



Examination of the Variables Explaining School Effectiveness by CHAID Analysis

Okul Etkiliğini Açıklayan Değişkenlerin CHAID Analizi ile İncelenmesi

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ABSTRACT: In parallel with the increase in social expectations regarding education and its outcomes, studies on school effectiveness continue unabated. The ability of educational organizations to provide qualitatively higher education has become the focus of the research. In this direction, school governance, the adaptation of governance principles to educational organizations, has come to the fore. The purpose of this research is to examine school effectiveness and to determine the significant variables in explaining school effectiveness. The study group of this research consists of 502 teachers working in Yozgat. Within the scope of this research, CHAID analysis was used to explain school effectiveness with school governance with the factors *-participation, transparency, rule of law* - and teachers' demographic variables. In terms of demographic variables, teachers' age, gender, union membership, education degree, seniority, working time with the current manager, and year of employment at the current school were analyzed. As a result of the analysis, it was determined that the first significant variable in explaining school effectiveness was the rule of law. Participation was found to be the second significant variable in predicting school effectiveness. It was inferred from the finding that adopting accountability within the rule of law dimension at school means taking steps to monitor the school's performance. Therefore, the rule of law has an impact on school effect. Furthermore, it was observed that accountability and equality practices positively affect school effectiveness. Based on the results, it was concluded that better school performance can be increased depending on good governance practices like the rule of law and following a participatory policy.

Keywords: School effectiveness, school governance, rule of law, participation.

ÖZ: Eğitime ve sonuçlarına ilişkin toplumsal beklentilerin artmasına paralel, okul etkililiği ile ilgili çalışmalar hız kesmeden devam etmektedir. Eğitim örgütlerinin hem niceliksel hem de niteliksel olarak yüksek çıktılar üretebilmesi, araştırmaların odak noktası haline gelmiştir. Bu doğrultuda yönetim ilkelerinin eğitim örgütlerine uyarlanması savunan okul yönetişimi gündeme gelmiştir. Bu araştırmanın amacı, okul etkililiğini açıklamada istatistiksel açıdan anlamlı değişkenleri ve değişkenlerin okul etkililiğini açıkladıkları varyanslarına göre önem sırasının belirlemektir. Araştırmanın çalışma grubunu Yozgat ilinde görev yapan 502 öğretmen oluşturmaktadır. Araştırma kapsamında okul etkililiğini açıklayan değişkenlerin belirlenebilmesi için CHAID analizi kullanılmıştır. Okul yönetişiminin boyutları olan katılım, şeffaflık, hukukun üstünlüğü ve öğretmenlerin yaşı, cinsiyeti, sendika üyeliği, eğitim durumu, kıdem, mevcut yöneticide çalışma süresi, mevcut okulda çalışma yılı demografik değişkenleri ele alınmıştır. Analiz sonucunda okul etkililiğini açıklamada ilk anlamlı değişkenin hukukun üstünlüğü olduğu belirlenmiştir. Katılım, okul etkililiğini açıklamada ikinci anlamlı değişken olarak bulunmuştur. Okulda hukukun üstünlüğü boyutunda hesap verebilirliğin benimsenmesinin, okulun performansının izlenmesine yönelik adımlar atılması anlamına gelmektedir. Bu doğrultuda hesap verebilirlik ve eşitlik uygulamalarının okul etkililiğini olumlu yönde etkilediği belirlenmiştir. Elde edilen sonuçlara göre, okullardaki uygulamalarda yönetim ilkelerinden hukukun üstünlüğünün benimsenmesi ve katılımcı bir politika izlenmesine bağlı olarak okul performansının artırılacağı sonucuna varılmıştır.

Anahtar kelimeler: Okul etkililiği, okul yönetişimi, hukukun üstünlüğü, katılım.

