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Development of Curriculum Practices Proficiency Scale for School Principals: A Study of Validity and Reliability

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Abstract

The main aim of this study is to test the construct validity of the scale of school principals' self-efficacy perceptions in managing curriculum implementation through confirmatory factor analysis (CFA). The study group consisted of 297 school principals working in primary, secondary and high schools affiliated to Trabzon Provincial Directorate of National Education. The data of the study were obtained by using the Self-Efficacy Perceptions of Managing Curriculum Implementation Scale. In the CFA analysis conducted to test the scale structure, χ^2/sd ratio was calculated as 1.68; RMSEA: 0.05; SRMR: 0.04; IFI: 0.95; TLI: 0.94; CFI: 0.95; GFI: 0.88; AGFI: 0.86; RMR: 0.02. These values indicate an acceptable fit. Cronbach Alpha value for the entire scale was measured as 0.94. Alpha value indicates that the reliability level of the scale is high. The Confirmatory Factor Analyses suggest that the scale assessing school principals' perceptions of self-efficacy in managing curriculum implementation, comprising 28 items across 4 factors, demonstrates construct validity.

Keywords: Construct validity, curriculum implementation, curriculum management, school principals

1. Introduction

One of the basic components of education is the curriculum. No matter how well developed a curriculum is, it is effective implementation that brings it to life. Implementation is the totality of the joint efforts of students, teachers and school principals to ensure the effective implementation of the curriculum. Curriculum implementation is the means of achieving the desired goals, and the new curriculum needs to be transformed into practice in order to yield results (Fullan, 2015). Neglecting the implementation process may lead to program breakdown or inefficiency (Wiles, 2016). It is the responsibility of the school administration to provide support and a conducive environment for the implementation of the curriculum. The school principal plays an important role in the process of developing, organizing, implementing and evaluating the curriculum (Chan, Ridley & Morris, 2022).

Despite the critical nature of curriculum implementation, most of the literature on curriculum focuses on curriculum development (Bahtilla & Hui, 2020). Curriculum researchers believe that curriculum implementation is a much more complex and difficult process than curriculum development (Cooper, 2017; Fullan, 2015; Lewy, 1977; Snyder, Bolin & Zumwalt, 1992).

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Teachers, who are primarily responsible for the implementation of the curriculum, face various difficulties in introducing the curriculum, setting goals, limiting and organizing content, and determining the teaching approach and assessment methods (Bennie & Newstead, 1999; Chaudhary, 2015; Fullan, 2015; Mkandawire, 2010).

Several factors may negatively impact curriculum implementation. Chaudhary (2015) listed the factors that hinder curriculum implementation as teacher, students, resources and materials, interest groups, school environment, culture and ideology, and supervision of teaching. Fullan (2015) stated that difficult classroom conditions, lack of training, inappropriate school environments, inadequate resources, and underperforming classes can negatively affect curriculum implementation.

The implementation of the curriculum requires strong and robust management support (Coleman 2003; Fullan, 1983). Tomlinson (2004) pointed out the importance of school management to implement the curriculum within a stipulated time. One of the important tasks of school principals is to supervise the curriculum implementation. Efforts to implement the curriculum without the support of the school principal are doomed to failure (Oliva & Gordon, 2018). If principals can create a school environment characterized by positive relationships among teachers, curriculum changes can be implemented more easily (Ornstein & Hunkins, 2014). In addition, principals have the roles of supervising teaching, coordinating the school curriculum, and monitoring student progress. By performing these roles effectively, principals can improve teaching and learning (Leithwood, Harris & Hopkins, 2008). Indeed, teachers expect principals to be instructional leaders and supporters of curriculum initiatives, and also to be highly visible and active in the school environment (Marsh, 2004).

