

Developing a Scale on “Factors Regarding Curriculum Alignment”

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Abstract

“Curriculum alignment” is the compatibility between a country’s centralized curriculum determined by the ministry of education and what teachers do during the teaching process. However, it is observed that teachers do not exactly implement the curriculum. The purpose of this study is to develop a scale that will determine the factors that influence the curriculum alignment. Validity and reliability analyses were carried out to improve the scale. A draft of the scale consisting of 76 items at the end of interviews and literature review was conducted to 573 teachers working in primary and secondary schools. The first sample size was found suitable in terms of such analyses as correlation, anti-image values, linearity, normality and reliability. On a further phase, exploratory factor analysis was carried out for validity examination. After the analyses, a four-dimension-structure that explained 49.5% of the total variance was carried out. The ranges of the items varied from .35 to .62 and the factor loads varied from .450 to .767. At the a-end of the analysis, the four dimensions were called “teacher, curriculum, education system, and school. A scientifically significant correlation was calculated among variables. The general reliability co-efficiency of the scale was calculated as .94. As a result, it can be said that this scale is efficiently valid and reliable enough to determine the factors that influence curriculum alignment.

Keywords: curriculum, compatibility, scale, correlation

1. Introduction

1.1 Curriculum Alignment

Within the literature, curriculum alignment generally used with such collocations of terms as “curriculum fidelity, curriculum alignment, coherent curriculum, and etc.” “Curriculum alignment” is defined as the compatibility between a country’s central curriculum determined by the ministry of education and what teachers do during the teaching process (Furtak, Ruiz-Primo, Shemwell, Ayala, Brandon, Shavelson and Yin, 2008; Bümen, Çakar and Yıldız, 2014). Pence et al. (2008:332) similarly define the term as “the application of a curriculum or an innovation by teachers in the way curriculum development experts design”. Ananda (2003:1) states that compatibility should be complementary for educational standards, assessment, and other constituents of the system, and have a collaboration to assess student learning effectively. In short, curriculum alignment is carrying out a curriculum in accordance with the designed form as the stakeholders (practitioners). Just as a vehicle operates thanks to the compatibility of all its parts, curriculum alignment can be explained with coherent operation of desired products during educational processes.

According to many studies (Webb, 1997; Aviles, 2001; Edglossary, 2014; Elsworth, 2014), there are two types of curriculum alignment as “vertical” and “horizontal”. Horizontal compatibility is defined as the match of course content with the teaching content (Aviles 2001). It can also be defined as the alignment of a designed curriculum and the practices teachers hold and the assessment they make. On the other hand, vertical compatibility is defined as the planning and application of a series of curricula from kindergarten to further twelve grades (Bergman et al., 1998).

There are publications in the literature referring to the type of the curriculum as “intended curriculum”, “planned (designed) curriculum”, “transmitted curriculum” depending on the characteristics of curricula (Kurz, Elliot, Wehby and Smithson, 2010; Burti Jr., 2010). There are still other publications that defining these with different significance or naming with different terms as “written, taught, assessed, and etc” (Glatthorn & Jailall, 2009; Burti Jr., 2010; Christensen, 2014; Wilson, 2015).

1.2 Aspects of Curriculum Alignment

There are many positive aspects of curriculum alignment. It builds a bridge between physical education practices and

theoretical education standards (Evans, 2014). It is stated that curriculum alignment is a very strong factor in school development and refers to a compatibility among all components of school curriculum –namely curriculum objectives, curriculum (teaching and using materials), and use of tests in assessment- (Crowell & Tissot, 1986). It can also be observed from the literature that in order to ensure standardization at a certain extent, the necessity and importance of compatibility between the curriculum designed by ministry of education for public and private school and the curriculum carried out by teachers at these schools (Crowell & Tissot, 1986; Webb, 1997; Armstrong & Suddards, 1999; Anderson, 2002; Bhola, Ĭmpara and Buckendahl, 2003; Olson, 2003; Webb, 2007; Kopera-Frye, Mahaffy and Svare, 2008; Vasquez, 2014). According to Vartuli and Rohs (2009), compatibility to an educational curriculum is a desired component of assessment, practice, and quality of research. According to Elsworth (2014), likewise, the provision of curriculum alignment can both improve the quality of education and academic achievement, and may reduce the effects of factors such as socioeconomic status and gender inequalities that have a significant role in academic performance during the teaching process. It is mostly entitled as one of the most powerful strategy to improve student achievement (Villarreal, 2001; Glatthorn, 1999; Kercheval & Newbill, 2001; McGehee & Griffith, 2001; Villarreal, 2001; Ybarra & Hollingsworth, 2001; Supovitz & Christman, 2003; Squires, 2005; Squires, 2009; Squires, 2012).

