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School Culture and Academic Achievement of Students: A Meta-analysis Study

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ABSTRACT The relationship between school culture and academic achievement was tested through meta- analysis in this paper. 54 studies of which only 25 can be included to the meta- analysis were examined in literature review. Through this paper, sample group of 20287 people was formed by gathering 25 independent studies. Based on the findings of analysis which were made by using random effects model, there were no publication bias in the obtained data and it was confirmed that school culture had a statistically significant effect on students' academic achievement.

INTRODUCTION

Culture is a product of the interaction between various factors. As a subject of many fields such as anthropology, ethnography and sociology, (Güvenç 1994) culture can be defined as a collective thinking schedule depending on the existence and unity of an interacting group of people, and it differentiates a group of people from others (Hofstede 1980; Sisman 2002).

Likewise culture, every organization can have a culture unique to itself (Hofstede 1991). School is a distinctive organization. In this regard, it has subjective properties and it is hard to analyze and understand it with an objective approach (Balci 2007; Demirtas 2010a; 2010b; Hoy and Miskel 2010; Sisman and Turan 2005). Many variables such as socialization, rituals, language, authority, economics, and technology have an impact on this process (Waller 1932). Organizations such as schools in particular, are products of the cultural paradigm in the society. Moreover, every school cultivates a culture that separates it from other schools depending on the special environment, varying inputs and processes (Dimmock and Walker 2005; Marzano et al. 2005; Morey and Luthans 1985).

Despite the uniqueness and hard-to-identify objective aspect of school culture, it affects many variables related to schools (Bass 2004; Bektas and Ocal 2012; Bellou 2010; Sezgin 2010; Yavuz 2010), and it is among the most important factors in explaining student achievement (Brown 2005; Hofman et al. 2002; Macneil et al. 2009; Pritchard et al. 2005; Worrel 2014). Many variables have impact on the academic achievement of students, and this paper aims to employ a meta-analysis method on the results of studies on school culture and student achievement.

METHODOLOGY

Research Design

The effect of school culture on students' academic achievement was tested through meta-analysis. Meta-analysis is a technique to find an effect size by combining the findings of independent quantitative studies on a specific issue statistically (Lipsey and Wilson 2001).

Literature Review Strategy and Inclusion/ Exclusion Criteria

First, a literature review was carried on the Higher Education Council Proquest and Ebsco academic databases in order to identify the studies to be included in the meta-analysis. At this stage, the review was performed using *academic achievement and student achievement* terms based on school culture term. Due date for the included studies is April 2014. The study includes doctorate and postgraduate theses and researches in peer-reviewed journals.

Various strategies are used to determine the suitable studies for the meta-analysis. Literature

review was first reduced to subject, keyword and abstract factors, and a research pool of 54 studies was finalized with all related school culture and academic achievement studies. 29 studies were excluded according to the below criteria. Descriptive statistics of the said 25 studies are given in Table 1.

The study employed the following inclusion criteria:

- Researches during the 2004-2014 period,
- Required statistical data for correlational meta-analysis (*n* and *r* or R^2 value),
- Researches measuring school culture and student achievement,

The study employed the following exclusion criteria:

- No quantitative data (such as compilations, theoretical studies, and qualitative studies),
- No correlation value in the study,

Coding Process

Coding process, which aims to extract clear and suitable data from complex data, is basically a data sorting process (Çogaltay et al. 2014). For this purpose, first a coding form was created and coding was carried out before moving on to statistical analysis. To determine the reliability of the coding process, coding was performed by two researchers. Cohen's Kappa inter-rater reliability coefficient was calculated as .91. Coding form was finalized by taking research references, sample data and quantitative data into account.

Statistical Procedure

Pearson Correlation Coefficient (*r*) is used in calculating the effect size, a standard measurement value of the power and direction of relations between study variables (Borenstein et al. 2009). Correlation coefficient takes a value between *+1* and *-1*, which means that the *r* value was converted into the value in *z* table for the calculations (Hedges and Olkin 1985).

