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Research Article

Yükseköğretimde Program Liderliği: Bir Ölçek Geliştirme Çalışması

Curriculum Leadership in Higher Education: A Scale Development Study

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Özet: Öğretim elemanlarının yükseköğretim ekosistemindeki "değişkenliği, belirsizliği, karmaşıklığı ve muğlaklığı" (VUCA dünyasını) dikkate alan, ortak akla dayalı, şeffaf bir liderlik anlayışıyla program geliştirme (tasarlama, değerlendirme ve güncelleme) sürecinde stratejik bir rol oynadığı düşünülmektedir. Bu düşünceden hareketle öğretim elemanlarının program liderliği düzeylerinin incelenebilmesi amacıyla geliştirilen Program Liderliği Ölçeği'nin 150 madde ve tek boyuttan oluştuğu saptanmıştır. Açımlayıcı faktör analizi sonucunda öz değeri birden büyük olan 31 faktörlü bir yapının ortaya çıktığı gözlenmiştir. Öte yandan ilgili alan yazında program liderliğine ilişkin çeşitli boyutların olduğunu öne süren araştırmalar bulunsa da bu boyutların iç içe geçmesi nedeniyle boyutlar arasında tam bir ayrımın yapılamadığı göz önünde bulundurularak bu araştırma kapsamında birinci ve ikinci öz değer oranı da incelenmiştir. Nitekim birinci ve ikinci öz değer oranının üçten büyük olması nedeniyle tek boyutlu bir yapının ortaya çıktığı sonucuna varılmıştır. Ayrıca öz değeri birden büyük olan ikincil minör faktörlerin bulunması nedeniyle ölçek yapısının temel tek boyutluluğa uygun olduğu tespit edilmiştir. Tek faktörlü bu yapının toplam varyansın %45.312'sini açıkladığı belirlenmiştir. Bununla birlikte ölçeğin tek faktörlü yapısını test etmek amacıyla gerçekleştirilen doğrulayıcı faktör analizi sonucunda uyum indekslerinin kabul edilebilir aralıkta olduğu saptanmıştır. Rasch analizi sonucunda ise model-veri uyumunun sağlandığı görülmüştür. Öte yandan Cronbach alpha iç tutarlık katsayısı 0.951 olarak bulgulanmıştır. Özetle; Program Liderliği Ölçeği'nin geçerlik ve güvenirlik değerlerinin yüksek düzeyde olduğu saptanmış olup elde edilen bulgular, öğretim elemanlarının program liderliği düzeylerini belirlemeye yönelik ilk ölçme aracı olma özelliği taşıyan bu ölçeğin öğretim elemanlarının program liderliği düzeylerini belirleme noktasında geçerli ve güvenilir bir araç olduğunu ortaya koymuştur.

Anahtar Kelimeler: Yükseköğretim, Program Liderliği, Ölçek Geliştirme

Abstract: Lecturers considered to play a strategic role in the curriculum development (design, evaluation and revision) process with a transparent leadership approach based on common sense, taking into account the "volatility, uncertainty, complexity and ambiguity" (VUCA world) in the higher education ecosystem. Based on this idea, the Curriculum Leadership Scale was developed and the scale was found to consist of 150 items and a single dimension in order to examine the curriculum leadership level of lecturers. In exploratory factor analysis, 31-factor structure with the eigenvalue greater than one emerged. Even though there were various dimensions of curriculum leadership, complete distinction could not be made between the dimensions due to the intertwining of these dimensions in the relevant literature. So, the first and second eigenvalue ratio were also examined in this study. Unidimensional structure emerged in this study since the first and second eigenvalue ratio were greater than three. Also, the scale structure was suitable for essential unidimensionality due to the presence of secondary minor factors with eigenvalues greater than one. This unidimensional structure explained 45.312% of the total variance. Besides, the fit indices were within the acceptable range in confirmatory factor analysis. In addition, model-data fit was ensured in Rasch analysis. On the other hand, the Cronbach alpha internal consistency coefficient was found to be as 0.951. In sum, the Curriculum Leadership Scale (the first measurement tool to determine the curriculum leadership level of lecturers) was a valid and reliable tool for determining the curriculum leadership level of lecturers.

Keywords: Higher Education, Curriculum Leadership, Scale Development

1. Introduction

Higher education institutions were accepted as the centre of research and innovation culture (Öztemel, 2013). Also, they played an important role in the construction of knowledge that would shape the future of societies.

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Besides, they played an important role in the training of highly qualified manpower required by the current era (Adem, 1977; Kaya, 2009, as cited in Yılmaz & Tınmaz, 2016). As it was known, curriculum approaches constituted the basis of university education and university education had various roles in society(s) since the establishment of universities (Imenda, 2006). These roles were *(i) supporting the ideological thinking of the national state, (ii) functioning as a mechanism for selecting elites, (iii) generating new knowledge,* and *(iv) training professionals to serve the economy.* Universities had given these roles varying levels of importance in line with historical periods and sociopolitical contexts, but largely continued to prioritise the curriculum (Adam, 2009). Currently, the need for quality and qualified curriculum was becoming increasingly important in order to enable higher education institutions to respond to the rapidly changing and developing world. Based on this importance and need, the design of an appropriate curriculum was considered a fundamental cornerstone for the service quality of all higher education institutions, regardless of the type of institution and programme (Khan & Law, 2015). Therefore, the responsibility of managing curriculum was associated with the academic and administrative staff(s) as well as students' commitment to learning in the context of strengthening higher education institutions. Also, strategic human resources were trained in the higher education institutions. These higher education institutions were aware of their responsibilities to successfully carry out all their administrative and educational activities (Walker & McLean, 2010). So, it was assumed that lecturers were the important and indispensable component of higher education institutions. Furthermore, they were the important source of motivation that positively affected the education system and teaching processes and ultimately the quality of universities (Anggraeni, 2014). In addition, when lecturers fulfilled their basic duties competently, they contributed to the development of the organisation in general and the curriculum in particular (Nadeak & Naibaho, 2019). On the other hand, effective leadership practices were considered as a critical factor and important element for the higher education ecosystem in terms of improving the quality, sustainability and performance of universities (Delener, 2013). Undoubtedly, competent lecturers should be professionally trained within the framework of a practice-oriented understanding of the curriculum development process rather than a theory-oriented approach. So that they could lead the development of effective and efficient curriculum by taking into account the needs and expectations of all relevant stakeholders such as government, employers and students (Collins et al., 2013). Curriculum leadership was considered a fundamental cornerstone for quality assurance in higher education. It was defined as a facilitative process aimed at establishing collaborative teams in the light of common goals in order to develop effective and efficient curriculum. Besides, curriculum leadership aimed at working with others in a team spirit in order to coordinate curriculum activities (Wiles, 2009, as cited in Albashiry et al., 2016).

Lecturers as a curriculum leader were supposed to be closely involved in curriculum implementation/interventions as well as collaboration, joint decision-making and problem solving in order to successfully achieve curriculum objectives (Khambali et al., 2022). Indeed, according to Connelly (1980) lecturers should undertake an important organisational responsibility as curriculum leaders. Thus, they could play an active role in the curriculum development process as well as the evaluation and revision process of the previously developed curriculum (as cited in Menon et al., 2022). At this point, the roles and responsibilities of lecturers as curriculum leaders were *(i) creating and sharing a vision, (ii) aligning standards and criteria according to student needs, (iii) subject area expertise, (iv) monitoring and evaluating student achievement, (v) engaging with stakeholders, (vi) delivering the curriculum,* and finally *(vii) managing the communication and transformation process* (Education, Consulting, Research, Analytics [ECRA], 2010). In addition, curriculum leaders could direct curriculum and teaching practices in line with changing student needs and expectations by fulfilling various roles such as teacher, consultant/mentor, coach, facilitator, administrator and parent. Curriculum leaders aimed to *(i) establish a structure so that the created vision can come to life in practice, (ii) become a symbol and pioneer of the organisational values, (iii) be aware of the symbolic nature of their position, (iv) consider lessons in relation to what they are promoting and how they are behaving, (v) be conscious of the possible consequences of their decisions and actions,* and finally *(vi) be aware of the potential consequences for students* (Jefferies, 2000). Especially in the new generation higher education institutions undergoing transformation process, curriculum leaders were strategically important in order to carry out the curriculum development (design, evaluation and revision) process in a more comprehensive, planned and systematic manner. Indeed, competent lecturers performed effective and participatory curriculum leadership and they aimed to achieve the curriculum objectives with a contemporary educational approach. Thereby they could facilitate the redesign, adaptation and revision of the curriculum in accordance with the new generation of students' needs. Because curriculum leaders were supposed to facilitate the organisational culture characterized by experimentation, risk-taking, continuous learning, professional

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development, open communication, participatory decision-making, collaboration and stakeholder empowerment. Beyond this idea, curriculum leaders could support the process of curriculum development by *(i) setting a new direction, (ii) coordinating and developing a personal and professional relationship with relevant stakeholders, (iii) investing in appropriate resources for effective curriculum,* and finally *(iv) regularly reviewing and reflecting on curriculum progress* (Menon et al., 2022; Zimmer & Keiper, 2021). In fact, according to Kapur (2021) leaders could contribute to the transformation of curriculum into a more functional form in line with the organisational vision, policies and practices. In conclusion, in order to strengthen higher education institutions, it was important to embrace the curriculum leadership approach that addressed each field of activity (education and training, research and development, social contribution, leadership, governance and quality) from a holistic perspective within the higher education ecosystem and its core functions. As well as it was important to manage strategies, relationships, time, authority sharing, organisational motivation and stress effectively and consistently in line with organisational objectives and values in general and curriculum objectives and values in particular. Based on this importances, the purpose of this study was to develop the Curriculum Leadership Scale. Thus, higher education institutions could examine the curriculum leadership levels of lecturers, who were considered to play a strategic role in the curriculum development, implementation and evaluation process with the supportive and dynamic leadership approach. It was thought that the Curriculum Leadership Scale could facilitate to achieve this purpose.