It is emphasized that there are factors that influence curriculum alignment directly or indirectly, and positively or negatively. According to Būmen et al. (2014), these factors are listed as: the characteristics of a teacher, curriculum, teacher education, institutional characteristics, regional social-economic-cultural characteristics, future-determining tests, changes, complexity and education systems.

There are studies (Çobanođlu, 2011; Kasapođlu, 2010; Fullan, 2005) which claim that curricula are modified by teachers on their own request or depending on the characteristics of the school or students; and teacher requests lead to such differences stem from teacher beliefs and approaches. Similarly, Gwimbi & Monk (2003) assert that school conditions and facilities affect teachers' decisions about teaching and their on-practice behaviors. In their studies, Caner & Tertemiz (2010) state that once the classroom door is closed, real school curriculum gets into practice and that teachers can endeavor their own beliefs and do what they have learnt. According to Öztürk (2012), in their classroom applications, teachers tend to reflect their individual preferences more broadly than what is envisaged on the annual curriculum. The author also refers to the fact that it is completely normal to differentiate between an annual curriculum and what is really carried out in classrooms. Explaining the reasons of the situation, he further asserts that unexpected situations might generally arise in education and therefore, the teacher might make certain changes on the curriculum due to some reasons derived from students and other factors.

1.3 Importance od Curriculum Alignment

Developed educational curricula are one of the key elements in the raising individuals desirable from a country's education system. There are numerous studies emphasizing the importance of curricula (Kaya, 2011; Glennerster, Kremer, Mbiti and Takavarasha, 2011; Demirel, 2012; UNESCO, 2015). Implementing curricula in the same way as they are intended is crucial to obtain expected results from education system. In order to implement curricula as they are intended, the factors affecting compatibility should carefully be analyzed and necessary measures should be taken accordingly. Some educators and administrators at all levels in various countries are said to assess and reshape to make their curricula aligned with the learning outcomes determined by their departments and government (Smith, 2014). It appears evident that there are no scales to determine the factors that affect curriculum alignment in the literature. The scale developed by this study is expected to bring significant contribution to the literature on curriculum alignment. The aim of this study is to develop a reliable and valid scale to determine the factors affecting 'curriculum alignment'.

2. Method

This section describes the stages and data analysis in the development process of the scale.

2.1 Participants

The participants of the study consist of 1728 secondary school teachers from different branches in the central district of Adiyaman in Turkey during 2014-2015 academic year. For the actual application of the development phase of the 'Scale for the Factors Influencing Curriculum alignment', 573 volunteer teachers, 33% of the participants, from primary and secondary schools participated in the study.

2.2 Procedure

During the development phase of the scale, a review of the literature was initially conducted and then, the reasons influencing curriculum alignment were listed. Ten teachers were asked an open-ended question: 'What are the factors that affect a teacher's curriculum alignment?' A 76-item pool was created based on the review of the literature and teacher responses. The questions in the item pool were presented to expert opinion to examine in terms of language and content validity, and the preliminary assessment was carried out by two experts. After necessary adjustments based on

proposals parallel to expert opinion, items on factors regarding teacher, curriculum, school, and education system were identified. The preliminary form consisted of 76 five-point Likert-style items. A five-point rating system was used in the scale. The draft form was applied to 573 teachers working in Adiyaman.

2.3 Data Analyze

Exploratory factor analysis was applied to determine the validity of the measurement instrument. Factor analysis is a multivariate analysis technique that describes the relationships which are quite difficult to interpret, and gathers significantly correlated items under structurally related but relatively independent factors. Factor analysis intends to attain results from a large number of structures (items) to definable few significant structures (factors) that can jointly be explained. (Büyüköztürk, 2002; Özdamar, 2002). In other words, it is a multivariate analysis that allows to present data more meaningfully and in a summary by depending on the correlation between variables.

