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Development and Validation of Data-Driven Decision Making in Schools Scale

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Abstract: Data has become an essential part of educational decisions about teaching and learning, classroom-level issues, management or a range of other decisions faced by educators. Due to the widespread use of data, which is a resource used and benefited from in making qualified decisions, the need for a valid and reliable measurement tool to determine the perceptions of administrators and teachers towards data-driven decision making in schools has arisen. For this purpose, a five-point Likert-type scale called "Data-Driven Decision Making in Schools Scale" was developed through a systematic process. The sample of the study consisted of 584 teachers and administrators for exploratory factor analysis and 392 teachers and administrators for confirmatory factor analysis. The McDonald's omega (ω) and Cronbach's alpha (α) coefficients calculated for the scale were found to be in the range of .84 – .96, and the CR and AVE values were above .60 and between .52–.60, respectively, indicating sufficient reliability and convergent validity. After the validity and reliability were ensured, the final version of the Data-Driven Decision Making in Schools Scale consisted of 23 items and three dimensions. These dimensions are data collection and storage, data analysis and interpretation, and data-driven culture. The analysis's findings demonstrate that the 3DM-School is a valid and reliable measuring instrument for figuring out how administrators and teachers feel about making decisions in schools based on data.

Keywords: Data-driven decision making, data for school management, data-driven management, data culture, scale development

Okullarda Veriye Dayalı Karar Alma Ölçeğinin Geliştirilmesi

Öz: Veriler; eğitim-öğretim, sınıf düzeyinde sorunlar, yönetim veya eğitimcilerle karşılaşılan diğer bir dizi karar hakkında eğitim kararlarının temel bir parçası haline gelmiştir. Nitelikli kararlar alınmasında başvurulan ve yararlanılan bir kaynak olan verilerin yaygın kullanımından dolayı okullarda veriye dayalı karar almaya yönelik yönetici ve öğretmenlerin algılarını belirlemek için geçerli ve güvenilir bir ölçme aracı ihtiyacı doğmuştur. Bu amaç doğrultusunda "Okullarda Veriye Dayalı Karar Alma Ölçeği" şeklinde adlandırılan beşli likert tipi bir ölçek sistematik bir süreçle geliştirilmiştir. Araştırmanın örneklemi açımlayıcı faktör analizi için 584, doğrulayıcı faktör analizi için 392 öğretmen ve yöneticiden oluşmuştur. Ölçek için hesaplanan McDonald's omega (ω) ve Cronbach's alpha (α) katsayıları .84–.96 aralığında bulunmuş, CR ve AVE değerleri ise sırasıyla .60'ın üzerinde ve .52–.60 arasında olup yeterli güvenirlik ve yakınsak geçerlik göstermiştir. Araştırmada geçerlik ve güvenirlik sağlandıktan sonra Okullarda Veriye Dayalı Karar Alma Ölçeği'nin son hali toplam 23 maddeden ve üç boyuttan oluşmuştur.

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Bu boyutlar; verilerin toplanması ve saklanması, verilerin analizi ve yorumlanması ve veriye dayalı kültür olarak sıralanmıştır. Analiz sonuçları ölçeğin öğretmen ve yöneticilerin okullarda veriye dayalı karar almaya yönelik algılarını belirlemede güvenilir ve geçerli bir ölçme aracı olduğunu göstermektedir.

Anahtar kelimeler: Veriye dayalı karar alma, okul yönetiminde veri, veriye dayalı yönetim, ölçek geliştirme

Introduction

For centuries, we have used data as a practical way to avoid uncertainty (Blau, 2011). Observations and recorded notes about changes in nature, such as when rivers flood, when crops ripen, when trees bear fruit, and when seasons start and end, can be considered as the first examples of the process of data collection, analysis and interpretation. Such data-based processes have made the environment more bearable and the future predictable. Throughout history, data has been used by both individuals and institutions in informal and formal ways. However, with the emergence of mass production in the early 20th century, data use became more systematic and was accepted as an important resource that management approaches benefit from, in line with Peter Drucker's words, "you can't manage what you can't measure" (Robinson et al., 2005). The reflection of this historical process to the present day is no longer limited to observing natural events, but also in the form of systematic collection, analysis and use of big data in almost every field, from decision-making processes of institutions to education systems, from health services to economic planning, by integrating it with modern technologies such as artificial intelligence. Thus, data used to understand nature in the past has become an indispensable tool for managing complex social systems today.

Data has become important as effective and objective sources for controlling organizations, increasing efficiency, being aware of market needs and feedback, providing agility for increasing competition and accurate measurements. Educational organizations are also places where continuous measurements are made, feedback is provided and data is used intensively. Following the No Child Left Behind Act in the early 2000s, data-driven decision-making became a focal point of educational policy and practice (Mandinach et al., 2006a). Data-driven decision-making represents an evolution for organizations from being "data-rich but knowledge-poor" to using data and transforming it into actionable knowledge (Kennedy, 2019).

Data-driven management emphasizes transparency and accountability and forces managers to make decisions based on evidence rather than intuition. Data-driven transformation leads organizations to change their working practices and requires additional skills such as a focus on innovative data collection and analysis practices to provide organizations with a competitive advantage in all their practices (Davenport, 2006; McGuire et al., 2012). Collecting, storing and analyzing data are becoming important routines for educational organizations to survive, progress and increase their productivity and effectiveness (Manyika et. al., 2011). Thus, it is seen as an important option for educational organizations to take a position for the future by obtaining insights from data.

Literature Review

Decisions constitute the essence of educational organizations. Decision making plays an important role in motivation, leadership, communication and organizational change (Hogg & Vaughan, 2007). It is known that schools, which have a dynamic structure, are directly related to decision-making processes as the main factor affecting their problem-solving skills and finding

effective solutions to problems. It is important to use data to identify the causes of the existing problem before taking measures for development and progress (Schildkamp et al., 2016). The use of data is an important element in turning decisions into action (Spillane, 2012). Decision-making is extremely important for management due to its difficulty, complexity and high number of variables, and it can also be a source of pressure and stress. Therefore, protecting against uncertainty in decision making has received considerable attention from both academia and industry (Ning & You, 2018). Data-rich educational organizations value data-driven decision making to use and leverage data to make objective, effective, and predictive decisions.

As the risks associated with a decision increase, so does the need for robust evidence (Epstein, 2008). Therefore, there is a need for data, which is considered as evidence in fulfilling the responsibility for effective decision-making. Data supports managerial and professional work and is critical for all decisions at all levels of a business (Alshikhi & Abdullah, 2018). According to Kaufman et al. (2014), data-driven decision making is the generation of options that include policies and procedures for the user through data analysis. Therefore, data-driven decision making is the main focus of both educational policies and educational practices (Mandinach et al., 2006b). Thus, in educational organizations, data have become the most effective tools to determine their future instead of being collected aside and seen only as ordinary files.

Data may initially appear to be just numbers, but can be transformed into valuable information by a competent user. Data that gain meaning through context (Mandinach & Honey, 2008; Williams & Hummelbrunner, 2011) provide effective and meaningful feedback for schools. Accurate and high-quality data can be considered as a source of inspiration and motivation in determining the destiny of the organization. Supporting the decisions made in organizations, freeing them from prejudices and accepting them without personalizing them becomes possible through data. Data can improve decisions, but making the best use of data and making healthy decisions is only possible with the use of accurate analysis methods and analysts. Data contains insights and meanings that can lead to better decisions, and the right analysis is the way to get them and act on them. In this way, data can be used in organizations as a decision-making tool or technique free from intuition, prejudice and experience.