2. Method

2.1. Research Model

Descriptive survey model was used in this study to develop the Curriculum Leadership Scale. Survey research was defined as the most basic type of research. It was used in order to observe (collect information about) certain phenomena in general at a single time (Kelley et al., 2003). In survey research, it was aimed to describe the relevant phenomenon as it existed within its own conditions (Tekindal, 2021). Question statements such as *"what is it?", "what is it about?", "what is it related to?"* and *"what does it consist of?"* were generally used to analyse different dimensions of an object (Kıncal, 2015). In the process of developing the Curriculum Leadership Scale, these questions were guided and the following steps were followed: *(i) creation of the item pool, (ii) presentation of the item pool to expert opinion, (iii) preparation of the pilot measurement tool, (iv) pilot implementation, (v) actual implementation to a large sample group,* and finally *(vi) validity and reliability studies.* Finally, the data obtained from the research group were analysed in SPSS (for exploratory factor analysis) and AMOS (for confirmatory factor analysis) programs to determine the validity and reliability of the developed measurement tool. Since the number of items in the scale was high, Rasch analysis based on Item Response Theory was performed by using Winsteps program.

2.2. Research Group

In this study, it was aimed to develop the Curriculum Leadership Scale to assess the curriculum leadership in higher education. Because of this aim, purposive sampling method was used in this study. This sampling method allowed the in-depth research to be conducted by selecting information-rich situations. Generally, purposive sampling method was preferred when it was intended to examine one or more special cases that met certain criteria or had certain characteristics. Indeed, when it was intended to include the agents that met the criteria determined for the sample, the criterion sampling technique (under the heading of purposive sampling methods) was applied (Büyüköztürk et al., 2016). Essentially, the purpose of this method was to select the sample in line with the criteria determined by the researcher(s) and accordance with the research purpose (Yıldırım & Şimşek, 2013). Criterion sampling technique facilitated the exploration and explanation of phenomena and events. For these reasons, criterion sampling technique was utilised in this study. Thus, it was aimed to reach the most appropriate research group. Since the Curriculum Leadership Scale was suitable for lecturers with administrative duties (dean/vice dean, institute, college and research centre director/vice director, head of department/vice head of department etc.), lecturers' administrative status (undertaking an administrative duty in any period of their careers) was determined as a criterion for participation in this study.

In sum; in this study, data were collected from the research group consisting of lecturers by choosing both online and face-to-face data collection methods. As it was suggested in the relevant literature, the data obtained from the research group were randomly divided into two subgroups and EFA was performed on the first group (336 people) and CFA on the other group (336 people) in order to determine the construct validity of the scale developed in this study. Because it was difficult to perform EFA and then CFA on another sample with similar characteristics in terms of both time factor and financial possibilities (Demir et al., 2020; Koçtürk &

Kızıldağ, 2018). Hence, EFA and CFA could be utilised on the data by randomly dividing into two subgroups in the the scale development studies (Akkoyunlu et al., 2005; Kılıç-Çakmak et al., 2014). In addition, considering the similar studies in the relevant literature (Awopeju & Afolabi, 2016; Çelen, 2008; Gözen-Çıtak, 2007; Kiany & Jalali, 2009; Somer, 1998), *"Rasch Analysis Based on Rating Scale Model"* under the umbrella of Item Response Theory was performed. Cümle sonuna (see ▶**Figure 1**) eklenecektir.

As it was seen in ▶**Table 1**, the first research group that performed exploratory factor analysis consisted of total of 336 lecturers, 191 (56.84%) of whom were male and 145 (43.16%) of whom were female. In addition, 87 lecturers aged 51-60, representing 25.89% of the total, consisted of the group with the highest percentage, while 31 lecturers under the age of 30, representing 9.24% of the total, consisted of the group with the lowest percentage. Meanwhile, 129 lecturers with more than 21 years of professional experience, representing 38.39% of the total, consisted of the group with the highest percentage, while there were no lecturers with less than 5 years of professional experience. Finally, 103

Table 1. Demographic Information Regarding The Research Group

Research Group	Analysis	Arguments	Subcategories	n	%
RESEARCH GROUP:	**Exploratory Factor Analysis**	Gender	Male	191	56.84%
			Female	145	43.16%
		Age	Under 30 Years Old	31	9.24%
			Between 31-40 Years Old	69	20.53%
			Between 41-50 Years Old	78	23.21%
			Between 51-60 Years Old	87	25.89%
			Above 61 Years Old	71	21.13%
		Duration of Professional Experience	Under 5 Years	-	-
			Between 6-10 Years	40	11.90%
			Between 11-15 Years	93	27.68%
			Between 16-20 Years	74	22.03%
			Above 21 Years	129	38.39%
		Duration of Administrative Duty	Under 5 Years	103	30.65%
			Between 6-10 Years	85	25.30%
			Between 11-15 Years	68	20.24%
			Between 16-20 Years	49	14.58%
			Above 21 Years	31	9.23%
	Confirmatory Factor Analysis and Rasch Analysis	Gender	Male	195	58.03%
			Female	141	41.97%
		Age	Under 30 Years Old	31	9.23%
			Between 31-40 Years Old	96	28.57%
			Between 41-50 Years Old	85	25.30%
			Between 51-60 Years Old	76	22.62%
			Above 61 Years Old	48	14.28%
		Duration of Professional Experience	Under 5 Years	-	-
			Between 6-10 Years	51	15.18%
			Between 11-15 Years	96	28.57%
			Between 16-20 Years	68	20.24%
			Above 21 Years	121	36.01%
		Duration of Administrative Duty	Under 5 Years	106	31.55%
			Between 6-10 Years	83	24.70%
			Between 11-15 Years	74	22.02%
			Between 16-20 Years	43	12.80%
			Above 21 Years	30	8.93%

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lecturers with less than 5 years of administrative experience, representing 30.65% of the total, consisted of the group with the highest percentage, while 31 lecturers with more than 21 years of administrative experience, representing 9.23% of the total, consisted of the group with the lowest percentage.

The second research group that performed exploratory factor analysis consisted of total of 336 lecturers, 195 (58.03%) of whom were male and 141 (41.97%) of whom were female. In addition, 96 lecturers aged 31-40, representing 28.57% of the total, consisted of the group with the highest percentage, while 31 lecturers under the age of 30, representing 9.23% of the total, consisted of the group with the lowest percentage. Meanwhile, 121 lecturers with more than 21 years of professional experience, representing 36.01% of the total, consisted of the group with the highest percentage, while there were no lecturers with less than 5 years of professional experience. Finally, 106 lecturers with less than 5 years of administrative experience, representing 31.55% of the total, consisted of the group with the highest percentage, while 30 lecturers with more than 21 years of administrative experience, representing 8.93% of the total, consisted of the group with the lowest percentage.

Steps of the scale development process were explained.

2.3. Identifying the Structure of Scale

In order to determine the scale structure, firstly, the purpose of the scale was determined and both national and international literature related to the concept of curriculum leadership was reviewed. In line with the review of the relevant literature;

- "*What is curriculum leadership?*"
- "*Why is curriculum leadership necessary in higher education?*"
- "*In which ways is curriculum leadership important?*"
- "*How can it be understood that a lecturer has curriculum leadership qualities?*"
- "*What does curriculum leadership provide to organisation, curriculum and students?*" ...

After the questions were answered, important reference sources published in the field of curriculum development were examined in order to clearly determine the framework of the concept. On the other hand, the results obtained from the related literature review were used to create the conceptual framework.

2.4. Item Pool

The creation of an item pool was very important for evaluating the construct (Hinkin et al., 1997). As it was stated in the relevant literature, five different sources could be utilised in the process of creating the item pool: *(i) target group (focus group), (ii) theory, (iii) current research, (iv) expert opinion*, and finally *(v) clinical observation (if any)* (DeVellis, 2017). In this study, a large and rich potential item pool was created through literature review and some rules were followed in the process of

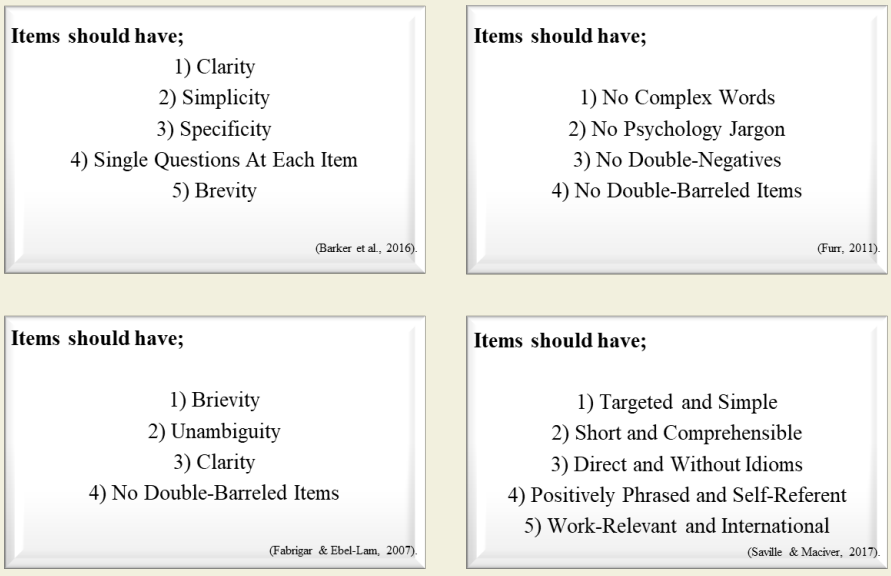

Figure 1. Basic Rules Regarding The Item Writing

Source: Kyriazos & Stalikas, 2018

creating the item pool as it was suggested in the relevant literature.