During the factor analysis process, Kaiser-Meyer-Olkin Measures of Sample Adequacy Test was conducted to determine the suitability of the scale for factor analysis, and Barlett test was conducted to determine the correlation between variables. In order to determine the suitability of the scale, also, anti-image values, item variance, factor rates explaining total variance, and the load of each item on the factor was calculated. Pearson product-moment correlation was conducted to determine whether there is a relationship between factors on the scale. Cronbach's alpha analysis was performed to determine reliability co-efficient.

3. Results

In this section, findings obtained during the development of the scale are presented.

3.1 Findings on Validity

Factor analysis technique was applied in the development process of the scale. The findings obtained are presented below.

Phase One:

After the preparation of data that was analyzed in terms of validity and reliability at the end of the application, confidence efficiency level of the data set was primarily determined. Cronbach's alpha reliability coefficient for the whole scale was calculated as .95. During the reliability analysis process, because their correlation with the total score was below .35, "items 4, 15, 18, 21 and 76" were removed from the scale. The total scores of correlations for the rest of the items ranged from .35 to .62. In the following phase, to determine whether the data are normally distributed on the remaining 71 items, the P-P plot of the data set was examined, and the skewness and kurtosis values were calculated.

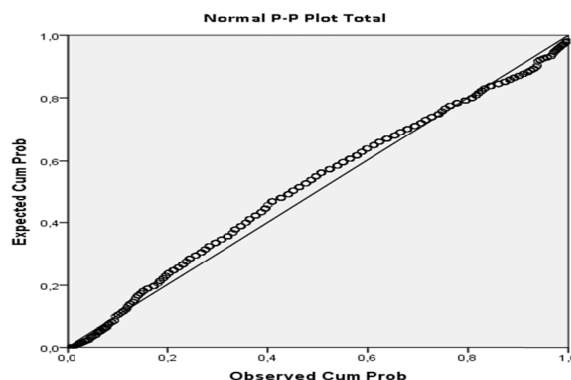


Figure 1. P-P Plot of Data Set

The analysis of P-P plots in Figure 1 indicates that the distribution of the data was found to be linear and normal. The skewness value was calculated -0.859 and Kurtosis 1.663 . Since these values are between -2 and $+2$, it was concluded that the data are normally distributed.

In the validation stage, the following findings in the Kaiser-Meyer-Olkin Measures of Sample Adequacy Test to determine if the sample sizes are suitable for factor analysis, and the following results in the Bartlett's Test analysis to determine the correlation between variables were obtained.

Table 1. KMO and Barlett's Test values

Kaiser-Meyer-Olkin Measures of Sample Adequacy Test		
,924		
Bartlett's Test	Chi Square	19911,391
	Independence	2485
	P	,000

KMO value of the data in Table 1 (KMO = 0.924) appears to be convenient for factor analysis in terms of sample size. Also, the findings for Barlett's Test are found to be scientifically significant, i.e. there are high correlations between the variables, and data is obtained from multiple normal distributions.

Another test that can be used in factor analysis is the 'anti-image' technique to determine whether each item is suitable for factor analysis. Anti-image values of the scale items ranged from .877 to .952. Therefore, it can be concluded that the material is suitable for factor analysis.

In the next stage, "principal components factor analysis" technique was applied to the data. The following results were obtained by applying this technique.

Table 2. Total variance exploratory percentages (a)

Component	Initial Basic Values			The sum of rotated square load		
	Total	Variance %	Cumulative %	Total	Variance %	Cumulative %
1	17,602	24,791	24,791	17,602	24,791	24,791
2	4,608	6,491	31,282	4,608	6,491	31,282
3	3,671	5,170	36,453	3,671	5,170	36,453
4	2,845	4,007	40,460	2,845	4,007	40,460
5	2,101	2,959	43,419	2,101	2,959	43,419
6	1,893	2,666	46,085	1,893	2,666	46,085
7	1,721	2,424	48,508	1,721	2,424	48,508
8	1,506	2,122	50,630	1,506	2,122	50,630
9	1,407	1,981	52,611	1,407	1,981	52,611
10	1,298	1,829	54,440	1,298	1,829	54,440
11	1,212	1,707	56,147	1,212	1,707	56,147
12	1,185	1,668	57,815	1,185	1,668	57,815
13	1,133	1,596	59,411	1,133	1,596	59,411
14	1,073	1,512	60,923	1,073	1,512	60,923
15	1,030	1,450	62,373	1,030	1,450	62,373