Data-driven decision making is considered as a complex process involving many variables. Studies (Bertrand & Marsh, 2015; Calzada Prado & Marzal, 2013; Creighton, 2007; Doğan, 2021; Ikemoto & Marsh, 2007; Kahneman & Klein, 2009; Kowalski & Lasley, 2009; Lasater et al., 2020; Mandinach, 2012; Park & Datnow, 2017; Schildkamp & Ehren, 2013; Young, 2006) on educational organizations and businesses were examined to determine the item pool and sub-factors to measure data-driven decision making in schools. When the studies on data and data-driven decision making are examined, concepts such as data analysis, interpretation, collection, storage, data literacy, data culture, data accessibility, data use, technological infrastructure, data interpretation, data systems are emphasized. In addition, the concepts of data collection, data storage, data analysis, data interpretation and data culture were emphasized in focus group interviews with teachers and administrators. Focus Group Interview, one of the interview techniques, can be used as a data collection tool and data sources are created by bringing together a small number of people related to the subject of the research (Şencan 2005). Therefore, while conceptualizing the sub-dimensions and items in the study, the concepts of data collection and storage, data analysis and interpretation, and data-driven culture were used.

It is seen that the studies conducted while creating dimensions for data-driven management and data-driven decision making include various classifications. Mandinach (2012) uses the concepts of collecting, storing and analyzing data, while Doğan (2021) considers technological infrastructure and hardware, data use culture, data use purpose and data literacy as sub-dimensions in his research. In addition, Park and Datnow (2017) argued that development-oriented data cultures can lead to equity-based data decisions. For the dimensions of the Data-Driven Decision Making in Schools scale developed with reference to these studies, the concepts of data collection and storage, data analysis and interpretation, and data-driven culture were used.

Data Collection and Storage

Collecting and storing data are among the routines of educational organizations. This can include data from student assessments, surveys, structured classroom and school observations (Mandinach & Jimerson, 2016). The process of collecting and storing data, which is one of the primary steps that data-driven organizations must overcome, is seen as valuable for timely access to data, data security, and data processing. Based on the hypothesis that data collection in education helps to prevent and correct problems such as biases associated with intuitive judgment and rationally improves the quality of educational decisions, there is a growing expectation in the educational community that teachers should intentionally and systematically use data to inform decision-making (Kowalski & Lasley, 2009). The collection and storage of data in educational organizations is mainly driven by three data use needs. Schildkamp et al. (2017) discuss these as accountability, school improvement and instruction.

Data Analysis and Interpretation

Analysis and interpretation of data is necessary to use data instead of intuition, experience and personal opinions, and to analyze and make sense of its results. Data gain value through analysis and the interpretation that results from it. In data-driven decision-making, an evidence-based decision-making approach used by schools, how data is collected, stored, analyzed and interpreted determines the impact and outcome of decisions. The manipulation or biased interpretation of data by users can be prevented through analysis. Even if data is collected rationally, teachers still need to make sense of it (Bertrand & Marsh, 2015). To engage in data interpretation, teachers need knowledge, skills and training to interpret data effectively and responsibly (Mandinach & Gummer, 2016). In the process of data analysis and interpretation, the importance and necessity of data literate teachers and administrators emerges. According to Calzada Prado and Marzal's (2013) definition, data literacy enables individuals to access, interpret, critically evaluate, manage, process and ethically use data. Incorrectly analyzed or interpreted data can lead to invalid inferences that are biased and cause decision-makers to reach precisely the wrong conclusions.

Data-driven Culture

Data-driven culture is vital for the use and impact of data in educational organizations. Therefore, a data-driven organizational culture plays an essential role for the proper functioning of data-driven decision-making processes in schools. Every element of schooling is impacted by culture, including how information is viewed and utilized (Firestone & Gonzalez, 2007). Data-driven decision-making is influenced by the ways in which data users (teachers and administrators) notice and make sense of data, as well as the organizational, social, and political contexts in which these interactions take place (Farrell, 2015). Therefore, data culture is a valuable organizational asset and characteristic to highlight the important role that data utilization methods are influenced

by the expert interpretation and judgment of instructors. As schools adopt policies that contradict prevailing values and beliefs, school cultures gradually shift rather than abruptly (Deal & Peterson, 2016). Therefore, creating a data-driven culture in schools requires a clear vision for data use, collaboration around data, resources and systems that allow teachers to access and make sense of data, a sense of trust around data use, shared responsibility for school improvement, school leadership that models and supports data use, and high expectations for student learning (Datnow & Park, 2014; Mandinach & Jackson 2012).

The main purpose of this study is to develop a valid and reliable measurement tool to assess the perceptions of teachers and school administrators regarding data-based decision-making processes in the context of the Turkish education system. In 21st century schools, data-driven applications are becoming dominant in the basis of effective decision-making processes. At the school level, the ability of teachers and administrators to make decisions based on data is considered an important factor that can increase school effectiveness and student performance. However, in order for this process to be carried out healthily, the perceptions of teachers and administrators regarding data-driven decision-making processes must be measured with valid and reliable tools. Although there are studies on data-driven decision making, most of which are based on a theoretical and qualitative perspective (Altun & Karasu, 2021; Brooks, 2012; Cemaloğlu, 2019; Datnow et al., 2018; Dilekçi et al, 2020; Doğan, 2021; Dunn, 2016; Dunn et al., 2013; Kartal, 2021; Marsh et al., 2006; Maqbool et al., 2022; Öz, 2020; Tabak et al., 2020; Simpson, 2011; Staman et al., 2014; Swan, 2009; Vicki & Datnow, 2009; Zeide, 2017). When these studies are examined, it is seen that they mainly focus on the theoretical foundations of data-driven decision making and some organizational outcomes and effects. However, there is a lack of a culturally, comprehensively and valid Turkish scale to measure the perceptions of teachers and administrators regarding data-based decision-making processes in Turkey. Existing scales usually focus only on teacher opinions or address the process in limited dimensions. This study aims to fill this gap by presenting a measurement tool that evaluates both teacher and administrator perceptions together and is specific to many organizational dimensions and contexts such as data analysis, data literacy and data culture.

Method

Research Design

This study was designed within the scope of the scale development model, which is one of the quantitative research methods. In this context, the research was structured as a developmental and descriptive survey model that follows the scientific steps specific to the scale development process.

The Process of The Scale Development

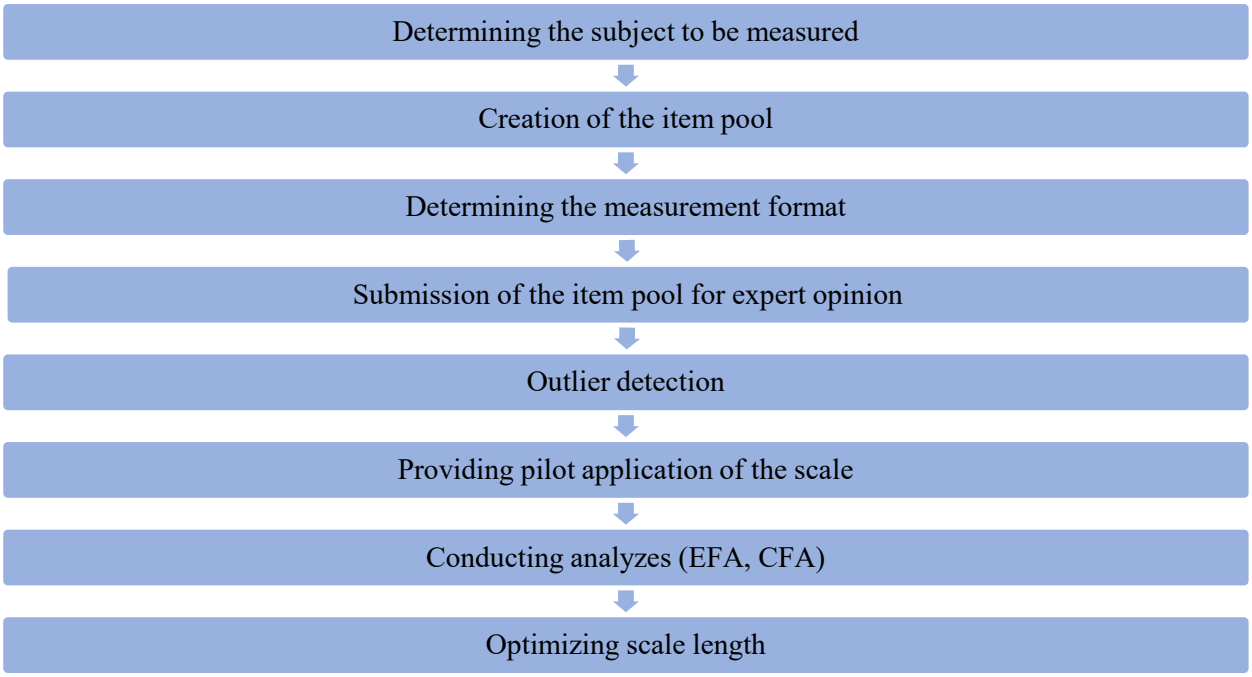
A pilot application of the proposed form was made to a study group of research participants who have similar characteristics (teachers and administrators from different school levels and seniority). Following the establishment of the psychometric properties (validation and reliability) of the preliminary version elements, the ultimate measurement form containing the ideal items was created (Yurdugül & Aşkar, 2008; Fraenkel et. al., 2011).