▶**Figure 1** showed the basic rules regarding the item writing.

In the process of developing the Curriculum Leadership Scale, the conformity of the items to the writing rules recommended in the relevant literature was evaluated. While creating the item pools, six experts from various universities (Ankara, Atatürk, Aydın Adnan Menderes, İnönü and Muş Alparslan), two of whom were linguist and four of whom were measurement and evaluation experts, were consulted. In addition, while writing the scale items, expert opinions were taken as a guide and decisions were made on issues such as the use of the conjunction *"and"* as well as the completion of verbs in the form of *"-mesi/ması"* or *"-mek/-mak"*. Thus, according to the related literature, the items forming the basic scale unit could be written as single words, phrases, sentences and even paragraphs (Revelle & Garner, 2022). In conclusion, according to the expert opinions, the verbs completed in the form of *"-mek/-mak"* in line with the scale structure.

Finally, at this stage, the likert type of the scale was decided. At the point of creating response categories in scales, the appropriate number of response categories should be determined and these categories should be named (DeVellis, 2017). In this study, items with positive statements were written in a five-point likert-type scale according to the scale structure. Also, it was decided to name the response categories as *"Very Good", "Good", "Acceptable", "Poor"* and *"Very Poor"* in the context of quality (see ▶**Figure 2**). The quality culture in higher education was gaining more and more importance every day. So, these categories were preferred in order to evaluate the quality of each mission area (education and training, research and development, social contribution etc.) on the axis of the organisation in general and the curriculum in particular with a sustainable quality understanding.

2.5. Expert Opinion (Content Validity)

In order to examine the suitability and quality of the items in the item pool (Morrison & Embretson, 2018), the content validity of the item pool should be evaluated in line with expert opinions (DeVellis, 2017). In this context, more than one expert (generally 5 to 7 experts) (selected from other than the researcher(s) who prepared the item pool) should examine the items' suitability, quality and representation to assess the item pool objectively and independently (Haynes et al., 1995).

Figure 2. Examples of Rating in Likert-Type Scales

Source: Bhandari & Nikolopoulou, 2023

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Based on this requirement, some statistical procedures such as content validity ratio (Lawshe, 1975), content validity index (Lynn, 1986) or Cohen's kappa (k) coefficient (Cohen, 1960) were used in the related literature to determine the content validity in line with expert opinions. Although there were different techniques for determining the content validity of scales in the relevant literature, technique developed by Lawshe (1975) generally was used (Yeşilyurt & Çapraz, 2018). When the Lawshe technique was compared with alternative techniques, this technique standed out due to its simplicity and usefulness (Yeşilyurt & Çapraz, 2018). On the other hand *"Modified Lawshe Technique"* was created by Wilson et al. (2012) and Ayre and Scally (2014) because of the Lawshe technique's weaknesses. In this study, modified Lawshe technique was used in order to determine the content validity. Eight experts were included in this study by using modified Lawshe technique and the expert evaluation form created by the researchers as a data collection tool. In this form, Lawshe's (1975) three-point scale of *"Appropriate", "Partially Appropriate" and "Not Appropriate"* was utilised. In addition, the experts expressed their opinions and suggestions regarding the items that needed to be corrected. Moreover, according to the related literature, the quality and number of experts (between 5-40) were of great importance for determining the content validity of the scales objectively (Ayre & Scally, 2014; Lawshe, 1975).

▶**Table 2** presented the gender, title, administrative position and department of the experts participating in the study.

Table 2. Information Regarding The Experts Participating in The Research

	Gender	Title	Administrative Position	Department
E1	Male	Prof. Dr.	Head of Department	Curriculum and Instruction
E2	Female	Prof. Dr.	Vice Dean	Health Sciences
E3	Male	Prof. Dr.	Assistant Manager	Mathematics and Science Education
E4	Female	Assoc. Prof. Dr.	Quality Coordinator	Curriculum and Instruction
E5	Male	Assoc. Prof. Dr.	Assistant Manager	Curriculum and Instruction
E6	Male	Assoc. Prof. Dr.	Vice Head of Department	Curriculum and Instruction
E7	Female	Assoc. Prof. Dr.	Head of Department	Curriculum and Instruction
E8	Female	Dr.	Coordinator	Counseling and Guidance

In line with the expert opinions, *"Content Validity Ratio (CVR)"* and *"Content Validity Index (CVI)"* values were calculated by using Microsoft Excel software to determine the content validity of the Curriculum Leadership Scale (by scoring the appropriate option as 3, partially appropriate option as 2 and not appropriate option as 1 in the expert evaluation form). In order to determine whether the items were included in the scale, content validity ratio (CVR) was calculated and in this context, the formula (Nu-N/2)/N/2 (Nu=number of experts who marked the appropriate option and N=number of experts) (Lawshe, 1975) was used. In the expert opinion (content validity) stage, the results obtained from this formula were finally compared with the criterion determined by Ayre and Scally (2014) (minimum value of CVR for eight experts=0.750) and the items were decided to be included in the scale.

▶**Table 3** presented the minimum values of CVR according to the number of experts.

Table 3. Minimum Values of CVR According to the Number of Experts

Number of Expert	CVR Minimum Value	Number of Expert	CVR Minimum Value
5	1	23	0.391
6	1	24	0.417
7	1	25	0.440
***8**	***0.750**	26	0.385
9	0.778	27	0.407
10	0.800	28	0.357
11	0.636	29	0.379
12	0.667	30	0.333
13	0.538	31	0.355
14	0.571	32	0.375
15	0.600	33	0.333
16	0.500	34	0.353
17	0.529	35	0.314
18	0.444	36	0.333
19	0.474	37	0.297
20	0.500	38	0.316
21	0.429	39	0.333
22	0.455	40	0.300

Source: Yeşilyurt and Çapraz, 2018

2.6. Pilot Implementation

After the scale was made ready for application by making the necessary adjustments in line with the expert opinions, it was necessary to determine the comprehensibility of the items in line with the participant opinions. In other words, it was of great importance to examine the items before the scale was applied. Although various techniques were used to analyse the items in the related literature, the think-aloud technique was widely used. In this technique, participants (preferably from the target group) read the scale items aloud and expressed their feelings and thoughts while answering the scale. This technique was used in order to determine whether

the items were clear and comprehensible, how the item was interpreted, why the individual chose a particular response, and whether the number of response categories was sufficient and/or additional options were needed (Van Oort et al., 2011). Finally, according to the relevant literature, focus group interview should generally be conducted with 6-8 people (Çokluk et al., 2011). In this study, the opinions of seven lecturers were taken in the focus group interview.

2.7. Validity and Reliability Studies

In this study, firstly the construct validity of the scale (EFA, CFA and Rasch analysis) was determined and then the internal consistency coefficient was calculated. EFA, CFA and Rasch analyses were used to determine the construct validity of the scale respectively. Scale reliability was determined by calculating Cronbach's alpha internal consistency coefficient. Before examining the construct validity of the scale, it was important to examine the data quality in order for the findings to be accurate and repeatable. Therefore, in the data analysis phase, missing data and outliers should be examined initially (▶**Table 4**).

Table 4. Procedures of Data Preparation

Procedures	Explanations
Missing Data	As a result of the Missing Completely at Random (MCAR) test performed to determine the percentage of missing data in the dataset and their random distribution, it was found that the missing data had a completely random distribution (χ2MCAR, p>.05). In addition, the missing data ratio in the dataset was less than 5%. In fact, if the missing data ratio in the dataset was less than 5%, values could be assigned to the missing data using one of the traditional methods (Tabachnick & Fidell, 2013). In this study, average values were assigned instead of missing data due to both the random distribution of missing data and the missing data ratio not exceeding 5% as a result of the MCAR test.
One Way Outliers	In this study, one-way outliers, extreme values for a single variable, were determined by converting the raw scores in the dataset into standard scores, and participants with Z value greater than +3 or less than -3 were assumed to be outliers (Mertler & Vannatta, 2005) and deleted from the dataset.
Multiple Outliers	Multiple outliers, unusual combinations of two or more variables' scores, were determined by a statistical process known as Mahalanobis distance. In this context, in addition to calculate the Mahalanobis value for each participant, chi-square values were analysed in order to determine the outliers precisely. As a result of this examination, participants whose chi-square probability value was less than .001 significance level were removed from the dataset.

After analysing the dataset in terms of missing data and outliers, the data were tested in terms of EFA assumptions. These assumptions were *(i) adequacy of sample size, (ii) univariate and multivariate normality, (iii) linearity, (iv) equivariance, (v) interrelatedness among items,* and finally *(vi) multicollinearity* (Beavers et al., 2013). On the other hand, some assumptions for exploratory factor analysis (univariate and multivariate normality, equivariance and multicollinearity) were checked for confirmatory factor analysis at the same time and the suitability of the dataset for CFA was determined. In addition, due to the high number of items, Rasch analysis was used in this study. Rasch analysis was under the umbrella of Item Response Theory. In order to perform Rasch analysis, three assumptions, namely unidimensionality, local independence and model-data fit should be examined (DeMars, 2010). Although there were three assumptions about Rasch analysis, these assumptions were not tested separately. Because ensuring model-data fit meaned that the unidimensionality assumption was met (Lee et al., 2010) and meeting the unidimensionality assumption meaned that there was no problem with local independence (Hambleton et al., 1991). Therefore, the only and basic assumption that needed to be checked was the examination of model-data fit in order to perform Rasch analysis (Güler et al., 2018).