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School effectiveness, in a simplified manner, can be defined as the relationship between observed outcomes and expected outcomes in the context of education systems (Lenkeit & Caro, 2014). Şişman (2002) expresses that in effective schools, students are encouraged to make decisions about the issues that affect them, and learning activities that improve students' cultural, social, and psychological perspectives are organized alongside academic activities. Effective schools emphasize all students' improvement without neglecting any of them, with the cooperation of leaders, teachers, and parents. In other words, effective school movements require the participation of all stakeholders and acceptance of students' holistic perspective improvement. Consequently, it can be inferred that effective schools are expected to have good governance.

The relationship between school effectiveness and school governance is symbiotic. Effective governance structures can facilitate and support school effectiveness by providing leadership, accountability, resources, and community engagement. Conversely, school effectiveness can drive improvements in governance by highlighting areas in need of reform and demonstrating the impact of governance decisions on student outcomes. Therefore, a well-functioning education system requires a harmonious and dynamic interaction between school governance and effectiveness to ensure all students have access to high-quality education.

Literature Review

The Coleman report (1966) investigating how the educational system affects students' academic achievements proclaimed an unexpected finding. It revealed that socio-demographic factors accounted for nearly all the variation in student scores, while school factors had no noticeable impact on academic performance. This conclusion elicited a strong reaction from educational researchers and initiated a line of investigation exploring the role of socioeconomic and school-level characteristics on student achievement (Chapman et al., 2016). Since then, studies that (Lenkeit & Caro, 2014; Murillo, 2007; Niemann et al., 2017; Scheerens, 1991; Şişman, 2002) contributed to the effective school movement have increased dramatically. These studies have focused on the characteristics of effective schools, such as positive school climate, participatory leadership, clear educational vision, adoption of the vision and mission by the stakeholders, stakeholder participation, and high and attainable academic expectations (Murillo, 2007; Niemann et al., 2017; Scheerens, 1991).

Verhelst et al. (2021), in their review article on school effectiveness for education for sustainable development, state that one of the characteristics of an effective school is pluralistic communication. Pluralistic communication entails the acknowledgment encompassing divergent perspectives and conceptual paradigms (Boeve-de Pauw et al., 2015; Lijmbach et al., 2002). Pluralistic communication engenders an atmosphere of communication that fosters and eases the process of garnering insights from the diverse experiences, standpoints, and arguments put forth by interlocutors. Such an ambience in communication augments various attributes, such as enhancing democratic decision-making by ensuring that stakeholders are well-informed about each other's viewpoints. Therefore, it can be stated that creating an effective school is associated with participation, mutual relationships, transparency, and accountability, which are the main principles of governance.

The concept of governance, distinct from administration, involves the collaboration of public institutions, private companies, and non-governmental organizations in promoting accountability, transparency, and the rule of law to support social and economic development (World Bank, 1994; Yüner & Burgaz, 2019). Good governance was defined as 'a process of decision making and the process by which decisions are implemented' (Sheng, 2009, p. 1). It is part of the New Public Management (NPM) paradigm, which considers public institutions as enterprises that can respond to demands for increased quality, transparency, and accountability (Kefela, 2011; Vyas et al., 2017). Graham et al. (2003) defined governance as a process by which societies or organizations determine whom to include in the decision process and how they hold accountability. Good governance in education requires the implementation of participatory, democratic, transparent, accountable, and law-based policies (Yüner & Burgaz, 2019). These policies should take into account the needs of the school community (Risteska et al., 2010). The participatory principle of governance includes the participation of students, teachers, school principals, parents, local government representatives, the private sector, and non-governmental organizations that make up the school community in the decision-making process.