The driving force that principals provide to education has a significant impact on the success of curriculums (Garner & Bradley, 1991). As instructional leaders, principals focus more on curriculum development and improvement than on administration and personnel (Lunenburg, 2013). Hallinger (1992) defined the instructional leader as "the primary source of information for the school's curriculum". Principals' effectiveness in curriculum implementation relies on their skills, expertise, and thorough knowledge of curriculum areas. (Kabiro, 2013). Taylor (2006) suggested that principals who neglect to highlight the importance of curriculum information and lack an understanding of it will be unsuccessful in providing effective leadership to teachers.

Curriculum implementation requires sound and strong management. School principals' leadership of curriculum implementation can contribute to the improvement of the instructional climate in schools. Instructional leadership, which emphasizes the technical basis of instruction, curriculum, and assessment, directs and influences the daily activities of teachers and students in schools (Marks & Printy, 2003). Hallinger & Murphy (1985; 221-223) proposed three dimensions for the principal's instructional leadership role: (1) "defining the school's mission", (2) "managing the instructional curriculum", and (3) "promoting a positive school learning climate". The Wallace Foundation (2013: 6) stated that a principal has five key responsibilities when assuming a curriculum leadership role: (1) "shaping a vision of academic academic for all students", (2) "creating a climate hospitable to education" (3) "cultivating leadership in others" (4) "improving instruction" and (5) "managing people, data, and processes to foster school improvement." In addition, curriculum leadership includes the managerial behaviors of coordinating the curriculum, monitoring and evaluating teacher practice, encouraging teachers' professional development, and supporting a collaborative work culture. Therefore, school principals are expected to have sufficient knowledge and skills to manage the curriculum implementation process.

One of the dimensions of instructional leadership is managing the curriculum. In this dimension, the administrator has the duties of supporting the teacher, creating a positive environment, supervising and evaluating teaching, explaining the educational objectives of the curriculum to employees and parents, solving problems that prevent the implementation of the curriculum, preparing an environment suitable for learning, supervising and evaluating the educational process (Başaran, 2006). The level of implementation of educational curriculums largely depends on the competencies of school principals to fulfill these roles. In this regard, the extent to which school principals consider themselves competent in managing curriculum implementation processes is an important research topic. The findings from studies conducted at each school level on school principals' perceived competence in curriculum implementation roles and responsibilities are expected to guide improvement initiatives and managerial decisions. This contribution is anticipated to enhance the literature in this field.

The effectiveness of the curriculum implementation process in a school is largely related to the self-efficacy of school principals who are responsible for implementation. Research shows that self-efficacy beliefs are determinant for behaviors (Bandura, 1986). Therefore, in order to predict the administrative behaviors of school principals, there is a need for a valid and reliable instrument to measure their self-efficacy perceptions in managing curriculum implementation. This study aims to assess the construct validity of Akyıldız's (2017) "Development of Curriculum Practices Proficiency Scale for School Principals: A Study of Validity and Reliability" using confirmatory factor analysis (CFA). Exploratory Factor Analysis (EFA) was used to develop the first form of the scale. CFA is a statistical technique used to confirm the factor structure of a set of observed variables (Suhr, 2006). While EFA is generally used in the early stage of the scale development process (Brown & Moore, 2012), CFA is used as a second step to examine whether the factor structure defined by EFA works in a new sample (Harrington, 2009). As emphasized in the literature, Confirmatory Factor Analysis (CFA) was employed to test the theoretical structure of the scale, which was previously identified through Exploratory Factor Analysis (EFA), using a different sample. It is anticipated that this study will enhance the validity and reliability of the scale.

2. Method

2.1. Research Model

The survey model was adopted to test the structure of the 'Self-Efficacy Perception Scale for Managing Curriculum Practices' obtained through Exploratory Factor Analysis (EFA) using Confirmatory Factor Analysis (CFA) for school principals. "A survey is a research model aimed at determining situations that have existed in the past or currently exist as they are." (Karasar, 2019, p. 109). "The survey method enables the quantitative determination of trends, attitudes, or opinions in the population through studies on a sample selected from that population" (Creswell, 2013, p. 155).