▶**Table 5** provided information regarding the assumptions. After the assumptions in ▶**Table 5** were examined and the assumptions regarding the analyses was checked, exploratory factor analysis, confirmatory factor analysis and Rasch analysis were performed respectively in this study. As a result of the EFA, firstly, the items with factor loadings below 0.30 were removed from the scale, and then the binary items that gave high loadings to more than one factor (the difference between the factor loadings was determined to be less than 0.10) were removed from the scale (Büyüköztürk et al., 2016). After the item deletion process was completed, the factor loadings and item-total correlation values for each item were calculated. After the item deletion process was completed in EFA, the number of factors was examined and the rule of *"eigenvalue being greater than one"* as well as the rule of *"first and second eigenvalue ratio being greater than three or four"* was followed while determining the number of factors (Slocum-Gori & Zumbo, 2011). When the rule of *"eigenvalue greater than one"* was followed solely, more factors may emerge than it should be. So, according to the related literature, other rules (the first and second eigenvalue ratio being greater than three or four) should also be followed because it may become difficult to make sense of these factors as the number of factors increased (Osborne, 2014).

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Table 5. Assumptions Regarding the Analyses Performed in the Study

Analysis	Adequacy of Sample Size	Univariate Normality	Multivariate Normality and Linearity	Interrelatedness Among Items	Multicollinearity	Equivariance	Infit and Outfit Statistics
EFA	**KMO=**.986 **Bartlett's Test of Sphericity=**p<.05	**SV:** 0.568 **KV:** -0.487 **Histogram Chart=** Close to Bell-Shaped Curve **Normal Q-Q Chart=**Close to Linear Line	**Scattering Matrix =** Close to Ellipse Form	**Anti Image Matrix=** Between 0.53 and 0.86 **Correlation Matrix=-** Between 0.333 and 0.713	**For Each Item:** **TV=** >.10 **VIF Value=**<10	**Box M Test=**p>.05	-
CFA	In the related literature, it was stated that the sample size should be larger than 200 (Jackson, 2001).	**SV:** 0.448 **KV:** -0.396 **Histogram Chart=** Close to Bell-Shaped Curve **Normal Q-Q Chart=**Close to Linear Line	**Scattering Matrix =** Close to Ellipse Form	-	**For Each Item:** **TV=** >.10 **VIF Value=**<10		-
Rasch Analysis	In the related literature, it was stated that the sample size should be larger than 100 (Chen et al., 2014).		-	-	-	-	While the infit statistics were found to be between 0.50 and 1.49, the outfit statistics were found to be between 0.51 and 1.48.
All assumptions regarding the analyses were met.							

Abbreviations: EFA=Exploratory Factor Analysis, C**FA**=Confirmatory Factor Analysis, **KMO**=Kaiser-Meyer- Olkin, **SV:** Skewness Value, **KV:** Kurtosis Value, **TV:** Tolerance Value

In addition, while determining the number of factors in EFA, following the rule of *"the ratio of the first and second eigenvalues being greater than three or four"* allowed the essential and strict unidimensionality of the scale to be examined (Slocum-Gori & Zumbo, 2011). Humphreys (1952, 1962) argued that while measuring any psychological trait, a large number of secondary minor dimensions/factors usually emerged (as cited in Slocum-Gori & Zumbo, 2011), and the presence of secondary minor dimensions/factors in measurement tool was called *"essential unidimensionality"*. On the other hand, *"strict unidimensionality"* referred to the presence of a dominant dimension/factor in the scale without secondary minor dimensions/factors (Slocum-Gori & Zumbo, 2011). In this study, unidimensionality or multidimensionality as well as essential or strict unidimensionality constructs were taken into consideration when analysing the results obtained from exploratory factor analysis. Also, the scale structure was confirmed by confirmatory factor analysis. Furthermore, the infit and outfit indices related to the measurement model were examined in Rasch analysis.

Exploratory and confirmatory factor analyses based on Classical Test Theory as well as Rasch analysis based on Item Response Theory were utilised to examine the construct validity of the scale. Although Rasch analysis was first developed only for dichotomous items scored as true/false (Haiyang, 2010), Andrich (1978) extended this analysis to be used in the analysis of likert-type scale data. Using Rasch analysis in likert-type scales overcame various limitations of methods based on Classical Test Theory. As a matter of fact, in a study conducted by Şahin and Weiss (2015), the unidimensionality of a measurement tool consisting of 100, 200 and 300 items was examined by using Item Response Theory. In this study, Rasch analysis was used due to the high number of items. In the Rasch analysis, the model-data fit was achieved since the infit and outfit statistics were within the range of 0.50 and 1.50 (de Ayala, 2013) determined as an acceptable criterion for these statistics.

Finally, in this stage, the internal consistency coefficient was calculated to determine the reliability of the scale, and it was aimed to determine whether the items in the scale consistently measure the conceptual structure within one measurement tool and application. In the context of internal consistency, a high level of Cronbach's alpha (α) coefficient for the measurement tool indicated not only the reliability of the measurement tool but also its construct validity (Baykul, 1979). As a matter of fact, reliable measurement tools required a high level of consistency between the items that consisted of the scale. As a result, Cronbach's alpha internal consistency coefficient was calculated in order to determine the reliability of the scale developed in this study. If the coefficient was higher than 0.80, there would be high level of internal consistency between the items that consisted of the scale (Büyüköztürk et al., 2016).

3. Findings

The findings obtained from the scale development study were examined.

3.1. Findings Regarding the Content Validity of the Curriculum Leadership Scale

In order to determine the content validity of the Curriculum Leadership Scale, firstly, the items in the scale were adjusted in line with the opinions of experts in the field of linguistic and measurement-evaluation. And then the opinions of the field experts were consulted by using the modified Lawshe technique. In this context, *"Content Validity Ratio (CVR)"* and *"Content Validity Index (CVI)"* values were calculated by using Microsoft Excel software to assess the content validity. In order to determine whether the items were included in the scale, content validity ratio (CVR) was calculated and the formula (Nu-N/2)/N/2 (Nu=number of experts who marked the appropriate option and N=number of experts) (Lawshe, 1975) was used. The results obtained from this formula were compared with the criterion determined by Ayre and Scally (2014) (minimum value of CVR for eight experts=0.750) and the items were decided to be included in the scale. Finally, the average of the CVR values of the items in the scale was calculated and the CVI value for the whole scale was determined. If the obtained CVI value was greater than the CVR value (minimum value of CVR for eight experts=0.750) (CVI>CVR), the content validity of the left items in the scale would be statistically significant. The results obtained from the modified Lawshe technique were explained.

▶**Table 6** showed the CVR values for each item in the Curriculum Leadership Scale.

As it was seen in ▶**Table 6**, CVR value for 221 items in the Curriculum Leadership Scale was greater than the minimum value of CVR (0.750), while the CVR value for

Table 6. CVR Values Regarding the Curriculum Leadership Scale

Items	Appropriate	Partially Appropriate	Not Appropriate	CVR
1.	8	0	0	1
2.	8	0	0	1
3.	8	0	0	1
4.	8	0	0	1
5.	8	0	0	1
6.	8	0	0	1
7.	8	0	0	1
8.	8	0	0	1
9.	8	0	0	1
10.	8	0	0	1
11.	8	0	0	1
12.	8	0	0	1
13.	8	0	0	1
14.	8	0	0	1
15.	8	0	0	1
16.	8	0	0	1
17.	8	0	0	1
18.	8	0	0	1
19.	8	0	0	1
20.	8	0	0	1
21.	8	0	0	1
22.	8	0	0	1
23.	8	0	0	1
24.	8	0	0	1
25.	8	0	0	1
26.	8	0	0	1
27.	8	0	0	1
28.	8	0	0	1
29.	8	0	0	1
30.	8	0	0	1
31.	8	0	0	1
32.	8	0	0	1
33.	7	1	0	0.75
34.	8	0	0	1
35.	8	0	0	1
36.	8	0	0	1
37.	7	0	1	0.75
38.	8	0	0	1
39.	8	0	0	1
40.	8	0	0	1
41.	8	0	0	1
42.	8	0	0	1
43.	8	0	0	1
44.	8	0	0	1
45.	8	0	0	1
46.	8	0	0	1
47.	8	0	0	1
48.	8	0	0	1
49.	8	0	0	1
50.	8	0	0	1
51.	8	0	0	1
52.	8	0	0	1
53.	8	0	0	1
54.	6	1	1	0.50
55.	8	0	0	1
56.	5	3	2	0.25
57.	8	0	0	1
58.	8	0	0	1
59.	7	1	0	0.75
60.	8	0	0	1
61.	8	0	0	1
62.	8	0	0	1
63.	7	1	0	0.75
64.	8	0	0	1
65.	8	0	0	1
66.	8	0	0	1
67.	8	0	0	1
68.	8	0	0	1
69.	8	0	0	1
70.	8	0	0	1
71.	7	1	0	0.75
72.	8	0	0	1
73.	8	0	0	1

