the class size increased, the teachers' adherence behavior decreased. This conflicts with the study by Cobanoglu and Capa-Aydin (2015), who reported that class size did not affect curriculum fidelity. Gelmez-Burakgazi (2020) determined

that while class size did affect curriculum fidelity, it did hinder adherence behavior. Therefore, the present study obtained different findings on the effect of institutional characteristics on curriculum fidelity than those reported in the literature.

The variables of grade level and NSSEN, which are student characteristics, did not predict curriculum adherence behaviors in the present study. However, this does not mean that other student characteristics do not predict curriculum fidelity. For example, a study by Mihalic, Fagan, and Argamaso (2008) showed that better student behavior could be related to higher levels of adherence behavior.

The finding from the present study showing that curriculum literacy did not predict the adherence dimension contradicts the literature and the related hypothesis put forward within the scope of this research. The literature indicates that as curriculum literacy increases, the gap between the original curriculum and the one put into practice diminishes (Aslan & Gurlen, 2019); in other words, the probability of applying the original program word for word increases in line with higher curriculum literacy (Akyildiz, 2020). While curriculum literacy did not significantly explain curriculum adherence, it did explain curriculum adaptation. This finding showed, in agreement with that reported by Nsibande and Mobida (2012), that curriculum literacy is more related to teachers making curriculum appropriate and adaptable than to sticking to the routine of applying curriculum word for word.

According to the present study results, adaptation behavior was significantly explained by curriculum literacy, as hypothesized. As the teachers' reading and writing skills improved, their tendency to adapt the curriculum became greater. Therefore, as Karagulle et al. (2019) reported, teachers with curriculum literacy can adapt ready-made curricula designed by the ministry to students and educational environments more effectively and functionally. This finding corroborates the idea that curriculum literacy is necessary for interpreting and designing a curriculum, both aspects of adaptation behavior, and for customizing it to meet student needs (Sarigoz & Bolat, 2018). Similarly, Steiner (2018) mentioned the necessity of curriculum literacy for making changes to a curriculum that is weak in practice.

Bumen, Cakar, and Yildiz (2014), in their study, stated that students' learning characteristics are one of the factors that affect curriculum fidelity. On the issue of the unique learning characteristic that students with special educational needs have, the present study's findings differ from the aforementioned study, as it showed that curriculum fidelity, in terms of adherence and adaptation dimensions, was not affected by the number of students with special education needs.

Studies have shown a correspondence between changes in student (Bumen, Cakar, & Yildiz, 2014), teacher (Larsen & Samdal, 2007), and institution (Dikbayir & Bumen, 2016) characteristics and the expectation of curriculum adaptation. However, the present study's findings revealed that adaptation behavior, which was shown to be largely explained by curriculum literacy, was not significantly explained by the aforementioned demographic variables, which suggests that even in cases where teacher and institution characteristics change, teachers' adaptation behaviors do not necessarily change in response; rather, this behavior changes in line with curriculum literacy. In other words, only teachers with curriculum literacy can adapt a curriculum according to their students and educational environments, regardless of the conditions and characteristics of that curriculum.

According to Erdem and Egmir (2018), while the curriculum reading skills are related to understanding a curriculum, the curriculum writing skills are related to adapting and creating original products. Within this framework, it could be argued that curriculum writing skills are more effective than curriculum reading skills in the curriculum adaptation dimension. However, the present study found different results in this regard, as they showed that the CLS reading dimension was slightly more effective in predicting the adaptation dimension of the CFS than that of the CLS writing dimension. These findings align with the thoughts of Ryu (2015), who argued that to take adaptive actions that can transform a curriculum, it is necessary first to understand that curriculum, that is, to read it. Sarigoz and Bolat (2018) also highlighted the importance of understanding a curriculum to design learning processes and create learning environments suitable to student needs.

According to the present study results, the class size variable significantly predicted the teachers' adherence behaviors in terms of curriculum fidelity, as hypothesized. In other words, as the class size increased, teachers' adherence behaviors decreased. This could result in the original curriculum failing to meet the needs and thereby direct teachers to adopt behaviors other than adherence. Based on this, it was hypothesized that the class size variable would predict the adaptation behavior in terms of curriculum fidelity in a positive direction. However, the findings did not reveal this, as the class size variable did not significantly predict the adaptation behavior. Instead, an increase in class size decreased the adherence behavior and failed to direct teachers to adapt the curriculum. This result suggests that there could be a third way, outside of adherence and adaptation behavior in terms of curriculum fidelity, to which teachers have recourse, such as "doing nothing" or "ignoring the curriculum completely" in crowded classes.

The results obtained in the study can be summarized as follows:

- Adherence behavior in terms of curriculum fidelity is mainly explained by demographic variables, while adaptation behavior is mainly explained by curriculum literacy.
- Student characteristics variables do not predict the adherence behavior; rather, teachers' gender, seniority, and class size can significantly predict this behavior.
- Male teachers and senior teachers have higher tendencies toward curriculum adherence.
- Curriculum adherence decreases in crowded classes.
- Demographic variables do not predict the adaptation dimension of curriculum fidelity.
- Compared to curriculum writing skills, curriculum reading skills are more effective predictors of curriculum adaptation.

### **Limitations and Recommendations**

According to the findings and limitations of the study, the following suggestions are presented:

- Regardless of the conditions, all teachers should be equipped with curriculum literacy skills so that they can adapt their curricula if necessary. To this end, curriculum design courses in undergraduate elementary education programs in Turkey should be switched from being elective to being compulsory.
- Other preferred methods apart from adherence and adaptation behaviors in challenging circumstances like crowded classes should be identified through qualitative processes.
- This study was restricted to only elementary school teachers. Future studies examining curriculum fidelity in terms of adherence and adaptation can be conducted with teachers from other disciplines and at different educational levels.
- In this study, only class size and course load were used as the variables related to institutions. Future studies on this subject can involve using different variables related to institutional characteristics, such as school climate and the location of schools.
- This study examined the prediction power of teacher characteristics, which were limited to gender and seniority. Future studies can investigate whether teachers' educational background (e.g., received graduate education in the curriculum design department or completed a curriculum design course at the undergraduate level) predicts their curriculum fidelity.
- The study addressed grade level and the number of students with special educational needs as student characteristics. Future studies can focus on different student characteristics, such as language, religion, and ethnicity.

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