Systematic steps were followed in the development process of the 3DM-School Scale (Figure 1). In order to obtain fair evidence, the data were collected from two different cities (Van and Siirt) at different times. Evidence for reliability and validity was presented according to the

replies of teachers and administrators (initial sample) to the draft form of the 3DM-School [exploratory factor analysis (EFA)]. Teachers and administrators employed in another city were subjected to the model that resulted from EFA during the validation phase (Second Sample). The validity and reliability of the 3DM-School Scale was examined by using confirmatory factor analysis (CFA) was used.

Figure 1

Scale development steps (Devellis & Thorpe, 2021)

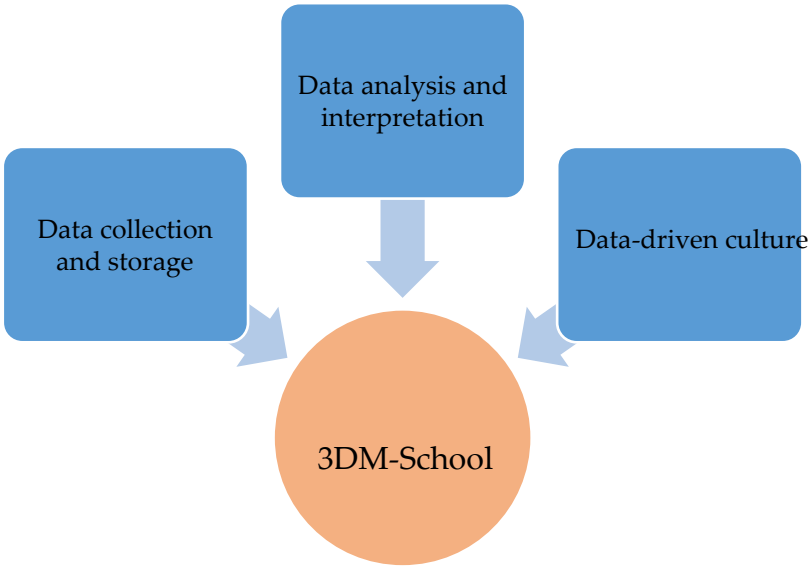


Determining the subject to be measured

The goal of this research was to create an instrument to measure teachers' and administrators' perceptions of data-driven decision making in schools. Three dimensions were obtained for the 3DM-School. These three dimensions—data collection and storage, data analysis and interpretation, and data-driven culture—were covered in the literature review (Figure 2).

Figure 2

Dimensions of the 3DM-School Scale



Creation of the item pool

During producing the item pool, studies on data-driven decision making were examined (e.g., Altun & Karasu 2021; Brooks, 2012; Datnow et al., 2018; Dilekçi et al, 2020; Doğan, 2021; Dunn et al. (2013); Dunn, 2016; Kartal, 2021; Mandinach & Gummer, (2013); Mandinach & Jackson 2012; Maqbool et al., 2022; Marsh et al., 2006; Öz, 2020; Simpson, 2011; Staman et al., 2014; Tabak et al., Vicki & Datnow, 2009; 2020; Zeide, 2017). Furthermore, every item in the scale was designed for teachers and administrators at the forefront (DeVellis, 2017). In order to measure the general perceptions of the participants, the phrase "In our school..." was placed at the beginning of each item in the pool. A 43-item draft form suitable for teachers and administrators was created by us. At this point, the researchers determined that some items were identical to one another in terms of the content of the questions and opted to eliminate 12 items from the draft form. There were only 31 items left in the draft, including 10 items for data collection and storage, 6 items for data analysis and interpretation, and 15 items for data-driven culture.

Determining the measurement format

A 5-point Likert was utilized in determining the measurement format of the 3DM-School. Likert options vary from "strongly disagreement" to “strongly agreement". The minimum level of aggreement is denoted by 1 while the maximum level is denoted by 5. This method was followed because the 5-point Likert is a widely used measurement method, as well as being an effective measurement method in obtaining the situation to be measured (DeVellis, 2017), and the reliability of the scores to be produced increases with the number of alternatives in the measurement tool (Thorndike, 2005).

Submission of the item pool to expert opinion

The phrases "appropriate, should be corrected, not appropriate and explanation" were included in an expert opinion form made by academicians (Four of the academics are Professors and Associate Professors in Educational Administration, one is an Associate Professor in

Curriculum and Instruction, and one is an Assistant Professor in Measurement and Evaluation.) regarding the suitability of the items in the item pool created as part of 3DM-School. Upon its creation, the form was progressively shown to academics in the field of school administration for their feedback, then measurement and evaluation in education, and finally from the field of Turkish to ensure understability of the scale. In the first stage, seven academicians from the field of educational administration gave their opinions for the form. After the experts from educational administration discipline were consulted, an academician's (who is an expert in measurement and evaluation in education) opinions were asked. According to the feedback, some items were corrected and some were removed from the form on the grounds that they were not appropriate. A few items were revised with the feedback given by language experts. As a result, the 3DM-School scale was revised in line with the Expert assessments and a final form with thirty-one items (10 items on data collection and storage, 6 items on data analysis and interpretation, and 15 items on data-driven culture) was created. The next phases of the study were conducted using the updated form as a guide.

Inclusion of control items

There were not any control items in the 3DM-School scale. Attempts were made to determine which forms were shown to be completed as outliers (answered haphazardly/sloppy) during the data collection phase, rather than utilizing control items. Inadequate responses were identified based on this approach (Tabachnick & Fidell, 2013), and as a result of extreme values, 28 individuals from the CFA sample and 38 participants from the EFA sample were excluded using the Z-score technique.

Piloting the scale

Before collecting evidence for the reliability and validity of the 3DM-School, the pilot procedure of the measurement tool was carried out including 27 teachers and administrators (17 teachers, 10 administrators) working at varying levels of education (primary, middle, high school) in the 2021-2022 academic year. Spelling mistakes, confusing phrases, face validity, and response time were all investigated in the pilot study. In this case, it was concluded that a few unnecessary terms should be removed from the form, that all terms were clear, and that the form was useful based on participant comments. The average response time of the participants was determined as 5-8 minutes. For this reason, the researchers allowed 8 minutes for the reliability of the scale not to be influenced by the time factor.