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Items	Appropriate	Partially Appropriate	Not Appropriate	CVR
74.	8	0	0	1
75.	8	0	0	1
76.	8	0	0	1
77.	8	0	0	1
78.	8	0	0	1
79.	8	0	0	1
80.	8	0	0	1
81.	8	0	0	1
82.	8	0	0	1
83.	8	0	0	1
84.	8	0	0	1
85.	8	0	0	1
86.	4	3	1	0
87.	8	0	0	1
88.	8	0	0	1
89.	8	0	0	1
90.	8	0	0	1
91.	8	0	0	1
92.	8	0	0	1
93.	8	0	0	1
94.	8	0	0	1
95.	8	0	0	1
96.	8	0	0	1
97.	8	0	0	1
98.	8	0	0	1
99.	7	1	0	0.75
100.	8	0	0	1
101.	8	0	0	1
102.	7	1	0	0.75
103.	8	0	0	1
104.	8	0	0	1
105.	8	0	0	1
106.	8	0	0	1
107.	8	0	0	1
108.	8	0	0	1
109.	8	0	0	1
110.	8	0	0	1
111.	8	0	0	1
112.	8	0	0	1
113.	8	0	0	1
114.	8	0	0	1
115.	8	0	0	1
116.	8	0	0	1
117.	8	0	0	1
118.	8	0	0	1
119.	8	0	0	1
120.	8	0	0	1
121.	8	0	0	1
122.	8	0	0	1
123.	8	0	0	1
124.	8	0	0	1
125.	8	0	0	1
126.	8	0	0	1
127.	8	0	0	1
128.	8	0	0	1
129.	8	0	0	1
130.	8	0	0	1
131.	8	0	0	1
132.	8	0	0	1
133.	8	0	0	1

Items	Appropriate	Partially Appropriate	Not Appropriate	CVR
134.	7	1	0	0.75
135.	8	0	0	1
136.	8	0	0	1
137.	8	0	0	1
138.	8	0	0	1
139.	8	0	0	1
140.	8	0	0	1
141.	8	0	0	1
142.	8	0	0	1
143.	8	0	0	1
144.	8	0	0	1
145.	7	1	0	0.75
146.	8	0	0	1
147.	8	0	0	1
148.	8	0	0	1
149.	8	0	0	1
150.	8	0	0	1
151.	8	0	0	1
152.	8	0	0	1
153.	8	0	0	1
154.	8	0	0	1
155.	8	0	0	1
156.	8	0	0	1
157.	8	0	0	1
158.	7	1	0	0.75
159.	8	0	0	1
160.	8	0	0	1
161.	8	0	0	1
162.	8	0	0	1
163.	7	1	0	0.75
164.	8	0	0	1
165.	8	0	0	1
166.	8	0	0	1
167.	8	0	0	1
168.	8	0	0	1
169.	8	0	0	1
170.	8	0	0	1
171.	7	1	0	0.75
172.	8	0	0	1
173.	8	0	0	1
174.	8	0	0	1
175.	8	0	0	1
176.	8	0	0	1
177.	8	0	0	1
178.	8	0	0	1
179.	8	0	0	1
180.	8	0	0	1
181.	8	0	0	1
182.	8	0	0	1
183.	8	0	0	1
184.	8	0	0	1
185.	8	0	0	1
186.	8	0	0	1
187.	8	0	0	1
188.	8	0	0	1
189.	8	0	0	1
190.	8	0	0	1
191.	8	0	0	1
192.	8	0	0	1
193.	8	0	0	1

Items	Appropriate	Partially Appropriate	Not Appropriate	CVR
194.	8	0	0	1
195.	7	1	0	0.75
196.	8	0	0	1
197.	8	0	0	1
198.	8	0	0	1
199.	8	0	0	1
200.	8	0	0	1
201.	8	0	0	1
202.	8	0	0	1
203.	8	0	0	1
204.	8	0	0	1
205.	8	0	0	1
206.	8	0	0	1
207.	8	0	0	1
208.	8	0	0	1
209.	8	0	0	1
210.	8	0	0	1
211.	8	0	0	1
212.	8	0	0	1
213.	8	0	0	1
214.	8	0	0	1
215.	8	0	0	1
216.	8	0	0	1
217.	8	0	0	1
218.	8	0	0	1
219.	8	0	0	1
220.	8	0	0	1
221.	7	1	0	0.75
222.	8	0	0	1
223.	8	0	0	1
224.	8	0	0	1

three items (Item 54, 56 and 86) was less than the minimum value of CVR (0.750). Therefore, the items below this critical value were excluded from the scale and the average of the CVR values for 221 items was calculated and the CVI value for the whole scale was determined as 0.984. According to Lawshe (1975) if the obtained CVI value was greater than the CVR value (minimum value of CVR=0.750 for eight experts) (CVI>CVR), the content validity of the left items in the scale would be statistically significant. In this study, the content validity of the scale was statistically significant since the CVI value (0.984) was greater than the CVR value (0.750).

Finally, the Curriculum Leadership Scale was revised in line with the expert opinions and suggestions and the scale was prepared for the validity and reliability studies with a total of 221 items.

3.2. Findings Regarding the Construct Validity of the Curriculum Leadership Scale

EFA, CFA and Rasch analyses were utilised to assess the construct validity of the Curriculum Leadership Scale. Firstly, EFA was performed and items (33 items) with factor loadings below 0.30 (Büyüköztürk et al., 2016) were excluded from the scale. In EFA, the promax method (among the oblique factor rotation techniques) was performed due to the values in the correlation matrix being greater than 0.32 as it was suggested by Tabachnick and Fidell (2013). Then, as a result of the exploratory factor analysis, the items (35 items) that loaded highly for more than one factor (difference between the factor loadings was determined to be less than 0.10) were removed from the scale. Because these items weakened the principle of each item measuring a single behaviour. As a result, a total of 68 items were deleted from the 221-item scale. Thus, the item deletion process in EFA was completed.

▶**Table 7** presented the factor loadings and item total correlation values of 153 items in the Curriculum Leadership Scale as a result of EFA.

A total of 68 items were deleted from the 221-item scale and factor numbers were analysed after the item dele-

Table 7. Factor Loadings and Item Total Correlation Values of the Items in the Curriculum Leadership Scale

Items	Factor Loadings	Item Total Correlation Values
1.	.435	.417
2.	.411	.402
3.	.688	.621
4.	.765	.674
5.	.338	.363
6.	.334	.345
7.	.683	.615
8.	.477	.441
9.	.489	.453
10.	.609	.556
11.	.597	.538
12.	.558	.518
13.	.678	.609
14.	.671	.602
15.	.768	.679
16.	.667	.594
17.	.336	.351
18.	.459	.429
19.	.509	.464
20.	.776	.684
21.	.709	.643
22.	.667	.596
23.	.689	.626
24.	.678	.611
25.	.692	.632
26.	.607	.554
27.	.471	.436
28.	.406	.391
29.	.551	.509
30.	.372	.378
31.	.688	.624
32.	.413	.404
33.	.452	.426
34.	.689	.627

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35.	.772	.681
36.	.373	.379
37.	.568	.528
38.	.565	.526
39.	.591	.533
40.	.785	.706
41.	.786	.713
42.	.524	.487
43.	.482	.445
44.	.508	.463
45.	.749	.668
46.	.471	.437
47.	.338	.364
48.	.509	.465
49.	.783	.701
50.	.781	.687
51.	.378	.386
52.	.698	.636
53.	.635	.572
54.	.691	.631
55.	.347	.367
56.	.721	.648
57.	.358	.369
58.	.382	.388
59.	.512	.473
60.	.669	.599
61.	.727	.655
62.	.501	.458
63.	.519	.481
64.	.663	.591
65.	.689	.628
66.	.377	.384
67.	.529	.491
68.	.538	.497
69.	.319	.333
70.	.683	.618
71.	.549	.507
72.	.611	.558
73.	.556	.514
74.	.489	.454
75.	.726	.654
76.	.592	.535
77.	.434	.416
78.	.466	.433
79.	.483	.448
80.	.485	.449
81.	.645	.578
82.	.482	.446
83.	.646	.579
84.	.523	.485
85.	.561	.521
86.	.471	.438
87.	.443	.421
88.	.371	.377
89.	.555	.511
90.	.711	.646
91.	.559	.519
92.	.436	.418
93.	.461	.431
94.	.691	.630
95.	.445	.423
96.	.424	.411
97.	.531	.493
98.	.678	.613
99.	.639	.576
100.	.705	.640
101.	.723	.650
102.	.772	.682
103.	.509	.466
104.	.556	.516
105.	.779	.686
106.	.409	.394
107.	.477	.442
108.	.517	.478
109.	.728	.656
110.	.747	.666
111.	.509	.468
112.	.511	.471
113.	.654	.584
114.	.635	.573
115.	.731	.658
116.	.742	.663
117.	.761	.671
118.	.604	.550
119.	.612	.559
120.	.624	.566
121.	.547	.504
122.	.531	.494
123.	.433	.415
124.	.581	.531
125.	.672	.606
126.	.509	.469
127.	.502	.459
128.	.542	.499
129.	.654	.585
130.	.657	.588
131.	.705	.641
132.	.783	.704
133.	.732	.659
134.	.629	.569
135.	.518	.479
136.	.521	.483
137.	.524	.488
138.	.605	.552
139.	.701	.638
140.	.603	.549
141.	.762	.672
142.	.403	.389
143.	.408	.393
144.	.542	.502
145.	.531	.495
146.	.741	.662
147.	.613	.561
148.	.617	.563
149.	.514	.476
150.	.621	.564
151.	.724	.652
152.	.503	.460
153.	.512	.474
Total Explained Variance Ratio=45.312, Bartlett's Test of Sphericity= p<.05, KMO=.986		

tion process was completed in EFA. In fact, the 31-factor structure with eigenvalue greater than one emerged in the EFA findings.