2.2. Study Group

The study group of this research consists of principals working in schools affiliated to Trabzon Provincial Directorate of National Education. The research data were collected on a voluntary basis in an in-service training seminar attended by school principals. The study group consisted of 297 school principals, 19 of whom were female (6.4%) and 278 of whom were male (93.6%). Of the school principals, 138 (46.5%) had 1-5 years of seniority (time spent as a school principal), 63 (21.2%) had 6-10 years of seniority, 36 (12.1%) had 11-15 years of seniority, 26 (8.8%) had 16-20 years of seniority, and 34 (11.4%) had 21-25 years of seniority. 66 (22.2%) of the principals work in primary schools, 101 (34.0%) in secondary schools and 130 (43.8%) in high schools. Of

the school principals, 151 (50.8%) have bachelor's degrees and 146 (49.2%) have postgraduate degrees. There are different views on sample size in the literature. According to Anderson and Gerbing (1984), CFA sample size should be more than 100, and according to Hu and Bentler (1999), sample size should be more than 250 for variables that do not show normal distribution.

2.3. Data Collection

The research data were obtained using the "Development of Curriculum Practices Proficiency Scale for School Principals: A Study of Validity and Reliability". The scale developed by Akyıldız (2017) has a four-factor structure, namely "Curriculum Knowledge", "Supporting the Teacher", "Creating a Positive Environment" and "Supervising Teaching". There are 6 items in the first factor, 8 items in the second factor, 6 items in the third factor and 8 items in the fourth factor, respectively. The scale consists of 28 items. Cronbach Alpha coefficients for the dimensions are as follows: curriculum knowledge, 0.84; supporting the teacher, 0.91; creating a positive environment, 0.86; and 0.94 for the overall scale. The correlation coefficients between the factors of the scale ranged between 0.43 and 0.87. A positive relationship was observed between the sub-factors of the scale at $p < 0.01$ significance level.

SSPMCI is a 5-point Likert-type scale. To ensure equal spacing of scores between 1 and 5 on the scale, score intervals were established as 0.80 using the formula $(n-1)/n$. Accordingly, the intervals were determined as 1,00-1,79 "Not at all adequate", 1,80-2,59 "Not adequate", 2,60-3,39 "Partially adequate", 3,40-4,19 "Adequate" and 4,20-5,00 "Fully adequate". The lowest score that can be obtained from the scale is 28 and the highest score is 140. As the factor scores of the scale increase, the self-efficacy perceptions of school principals in managing curriculum implementations related to the dimensions also increase.

2.4. Data Analysis

AMOS 22 program was used in the analysis of the data. Before proceeding to CFA, the normal distribution of the data was checked. Chi square statistics were used for model fit. A lower chi-square statistic indicates better model fit (Alavi, Visentin, Thapa, Hunt, Watson & Cleary, 2020). When the chi-square statistic is affected by the sample size, the ratio of the chi-square statistic to the relevant degrees of freedom (χ^2 / df) is preferred (Wheaton, Muthen, Alwin & Summer, 1977).

Many fit indices are used in CFA to test the models. There are different opinions in the literature about which of the fit indices to use. For example, Brown (2006) stated that RMSEA, SRMR, CFI and NNFI (TLI) fit indices, and Kline (2005) stated that reporting RMSEA, χ^2 , CFI and SRMR fit indices would be sufficient. However, in the literature, it is recommended to use multiple fit indices to test the model (Jöreskog & Sörbom, 1993; Kline, 2005; Schumacker and Lomax, 1996; Tabachnick & Fidell, 2013). Generally, χ^2 , χ^2 / df , GFI, IFI, CFI and RMSEA values are reported in the studies, and RMR, NFI and AGFI values are also included in some studies (Meydan & Şeşen, 2015: 72). In this study, the model was tested using the following fit indices: χ^2 (Chi-Square Goodness), χ^2 / df (Chi-square divided by the degrees of freedom), RMSEA (Root Mean Square Error of Approximation), SRMR (Standardized Root Mean Square Residual), IFI (Incremental Fit Index), TLI (Tucker Lewis Index), CFI (Comparative Fit Coefficient), GFI (Goodness of Fit Index), AGFI (Adjustment Goodness of Fit Index) and RMR (Root Mean Square Residual). Cronbach Alpha values were calculated to determine the reliability of the scale.