Conducting analysis

To demonstrate the 3DM-School scale's validation, the way of scale development was addressed with two different studies based on the response processes. The EFA procedures were applied using the first responses, and the CFA procedures were applied using the second responses. Convenience sampling was utilized to gather these responses from teachers and administrators in two distinct Turkish cities during the second semester of the 2021–2022 school year. It was voluntary for both samples to participate in 3DM-School.

As the 3DM-School instrument was being developed, attention was paid to reaching the suitable number of samples to get reliable and valid findings. Otherwise, the latent structure of the scale and EFA results could have been negatively affected. To determine the appropriate number of participants, there are a number of recommendations and methods according to prior studies referring the acceptable number of participants. Although there are differing opinions on the ideal

sample size for factor analysis, many researchers agree that a sample size of 300 to 500 is generally acceptable (Comrey & Lee, 1992; Tabachnick & Fidell, 2013). Therefore, it was decided that the number of participants should be as high as possible above 300. Following the removal of the forms containing outliers, 364 teachers and school administrators were included in the second sample, and 546 teachers and administrators made up the first sample. Thus, it can be concluded that the study's initial sample size for EFA satisfied the "very good" criterion, when the latter one analyzed for CFA has "good" criterion.

In order to test the construct validity of the 3DM-School scale, Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were conducted respectively on two independent samples. Prior to EFA, assumptions related to sample adequacy (KMO, Bartlett's test), normality (skewness and kurtosis), and item-total correlations were checked. EFA was performed using the maximum likelihood method with Direct Oblimin rotation, considering criteria such as eigenvalues, scree plot, and factor loadings. After determining the factor structure, Cronbach's alpha reliability coefficients and inter-factor correlations were calculated. CFA was then conducted on the second sample to confirm the scale's structure, and model fit was evaluated using standard indices (χ^2/df, CFI, NFI, RMSEA, SRMR). Details of these analyses and related findings are presented in the Findings section.

Optimizing scale length

Initially containing 43 items, the 3DM-School was later reduced to 31 items based on the views from researchers and academics. Following EFA and CFA tests, the ultimate measurement tool had 23 items under three factors.

Findings

The findings obtained from the 3DM-School analysis are given in the following subsection.

Validation of the 3DM-School

In order to determine the construct validity, firstly the factor structure of the scale was discovered by applying explanatory factor analysis (EFA). Then, confirmatory factor analysis (CFA) was performed to test the accuracy of this structure. The findings obtained as a result of both analyses were evaluated to the extent that they were consistent with the theoretical structure of the scale and evidence regarding construct validity was presented. The detailed results of these analyses are given below with tables and graphs.

Exploratory factor analysis (EFA)

To determine whether the sample size found in the study was appropriate for EFA, the KMO and Bartlett tests were used. The sample size's KMO value was =.97, and the Bartlett's test resulted in (χ^2=8641.40, p<.05). Based on this outcome, it is considered that the sample size is sufficient for EFA. Furthermore, Field (2017) acknowledged that the data were regarded to be normally distributed due to the fact that the coefficients of skewness and kurtosis varied from ± 2.00. The item-total correlations of the items in the 3DM-School were examined prior to the EFA application and some items (i10 = .27; i6 = .23; i19=.18; i13=.24) were taken off the 3DM-School because of being below .30 value. When the items were accumulated under certain factors, the dimensions were determined and the items that did not fall under any dimension were removed. Therefore some items (i3, i12, i16, i23) were decided to be removed from the scale because they were not gathered under any factor. After the related items were removed, it was found that the

remaining 23 items had a sufficient item-total correlation represented in Table 1. EFA was used to ascertain the 3DM-School's factor structure when it was determined whether the study's sample size was appropriate.

Table 1

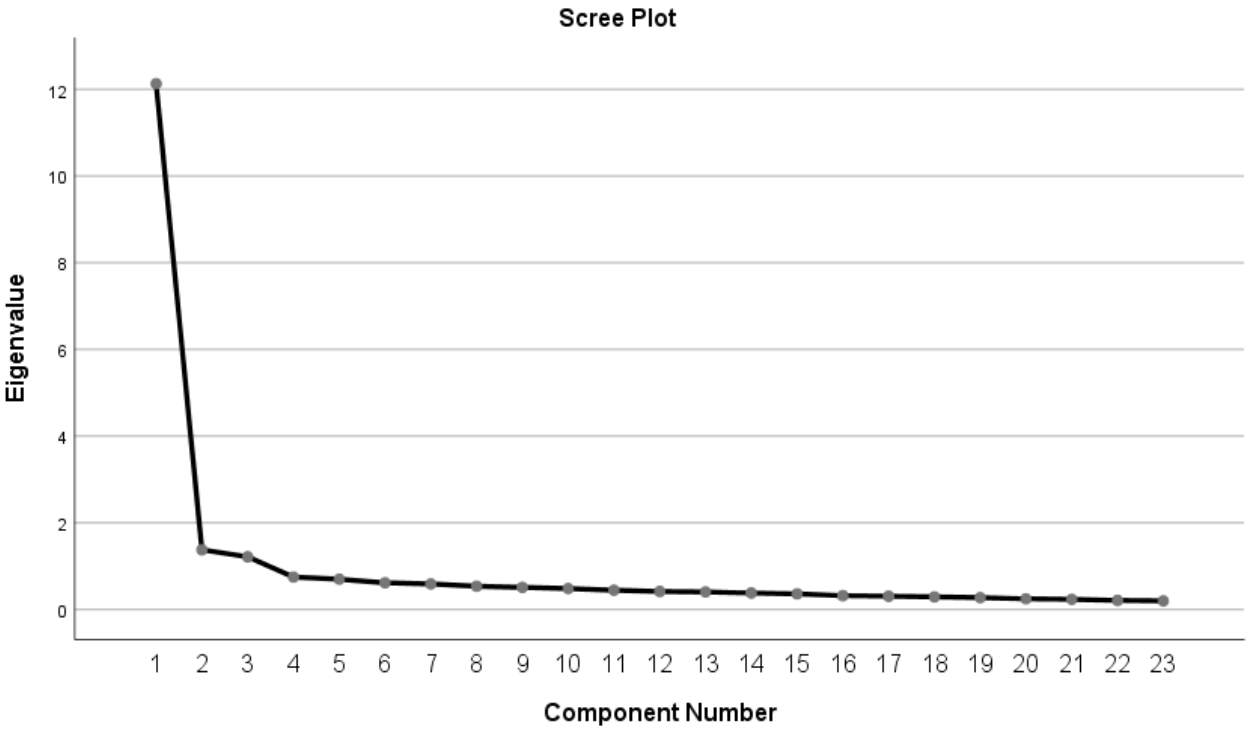
EFA results for the scale of data-driven decision making in schools

Factor	Former Item No.	New Item No	Item Loading Values
Collection and Storage of Data (CSD)	i2	i2	.72
	i7	i5	.71
	i1	i1	.70
	i4	i3	.69
	i9	i7	.66
	i5	i4	.64
	i8	i6	.53
Data Analysis and Interpretation (DAI)	i11	i8	.39
	i14	i9	.75
	i17	i11	.74
	i18	i12	.60
	i15	i10	.49
Data-Driven Culture (DDC)	i27	i19	.76
	i25	i17	.72
	i24	i16	.72
	i26	i18	.71
	i30	i22	.68
	i29	i21	.65
	i20	i13	.65
	i31	i23	.64
	i22	i15	.63
	i21	i14	.59
	i28	i20	.53

As a result of the analysis, it was decided to remove 8 items (3, 6, 10, 12, 13, 16, 19, 23) with item loadings below 0.3 from the former 31-item scale. The 3-factor scale structure consisting of 23 items was prepared for CFA by renumbering the scale items from 1 to 23 in order to distinguish between former and latter items.