▶**Table 8** showed information about the dimensions with eigenvalues greater than one.

Table 8. Information Regarding the Dimensions with Eigenvalue Greater Than One in the Curriculum Leadership Scale

Dimension Number	Eigenvalue	Total Explained Variance Ratio
1	26.022	45.312%
2	6.900	3.254%
3	6.872	3.178%
4	5.454	3.153%
5	4.258	3.116%
6	2.978	2.961%
7	2.692	2.591%
8	2.524	2.442%
9	2.434	2.417%
10	2.305	1.404%
11	2.124	1.401%
12	2.046	1.337%
13	1.827	1.218%
14	1.733	1.190%
15	1.515	1.185%
16	1.468	1.152%
17	1.439	1.102%
18	1.402	1.101%
19	1.389	1.096%
20	1.261	1.082%
21	1.252	1.069%
22	1.238	1.061%
23	1.227	1.056%
24	1.205	1.054%
25	1.201	1.044%
26	1.109	1.032%
27	1.103	1.021%
28	1.101	1.011%
29	1.091	1.009%
30	1.062	1.002%
31	1.021	1.001%

As it was suggested in the related literature, when determining the number of factors, the rule that the eigenvalue is greater than one could be followed, as well as the rule that the first and second eigenvalue ratio is greater than three or four. In addition, there were various dimensions of curriculum leadership in the related literature. But complete distinction couldn't be made between the dimensions due to the intertwining of these dimensions. So, the first and second eigenvalue ratio were also examined in this study. As a matter of fact, in this study, unidimensional structure emerged since the first and second eigenvalue ratio was greater than three (26.022/6.900). Moreover, unidimensionality was divided into two as essential and strict in the related literature. In this study, the scale structure was suitable for essential unidimensionality due to the presence of secondary minor dimensions/factors with eigenvalues greater than one. In essential unidimensionality, it was not necessary to define secondary minor dimensions/factors since it was difficult to make sense of the factors as the number of factors increased (Slocum-Gori & Zumbo, 2011). Based on this information, it was decided not to define these secondary minor dimensions/factors in the scale. Because different dimensions of curriculum leadership were intertwined and a clear distinction couldn't be made between the dimensions as it was stated in the related literature. In other words, it would be appropriate to use the scale as a single factor due to the problems encountered in the interpretation and naming of these factors. On the other hand, the number of factors was decided in line with the scree plot in this study (▶**Figure 3**).

As it was seen in ▶**Figure 3**, the first immediate change in the scree plot was observed in the first factor. Based on this result, the scale had a single factor structure. Also, this one-factor structure explained 45.312% of the total variance. According to Tabachnick and Fidell (2013), the high explained variance ratio showed the strength of the factor structure. Scherer et al. (1988) stated that the variance ratio in social sciences should be between 40% and 60%. Based on this information, the variance ratio obtained from the study adequately explained the single-factor structure of the scale.

As a result of EFA, the Curriculum Leadership Scale was found to consist of 153 items with a single dimension. Confirmatory factor analysis was performed to test the single-factor structure of the scale. As a result of the data analysis, the three items were removed from the scale due to low factor loadings and the analysis was repeated. As a result of the repeated analysis, the fit indices of the model improved.

▶**Table 9** presented the fit indices for the tested measurement model and the accepted criterion for these indices (Tabachnick & Fidell, 2013). As it was seen in ▶**Table 9**, the fit indices of the Curriculum Leadership Scale were found to be within the acceptable range. Hence, the one-factor structure of the scale was confirmed.

Finally, considering that exploratory and confirmatory factor analyses based on Classical Test Theory had some limitations, the scale structure was confirmed by performing Rasch analysis. The use of Rasch analysis in likert-type scales helped to overcome various limitations related to methods based on Classical Test Theory (Andrich, 1978). When the related literature was examined, there were studies using factor analysis and Rasch analysis together to evaluate the construct validi-

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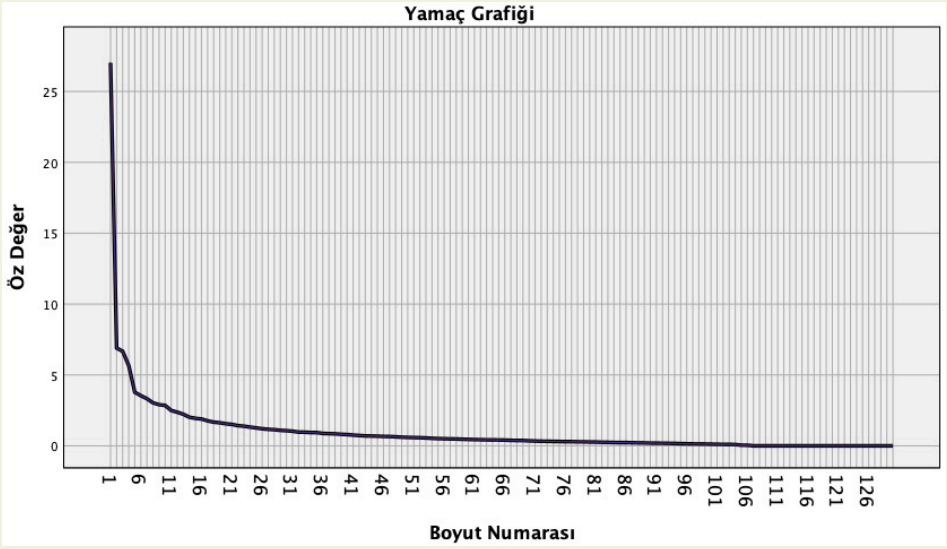

Figure 3. Scree Plot of the Curriculum Leadership Scale

Table 9. Fit Indices of the Curriculum Leadership Scale

Fit Indices	Scale Values	Good Fit	Acceptable Fit
À²/sd	4.6	<5	-
RMSEA	0.06	≤0.05	0.06-0.08
NFI	0.92	≥0.95	0.90-0.94
NNFI	0.93	≥0.95	0.90-0.94
IFI	0.91	≥0.95	0.90-0.94
GFI	0.88	≥0.90	0.85-0.89
AGFI	0.89	≥0.90	0.85-0.89
CFI	0.96	≥0.97	≥0.95

ty of the scale. In fact, in a study conducted by Şahin and Weiss (2015), the unidimensionality of a measurement tool consisting of 100, 200 and 300 items was examined by using Item Response Theory. In this study, Rasch analysis under the umbrella of Item Response Theory, was used due to the high number of items. In order to perform Rasch analysis, three assumptions, namely unidimensionality, local independence and model-data fit, should be examined (DeMars, 2010). Although there were three assumptions about Rasch analysis, these assumptions were not tested separately. Because ensuring model-data fit meaned that the unidimensionality assumption was met (Lee et al., 2010) and meeting the unidimensionality assumption meaned that there was no problem with local independence (Hambleton et al., 1991). Therefore, the only and basic assumption that needed to be checked was the examination of model-data fit in order to perform Rasch analysis (Güler et al., 2018). So, when the findings obtained from Rasch analysis were examined, the infit statistics (between 0.50 and 1.49 values) and outfit statistics (between 0.51 and 1.48 values) (infit and outfit statistics) were in the range of 0.50 and 1.50 (de Ayala, 2013), regarded as the acceptable limit for these statistics, and model-data fit was ensured. Based on these findings, the research data confirmed the unidimensional structure of this scale.

▶**Table 10** showed the item statistics of the Curriculum Leadership Scale.

The findings regarding the reliability of the Curriculum Leadership Scale were explained.

3.3. Findings Regarding the Reliability of the Curriculum Leadership Scale

The internal consistency coefficient was calculated to assess the reliability of the Curriculum Leadership Scale and it was aimed to determine whether the items

Table 10. Item Statistics Regarding The Curriculum Leadership Scale

Items	Measures	Infit	Outfit
1.	0.181	0.59	0.53
2.	0.221	0.56	0.51
3.	0.619	0.51	0.62
4.	0.247	0.93	0.54
5.	0.430	0.63	0.77
6.	0.756	0.64	0.68
7.	0.556	0.78	0.79
8.	0.931	0.70	0.66
9.	0.974	0.90	0.81
10.	0.545	0.53	0.59
11.	0.592	0.59	0.61
12.	0.860	0.61	0.88

Items	Measures	Infit	Outfit
13.	0.580	0.65	0.58
14.	0.101	0.74	0.87
15.	0.381	0.69	0.65
16.	0.622	0.78	0.66
17.	0.668	1.09	0.53
18.	0.443	0.87	0.56
19.	0.179	0.73	0.99
20.	0.527	1.12	0.89
21.	0.656	0.53	0.81
22.	0.151	0.88	1.38
23.	0.880	0.63	0.61
24.	0.553	0.64	0.83
25.	0.805	0.94	1.30
26.	0.941	0.82	0.54
27.	0.635	0.56	0.55
28.	0.365	0.95	0.81
29.	0.151	0.93	0.57
30.	0.177	0.91	0.55
31.	0.556	0.92	0.51
32.	0.759	0.58	0.68
33.	0.809	0.56	0.65
34.	0.336	0.98	0.61
35.	0.651	1.33	1.07
36.	0.341	0.65	1.31
37.	0.502	1.28	0.87
38.	0.833	0.65	0.54
39.	0.132	0.66	0.63
40.	0.595	0.54	1.27
41.	0.146	0.78	1.31
42.	0.310	0.51	0.57
43.	0.885	0.88	1.16
44.	0.362	1.31	1.33
45.	0.639	0.99	1.03
46.	0.592	0.63	0.52
47.	0.553	0.71	0.51
48.	0.574	0.53	0.95
49.	0.947	0.55	1.22
50.	0.126	0.74	0.73
51.	0.882	0.98	0.72
52.	0.617	1.29	0.98
53.	0.848	0.53	0.55
54.	0.570	1.18	0.52
55.	0.153	1.41	0.68
56.	0.155	0.86	0.96
57.	0.191	0.75	0.69
58.	0.429	0.52	0.55
59.	0.451	0.68	0.87
60.	0.844	0.53	0.91
61.	0.531	0.51	0.52
62.	0.797	1.28	0.80
63.	0.583	0.59	0.92
64.	0.906	1.12	1.07
65.	0.321	1.10	1.48
66.	0.264	0.56	0.61
67.	0.622	0.72	1.13
68.	0.888	0.64	0.57
69.	0.362	0.82	0.93
70.	0.978	0.50	0.53
71.	0.741	0.59	0.71
72.	0.114	0.67	1.04