The basic principles to be followed in the implementation of good governance in educational organizations are participation, transparency, and the rule of law. The principle of participation means that all stakeholders of the school participate in the decision-making process on issues that concern them. It is important that representatives of the school community, the business world, or local government who affect and are affected by the education process actively participate from the planning to the evaluation of the process. It is obvious that the educational process carried out in cooperation will positively affect the quality of the outputs. The principle of transparency, on the other hand, means that stakeholders can access the necessary information on issues that concern them. The principle of transparency brings open communication channels and responsiveness. The principle of the rule of law includes equality, which means the fair application of laws to all and the accountability of authorized persons. Accountability involves taking responsibility for one's actions in relation to others. It includes being answerable and enforcing good governance practices to achieve goals effectively and efficiently. High accountability not only instills confidence in stakeholders but also implies a moral responsibility to provide quality services. Transparency and accountability are necessary to ensure good governance. These aspects are critical for evaluating the school's overall performance, not just its quantitative progress but also its qualitative development.

The expectation for effective schools is increasing, and demands for participation, transparency, justice, and accountability from teachers, parents, and students require a reevaluation of school processes. This has led to a focus on school governance, which involves conducting the teaching process transparently and lawfully with the participation of relevant school actors. Good school governance is about competent management of resources, including openness, accountability, fairness, and responsiveness to society's needs. It involves participatory, democratic, transparent, accountable, and law-based policies, including multidirectional communication channels, financial and administrative transparency, and community participation in decision-making (Yüner & Burgaz, 2019).

Good governance in schools can enhance institutional performance in delivering education services, increase participation, accountability, transparency, and effectiveness of school management, and ultimately improve school performance. Studies revealed that school governance enhances the quality of producing effective school governance performance (Lewis & Pettersson, 2009; Lingard et al., 2002). Implementing good governance at school would increase participation, accountability, and transparency, which would lead to effectiveness. The evaluation of school effectiveness is mostly based on outcomes. The main output of education is student success. Teachers have a primary role in students' learning and success in schools. Therefore, it can be assumed that getting the opinions of teachers for the evaluation of the effectiveness of a school and the practices in the school would give more accurate results. In this context, it is aimed to examine school governance and school effectiveness from the perspective of teachers.

The aim of this research is to determine the level of teachers' opinions about school effectiveness and the variables that are effective in determining teachers' opinions about school effectiveness. For this purpose, the research questions sought to be answered are as follows:

1. What are the teachers' views on school effectiveness?
2. What are the demographic and school governance variables that explain teachers' views on school effectiveness, respectively?

Methodology

Model of the Research

This research, which aims to determine teachers' views on school effectiveness, is in the correlational model. The relational survey model is the examination of the relevant variables in their current conditions. It aims to investigate the existence of the relationship between the variables and the direction and degree of the relationship (Fraenkel et al., 2012).

The Study Group

The study group of this research consists of 502 teachers working in schools affiliated with the Ministry of National Education in Yozgat. Information about the participants is presented in Table 1.

As can be seen from Table 1, 58.4% of the participants are female and 41.6% are male. 61.7% of teachers are union members. When examined in terms of education levels, 81.3% of the teachers have a bachelor's degree. Only four teachers have doctoral degrees. The majority of the participants (35.8%) have between six and ten years of experience. While 28.5% of the teachers have been working with the school principal for one year, 34.1% of them have been working at their current school for four to six years.

Table 1
Participants

Demographic Variables		N	Percentage (%)
Age	23-27	73	14.5
	28-32	118	23.5
	33-37	116	23.2
	38-42	111	22.1
	43+	84	16.8
Gender	Female	293	58.4
	Male	208	41.6
Union membership	Yes	310	61.7
	No	192	38.3
Education Degree	Bachelor	408	81.3
	Master degree	90	17.9
	Philosophy of doctorate	4	.8
Seniority	1-5 years	98	19.6
	6-10 years	180	35.8
	11-15 years	92	18.4
	16+ years	132	26.3
Working time with the current manager	1 year	143	28.5
	2 years	99	19.8
	3 years	106	21.2
	4 years	77	15.4
	5 years +	77	15.1
Year of employment at current school	1-3 years	98	19.6
	4-6 years	171	34.1
	7-10 years	74	14.8
	11 years +	43	8.4