Analyzing the findings in Table 2, it was attained at the end of the factor analysis that the eigenvalue of the scale accumulated on 15 factors greater than one. Total variance exploratory rate of these 15 factors was calculated %62.37. Item variances ranged from .47 to .77.

During the application of Principal Component Factor Analysis, Scree Plot was also investigated. The following chart was obtained as a result of this analysis.

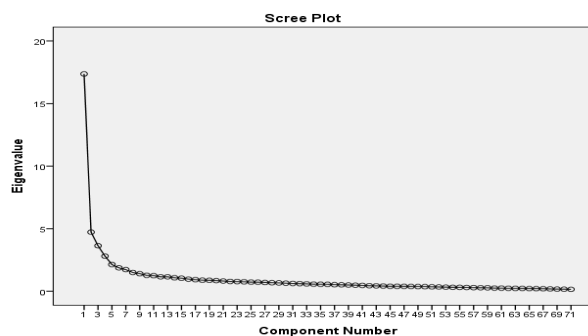


Figure 2. Scree plot chart regarding factors

As shown in Figure 2, the scale seems to be suitable on Scree Plot curve for decomposition from 2 to 5 factors. The scale was concluded to be based on four factors by investigating Scree Plot curve, and considering the results obtained from the interviews and four dimensional theoretical framework of the scale.

Second Phase:

After defining the number of factors as four, factor analysis was repeated conducting varimax technique due to the assumption of inter-factor correlations. Total variance ratio of the four factors in this analysis were calculated as 40.46%. During this analysis, because their variance was below .35, some items

(1-2-3-13-20-22-23-24-25-26-27-28-29-30-31-33-34-43-44-45-51-53-58) were excluded and the analysis was re-conducted. The following results were obtained with repeated analysis.

Table 3. Exploratory percentages of total variance (b)

Variance	Initial eigenvalue			The sum of rotated square loads		
	Total	Variance %	Cumulative %	Total	Variance %	Cumulative %
1	13,072	28,417	28,417	7,478	16,256	16,256
2	4,041	8,785	37,202	5,599	12,172	28,428
3	3,153	6,854	44,056	4,997	10,863	39,290
4	2,505	5,446	49,502	4,697	10,212	49,502

Examining the findings in Table 3, it can be seen that through conducted factor analysis the scale was explained with four factors, and the eigenvalue of the factors ranged from 12,505 to 13,072. The exploratory ratio of total variance for these four factors was calculated as 49.5%. In this phase, because their item variance value fell below .35, items 19 and 32 were excluded from the scale. The item variance value of the remaining items ranged from .35 to .62. These findings were considered sufficient for the validity of scale as a measurement tool.

After all these phases, the variable scope of each item, the load value in the variable, and common factor variances were calculated. The findings are presented in the following table.

Table 4. The items in the factors and load values

Factor 1		Factor 2		Factor 3		Factor 4	
Items	Item factor loads	Items	Item factor loads	Items	Item factor loads	Items	Item factor loads
i49	,665	i5	,574	i35	,591	i69	,626
i50	,608	i6	,497	i36	,758	i70	,721
i52	,450	i7	,592	i37	,765	i71	,751
i54	,612	i8	,715	i38	,767	i72	,732
i55	,675	i9	,656	i39	,730	i73	,616
i56	,743	i10	,666	i40	,734	i74	,702
i57	,664	i11	,723	i41	,659	i75	,735
i59	,612	i12	,687	i42	,562		
i60	,710	i14	,697	i46	,518		
i61	,555	i16	,690	i47	,514		
i62	,580	i17	,645				
i63	,503						
i64	,584						
i65	,601						
i66	,639						
i67	,612						
i68	,588						

It can be observed from the findings in Table 3.5 that item factor loads ranged from .450 to .767. Item 48 was excluded as its factor load fell below .45. Based on the findings from institutional and individual interviews, the factors were entitled as the factors regarding 'teacher, curriculum, school, and education system'. Identified factors, items under these factors, the number of items, and sample items are provided in the table below.

