

Chapter 13

The Effect of Collective Teacher Efficacy on Student Achievement

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13.1 Introduction

The self-efficacy concept was firstly mentioned in the studies of Rotter (1966) and Bandura (1977) in the context of social cognitive theory. According to social cognitive theory, human behaviors are shaped under the influence of internal factors, such as beliefs, emotions and expectations, and the self-efficacy belief is one of these factors (Bandura 1977). In this regards, a teacher's self-efficacy is a concept reflecting his or her beliefs regarding his or her competence and whether (s)he can effectively facilitate the learning of students (Bandura 1997; Tschannen-Moran et al. 1998; Tschannen-Moran and Barr 2004). Teacher self-efficacy can be defined as a variable that influences educational activities, revealing professional differences among teachers (Gibson and Dembo 1984). The self-efficacy perceptions of teachers are linked to four sources (Tschannen-Moran et al. 1998): *i*) Mastery Experiences: This factor is related to how skills and behaviors that were previously learned affect educational situations. Since teachers can see their strengths and weaknesses only through practice, mastery experience is an important source of self-efficacy. *ii*) Emotional and Physiological Cues: Teachers' behaviors are closely related to how they feel spiritually and physically. The physiological responses of the people (increase in heart rate, sweating palms, shallow breathing and chills) in the face of a situation give clues of their beliefs about their own capacity. Teachers will be more successful when they learn how to give more consistent responses when faced with stressful situations or how to reduce their anxiety levels. For this reason, having different working experiences and facing various professional

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situations before entering the teaching profession may increase the future self-efficacy beliefs of teacher candidates. *iii*) Vicarious Experiences: Teacher candidates start to build their mastery through pre-service experiences (internship, in-service training) and by observing professional practices. These observations provide an indirect experience to the individual and assist to the formation of educator identity. *iv*) Social Persuasion: The encouragement, advice, or counsel that individuals receive about their achievements (whether they will be able to achieve success or not) affect their self-efficacy beliefs. In this regard, the feedback received from managers, inspectors and peers and the encouragement and support from school may enhance teachers' self-efficacy.

Teacher self-efficacy is the subject of studies for many years and there were many attempts to examine its relations with other school-related variables. In addition, the literature, apart from showing that self-efficacy belief is an important variable, it also highlighted that self-efficacy beliefs determine the attitude and behaviors of the teachers in the classroom (Bandura 1997; Dembo and Gibson 1985; Riggs and Enochs 1990; Ross 1992; Tschannen-Moran and Hoy 2001; Wolfolk and Hoy 1990). Research has showed that teachers with high self-efficacy perceptions are more motivated and diligent in their work, they work in an organized manner, they are more successful in interpersonal relations, they spend more time with their students, they help students with learning difficulties more and they make a better contribution to students' achievement (Gibson and Dembo 1984; Tschannen-Moran et al. 1998; Tschannen-Moran and Barr 2004).

Collective efficacy is a concept founded by Bandura (1993, 1997) interpreting self-efficacy on a group basis. Collective efficacy is the joint belief regarding the sum of the abilities of a group for organizing and executing the action plans required to achieve certain gains (Bandura 1997). This type of efficacy appears at group level, it reflects the belief of the group about its own power that allows the realization of common goals and it is a predictor of group performance (Bandura 1993, 1997). Collective teacher efficacy is a characteristic belonging to the whole school and it is part of the school culture (Schechter and Tschannen-Moran 2006). According to Bandura (1997), academic improvement is not only related to the sum of individual contributions but it can also be achieved through factors such as the collaborative work of teachers and their beliefs about the school's ability to achieve success. The literature has showed that there is a strong relationship between collective teacher efficacy and student achievement (Alinder 1994; Bandura 1993; Goddard 2001; Tschannen-Moran and Barr 2004). This raises the question of whether collective teacher efficacy plays a role in shaping in-school activities, such as class management, student motivation and teaching methods.

In this study, the effect of collective teacher efficacy on student achievement was investigated. In addition, the factors that are thought to affect the average effect size obtained in the study were set as moderators. These are the following: *(i)* the publication year of the research, *(ii)* the publication type of the research, *(iii)* the scale used to measure collective teacher efficacy and *(iv)* the level of education. All these variables, along with the results of previous research results, were used to test the following hypotheses of this study:

H₁ Collective teacher efficacy has a positive effect on student achievement.