Data Collection Tools

School Governance Scale: The School Governance Scale, developed by Yüner (2019), was composed of 28 items. The scale has three factors: *rule of law*, *participation*, and *transparency*. The results of the validity and reliability analyses of the scale are within the accepted limits in the literature [$\chi^2/df=1.29$, RMSEA=.04, SRMR=.43, GFI=.98, AGFI=.97, NFI=.97, CFI=.99]. The Cronbach alpha coefficients-.93 for the *rule of law*, .91 for *participation*, .85 for *transparency*, and .95 for the whole scale, showed that the scale is highly reliable. Reliability and validity analysis were reconducted for this study, and the results [$\chi^2 = 429.83$; $df = 296$; $\chi^2/df = 1.45$; RMSEA = .051; CFI = .98; NFI = .96; Cronbach= .79, .90, .82, respectively for factors] were within the acceptable limits.

School Effectiveness Index: The School Effectiveness Index, developed by Hoy (2009) and adapted into Turkish by Demirkasımoğlu and Taşkın (2015), is a 5-point Likert scale. The scale is used to determine teachers' views on perceived school effectiveness. It consists of 8 items and one dimension. The confirmatory factor analysis results obtained in the adaptation study into Turkish are as follows: [$\chi^2 = 44.07$; $df = 20$; $\chi^2/df = 2.2$; GFI = .91; AGFI = .85; RMSEA = .10; CFI = .99; NFI = .97]. Researchers used Cronbach's alpha to determine the reliability of the scale. Reliability and validity analysis were reconducted for this study and the results [$\chi^2 = 339.460$; $df = 280$; χ^2/df

=1.212; RMSEA = .06; CFI = .90; NFI = .90; Cronbach= .93] were within the acceptable limits.

Data Analysis

Within the scope of this research, Chi-squared Automatic Interaction Detection (CHAID) analysis was used to explain teachers' views on school effectiveness with school governance with the factors -participation, transparency, rule of law - and teachers' demographic variables. In terms of demographic variables, teachers' age, gender, union membership, education degree, seniority, working time with the current manager, and year of employment at the current school were analyzed.

CHAID analysis is one of the decision tree methods used in data mining. CHAID analysis is one of the data mining methods used to create homogeneous subclasses according to the predicted variable. Decision trees created by CHAID analysis not only explain the predicted variable through predictive variables such as the branches of a tree but also divide the data into homogeneous subclasses and show all possible relationships in the form of trees (Samar Ali et al., 2019). CHAID analysis does not have the assumptions required by parametric statistics and is quite a powerful algorithm (Kayri & Boysan, 2007). CHAID analysis is a very powerful statistical technique in that it can analyze data from all scale types simultaneously and reveal the relationships between predicted and predictive variables hierarchically (Avsar & Yalcin, 2015).

Limitations and Ethical Procedures

The independent variables discussed in this study to explain school effectiveness are limited to the dimensions of school governance -participation, transparency, rule of law - and teachers' demographic variables, including their age, gender, union membership, education degree, seniority, working time with the current manager, year of employment at the current school.

Before data collection, necessary permission was obtained from the ethics committee of Yozgat Bozok University (No: E-55005497-605.01.21073479; Date: 22.02.2021).

Results

As a result of the CHAID analysis carried out to determine the variables that predict school effectiveness, a decision tree consisting of five nodes was obtained. The decision tree is presented in Figure 1.