Figure 3

Scree plot graph of the 3DM-School Scale



The EFA analysis revealed a three-factor structure with an eigenvalue ≥ 1.00, which provided 64.01% of the total variance. It was observed that a horizontal curve continued after the third factor when the scree plot graph was examined, it. Accordingly, the variance explained (64.01%) was found to be acceptable. The first factor's eigenvalue was 21.91%, the second factor's eigenvalue was 16.40%, and the third factor's eigenvalue was 25.69 %. In addition, the Scree Plot graph used to determine the number of factors was examined and it was observed that the breaking point was concentrated in three factors as seen in figure 3. This provides visual evidence supporting the three-factor structure of the scale.

Table 2

Component and rotated factor loadings with communalities for 3DM-School Scale

	Component Matrix			Rotated Component Matrix			Communalities
Items	1	2	3	1	2	3	Extraction
i1	.64	.38	.14	.70	.20	.20	.59
i2	.76	.32	.13	.72	.29	.27	.68
i3	.78	.26	.13	.69	.34	.31	.69
i4	.76	.19	.23	.66	.27	.41	.67
i5	.69	.38	.01	.71	.32	.12	.62
i6	.59	.14	.39	.53	.07	.48	.52
i7	.58	.41	-.08	.65	.30	-.01	.52
i8	.75	.05	.07	.33	.39	.32	.57

i9	.57	-.33	.45	.16	.75	.18	.62
i10	.76	.01	.17	.34	.49	.37	.61
i11	.56	-.41	.35	.26	.74	.07	.61
i12	.75	-.11	.26	.34	.60	.40	.64
i13	.82	-.11	-.11	.36	.37	.65	.70
i14	.77	-.21	-.02	.45	.27	.59	.64
i15	.76	-.31	-.04	.48	.19	.63	.67
i16	.79	-.15	-.21	.30	.30	.72	.70
i17	.80	-.23	-.17	.37	.25	.72	.72
i18	.78	-.31	-.14	.43	.18	.71	.73
i19	.78	-.21	-.27	.27	.23	.76	.72
i20	.69	.18	-.19	.08	.40	.53	.55
i21	.74	.07	-.27	.11	.43	.65	.62
i22	.63	.11	-.43	-.06	.37	.68	.60
i23	.81	.01	-.14	.27	.44	.64	.68

Table 2 presents the Component Matrix, Rotated Component Matrix and Communalities values of the 3DM-School Scale. All of the factor loadings and common variance values in the table are above the accepted limit values. This shows that the items of the scale adequately reflect the factor structure and support the construct validity.

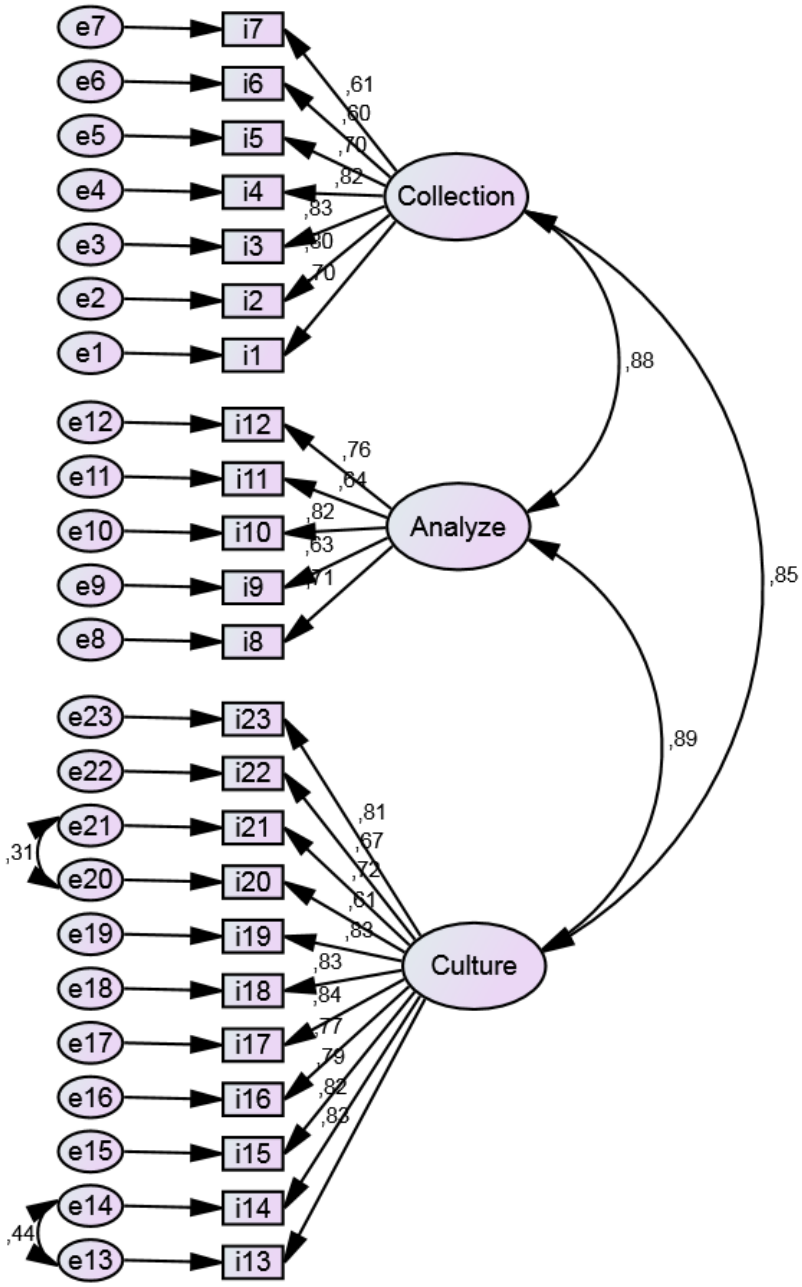
Confirmatory factor analysis (CFA)

Confirmatory factor analysis (CFA) was first applied to the original form of the scale and model-data fit indices were examined. When the fit indices were below the reference values, modification suggestions were evaluated. In this process, modifications were made between the item pairs with the highest error covariance (i13–i14 and i20–i21) and the model was re-run. Since the explanatory power of the items with high error variance is low, such items were first reviewed individually. In cases where more than one item shows negative error variance, it is recommended to remove the items from the model one by one and evaluate the effect of these changes on the model (Şimşek, 2007). The modifications were applied gradually (one by one) in accordance with the theoretical basis of the model (Çokluk et al.; 2010).; improvements were observed in the model fit indices after each modification.

When the modification model-data fit indices were examined, the results are as; $\chi^2/df= 3.25$, CFI= .92,TLI= .91, NFI= .90, RMSEA= .07. The analysis results reveal that the fit of the model with the data is within acceptable limits and the fit indices are at an appropriate level (Hu & Bentler, 1998; Marsh & Hocevar, 1985; Browne & Cudeck, 1993; Marsh et al., 2006). Accordingly, the three-factor structure of the 23-item 3DM-School was validated using an independent sample. The model-data fit indices for the 3DM-School are presented in Figure 4.

Figure 4

CFA results of the 3DM-School Scale


e7
e6
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i7
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Collection
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e12
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Analyze
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,31
,44
,81
,67
,72
,61
,83
,83
,84
,77
,79
,82
,83
Culture
,89

The factor loadings of the items in the first factor (i1, i2, i3, i4, i5, i6, i7) ranged between .61 and 0.83, the factor loadings of the items in the second factor (i8, i9, i10, i11, i12) ranged between .63 and .82 and finally the factor loadings of the items in the third factor (i13, i14, i15, i16, i17, i18, i19, i20, m21, i22, i23) ranged between .61 and .84. The satandard factor loadings are presented in Table 3.