H₂ Publication type is a moderator for the positive effect of collective teacher efficacy on student achievement.

H₃ School level is a moderator for the positive effect of collective teacher efficacy on student achievement.

H₄ The tool of data collection is a moderator for the positive effect of collective teacher efficacy on student achievement.

H₅ The year of the studies is a moderator for the positive effect of collective teacher efficacy on student achievement.

13.2 Method

13.2.1 Study Design

In this study, the effect of collective teacher efficacy on student achievement was tested with a meta-analysis design.

13.2.2 Review Strategy and Criteria for Inclusion/Exclusion

To determine the research studies to include in the meta-analysis, the Science-Direct, Proquest and Ebsco academic databases were used to conduct a literature review. For this process, the terms collective teacher efficacy and student achievement/student success included in the titles of the studies were used to screen the research studies. The end date for the research studies included in the research was identified as January 2016. Doctoral dissertations and peer-reviewed journals were included in the study.

Many strategies were used to identify the research studies that were appropriate for the meta-analysis of the study. First, a research study pool (48 research studies) was established; it included all studies with collective teacher efficacy and student achievement/success in their titles. The abstracts of these studies were reviewed, and all were found to be appropriate to include in the study. In the second stage, all research studies in the pool were examined in detail. The results of the examination found that 35 of the research studies in the pool were appropriate, and 13 were not found to be suitable. The descriptive statistics of the 35 research studies included in the analysis are presented in Table 13.1.

Table 13.1 Characteristics of the studies included in the meta-analysis

Options	1	2	3	Total
Type of publication	Thesis	Article		–
	24	11		35
	65.57	34.43		100
The years of the studies	2000–2015	2006–2011	2011–2016	
	9	16	10	35
	25.71	45.71	28.57	100

The criteria for inclusion of the research studies in the analysis study were identified as follows:

- To have the statistical information necessary for correlational meta-analysis (n and r , or R^2 values)
- To be a study measuring the correlation school culture and student achievement/success

Reasons for not including a research study in the meta-analysis:

- Having no quantitative data (qualitative research)
- Not having a correlation coefficient
- Not focusing on student achievement
- Not focusing on collective teacher efficacy

13.2.3 Coding Process

The coding process was essentially a data sorting process used to ascertain which data were clear and suitable for the study. In this scope, a coding form was developed before the statistical analysis was conducted, and the coding was conducted according to the form. The main aim was to develop a specific coding system that allowed the study to see the entirety of the research studies in general and that would not miss any characteristics of each individual research study. The coding form developed in the study was comprised of:

- References for the research
- Sample information
- Sample group
- Type of publication,
- The years of the studies
- Data collection tool(s)
- Quantitative values

13.2.4 *Statistical Processes*

The effect size acquired in meta-analysis is a standard measure value used in the determination of the strength and direction of the relationship in the study (Borenstein et al. 2009). Pearson's correlation coefficient (r) was determined to be the effect size in this study. Because the correlation coefficient has a value between $+1$ and -1 , the r value calculated was evaluated by converting this value into the value as it appears in the z table (Hedges and Olkin 1985). Provided that more than one correlation value is given between the same structure categories in correlational meta-analysis studies, two different approaches are used in the determination of the one to be used in the meta-analysis (Borenstein et al. 2009; Kulinskaya et al. 2008). For this study, (i) first, if the correlations were independent, all the related correlations were included in the analysis and were considered to be independent studies, and (ii) if there were dependent correlations, then the *average correlation value* was accepted. Accordingly, for each study, a mean correlation was determined by finding the average of all reported correlations between CTE and achievement (reading, math, writing, social studies). For example, if one researcher measured math, reading, and writing achievement for third, fourth, and fifth grades, so for each subject area, the average of the three correlations for CTE and achievement was reported as one correlation. A *random effect model* was used for the meta-analysis processes in this study. The *Comprehensive Meta-Analysis* program was used in the meta-analysis process.

13.2.5 *Moderator Variables*

To determine the statistical significance of the differences between the moderators of the study, only the Q_b values were used. Four moderator variables that were expected to have a role in the average effect size were identified in the study. The first of these considered is the *type of publication* as a moderator in regards to the relationship between collective teacher efficacy and student achievement. The second is the *tools of data collection* which was thought to have a role on the average impact of school culture on student achievement. The rest are the *school level, and years of the studies*.