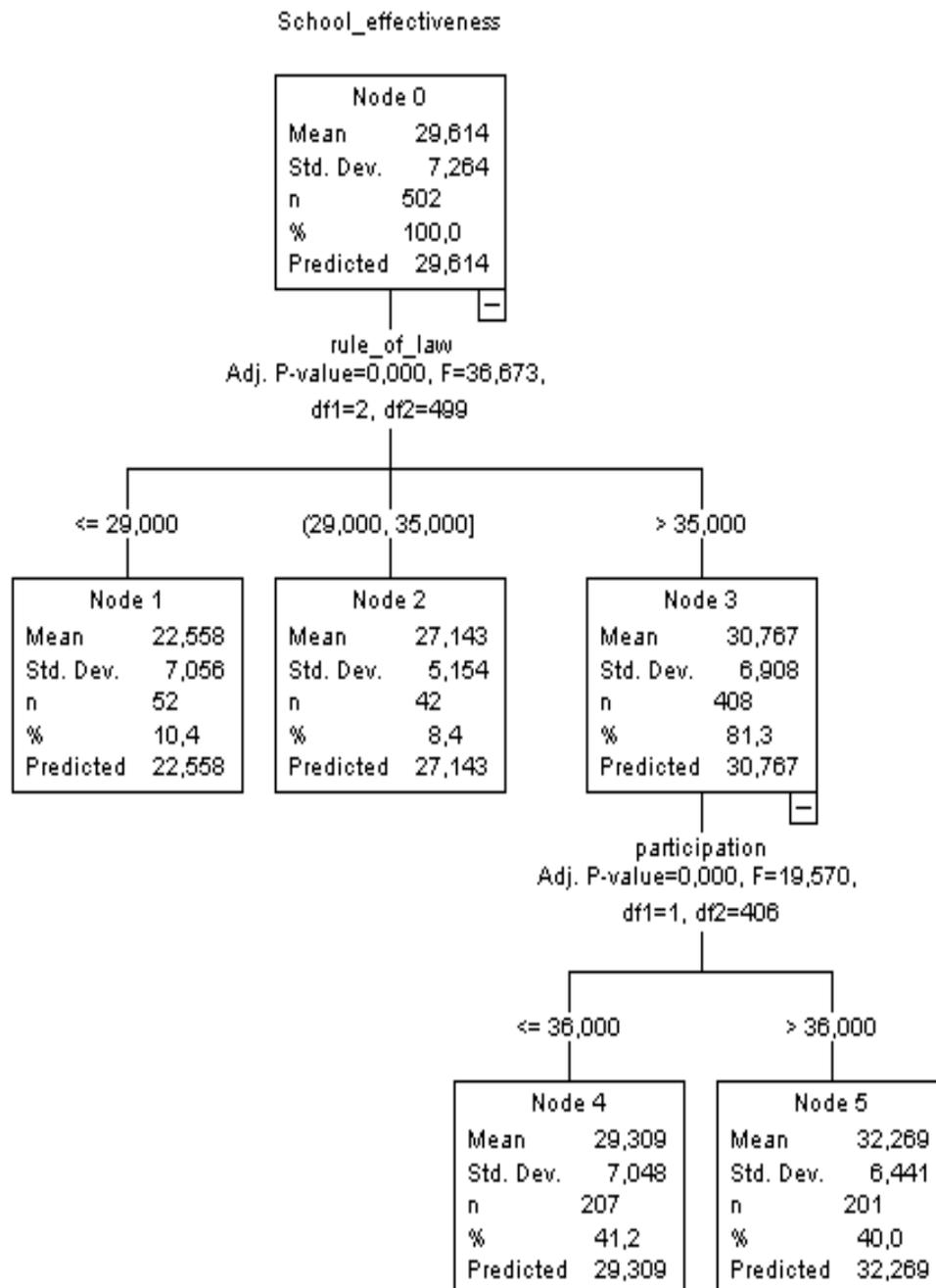
As can be seen from Figure 1, the average score of teachers regarding school effectiveness as a result of the CHAID analysis is 29.614. Considering the highest score (40.00) and the median score (18.00) that can be obtained from the school effectiveness scale, it can be stated that the level of teachers' perception of their school as effective is above average.

Based on the decision tree generated by the CHAID procedure, it was determined that the variable that best explains the school effectiveness is the variable of the rule of law ($F_{(499,2)} = 36.673$; $p < 0.05$). Under the rule of law dimension, teacher opinions were collected in three nodes. The first node is formed by those whose school effectiveness average scores are below 29.00. The average score of these teachers' rule

of law is 22.558, which is below the median score (24.00). In this node, there are 52 teachers who constitute 10.4% of the sample. The second node consists of teachers whose school effectiveness average is between 29.00 and 35.00. There are 42 teachers in this node that constitute 8.4% of the data set. The average score of the rule of law of the teachers in this node is 27.143.