Items	Measures	Infit	Outfit
73.	0.375	0.69	0.66
74.	0.431	0.58	1.16
75.	0.987	0.51	0.62
76.	0.486	0.52	0.60
77.	0.868	0.67	0.55
78.	0.809	0.72	0.99
79.	0.127	0.55	0.67
80.	0.763	0.54	0.61
81.	0.777	0.52	0.65
82.	0.213	0.99	1.12
83.	0.609	0.91	0.96
84.	0.822	0.55	0.61
85.	0.632	0.90	0.87
86.	0.847	0.81	0.97
87.	0.823	1.31	0.69
88.	0.911	0.92	1.09
89.	0.141	0.57	0.85
90.	0.468	0.88	0.92
91.	0.452	0.53	1.25
92.	0.479	0.75	0.94
93.	0.765	0.61	0.93
94.	0.118	0.98	0.77
95.	0.724	0.84	0.95
96.	0.302	0.76	0.97
97.	0.244	1.05	1.17
98.	0.660	1.36	0.98
99.	0.993	0.52	0.61
100.	0.677	0.80	0.73
101.	0.163	1.32	0.82
102.	0.124	1.21	1.19
103.	0.437	0.67	0.58
104.	0.532	0.89	0.78
105.	0.471	1.08	0.93
106.	0.721	1.35	0.69
107.	0.620	0.92	0.57
108.	0.190	0.79	1.11
109.	0.545	0.92	0.61
110.	0.196	1.44	1.46
111.	0.153	1.17	1.05
112.	0.893	1.46	1.33
113.	0.108	1.29	1.45
114.	0.671	0.59	0.81
115.	0.677	0.57	0.64
116.	0.686	0.54	1.33
117.	0.162	0.72	1.08
118.	0.876	0.75	0.61
119.	0.123	0.52	1.20
120.	0.921	0.73	1.22
121.	0.989	0.69	0.64
122.	0.760	0.66	0.91
123.	0.168	0.62	0.53
124.	0.703	0.50	0.60
125.	0.133	0.68	0.94
126.	0.244	0.86	0.57
127.	0.785	0.51	0.52
128.	0.497	0.56	0.61
129.	0.297	0.82	0.99
130.	0.152	0.88	0.62
131.	0.333	0.54	0.59
132.	0.599	1.10	0.62

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Items	Measures	Infit	Outfit
133.	0.367	1.45	0.58
134.	0.335	0.99	0.55
135.	0.482	1.17	0.74
136.	0.817	0.84	1.17
137.	0.117	0.51	0.63
138.	0.845	0.82	0.74
139.	0.807	1.23	0.55
140.	0.137	0.76	0.74
141.	0.788	0.75	0.78
142.	0.346	0.71	0.76
143.	0.887	0.73	0.75
144.	0.231	0.81	0.82
145.	0.694	0.57	0.85
146.	0.865	0.53	0.91
147.	0.847	0.98	0.76
148.	0.271	0.78	0.88
149.	0.666	0.69	1.04
150.	0.174	1.49	1.42

in the scale consistently measure the conceptual structure within one measurement tool and application. In the context of internal consistency, a high level of Cronbach's alpha (α) coefficient for the measurement tool indicated not only the reliability of the measurement tool but also its construct validity (Baykul, 1979). As it was known, reliable measurement tools required a high level of consistency between the items that consisted of the scale. In this study, the reliability level of the scale was calculated using Cronbach's alpha reliability method and Cronbach's alpha reliability coefficient was determined as α=0.951. Based on this value, there was a high level of internal consistency among the items that consisted of the scale.

In summary; as a result of the data analysis, the validity and reliability values of the Curriculum Leadership Scale, were found to be at a high level, and these findings revealed that the scale was a valid and reliable tool for determining the curriculum leadership levels of lecturers.

4. Conclusion and Discussion

In today's reality, innovative higher education institutions should be sensitive to social and universal needs. Also, they were supposed to have a highly strategic important role for ensuring that students could make positive contribution(s) to the common future of humanity with a global consciousness. Fulfilling this important role depended on the effective and efficient curriculum design. In fact, special importance should be given to the curriculum development (design, evaluation and revision) process. So, curriculum development process should be the primary concern for educators, policy makers and relevant stakeholders in higher education institutions (Khan & Law, 2015). Curriculum leaders were supposed to play a major role in terms of facilitating the curriculum development process (design, evaluation and revision) in higher education. Indeed, competent lecturers could perform effective and participatory curriculum leadership. Also, they aimed to achieve curriculum objectives with a contemporary educational approach. Thus, they could facilitate the redesign, adaptation and revision of the curriculum in accordance with the new generation students' needs and expectations. Curriculum leaders were supposed to facilitate the organisational culture characterized by experimentation, risk-taking, continuous learning, professional development, open communication, participatory decision-making, collaboration and stakeholder empowerment. Beyond this idea, curriculum leaders could support the curriculum development process by *(i) establishing a new direction, (ii) coordinating and developing a personal and professional relationship with relevant stakeholders, (iii) investing in appropriate resources for effective curriculum,* and *(iv) regularly reviewing and reflecting on curriculum progress* (Zimmer & Keiper, 2021). In conclusion, as a reflection of the new trends in the higher education ecosystem and techno-socio-economic landscapes' changes, competent lecturers had important duties and responsibilities related to curriculum leadership in order to design effective and efficient curriculum (Adam, 2009).

Curriculum leaders were considered to be one of the most important parts of the higher education ecosystem. Also, they had important roles and responsibilities for the achievement of effective learning and teaching processes within a learning community (Delener, 2013). In addition, an increasing number of studies in the relevant literature indicated that there was a meaningful and current expectation for lecturers to fulfil their curriculum leadership duties. These tasks were *(i) defining and sharing curriculum purpose (i.e. mission, objectives and standards), (ii) fostering collaboration with internal and external curriculum stakeholders, (iii) providing a structure for curriculum development efforts,* and *(iv) coordinating complex curriculum development activities* (Nguyen, 2012). In addition, curriculum leaders should focus on two main functions to change the curriculum into a better version. The first function was about carrying out regular revisions of the curriculum, complying with accreditation standards and obtaining the necessary resources. On the other hand, the second function was about revising the curriculum/course(s), setting new objectives and innovating for better student learning (Wiles, 2008, as cited in ECRA, 2010). In a study conducted by Avizhgan et al. (2015), one of the critical roles of curriculum leaders was the acquisition

of innovative reward and promotion system to motivate lecturers' participation in the curriculum development process. In our country learning outcomes, curriculum, delivery mode of educational services (formal, distance, blended, open), teaching methods and assessment-evaluation compliance as well as the coordination of all these processes were monitored by the senior management in order to ensure quality assurance in higher education (THEQC, 2022). Also, the education and training process was carried out under the coordination of the senior management. So, the duties and responsibilities related to this process were defined. On the other hand, dynamic curriculum leaders were required to acquire knowledge and skills that supported the higher education institutions' duties and responsibilities (Delener, 2013). According to Stark (2002) curriculum leaders adopted four styles (Style A, B, C and D) while managing the curriculum development process. Curriculum leaders who adopted Style A emphasised the responsibility of lecturers for curriculum planning, while curriculum leaders who adopted Style B emphasised the responsibility of coordinating the curriculum development process. In addition, curriculum leaders who adopted Style C encouraged lecturers to become curriculum leaders, while curriculum leaders who adopted Style D supported curriculum changes. Hence, curriculum leaders were found to mostly use Style C, A, D and B, respectively (Stark, 2002). Nevertheless, according to Stark (2002) curriculum leadership was a neglected dimension in higher education institutions and curriculum leaders were not sufficiently prepared for their roles in the curriculum development process. Based on these findings, it was recommended to plan the necessary trainings and activities to develop leadership competencies. In addition, curriculum leadership competencies of department heads should be supported in various ways such as regular review of curriculum, creating opportunities for individualised coaching and formal reflections (Albashiry et al., 2016).