13.2.6 *Publication Bias*

A funnel plot for the research studies included in the meta-analysis of can be seen in Fig. 13.1. Evidence that publication bias affected the research studies included in the meta-analysis can be seen in Fig. 13.1. A serious asymmetry would be expected in the funnel plot if there were a publication bias. The concentration of plots on one

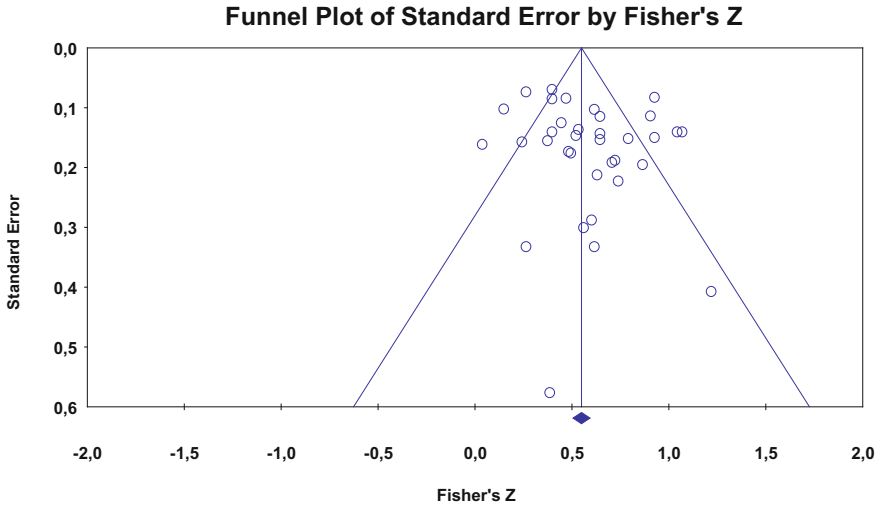


Fig. 13.1 Effect size funnel for publication bias

Table 13.2 Duval and Tweedie’s trim and fill test results

	Excluded studies	Point estimate	CI (confidence interval)		<i>Q</i>
			Lower limit	Upper limit	
Observed values		.52*	.45	.59	130.34
Corrected values	0	.52*	.45	.59	130.34

side under the line of average effect size, particularly in the bottom section of the funnel, suggests the probability of a publication bias in the research studies. In this study, no evidence of partiality of the publications was observed in any of the 35 data subjected to meta-analysis.

Although no partiality in publications was observed in the funnel plot, the results of Duval and Tweedie’s trim and fill test, which was applied to determine the effect of partiality in publications acquired with the meta-analysis using the random effect model, are given in Table 13.2. As is seen in Table 13.2, there is no difference between the effect observed and the artificial effect size created to fix the effect of the partiality of publications. The research on each side of the center line is symmetrical, and this is the indicator of non-difference. Because there is no evidence indicating lost data on either side of the center line, the difference between the fixed effect size and observed effect size is zero.

13.3 Findings

Table 13.3 presents the results of the meta-analysis regarding the relationship between collective teacher efficacy and student achievement. The findings support hypothesis H₁ which states that there is a positive relationship between collective teacher efficacy and student achievement. The effect size of collective teacher efficacy on student achievement is calculated as .52. This value shows that teacher efficacy has a high level of effect on student achievement (see Cohen 1988). In addition, Table 13.3 presents the meta-analysis results regarding the effect size of teacher efficacy in different courses. Accordingly, the level of effect of collective teacher efficacy on student achievement is calculated as .54, .61, .61 and .50 for mathematics, reading, writing and English courses respectively. The effect sizes are at a high level in all the courses examined.

Findings did not support hypotheses H₂, H₃, H₄ and H₅ regarding the variables of education level, publication year, publication type and scale type (tool of data collections) which were hypothesized to be moderators in the relationship between

Table 13.3 Findings of the correlations between collective teacher efficacy and student achievement: results of meta-analysis