Figure 1

Nodes Explaining School Effectiveness



In the third node, there are 408 teachers who are the ones that are closest to the full score on school effectiveness. Teachers constitute 81.3% of the data set. School effectiveness mean scores in this node are higher than 35.00. Considering the highest score that can be obtained for school effectiveness (40.00), this group of teachers has an

average score that is close to the full score. The average score for the rule of law of teachers in this node is 30.767.

The third node was further segmented by the CHAID into two subgroups with significant values. These subgroups were defined according to the participation variable. It was determined that the participation variable was a significant predictor of the opinions of teachers with a high perception of the rule of law regarding school effectiveness. It was found that the participation variable was associated with school effectiveness ($F_{(1,406)} = 19.570$; $p < .05$). As a result of the analysis, two nodes were formed of those with school effectiveness mean scores lower than 36.00 and those with higher than 36.00. In the fourth node, where the average score is lower than 36.00, there are 207 teachers who make up 41.2% of the data set. The average participation score of the teachers is 29.309. When the median value (20.00) in the participation variable is evaluated, it is seen that the participation scores of the teachers are above the average. There are 201 teachers in the fifth node, which consists of those with a school effectiveness score above 36.00 and explains 40% of the data set. The average score of participation of the teachers in this node is 32.269.

Discussion, Conclusion and Recommendations

As indicated above, the aim of the research was to find the variables that significantly explain school effectiveness. In the study, participation, transparency, and rule of law factors of school governance scale, teachers' age, gender, union membership, education degree, seniority, working time with the current manager, and year of employment at the current school were analyzed as independent variables. As a result of the analysis, it was determined that the first significant variable in explaining school effectiveness was the rule of law.

The two main points emphasized by the rule of law dimension are accountability and equality. The rule of law is a prerequisite for the principle of accountability. Accountability means being willing to accept the authority and responsibility assigned within an institution. It entails taking responsibility for the outcomes of the tasks assigned, including acknowledging shortcomings and failures when results are negative. School accountability should be evaluated as a reflection of NPM, which emphasizes the management of public services like the private sector (Ambrosio 2013; Gunter et al. 2016). In NPM, the quality of the outputs and customer satisfaction are important criteria.

Adopting accountability within the rule of law dimension at school means taking steps to monitor the school's performance. Therefore, the rule of law has an impact on school effectiveness. The explicit function of accountability is to measure performance to initiate improvement, and it cannot be separated from its latent functions, such as performativity. Studies also reveal the effect of adequate accountability in achieving positive school outcomes (De Fraine et al., 2002; Ordofa & Asgedom, 2022; Rosenblatt & Wubbels, 2021).

Based on the principles of justice and equality, the rule of law must be implemented effectively and impartially (Gözlügöl, 2013). Justice and equality in governance are not left to the mercy and discretion of the administration. Within the framework of the rule of law principle, institutions like individuals have to act in accordance with the law (Yüner & Burgaz, 2019). Every individual and actor is free to

use the rights granted to him by law. For the rule of law in school governance, it is expected that every student and parent should be treated equally, no discrimination among school employees according to gender, branch, and the union they are a member of, and accountability related to the goals reached or not reached.

The rule of law is a requirement of democratization and an indicator of the quality of governance. Today, citizens' demand for information about the services offered in both the public and private sectors has increased. This situation obliges the authorities to be more careful while making decisions and performing their duties (Yüner & Burgaz, 2019).