2.5. Ethics Committee Permission

In this study, all the rules specified in the Scientific Research and Publication Ethics Directive for Higher Education Institutions were strictly followed. The ethical approval for this study was obtained from Trabzon University's Ethics Committee for Social and Humanities Research (07.07.2023/2023-7/1.7).

3. Findings

Before conducting CFA, the sample size and whether the data showed a normal distribution were examined. In this study, the sample size is 297. According to Hu & Bentler (1999), the sample size should be more than 250 for variables that do not show normal distribution. Therefore, it can be claimed that the sample size is sufficient for CFA. In the normality test, Skewness and Kurtosis values were determined as 0.105 and -0.028, respectively. It is accepted that the distribution is normal if the Kurtosis and Skewness values are between -1.5 and +1.5 (Tabachnick & Fidell, 2013). Thus, these values indicate the normality of the distribution. It was observed that there were no missing data and outliers in the data set.

Firstly, the chi-square maximum likelihood method was used to evaluate the fit between the hypothesised model and the data from the observed variables. The χ^2 /df of the scale was found to be 1.68. When the χ^2 /df value is ≤ 2 , it indicates good fit (Cole, 1987). As a result of the analysis, it was observed that some of the fit indices were close to the accepted reference values but did not fully represent the desired values. In cases where the values for CFA do not comply with the fit indices, modifications can be made between the appropriate items in order to improve the model, while remaining within the same factor (Evcı & Aylar, 2017). In order to make the obtained values more compatible with the fit indices, modifications were made between items e16 and e17; e19 and e20; e22 and e23; e24 and e25 under the same factor in order to obtain a better fit by taking into account the modification suggestions made by the AMOS program. The factor loadings of the scale are given in Figure 1.