Variables	<i>k</i>	<i>N</i>	<i>r</i>	CI (confidence interval)		<i>Q</i>	<i>Q_b</i>
				Lower limit	Upper limit		
Average	35	2087	.52*	.45	.59	130.34*	
Math	25	1285	.54*	.45	.61	88.62*	
Reading	18	833	.61*	.53	.68	40.91*	
Writing	10	438	.61*	.50	.70	20.91**	
English	7	290	.50*	.34	.63	14.25**	
Moderator [publication type]							0.1
Article	11	982	.52*	.39	.62		
Dissertation	24	1105	.52*	.43	.60		
Moderator [year of publication]							
2000–2005	9	641	.55*	.42	.66		1.39
2006–2010	16	860	.54*	.44	.63		
2011–2016	10	586	.45*	.31	.58		
Moderator [scale]							
CE-Long	8	349	.50*	.32	.65		1.09
CE-Short	20	1288	.55*	.46	.63		
Other	7	450	.46*	.28	.60		
Moderator [level of education]							
Elementary	19	1120	.50*	.40	.60		1.55
High	10	468	.59*	.45	.70		
Middle	2	115	.44*	.10	.70		
Other	4	384	.49*	.27	.66		

p* < .01, *p* < .05

collective teacher efficacy and student achievement. The moderator analysis showed that there are no statistically significant differences in the effect sizes of the publication years examined ($Q_b = 0.1, p > .05$), of the two publication types ($Q_b = 1.39, p > .05$), of the various scale types ($Q_b = 1.09, p > .05$) and of the different educational levels ($Q_b = 1.55, p > .05$).

13.4 Conclusion

The findings obtained in this meta-analysis showed that collective teacher efficacy has a high level positive effect on student achievement. The findings showed that the joint competency belief level of the teachers working in the same school is a good predictor of this school's student achievement. Collective teacher efficacy, which describes the joint beliefs of the teachers working in the same school about the sum of their competencies for planning and executing educational activities to achieve certain goals (Bandura 1993, 1997; Gibson and Dembo 1984; Tschannen-Moran et al. 1998), affects teachers' attitude and behaviors towards the training of students, the management of classes and students' motivation (Goddard et al. 2000). Teachers from schools with higher belief levels set more challenging and long-term goals, they are not easily discouraged and they make more efforts, they do not avoid responsibilities and they do not consider demographic variables, such as socio-economic status or race, as reasons of failure (Acun 2014; Alinder 1994; Goddard 2001; Bandura 1993; Schechter and Tschannen-Moran 2006; Tschannen-Moran and Barr 2004). They believe that they can carry student achievement to a higher level through these attitudes and behaviors in school. The findings of our study support the literature's theoretical suggestions about collective teacher efficacy. According to the findings of the meta-analysis, the previously mentioned effect is high for all disciplines (such as reading, writing and maths), which shows that collective teacher efficacy is strongly associated with academic achievement. The role of teachers is crucial in enhancing student achievement, and it is possible to say that collective teacher efficacy beliefs in the school shape and influence student achievement to a large extent. It should be kept in mind, however, that according to social cognitive theory it is not only the beliefs that affect the behaviors and the environment but also the vice versa. This study analyzes the effect of collective teacher efficacy, which in some way arises within the school, on academic achievement but it does not show how this belief about teacher efficacy has emerged. Such a question can only be answered through qualitative studies that will be conducted in the schools having or lacking strong collective efficacy beliefs.

The result of the analysis performed in terms of publication year, publication type, scale and education level, which were thought to be moderator in the relationship between collective teacher efficacy and student achievement, did not show any moderator effect of these variables. The effect size of these variables is also positive and high. This finding shows that collective teacher efficacy researches reported similar effects, even though they have used different scales, they have been

conducted in different years and at different education levels. In the light of the meta-analysis findings, the following suggestions were submitted:

- The schools who want to improve student achievement should determine collective efficacy perception level of their teachers. Considering that this level is an important predictor of student achievement, all schools should make efforts to increase this efficacy level.
- Since quantitative studies measure only the level of collective teacher efficacy in school, qualitative studies should be conducted to determine descriptive and predictive variables of this efficacy belief.
- The majority of the researches included in the meta-analysis were conducted in the schools of USA, which has not allowed to make an analysis in terms of culture variable. Considering this fact, studies revealing the relationship between collective teacher efficacy and student achievement should be conducted in different countries.
- Similar meta-analysis study, examining the relations of collective teacher efficacy with other school variables (culture, climate, loyalty, school leadership, etc.) should be conducted.

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- Note.* “*” References marked with an asterisk indicate studies included in the meta-analysis. The in-text citations to studies selected for meta-analysis are not followed by asterisks.
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