It was observed that when the teachers' average scores in the rule of law dimension in the nodes formed according to the school effectiveness are examined, it is seen that there is a parallel relation between the two variables. In the first node, which consists of teachers with the lowest average score on school effectiveness, the average score for the rule of law is also low. On the other hand, in the third node, which consists of teachers with the highest average score on school effectiveness, the average score for the rule of law is also high. In this respect, it can be concluded that accountability and equality practices within the scope of the rule of law positively affect school effectiveness.

Participation was found to be the second significant variable in predicting school effectiveness. The node formed by the teachers with the highest perception of effectiveness was further segmented into two subgroups with participation. The participation dimension refers to the participation of the school community and stakeholders in the whole process, from the decision stage to the evaluation, in matters that concern them.

The school should encourage the participation of the relevant actors (Backman & Trafford, 2007). The participation dimension is important in terms of evaluating school effectiveness. Opinions of teachers, students, and parents regarding the current process and alumni's views on the outputs of the process are sources of information. Governance is a process in which institutions constantly evaluate themselves. The schools are expected to correct their deficiencies in line with the opinions and increase their effectiveness. The participation of the primary actors, such as students, teachers, the principal, and the parents, in the decision-making process would make significant improvement. Studies have revealed that participation improves decision-making quality (Supriadi et al., 2021) and increases human capital by stimulating them to recognise the needs, desires, and potentials of collaborative work towards their fulfilment (Denhardt & Denhardt, 2011; Widanto & Satrya, 2019). Therefore, the participation of the aforementioned actors is critical for better outcomes that will lead to school effectiveness. Family support is also important for students' social and cognitive development (Roksa & Kinsley, 2019). Behaviors taught at school cannot be permanent unless they are supported by the family. For this reason, cooperation between students, teachers, and parents is required for the student to win and be successful.

The rule of law occupies a central position in democratization and serves as a litmus test for governance quality. In the context of the modern world, where citizens' information demands have escalated, its importance is accentuated. The availability of information fosters an environment of transparency, accountability, and public

engagement. These demands are also increasing in educational organizations, as the principles of governance, such as transparency, rule of law, and participation, are now recognized as requirements for the effectiveness of schools. The result of the study reveals that good governance practices play an important role in school performance. In addition, it can be stated that better school performance can be increased depending on good governance practices like the adoption of the rule of law as one of the governance principles and following a participatory policy. It can be stated that the outputs of school performance will be higher and more qualified in a school environment where teachers do not have concerns about justice, think that the practices are in compliance with the law, and believe that they can contribute to the process with their ideas.

The independent variables discussed in this study to explain school effectiveness are limited to the dimensions of school governance -participation, transparency, rule of law - and teachers' demographic variables, including their age, gender, union membership, education degree, seniority, working time with the current manager, year of employment at the current school. Reconsidering the subject with different variables can produce meaningful results. Based on the findings of the study, it can be declared that school governance is critical in improving school performance and increasing effectiveness. Therefore, these suggestions would be useful to ensure effectiveness. School management should be open to evaluation and provide opportunities to other actors for this. The point reached in terms of targeted academic success, social and cultural gains, and desired behavioral changes should be evaluated by all actors, and deficiencies should be determined together. School administration and teachers should also be prepared to be accountable during the evaluation phase. There should be no discrimination between students, teachers, or parents at school for any reason. Legal rights apply to every individual. Those who are in the same situation at school should be treated in the same way, under the same conditions. In a fair evaluation process, it is accepted that the evaluation criteria are standard and the rewards and punishments are given fairly.

Author Bio

The author was born in Kayseri in 1985. The author completed her undergraduate and graduate studies at Erciyes University, Department of English Language and Literature; completed her doctorate in Hacettepe University, Department of Educational Administration, Inspection, Planning and Economics. Between 2007 and 2017, she worked as a teacher in schools affiliated to the Ministry of National Education. She started working at Yozgat Bozok University in 2017. The author, being married and having three children, is still a faculty member at the Educational Faculty, Educational Sciences Department, Educational Administration Department. Her fields of study are leadership, governance, organizational behavior. The author has chapters and articles in books in related fields.

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