Table 3

Standard factor loadings after CFA

Dimensions	Items	Factor Loadings
Collection and Storage of Data (CSD)	i1	.70
	i2	.80
	i3	.83
	i4	.82
	i5	.70
	i6	.60
	i7	.61
Data Analysis and Interpretation (DAI)	i8	.71
	i9	.63
	i10	.82
	i11	.64
	i12	.76
Data-Driven Culture (DDC)	i13	.83
	i14	.82
	i15	.79
	i16	.77
	i17	.84
	i18	.83
	i19	.83
	i20	.61
	i21	.72
	i22	.67
	i23	.81

The Turkish and English translations of all items in the 3DM-School scale are presented in detail in Table 4 in order to illustrate the linguistic validity and comprehensibility of the scale. This table includes both the original (Turkish) form of each item and the English translation used within the scope of the research. Thus, the content structure of the scale and the consistency in the translation process can be followed more clearly.

Table 4

3DM-School Scale items

English Version	Türkçe Versiyonu
1. In our school, data are collected by using multiple data collection techniques (questionnaire, interview, test, etc.).	1. Okulumuzda çoklu veri toplama tekniklerinden (anket, görüşme, test vb.) yararlanılarak veriler toplanır.
2. In our school, the existing data is constantly updated with new data entries.	2. Okulumuzda sürekli yeni veri girişleriyle mevcut veriler güncellenir.
3. In our school, multidimensional data are collected about internal and external factors (student, teacher, administrator, parent, environmental indicators, etc.).	3. Okulumuzda iç ve dış faktörler (öğrenci, öğretmen, yönetici, veli, çevresel göstergeler vb.) hakkında çok yönlü veriler toplanır.
4. There is a defined systematic procedure for data collection (who will collect what kind of data, from where, when and how).	4. Veri toplamaya ilişkin tanımlanmış sistemli bir işleyiş (kimin, ne tür verileri, nereden, ne zaman, nasıl toplayacağına ilişkin) vardır.
5. In our school, data is stored by classifying according to data types (student, teacher, parent, administrator, environment, etc.).	5. Okulumuzda veriler sınıflandırılarak (öğrenci, öğretmen, veli, yönetici, çevre vb.) saklanır.
6. Our school has technological equipment (automation system) for efficient storage and use of data	6. Okulumuz, verilerin etkin saklanması ve kullanılmasına dönük teknolojik donanıma (otomasyon sistemi) sahiptir.
7. In our school, personal/private information is protected from access by others by paying attention to confidentiality.	7. Okulumuzda kişisel/mahrem bilgilerin gizliliğine önem verilerek erişime karşı korunur.
8. The administrators and teachers in our school have sufficient knowledge and skills in processing and interpreting data.	8. Okulumuzdaki yönetici ve öğretmenler verileri işlemede ve yorumlamada yeterli bilgi ve beceriye sahiptir.
9. Necessary trainings on data analysis and data mining are given in our school.	9. Okulumuzda veri analizi ve veri madenciliği konusunda ihtiyaç duyulan eğitimler verilir.
10. The analysis and interpretation of data is given importance for the effectiveness of the school and the development of the students.	10. Okulun etkililiği ve öğrencilerin gelişimi için verilerin analizi ve yorumlanmasına önem verilir.
11. In our school, information technologies and statistics are fields that everyone has knowledge of in the analysis of data.	11. Okulumuzda verilerin analizinde bilgi teknolojileri ve istatistik herkesin bilgi sahibi olduğu alanlardır.
12. In our school, it is important to use supportive measurements and visuals (graphics, tables, etc.) in the analysis and interpretation of data.	12. Okulumuzda verilerin analiz ve yorumlanmasında destekleyici ölçümler ve görsellerin (grafik şekil tablo vb.) kullanılmasına önem verilir.
13. An objective management approach is ensured thanks to data-driven decisions at our school.	13. Okulumuzda veriye dayalı alınan kararlar sayesinde objektif bir yönetim anlayışı sağlanır.

14. In our school, data-based inspections and evaluations are made.	14.Okulumuzda verilere dayalı denetim ve değerlendirmeler yapılır.
15. All the planning (strategic plan, course and class distributions, annual events, etc.) in our school is based on data.	15. Okulumuzdaki tüm planlamalar (stratejik plan, ders ve sınıf dağılımları, yıllık etkinlikler vb.) veriye dayalı gerçekleştirilir.
16. In our school, data is considered as an important tool to ensure transparency and accountability.	16. Okulumuzda veriler; şeffaflık ve hesap verebilirliği sağlamak adına önemli bir araç olarak kabul edilir.
17. Data is seen as the main criterion in revealing the current status and potential of the school.	17. Okulun mevcut durumunu ve potansiyelini ortaya koymada veriler temel ölçüt olarak görülür.
18. In our school, data-driven decision making is a decision-making technique that all employees value.	18. Okulumuzda veriye dayalı karar alma; tüm çalışanların değer verdiği bir karar alma tekniğidir.
19. In our school, decisions driven by data are considered valuable for democracy and justice within the organization.	19. Okulumuzda veriye dayalı alınan kararlar örgüt içi demokrasi ve adalet için değerli görülür.
20. In our school, there is a continuous data sharing between the guidance service and the school management.	20.Okulumuzda rehberlik servisiyle okul yönetimi arasında sürekli bir veri paylaşımı gerçekleşir.
21. In our school, teachers constantly share the data they obtain with the management.	21.Okulumuzda öğretmenler elde ettikleri verileri yönetimle sürekli paylaşır.
22. Except for the data collected in the school, all databases belonging to the Turkish Ministry of National Education (MEBBIS, E-OKUL, İLSİS, etc.) are utilized to the maximum extent.	22.Okulun topladığı veriler dışında MEB'e ait tüm veri tabanlarından (MEBBİS, E-OKUL, İLSİS vb.) azami derecede yararlanılır.
23. In our school, there is a common understanding among all stakeholders regarding the use of data.	23. Okulumuzda verilerin kullanımına ilişkin tüm paydaşlar arasında ortak bir anlayış vardır.

Findings Related to Reliability Analyses

In order to determine reliability of the scale, Cronbach's Alpha and McDonald's Omega were calculated. The Cronbach's Alpha and McDonald's Omega results were found to be of similar values. Both of the reliability coefficients for the three factors of the 3DM-School scale were found to be .89 for the first factor, .84 for the second factor, .94 for the third factor, and .96 for the total of 3DM-School indicating good to excellent internal consistency across all dimensions. The results are presented in Table 5.

Table 5

Findings related to ınternal consistency analyses of the 3DM-School Scale

Dimensions	Cronbach Alpha Values	McDonald's Omega Values
Data Collection-Storage	.89	.89

Data interpretation-Analyze	.84	.84
Data Culture	.94	.94
Total of 3DM-School	.96	.96

Findings Related to Convergent Validity Analyses

For convergent validity, the composite reliability (CR) value and the average variance extracted (AVE) value are taken into account. According to some sources, the AVE value is to be above .50 (Shrestha, 2021) and the CR >AVE condition is required for convergent validity (Hair et al., 2014).

Table 6

Findings related to convergent validity analyses of the 3DM-School Scale

Dimensions	CR	AVE
Data Collection-Storage	.89	.53
Data interpretation-Analyze	.84	.51
Data Culture	.94	.60
Total of 3DM-School	.96	.56

As seen in Table 6, CR values are above .60 for the total of the scale and all dimensions. The high CR values of the scale and in its sub-dimensions indicate good internal consistency reliability. In addition, AVE values are between .52 and .60, supporting the convergent validity of the scale. According to the results, it can be said that the scale provides convergent validity.