There are two basic models used in meta-analysis studies: fixed effect model and random effect model. To decide on which model to use, characteristics of researches included in the meta-analysis are analyzed in terms of meeting the prerequisites of models (Borenstein et al. 2009; Hedges and Olkin 1985; Kulinskaya, et al. 2008; Little et al. 2008). If researches are not deemed to be functionally equal, and if it is aimed to make a generalization in bigger populations with the calculated effect size, *random effect model* should be the preferred method. Given all these conditions, *random effect model* was employed in the meta-analysis operations. *Comprehensive Meta-analysis* was used for data analysis.

RESULTS

Publication bias was determined before moving on to the analysis of researches included in the meta-analysis. Publication bias is basically dependent on the assumption that not all researches on a subject could be published. Since researches with no statistically significant relations or low level of relations are not seen fit for publication, this situation negatively affects the total effect size and creates a biased increase in the average effect size (Borenstein et al. 2009; Hanrahan et al. 2013; Kulinskaya et al. 2008). This publication bias, which is also called as missing data, negatively affects the total effect of meta-analysis studies. In this sense, publication bias

Table 1: Characteristics of researches included in the meta-analysis

Options		*1*	*2*	*3*	*4*	*5*	*6*	*Total*
Publication Date of Research		2014	2012	2010	2009	2008	2007	25100
	N	1	4	4	3	3	4	
	%	4	16	16	12	12	16	
		2006	2005	2004	-	-	-	
	N	1	3	2				
	%	4	12	8				
Research Type		Thesis	Article	-	-	-	-	-
	N	15	9					25
	%	60	40					100
Sample Group		Principal	Teacher	Student	-	-	-	
	N	3	16	6				25
	%	12	64	24				100

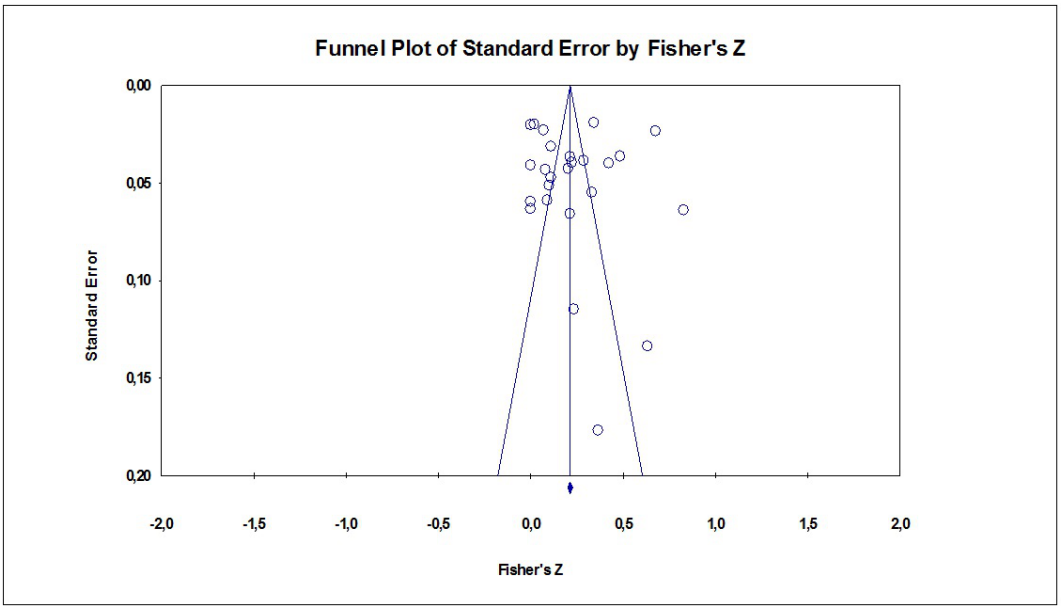

Fig. 1. Funnel plot of publication bias

is taken into consideration in meta-analysis studies (Çogaltay 2014). The following questions were answered to analyze the publication bias of this study:

- Is there any proof of a publication bias?
- Can general effect size be the result of a publication bias?
- What percent of the total effect size depends on publication bias?

A set of calculation methods were used in meta-analyses to give statistical answers to the above questions. The primary method is funnel plot. Funnel plot of the studies included in this research is given in Figure 1. Figure 1 shows no proof of an effect caused by publication bias in the studies included in the meta-analysis. This research shows no proof of publication bias in 25 studies included in the meta-analysis.