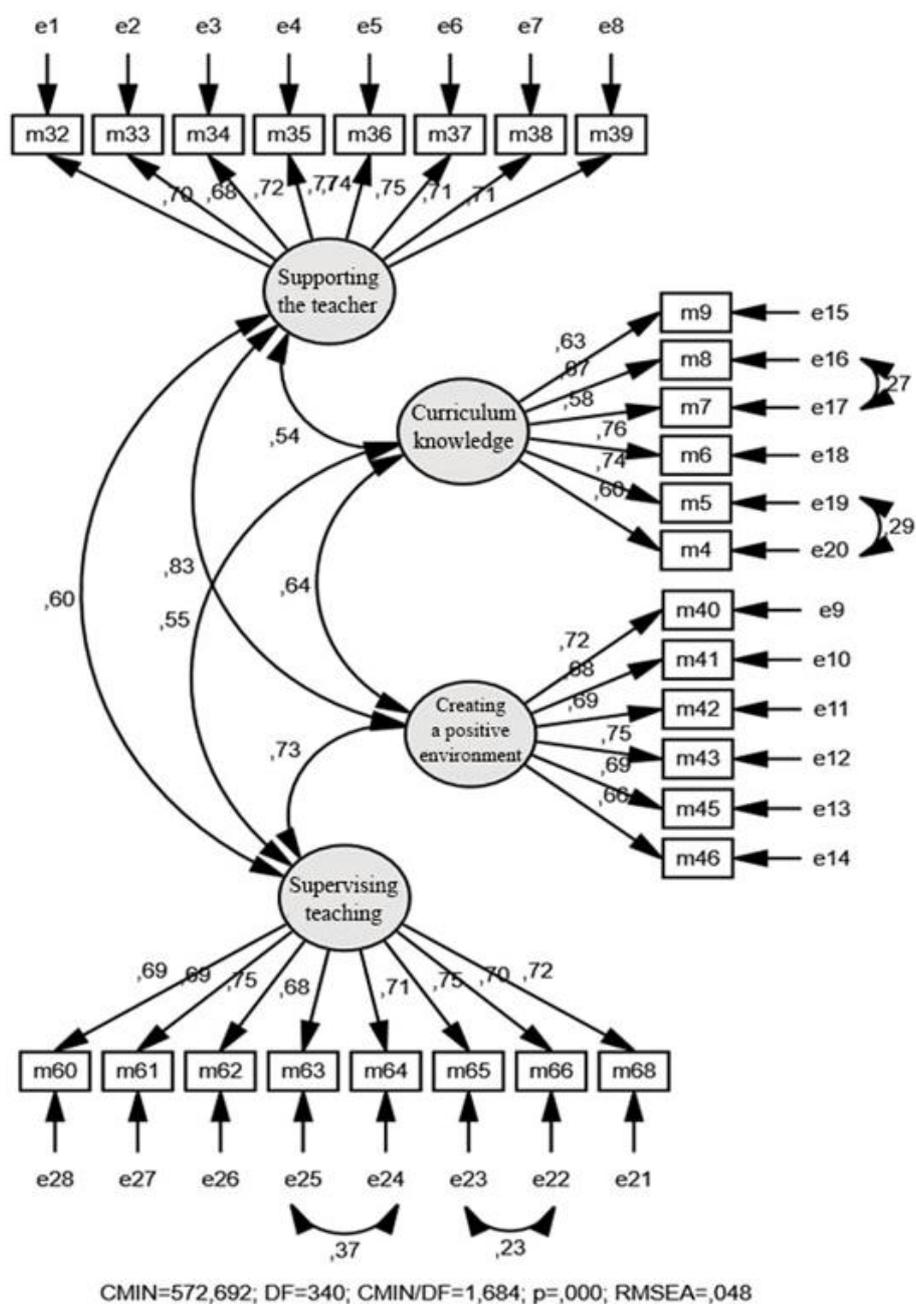


Figure 1. Four-factor Structure of the SSPMCI Scale

Figure 1 shows the item loadings of the "school principals' self-efficacy perceptions of managing curriculum implementation scale". The distribution of item loadings on the sub-factors ranged between 0.68 and 0.77 for supporting teachers; 0.58 and 0.76 for curriculum knowledge; 0.66 and 0.75 for creating a positive environment; and 0.68 and 0.75 for supervising teachers.

In the study, χ^2/df , RMSEA, SRMR, IFI, TLI, CFI, GFI, AGFI and RMR values were reported. The fit index values for the scale and the reference values for the standard fit indices in the

literature are given in Table 1. The values obtained for the scale were interpreted by considering the CFA values referenced in the relevant literature (Anderson & Gerbing, 1984; Bayram, 2013; Browne & Brown, 2006; Cudeck, 1993; Hooper, Coughland & Mullen, 2008; Hu & Bentler, 1999; Kline, 2005; Seer, 2015; Schermelleh-Engel, Moosbrugger & Mller 2003; ŐimŐek, 2007; Tabachnick & Fidell, 2013).

Table 1

CFA Values of "The Scale of School Principals' Self-Efficacy Perceptions In Managing Curriculum Implementations"