Table 5. Factors and number of items

Factors	Number of items	Item number	Sample item
Regarding teachers	11	i5-i6-i7-i8-i9-i10-i11-i12-i14-i16-i17	Teacher's attitude towards a new curriculum
Regarding curriculum	10	i35-i36-i37-i38-i39-i40-i41-i42-i46-i47	Indicating teaching content clearly in the curriculum
Regarding school	17	i49-i50-i52-i54-i55-i56-i57-i59-i60-i61-i62-i63-i64-i65-i66-i67-i68	Schools having necessary physical infrastructure
Regarding education system	7	i69-i70-i71-i72-i73-i74-i75	The existing centralized education system in our country
Total number of items	45		

In a following phase, 'Pearson moment correlation' was conducted to calculate the correlation between these four factors. The results obtained are presented in Table 6 below.

Table 6. The inter-factor correlation values

	<i>School</i>	<i>Education System</i>	<i>Teacher</i>	<i>Curriculum</i>
School	-	,460*	,572*	,418*
<i>Education System</i>			,281*	,349*
Teacher				,259*
Curriculum				

*p<0,01

Analyzing findings in the table, scientifically significant correlations between each factor can be observed based on $p < .01$. The highest correlation can be seen between the factors regarding school and teacher ($r = .572$). The correlation between education system and teacher is the lowest compared to the rest. Consequently, it can be stated that the dimensions on the scale are all correlated with each other.

Findings on Reliability

In this phase, the reliability analysis of the scale was re-conducted after excluding some items and identifying factors. The reliability value of identified factors was also calculated as the scale was finalized.

Table 1. The findings regarding reliability

Factors	Cronbach alpha
Factors regarding teacher	.886
Factors regarding curriculum	.881
Factors regarding school	.924
Factors regarding education system	.865
General	.940

The findings obtained indicate that the scale is a reliable measuring tool. As a result, it can be said that the scale is sufficiently reliable and valid.

4. Discussion

The aim of this study was to develop a scale to determine the factors that affect curriculum alignment. Based on a review of literature and seeking answers to 'What are the factors affecting curriculum alignment?' interview question, the first draft of the 76-item scale was conducted to a sample 573 participants.

It is indicated in the literature that it would be sufficient to apply the scale to at least five times as many participants as the number of items on developed draft. For a scale with 76 items, as this was applied to 573 participants, it meets the criteria. It is further stated that 300 participants for a factor analysis is 'good', 500 is 'very good', and 1000 is 'excellent' (Büyüköztürk, 2010; Tabachnick & Fidell, 1996). Consequently, it can be claimed that the sample size is sufficient for the development of a scale.

In order to identify the validity and reliability of the findings obtained in the application of the study, analyses were carried out. Factor analysis was applied for the validity of the scale. Before the factor analysis, the data was examined whether it was appropriate for analysis. The distribution of the data obtained from the scale was found to be linear and normal, and the reliability coefficient was found to be sufficient for analysis. The results of KMO, conducted to determine the suitability of the sample size, was found .90 'excellent', and Bartlett's test results, conducted to determine the relationship between variables showed that it was ready to analyze the data. During factor analysis, anti-image value of the items was calculated. Normally, anti-image value of the items is expected to be above .50. Obtained results indicated that anti image value was acceptable.

After determining that the data was ready for factor analysis, it was carried out for the principal components. In the first step of this two-phase analysis, a 15-factor structure explaining 62,373% of total variance was obtained. Considering qualitative analysis results and the theoretical framework used in the examination of Scree plot graphs and turning the scale into a draft, the analyses were repeated in four dimensions. In the end of these analyses, the scale had a four-dimensional structure and explained 49.50% of total variance. The analyses continued as this result was acceptable. Some items were excluded due to their item variance values.

According to Büyüköztürk (2002:473), items in the factors must have high load values. It is considered to be a good criterion of selection for factors to have a load value of 0.45 or higher. In this study, the value of item factor load was accepted as 0.45. The factor loads of four-dimensional items were acceptable, too.