While there is no proof of publication bias in the funnel plot, the results of Duval and Tweedie's (2000) trim and fill test are given in Table 2 in order to evaluate the influence quantity of publication bias obtained from the meta-analysis. As seen in Table 2, there is no difference between the observed effect size and the virtual effect size created to correct the publication bias effect.

After determining that there is no publication bias effect in the studies included after the funnel pilot and Duval and Tweedie's (2000) trim and fill test, meta-analysis calculation on school culture and academic achievement of students was performed next. Table 3 shows a positive relationship between school culture and academic achievement. The effect value of school culture on academic achievement is calculated as .23. This value shows a *low level* (see Cohen 1988) effect of school culture of the academic achievement of students.

Table 2: Duval and Tweedie's (2000) trim and fill test results

	Excluded study	*Point estimate*	*CI (Confidence Interval)*		*Q*
			Lower limit	*Upper limit*	
Observed values		.23	.14	.31	965,466*
Corrected values	0	.23	.14	.31	965,466*

Table 3: Correlation findings between school culture and academic achievement; Meta-analysis results

Variable	*k*	*N*	*r*	*CI (Confidence Interval)*		*Q*
				Lower Limit	*Upper Limit*	
School culture	25	20287	.23*	.14	.31	965,466**

DISCUSSION

This meta-analysis paper aims to make a quantitative summary of relations obtained from studies on the relationship between school culture and academic achievement of students. The narrow confidence interval of the meta-analysis study shows that results of studies included in the research are reliable. This finding is significant for making more reliable decisions about the direction and power of the relations obtained through meta-analysis (Çogaltay et al. 2014).

Meta-analysis results show that school culture has a low level (r=.23) of positive effect on the academic achievement of students. However, given the complex nature of the concept of school culture, the value obtained from this study has a significant effect on the achievement of students. Many studies on the relationship between school culture and the academic achievement of students show a significant relationship between two variables (Bowles 2000; Hofstede 1998; Karadag et al. 2014; Smith 2006; Tucker 2011; Zuniga-Barrera 2006). Said studies state that the dominant culture in schools has impact on all stakeholders, especially on students. A positive school culture helps students to feel more connected to the objectives of the school, thus improving the academic achievement (Demirtas 2010; Gruenert 2005).

Taking Cohen's (1988) classification into consideration, study finding revealed that school culture had a small (r=.23), positive effect on students' academic achievement. Based on the analysis, it was seen that this effect was statistically significant ($p < .05$). This finding should be evaluated with factors such as the fact that the concept of school culture has a complicated nature and students' achievement has a lot of precursors. Within this context, this paper had importance because its finding showed that students' achievement had an effect on school culture.

School culture plays a significant role in the academic achievement of students. This effect depends on school culture factors such as mutual support between stakeholders, shared beliefs, occupational development support, family support, and recognition of the needs of all students (Barent 2005; Deal and Peterson 1999; Leithwood and Louis 1998).

CONCLUSION

The meta-analysis of the relationship between school culture and student achievement reveals that school culture variable has a significant effect on student achievement. However, the concept of academic achievement has been a controversial issue for many years and is influenced by many variables. From this aspect, the effect level obtained from this study can be said to be highly significant. In this context, achievable visions and missions should be set with a holistic approach in order for the unique school culture of every school to contribute to the academic achievement of students.

RECOMMENDATIONS

This paper is significant in showing the impact of the school culture on the students' academic achievement. Understood from this result, all stakeholders of the school (administrators, teachers, parents, school environment) should be rigor for necessary construction of school culture supporting the academic achievement of students. However, this effect can only be considered as a result of quantitative research findings, so we need in qualitative research to understand this effect more depth. In this context, researchers should provide more detailed information and findings to all stakeholders in development of school culture that supports the academic achievement of students with qualitative research. However, it should be performed the meta-analysis relevant studies for other variables that affect academic achievement (academic leadership, teaching methods, school climate). This paper mainly deals with the school culture. Hence, more detailed studies and result compar-

isons can be done by evaluating moderator variables influencing school culture and student achievement.

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APPENDIX

The abstract of study features in findings of the analysis of school culture and academic achievement