Discussion and Conclusion

This study aims to develop an original measurement tool regarding data-driven decision-making processes in schools. This measurement tool, called 3DM-School, was designed to systematically evaluate teachers' perceptions in the context of data-driven decision-making. Therefore, this study aims to develop a valid and reliable assessment tool covering three basic dimensions of data-driven decision-making processes in schools.

The exploratory factor analysis (EFA) applied in the study revealed that the data had a three-factor structure. These factors were named as data collection and storage, data analysis and interpretation, and data-driven culture. The confirmatory factor analysis (CFA) results also showed that this structure provided an acceptable level of model fit. Thus, the findings obtained support that the developed 3DM-School measurement tool is valid and reliable (Tabachnick & Fidell, 2019).

The 3DM-School scale provides an important contribution to the literature as an original tool for evaluating data-driven decision-making processes in educational administration. It can

provide a more comprehensive assessment, especially with its dimensions of data culture, data literacy, and data analysis and interpretation. In addition, the multidimensional structure of the scale supports its use as a powerful assessment tool for researchers and practitioners by examining in detail the different aspects of leadership and governance processes in educational institutions. In this context, the 3DM-School scale contributes to the development of a data-driven decision-making culture in the field of educational administration, both theoretically and practically.

The 3DM-School scale differs from existing tools (Brynjolfsson & McElheran, 2016; Doğan & Demirbolat, 2021; Qiao et al., 2025; Yılmaz & Jafarova 2022) in the literature in several ways. First, the scale was developed based on the direct experiences of teachers working in public schools in Türkiye. In this respect, it stands out as a measurement tool that is sensitive to the local context. Second, the dimensions covered by the scale, especially through structures such as "data-driven culture," make areas that are missing in the literature measurable (Datnow & Park, 2014; Mandinach & Gummer, 2013). This shows that the 3DM-School has the capacity to assess not only individual attitudes but also organizational data culture. In addition, unlike existing data-driven decision-making scales, the 3DM-School scale addresses the "Data Analysis and Interpretation" dimension separately and distinctly. This dimension fills an important gap between the scales by focusing on the effective analysis of data and the extraction of correct conclusions during the decision-making process. This unique approach contributes to increasing the data literacy of practitioners in the field of education and improving decision quality.

The dimensions of "data collection and storage", "data analysis and interpretation" and "data culture" used in this study were structured based on the action theories developed in the literature on data use (Boudett et al., 2005; Earl & Katz, 2006; Marsh, 2012; Schildkamp & Poortman, 2015) and studies on data-driven decision-making processes (Mandinach et al., 2008). The significance of precisely identifying the intended use of the data is stressed in all of these theories. It is also stated that data use is not limited to just collecting information; it is a cyclical and reflective process that includes analysis, interpretation and actions based on these findings. Therefore, it is important to create a data-driven school culture in order to develop teachers' sustainable data understanding and to support data literacy competencies for data analysis and interpretation. The developed 3DM-School scale contributes to the strengthening of a data-driven decision-making culture in schools with its rich and theoretically based factor structure. The scale aims to systematically support school development by providing teachers with the opportunity to evaluate their current situation regarding data use in a multidimensional manner.

Educational organizations are rich in data but have a long way to go in terms of using and benefiting from data. Data-rich schools need to encourage teachers to take an active role in data analysis and interpretation. Many teachers make limited efforts to develop data literacy skills and have difficulty integrating this skill into classroom practices (Mandinach & Gummer, 2012). It has been observed that teachers use data very rarely, especially in terms of analyzing student failures, setting individual learning goals, and adapting teaching to students' needs within the scope of instructional data use (Mandinach et al., 2008). This situation shows that data cannot be effectively integrated into the teaching-learning process and its potential contribution is limited (Campbell & Levin, 2009; McNaughton et al., 2012). Therefore, it is of great importance for teachers to turn to practices that will support their professional development in data analysis.

Since the research data were collected with a cross-sectional design, participants' perceptions of the 3DM-School scale items were measured in the same time period. This situation

does not make it possible to evaluate the changes in participants' attitudes and perceptions over time. Furthermore, since the study was limited to teachers working in a specific time period and geographical region in Turkey, the generalizability of the findings may be limited to other countries or different cultural contexts. However, only teachers' views were included in the study; perceptions of other stakeholders such as students or parents regarding data use were excluded. Therefore, the inclusion of different stakeholder groups in future studies will contribute to a more holistic understanding of the data-driven decision-making culture.

The 3DM-School scale can be used as an effective tool in studies aimed at understanding and developing cultural structures related to data use in schools. It makes significant contributions, especially in terms of determining teachers' data literacy levels, evaluating the effectiveness of educational programs in this area, and ensuring the traceability of data-based approaches in school development plans (Schildkamp & Poortman, 2015). It is also suitable for use in various research and application areas such as examining data culture differences in different school types and supporting data-based leadership practices.

In today's world where data is considered a valuable mine, rapidly developing technologies are increasing the importance of data-based approaches in education. Today, data has become the main fuel not only for generating information but also for effective decision-making and sustainable school development. As the digitalization process in education gains momentum, teachers' predisposition to data-based applications is also becoming critical. With this study, a valid and reliable measurement tool has been developed that can evaluate data-driven decision-making processes in schools in a multidimensional manner. The fact that 3DM-School can be used in research, policy analyses and applied intervention studies strengthens the theoretical and practical contribution of this study. In future studies, it is recommended that the scale be tested in different cultural contexts and private schools, and that changes in data use be monitored through longitudinal studies.

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Author Contribution: The authors declare that they have contributed equally to the article.

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Geniş Özet

Giriş

Eğitim örgütleri sürekli ölçümlerin yapıldığı, dönütlerin sağlandığı ve verilerin yoğun olarak kullanıldığı yerlerdir. 2000'li yılların başında "Hiçbir Çocuk Geride Kalmasın" A.B.D. yasasının ardından veriye dayalı karar alma, eğitim politika ve uygulamalarının odak noktası haline gelmiştir (Mandinach vd., 2006a). Veriye dayalı yönetimlerde şeffaflık ve hesap verilebilirlik ön planda iken yöneticileri de sezgiler yerine kanıta dayalı karar almaya zorlamaktadır. Veriye dayalı dönüşüm, örgütlerin çalışma uygulamalarını değiştirmesine yol açar ve örgütlere tüm uygulamalarında rekabet avantajı sağlamak için yenilikçi veri toplama ve analiz uygulamalarına odaklanma gibi ek beceriler gerektirmektedir (Davenport, 2006; McGuire vd., 2012).

Bir kararla ilgili riskler arttıkça, sağlam bir kanıta olan ihtiyaç da artmaktadır (Epstein, 2008). Bu nedenle etkili karar alma sorumluluğunun yerine getirilmesinde bir kanıt olarak düşünülen verilere ihtiyaç vardır. Örgütlerde verilerin toplanarak belli bir analiz ve yorumlama sürecinden geçirilerek karar alma sürecinde kullanılmasına veriye dayalı karar alma denir. Kaufman ve arkadaşlarına (2014) göre veriye dayalı karar alma veri analizleri yoluyla kullanıcı için politika ve prosedürler içeren seçenekler üretilmesidir. Bundan dolayı veriye dayalı karar alma hem eğitim politikaları hem de eğitim uygulamalarının temel odağını oluşturmaktadır (Mandinach vd., 2006b). Böylece eğitim örgütlerinde veriler bir kenara toplatılıp sadece sıradan dosyalar olarak görülmek yerine geleceklerini tayin edebilecekleri en etkili araçlar haline gelmiştir.