Adopting the curriculum leadership approach that supported -*continuous*- learning, inquiring, innovation, participation, collaboration and teamwork with a shared governance approach was of great importance as quality goals in today's higher education institutions (Avizhgan et al. 2015; Voolaid & Ehrlich, 2017). In this study, the Curriculum Leadership Scale had too many items which negatively affected the applicability of the scale. But it was still essential to provide the necessary resources (time, incentives, etc.) in order to comprehensively determine lecturers' level of curriculum leadership in higher education institutions. The Curriculum Leadership Scale was the first measurement tool designed to determine the level of curriculum leadership in higher education. On the other hand, while there was no measurement tool to determine the level of curriculum leadership in higher education at national and international literature, there were various scale development and adaptation studies for different educational levels in order to ensure a more qualified learning and teaching process. To present some examples of these studies from the national literature; Bolat and Baş (2023) developed a measurement tool to determine the curriculum leadership levels of teachers, while Bayırlı and Balcı (2021) developed a measurement tool to determine the curriculum leadership levels of school principals. In addition, there was a measurement tool adapted by Demiral (2009) to determine the curriculum leadership levels of school principals in the related literature. On the other hand, to present some examples of these studies from the international literature; in the Teacher Curriculum Leadership Scale, which combined the concepts of teacher leadership and curriculum leadership, three dimensions, namely *"perspective"*, *"practice"* and *"identity"*, were identified, and the related scale focused on the capacity of teachers in terms of cooperating with stakeholders in the curriculum area (Wang et al., 2022). In addition, the School Principal Curriculum Leadership Scale developed by Huang and Wu (2005) included five dimensions of curriculum leadership such as *"shaping the curriculum vision"*, *"integrating curriculum resources"*, *"testing the curriculum"*, *"creating a supportive environment"* and finally *"conducting curriculum supervision"*. Similarly, the Instructional Leadership Scale developed by Lai and Lien (2025) focused on school principals' levels of managing curriculum development, instruction and evaluation processes. Therefore, lecturers played a strategic role in the process of curriculum development (design, evaluation and revision) with a transparent leadership approach taking into account the "volatility, uncertainty, complexity and ambiguity" (VUCA world) in the higher education ecosystem. For these reasons, in this study, the Curriculum Leadership Scale was developed to determine the level of curriculum leadership in higher education. Thus, in this study, it was aimed to develop a valid and reliable measurement tool for determining the curriculum leadership levels of lecturers. As a result of the scale development study, Curriculum Leadership Scale rating in a five-point likert-type scale was found to consist of 150 items and one dimension. Scale scores could be used for conducting new research and developing functional policies. Therefore, it was necessary to examine construct validity in order to accurately assess the appropriateness, meaningfulness, and usefulness of the inferences obtained from scale scores (Slocum-Gori & Zumbo, 2011). Unidimensional structure was found in the exploratory factor analysis. Furthermore, when the fit indices (GFI=.88, AGFI=.89, CFI=.96 and RMSEA=.06) were examined in the confirmatory factor analysis, es-

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sential unidimensional structure of the scale was found to be confirmed. Indeed, variables in the social sciences didn't necessarily have to meet the strict standard of unidimensionality and minor factors did not adversely affect the accurate interpretation of the total scale score. In the scale development process, firstly unidimensionality of the scale structure should be established in an acceptable manner and then the reliability of the scale should be evaluated. In fact, even a perfect unidimensional scale was not fully functional in the practical context when the scale reliability was low. Cronbach's alpha internal consistency coefficient could be used to evaluate the scale reliability (Slocum-Gori & Zumbo, 2011). In this sudy, the Cronbach alpha internal consistency coefficient was found to be as 0.951. Consequently, the validity and reliability values of the Curriculum Leadership Scale were found to be at a high level, and these findings revealed that the scale was a valid and reliable tool for determining the curriculum leadership levels of lecturers.

5. In Terms of Improving the Higher Education Ecosystem: Practices and Recommendations Regarding the Curriculum Leadership

Higher education institutions emerged as living institutions with a spiritual dimension rather than mechanical structures and sets of rules (Günay, 2018). This was because higher education institutions played a critical role in social development in terms of economic development as a gateway to employment and in terms of contributing to people's academic and professional development as well as their psycho-socio-cultural development (Şenay et al., 2020). Within this critical role, the currency of curriculum, the competence of lecturers, and the monitoring of student success were among the important responsibilities of higher education institutions (Harvey & Williams, 2010, as cited in Yeşilbaş-Özenç, 2024). In order to successfully fulfil these important responsibilities, organisational administrators should incorporate each quality element into the management process and strive to increase organisational effectiveness. Higher education institutions could transform themselves into new generation universities when they complied with international quality standards. New generation universities could achieve effective and efficient learning processes by adapting to the requirements of the 21st century in the globalisation process (Yeşilbaş-Özenç, 2024). In the 21st century embracing new educational ideals, today's higher education institutions should take firm steps towards becoming a new generation university. Also, they should develop curriculum that responded appropriately to individual, sectoral and social needs and expectations, as well as the needs and expectations of the modern age, under the leadership of competent lecturer (Derin-Kılıç, 2024).

As a curriculum leader, lecturers should support organisational culture (Beachum & Dentith, 2004), encourage professional learning communities (Friedman, 2011; Hairon et al., 2015) and implement curriculum reforms (Hofstein et al., 2004; Lai & Cheung, 2015) in order to transform today's higher education institutions into centres of excellence that aligned with global trends (flexibility, internationalisation, academic mobility, etc.) from administrative and educational perspectives. Organisational culture should support curriculum leadership elements that strengthened organisational communication in particular and the organisational climate in general. The characteristics of that organisational culture were the shared sense of purpose, shared commitment to student learning, desire for lifelong learning, empowerment of lecturer, collegiality, and collaboration (Cooper et al., 2016; Ghamrawi, 2010). In this context, in the relevant literature, curriculum leaders were supposed to influence people through *"developing trust-based relationships"* and *"establishing professional cooperation"* (York-Barr & Duke, 2004). Also, curriculum leaders should support their colleagues in terms of encouraging people (Nicholson et al., 2017), sharing innovative ideas and resources (Collinson, 2012; Fairman & Mackenzie, 2015) and modelling new practices (Fairman & Mackenzie, 2015; Nicholson et al., 2017). In addition, lecturers tended to accept curriculum leaders' reform efforts when strong relationships were established with colleagues (Fairman & Mackenzie, 2015), organisational development was supported and the views of all relevant stakeholders were valued within a flexible, transparent, and supportive structure that encouraged effective curriculum leadership (Foster, 2005; Muijs & Harris, 2006; Rutherford, 2006; Woodhouse & Pedder, 2017). On the other hand, a top-down, rigid and non-transparent organisational structure created a major obstacle to effective curriculum leadership (Foster, 2005; Little, 2003; Muijs & Harris, 2006). Indeed, non-supportive organisational culture (e.g., cultures of pressure, coercion, and blame) and dominance of personal interests constituted a major obstacle to effective curriculum leadership (Cooper et al., 2016; Muijs & Harris, 2006; Poekert et al., 2016; Woodhouse & Pedder, 2017). In other words, supportive colleague relationships were described as an important facilitating factor for curriculum leadership, while unsupportive colleague relationships were described as transforming curriculum leadership into a challenging task. Therefore, it was crucial to embrace the curriculum leadership approach. Moreover, curriculum leaders should internalise and

support this approach by creating sufficient space, time and opportunities for lecturers to be more closely involved in curriculum decisions and other organisational matters (Cheng & Szeto, 2016; Chew & Andrews, 2010; Smith et al., 2017; Woodhouse & Pedder, 2017). On this axis of importance, organisational leaders' beliefs about leadership (e.g., belief in shared leadership), knowledge of curriculum leadership, frequency of interaction with curriculum leaders, and support of curriculum leaders' efforts were among the main factors influencing curriculum leadership (Mangin, 2007). Indeed, various training activities should be planned in order to provide opportunities for the development of leadership competencies (Albashiry et al., 2016).

In conclusion, in order to strengthen higher education institutions, it was important to embrace the curriculum leadership approach that addressed each field of activity (education and training, research and development, social contribution, leadership, governance and quality) from a holistic perspective within the higher education ecosystem and its core functions. As well as it was important to manage strategies, relationships, time, authority sharing, organisational motivation and stress effectively and consistently in line with organisational objectives and values in general and curriculum objectives and values in particular. Based on this importances, the purpose of this study was to examine the curriculum leadership levels of lecturers, who were considered to play a strategic role in the curriculum development, implementation and evaluation process with the supportive and dynamic leadership approach. It was thought that the Curriculum Leadership Scale could facilitate to achieve this purpose.

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Research Ethics

Ethical approval for this study was obtained from the Atatürk University Social and Human Sciences Ethics Committee, with the decision dated 25/05/2023 and numbered 27.

Artificial Intelligence Use

The authors declare that no generative artificial intelligence (e.g., ChatGPT, Gemini, Copilot, etc.) was used in any part of this study.

Author Contributions

The authors have accepted responsibility for the entire content of this manuscript and approved its submission.

***Conceptualization*:** [Asil Derin, Adnan Küçükoğlu], ***Data curation*:** [Asil Derin, Adnan Küçükoğlu], ***Formal analysis*:** [Asil Derin, Adnan Küçükoğlu], ***Funding acquisition*:** [Asil Derin, Adnan Küçükoğlu], ***Investigation*:** [Asil Derin, Adnan Küçükoğlu], ***Methodology*:** [Asil Derin, Adnan Küçükoğlu], ***Project administration*:** [Asil Derin, Adnan Küçükoğlu], ***Resources*:** [Asil Derin, Adnan Küçükoğlu], ***Validation*:** [Asil Derin, Adnan Küçükoğlu], ***Visualization*:** [Asil Derin, Adnan Küçükoğlu], ***Writing – original draft*:** [Asil Derin, Adnan Küçükoğlu], ***Writing – review & editing*:** [Asil Derin, Adnan Küçükoğlu]

Competing Interests

The authors state no conflict of interest.

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Data Availability

The raw data can be obtained on request from the corresponding author."

Peer-review

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