Fit Indices	Perfect Fit	Acceptable Fit	Values Related to the Scale	Compatibility of the Scale
χ^2/df	$0 \leq \chi^2/df \leq 2$	$2 \leq \chi^2/df \leq 3$	1,68	Perfect fit
RMSEA	$0 \leq RMSEA \leq 0,05$	$0,05 < RMSEA \leq 0,10$	0,05	Perfect fit
SRMR	$0 < SRMR \leq 0,05$	$0,06 < SRMR \leq 0,10$	0,04	Perfect fit
IFI	$0,95 \leq IFI \leq 1,00$	$0,90 \leq IFI < 0,95$	0,95	Perfect fit
TLI	$0,95 \leq TLI \leq 1,00$	$0,90 \leq TLI < 0,95$	0,94	Acceptable fit
CFI	$0,95 \leq CFI \leq 1,00$	$0,90 \leq CFI < 0,95$	0,95	Perfect fit
GFI	$0,90 \leq GFI \leq 1,00$	$0,85 \leq GFI \leq 0,89$	0,88	Acceptable fit
AGFI	$0,90 \leq AGFI \leq 1,00$	$0,85 \leq AGFI \leq 0,89$	0,86	Acceptable fit
RMR	$0,00 \leq RMR \leq 0,05$	$0,05 \leq RMR \leq 0,08$	0,02	Perfect fit

When the fit values obtained for the scale in Table 1 are examined, it is seen that the χ^2/df ratio is 1.68 ($\chi^2/df = 572,692/340$). A calculated χ^2/sd value lower than 3 indicates that the factor structure is perfectly compatible (Kline, 2005). According to Table 1, RMSEA value of 0.05 and SRMR value of 0.04 indicate perfect fit (Kline, 2005; Schumacker & Lomax, 1996), IFI value of 0.95 and CFI value of 0.95 indicate perfect fit (okluk, Őekerciođlu & Bykztrk, 2012; Kline, 2005; Thompson, 2004) and RMR value of 0.02 indicates perfect fit (Brown, 2006). The TLI fit value of the scale was calculated as 0.94. A TLI value of 0.95 and above indicates a good fit, and a TLI value above 0.90 indicates an acceptable fit (Hu & Bentler, 1999). The table also shows that the GFI value is 0.88 and the AGFI value is 0.86. GFI and AGFI values greater than 85 are considered acceptable fit values (Bayram, 2013; Schermelleh-Engel, Moosbrugger & Mller 2003; Seer, 2015). Accordingly, the calculated TLI, GFI, AGFI values of the scale show acceptable fit values. Based on these results, it can be concluded that the Scale of School Principals' Self-Efficacy Perceptions of Managing Curriculum Implementation has construct validity. Factor number, reliability coefficients and reliability levels of the scale are shown in Table 2.

Table 2

Number of Items, Factor Loadings, and Cronbach Alpha Reliability Coefficients of Sub-Factors

Factors	Number of Items	Cronbach Alpha coefficients (α)	Confidence level
1. Curriculum Knowledge	6	0,84	Highly Reliable
2. Supporting the Teacher	8	0,90	Highly Reliable
3. Creating a Positive Environment	6	0,85	Highly Reliable
4. Supervising teaching	8	0,90	Highly Reliable

Cronbach Alpha values were calculated for the reliability of the scale. These values were calculated as 0.84 for the "curriculum knowledge" factor, 0.90 for the "supporting the teacher" factor, 0.85 for the "creating a positive environment" factor and 0.90 for the "supervising teaching" factor. In the interpretation of alpha values, if $0.80 \leq \alpha < 1.00$, the scale is considered

highly reliable (Özdamar, 2002). Cronbach Alpha values indicate that the reliability level of the scale is high.

4. Discussion and Conclusion

In the existing literature, Akyıldız (2017) has introduced a scale designed to assess school principals' perceptions of competence in managing curriculum practices. The factor structure of the scale developed with EFA method was tested with CFA in this study. As a result of the analyses, it was concluded that the Chi Square (χ^2) Goodness of Fit Test: 1.68, RMSEA: 0.05, SRMR: 0.04, IFI: 0.95, TLI: 0.94, CFI: 0.95, GFI: 0.88, AGFI: 0.86 and RMR: 0.02 values confirmed the factor structure of the SSPMCI determined by EFA and that the scale has a four-factor structure. Cronbach and Alpha values of the scale ranged between 0.84 and 0.94. Cronbach and Alpha values in the range of $0.81 < \alpha < 1.00$ indicate that the scale is highly reliable (Özdamar, 2002). Based on these findings, it can be concluded that SSPMCI is a valid and reliable measurement scale suitable for data collection in studies involving primary, secondary, and high school principals.