Factors in the scale were entitled as 'teacher, curriculum, school, and education system'. The dimension regarding 'teacher' included such factors as teacher's motivation, job satisfaction, attitudes about the curriculum, openness to change, self-confidence, teaching enthusiasm, content knowledge, competence regarding curriculum, self-efficacy and readiness to teaching progress'.

The second dimension related to factors affecting curriculum alignment emerged as factors regarding ‘curriculum’. The vagueness of teacher roles in curricula, the unclear statement of objectives, content, teaching activities, assessment and evaluations in curricula, the complexity of innovations made in curricula, non-applicability of innovations, the difficulty of curricula, and the preparation of curricula without considering in-class processes were identified as factors affecting curriculum alignment.

Another dimension in the scale was regarding ‘school’. Under this scope there were such factors as inconvenience of school’s physical infrastructure, school climate, crowded classrooms, support from school administration, leadership of executives, insufficiency of teaching materials, the environment in which the school is located and characteristics of students.

The final dimension in the scale was on “education system”. The inclusion of bureaucracy into educational process by the ministry of education, frequently changed national education policies, centralized education system, future-determining exams, out-of-field teacher assignments, and not considering the characteristics of the nation during curriculum development were included in the scale as affecting factors.

The correlations between identified four dimensions of the scale were calculated, and they were acknowledged to be scientifically significantly correlated. The reliability coefficient of the 45-item scale was found to be adequate. It can be claimed that this 5-point Likert-type scale is reliable and valid with its 45 items.

Consequently, it can be asserted that the scale has proper characteristics to be used by researchers who want to identify factors affecting curriculum alignment.

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Appendix

The Scale on Factors Regarding Curriculum Alignment

		(1) definitely not efficient (2) not efficient (3) partly efficient (4) efficient (5) very efficient
Factors regarding teacher		
1	Teacher's motivation	()
2	Teacher's job satisfaction	()
3	Teacher's attitude towards a new curriculum	()
4	Teacher's openness to innovations	()
5	Teacher's self-confidence	()
6	Teacher's teaching enthusiasm	()
7	Teacher's content knowledge	()
8	Teacher's having up-to-date knowledge on curriculum (e.g. branched grid usage, etc.)	()
9	Teacher's professional competence	()
10	Teacher's self-efficacy	()
11	Teacher's preparedness (towards teaching process)	()
Factors regarding curriculum		
12	Vagueness of teacher roles in the curriculum	()
13	Vagueness of objectives in the curriculum	()
14	Vagueness of teaching content in the curriculum	()
15	Vagueness of teaching activities in the curriculum	()
16	Vagueness of assessment and evaluation in the curriculum	()
17	Complexity of the innovations made in the curriculum	()
18	Unpracticality of the innovations made in the curriculum	()
19	The difficulty of curriculum content	()
20	The development of curriculum without the basis of practicality	()
21	The development of curriculum without the basis of teaching processes, distance from reality	()
Factors regarding school		
22	Schools' not having necessary physical infrastructure	()
23	School climate	()
24	Crowded classrooms	()
25	Support from school administration	()
26	Opportunities provided by school executives to teachers for teaching process	()
27	School administration's attitude in problem solving	()
28	Effective leadership of school executives	()
29	The motivation of school staff (school principal, personnel, etc.)	()
30	Accessibility to materials during curriculum application process	()
31	Insufficiency of teaching materials	()
32	Institutions and organizations promoting the curriculum (institutions related to the field, etc.)	()
33	The society's not having relevant characteristics for curriculum application	()
34	Cultural characteristics of school environment	()
35	Economic characteristics of school environment	()
36	Characteristics of the student in classrooms (physical, mental, affective, etc.)	()
37	Academic achievement of the student in classrooms	()
38	Individual learner differences in classrooms	()
Factors regarding education system		
39	The inclusion of bureaucracy into educational process by ministry of education	()
40	Frequent changes in educational policies	()
41	Existing centralized education system	()
42	Future determining exams (TEOG, LYS, etc.)	()
43	Teachers' ignorance of certain teaching contents because they are not covered in future determining exams (TEOG, LYS, etc.)	()
44	Out-of-field teacher assignments	()
45	The development of curricula without considering the characteristics of the nation	()



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