Verilerin rasyonel olarak eğitim kararlarının kalitesini artırdığı hipotezinden yola çıkarak, öğretmenlerin karar verme sürecini bilgiyle desteklemek için verileri kasıtlı ve sistematik olarak kullanmaları gerektiğine dair eğitim camiasında artan bir beklentiden söz edilebilir (Kowalski & Lasley, 2009). Veriler analiz ve onun sonucu olan yorumlama ile değer kazanmaktadır. Veriler rasyonel olarak toplansa bile, öğretmenlerin yine de verileri anlamlandırması gerekir (Bertrand & Marsh, 2015). Bu anlamlandırma sürecine dahil olabilmek için öğretmenlerin verileri etkili ve sorumlu bir şekilde yorumlamak için bilgi, beceri ve eğitimlere ihtiyacı vardır (Mandinach & Gummer, 2016).

Veriye dayalı kültür eğitim örgütlerinde verilerin kullanımı ve etkisi için hayati önem taşımaktadır. Bu nedenle, eğitimcilerin profesyonel yorumlama ve takdir yetkisinin veri kullanım süreçlerinde oynadığı önemli rolü vurgulamak için veri kültürü değerli bir örgütsel kazanım ve özelliktir. Okul kültürleri birdenbire değişmez, okullar mevcut değerlere ve inançlara meydan okuyan uygulamalara girdikçe zamanla değişir (Deal & Peterson, 2016). Bu nedenle okullarda veriye dayalı bir kültür oluşturmak için veri kullanımı için net bir vizyon, veriler etrafında işbirliği, öğretmenlerin verilere erişmesine ve bunları anlamlandırmasına izin veren kaynaklar ve sistemlere ihtiyaç vardır (Mandinach & Jackson 2012; Datnow & Park, 2014).

Alanyazında veriye dayalı karar almaya yönelik çoğunluğu yabancı olan çalışmalar bulunmaktadır (Marsh & Ark., 2006; Swan, 2009; Vicki & Datnow, 2009; Simpson, 2011; Brooks, 2012; Dunn, Airola, & Garrison, 2013; Staman, Visscher, & Luyten, 2014; Dunn, 2016; Zeide, 2017; Datnow & Ark., 2018; Cemaloğlu, 2019; Dilekçi ve Ark., 2020; Öz, 2020; Tabak, Şahin, & Yavuz Tabak, 2020; Altun & Karasu, 2021; Doğan, 2021; Kartal, 2021; Maqbool & Ark., 2022). Yapılan bu çalışmalar incelendiğinde ağırlıklı olarak veriye dayalı karar vermenin kuramsal temellerine ve bir takım örgütsel çıktı ve etkilerine odaklanıldığı görülmektedir. Ancak veriye dayalı karar almanın okul düzeyinde hem öğretmen hem de yönetici algılarına göre nasıl anlamlandırıldığı ve bir bütün olarak örgütte veriye dayalı karar alma süreçlerine yönelik algılarında farklılaşmanın ne düzeyde olduğu ile ilgili araştırmalar çok az sayıdadır. Bu durum araştırmamızı diğerlerinden ayıran en belirgin amaç olarak değerlendirilmektedir.

Yöntem

Bu çalışma, öğretmen ve yöneticilerin okullarda veriye dayalı karar almaya yönelik algılarını ölçmeye yarayan bir ölçek geliştirmeyi amaçlamaktadır. Araştırmada alanyazın taraması ve uzman görüşlerini içeren nicel araştırma yöntemi kullanılmıştır. Ölçek geliştirmenin ilk adımlarında olan madde havuzu oluşturulurken alan yazında veriye dayalı karar almaya yönelik yapılan çalışmalar. Ayrıca ölçekte kullanılan her bir maddenin öğretmen ve yöneticilere yönelik yapılandırılmasına özen gösterilmiştir (DeVellis 2017). Araştırmacılar tarafından öğretmen ve yöneticilere uygun olarak 43 maddelik bir taslak form oluşturulmuştur. Bu noktada araştırmacılar bazı maddelerin soru içerikleri bakımından birbirine benzediğini tespit ederek taslak formdan 12 maddenin çıkarılmasına karar vermişlerdir. Taslakta verilerin toplanması ve saklanması için 10 madde, verilerin analizi ve yorumlanması için 6 madde ve veriye dayalı kültür için 15 madde olmak üzere taslaktaki madde sayısı 31'e düşürülmüştür.

Ölçeğin geçerlik ve güvenirlik yapılarını incelemeden önce, farklı okul kademelerinde (ilkokul, ortaokul, lise) çalışan 27 öğretmen ve yönetici (17 öğretmen, 10 yönetici) ile 2021-2022 eğitim-öğretim yılında bir pilot çalışma gerçekleştirilmiştir. Pilot uygulamanın ardından ölçek katılımcılara uygulanmış ve elde edilen veriler ile ölçek geliştirmenin ilk adımı olan AFA prosedürlerinin uygulanması sağlanmıştır. Katılımcılardan elde edilen ikinci veri toplama

sürecinde ise DFA prosedürleri gerçekleştirilmiştir. AFA için 546 öğretmen ve okul yöneticisi, DFA içi ise 364 öğretmen ve okul yöneticisinin verdiği yanıtlar analiz edilmiştir. Analizler sonucunda başlangıçta 43 madde içeren ölçek, daha sonra araştırmacı ve akademisyenlerin görüşlerinden yararlanılarak madde sayısı 31'e düşürülmüştür. AFA ve DFA analizleri uygulanarak nihai ölçek uzunluğu 23 madde olarak belirlenmiştir.

Bulgular

Bu çalışma, öğretmen ve yöneticilerin okullarda veriye dayalı karar almaya yönelik algılarını ölçmek için yeni bir ölçme aracı önermektedir. Ölçek formu, literatür taramasına dayalı olarak geliştirilmiştir. Ölçek maddelerinin uygulanabilir hale gelmesi için aşamalı olarak uzman görüşüne başvurulmuştur. Veriler, AFA için SPSS programı ve DFA için Lisrel programı kullanılarak test edilmiştir. AFA sonucunda ölçekte yer alan 23 madde üç faktörde toplanmıştır. Özdeğeri >1.00 olan üç faktör toplam varyansın %64.01'ini açıklamıştır. Birinci faktörün öz değeri %21.91, ikinci faktörün öz değeri %16.40 ve üçüncü faktörün öz değeri %25.69'dur. DFA sonucunda model veri uyum indeksleri $\chi^2/df = 3.25$, CFI = .92, TLI= .91, NFI = .90 ve RMSEA = .07 olarak bulunmuştur. AFA ve DFA analizleri sonucunda OVEDKA geçerli ve güvenli bir ölçme aracı olarak değerlendirilmektedir.

Sonuç ve Tartışma

Sonuç olarak çalışmada 23 maddeden oluşan Okullarda Veriye Dayalı Karar Alma ölçeği geliştirilmiş ve araştırmacıların kullanımına önerilmektedir. Ölçek; veriye dayalı kültür, verilerin analizi ve yorumlanması ve verilerin toplanması ve saklanması boyutlarını içermektedir. Beşli Likert ölçme biçiminde tasarlanan ölçekten alınan yüksek puan, okullarda veriye dayalı karar almaya ilişkin algı düzeyinin yüksek olduğunu göstermektedir. Boyutlar açısından alınan yüksek puan, okullarda veriye dayalı karar almanın boyutlarının içeriğine ilişkin algı düzeyinin yüksek olduğunu göstermektedir. Ölçeğin güvenirlik katsayıları kabul edilebilir düzeyin üzerindedir. Ayrıca yapı geçerliliği testlerinde ilgili maddelerin yapıları yeterince temsil ettiği görülmüştür. Son olarak, ölçeğin amaçlanan yapıları ölçmek için güvenli ve geçerli bir araç olduğu söylenebilir.