The validity and reliability of the scale can be tested on different sample groups. Research can be conducted to examine the relationship between school principals' self-efficacy perceptions of managing curriculum practices and other variables such as instructional leadership and curriculum commitment. In addition, the teacher form of the scale can be developed.

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Ethics Committee Permission:

In this study, all the rules specified in the Scientific Research and Publication Ethics Directive for Higher Education Institutions were adhered to. The ethical approval for this study was obtained from Trabzon University's Ethics Committee for Social and Humanities Research (07.07.2023/2023-7/1.7).

Appendix: Scale of School Principals' Self-Efficacy Perceptions in Managing Curriculum Implementations. (Researchers can use the scale in their studies by adhering to ethical rules.)

Curriculum Knowledge	
1. (8)	Having knowledge about the tools and materials required by the curriculum.
2. (5)	Having knowledge about the methods and techniques required by the curriculum.
3. (4)	Having knowledge about the teaching approaches to be used in the teaching of the curriculum.
4. (7)	Having knowledge about the helpful resources required by the curriculum.
5. (6)	Having knowledge about the teaching environments required by the curriculum.
6. (9)	Having knowledge about testing and evaluation techniques required by the curriculum.
Supporting the Teacher	
7. (39)	Making necessary suggestions at teachers' board meetings regarding the implementation of the curriculum.
8. (34)	Supporting all kinds of collaboration between teachers on curriculum implementation.
9. (38)	Encouraging teachers to participate in activities such as courses, seminars, etc. related to the implementation of the curriculum.
10. (32)	Encouraging teachers to review course syllabuses.
11. (35)	Guiding teachers to consider curriculum objectives together with student goals and expectations.
12. (37)	Preparing environments where teachers can share their knowledge and experiences regarding the implementation of the curriculum with each other.
13. (36)	Encouraging teachers to develop learning and teaching strategies tailored to students' individual differences.
14. (33)	Coordinating cooperation between teachers to ensure unity between course curricula and practices.
Creating a Positive Environment	
15. (40)	Guiding teachers in organizing alternative learning activities appropriate to students' individual differences.
16. (41)	Developing solutions and suggestions along with teachers to the problems that arise during the implementation of the course curriculum.
17. (43)	Providing guidance to teachers on employing testing and evaluation methods aligned with the objectives and learning outcomes of the curriculum.
18. (42)	Guiding teachers to take students' individual characteristics (interest, needs, expectations, etc.) into consideration when preparing learning activities.
19. (45)	Collaborating with teachers to identify the strengths and weaknesses of the curriculum.
20. (46)	Encouraging teachers to implement new curriculum.
Supervising Teaching	
21. (64)	Comparing and analyzing the questions prepared to measure the student success with the learning outcomes of the curriculum.
22. (63)	Ensuring that exam questions for students are aligned with the learning outcomes specified in the course curriculum.
23. (65)	Conducting monitoring studies to assess the implementation of course curricula. (Observation, supervision, interview, examining students' works, etc.)
24. (62)	Checking whether alternative measurement and evaluation methods and techniques are reflected in practice by teachers.
25. (68)	Determining the achieved and unachieved objectives/learning outcomes of the curriculum based on the exam results and sharing them with teachers.
26. (60)	Checking the measurement tools (Exam paper, performance and project evaluation scale, etc.) prepared by teachers to measure the objectives/learning outcomes in the curriculum of the courses before applying them.
27. (61)	Organizing meetings to make a general evaluation of the curriculum of the courses.
28. (66)	Observing the implementation process of course curriculum in the learning environment.