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Teacher Characteristics and Sense of Teacher Efficacy: A Meta-analysis Study*

Kamile Demir

Alaaddin Keykubat University Faculty of Education, Faculty of Education, Department of Educational Sciences
E-mail: kdemir@mehmetakif.edu.tr

KEYWORDS Classroom Management. Experience. Gender. Instructional Strategies. Student Engagement

ABSTRACT The purpose of this research study is to investigate the relationship between teacher characteristics and teacher efficacy via meta-analysis. An extensive literature search was conducted to identify reports that examined the relationship between teacher characteristics and the teacher efficacy to minimize potential availability bias. In total, research reports have identified the provisions of usable data for 17 independent samples. Four of these studies were published, while 13 were unpublished dissertations. In this study, an indicator of effect size is chosen as the correlation coefficient. Random effects model was preferred according to heterogeneity tests conducted for teacher characteristics. As a result of meta-analysis, it was found that teacher characteristics correlate positively with teacher efficacy. Also, there is a positive correlation between teacher characteristics and efficacy in student engagement. Teacher characteristics have a significant relationship with efficacy in instructional strategies. Finally, teacher efficacy in classroom management was positively related to teacher characteristics.

INTRODUCTION

Self-efficacy is based on the theoretical framework of social cognitive theory stressing the evolvement and exercise of human agency that people can exercise some influence over what they do (Skaalvik and Skaalvik 2010). Self-efficacy refers to the perceived capability of an individual to perform actions needed to accomplish a specific task (Bandura 1986). According to theory and research, self-efficacy may make a difference in how people think, feel, and act (Schwarzer and Hallum 2008). According to Egger (2006), individuals base their actions and responses on their perceived self-efficacy. In addition to influencing the choices people make and the actions they take, efficacy beliefs have an impact on how much effort individuals will put forth on a particular task.

Bandura (1986) stated that there are four major sources of self-efficacy perceptions. However, the dominant influence on self-efficacy is a mastery experience. A second source of self-efficacy is vicarious learning or modelling. The third influence on self-efficacy is social persuasion, which refers to positive feedback, encouragement, and support for effort. The fourth source of self-efficacy is the person's somatic and emotional states.

Schwarzer and Hallum (2008) asserted that there is a general self-efficacy that refers to confidence in one's coping ability across a wide range of demanding or novel situations. Thus, self-efficacy is commonly understood to be domain-specific. That is, one can have more or less firm self-beliefs in different domains or particular situations of functioning.

Teacher Self-efficacy

Researchers in education have based the conceptualization of teacher self-efficacy on the theoretical framework of general self-efficacy. Therefore, the roles of self-efficacy in education have continued to interest researchers. Teachers' sense of efficacy was identified as one of the few teacher characteristics related to student achievement (Hoy and Spero 2005). Since then, the research literature shows a growing interest in teacher self-efficacy (Skaalvik and Skaalvik 2010).

According to Skaalvik and Skaalvik (2007), teacher self-efficacy can be defined as the individual beliefs of the teacher's ability to achieve a set of goals through planning, organizing, and completing tasks associated with those goals. Tschannen-Moran and Hoy (2001) suggest that a teacher's efficacy belief is a judgment of his or her capabilities to bring about desired outcomes of student engagement and learning, even among those students who may be difficult or unmotivated. Thus, the conceptualization of teacher efficacy in the literature has focused on the teacher's perception of his or her own capability and

on the ability of teaching as a professional discipline to shape students' knowledge, values and behavior (Friedman and Kass 2002).

The powerful role played by teacher efficacy has been repeatedly emphasized by many studies. Research showed that a teacher's self-efficacy has been related to several student outcomes including student achievement, motivation, and student self-efficacy (Tschannen-Moran and Hoy 2001; Tschannen-Moran and Barr 2004; Tschannen-Moran and Hoy 2007; Ashton and Webb 1986). Furthermore, teacher's perceived self-efficacy has been found to be related to positive attitudes toward school. Caprara et al. (2006) stated that teacher's self-efficacy may also contribute to promoting student's self-efficacy, raising their involvement in class activities, and their efforts in solving problems.

Teacher efficacy has positive effect on the academic climate in schools (Chong et al. 2010). Schunk (1989) stressed that self-efûcacy is a useful concept in explaining teacher behaviors. Many researchers suggested that teacher efficacy may underlie important instructional decisions, such as the choice of classroom management strategy (Soodak and Podell 1996).

Studies also revealed a relationship between teacher self-efficacy and student's performance (Tobin et al. 2006). However, teacher's sense of efficacy may influence a student's achievement in several ways. Teachers with high sense of efficacy are more likely than teachers with a low self-efficacy belief to implement innovations in the classroom management approaches and teaching methods that encourage students' autonomy and reduce control, to take responsibility for learning of students, to manage classroom problems, and to keep students on task (Caprara et al. 2006). In addition, efficacy beliefs affect the effort they invest in teaching, the goals they set, and their level of aspiration. Teachers with a strong efficacy belief tend to represent greater level skills of planning and organization. Efficacy beliefs influence teachers' persistence when things do not go easily and their resilience in the face of obstacles. Greater efficacy enables teachers to be less critical of students when they make errors, to work longer with a student who is struggling, and to be less inclined to refer a difficult student to special education. Teachers with higher self-efficacy show greater enthusiasm for teaching, have greater commitment towards teaching, and are more likely to remain in teaching (Tschannen-Moran and Hoy 2001; Hoy and Spero 2005; Soodak and Podell 1996). Thus, teacher efficacy has been consistently correlated with teachers' attributes and performance. Teachers' perceived self-efficacy have a significant impact on teacher's burnout (Skaalvik and Skaalvik 2007), professional commitment (Ware and Kitsantas 2011), and job satisfaction (Caprara et al. 2006). Sass et al. (2011) pointed out that a teachers' sense of self-efficacy may influence their interactions along with negative factors such as stress, burnout, and their ultimate intent to quit teaching. The educational literature also has demonstrated that teachers' sense of efficacy is affected by the teacher characteristics (Klassen and Chiu 2010; Guvenc 2011; Wolters and Daugherty 2007; Lam 2012).

Objectives of the Study

The purpose of this research study is to investigate the relationship between teacher characteristics and teacher efficacy via meta-analysis. In the light of teacher efficacy literature, the following hypotheses were tested:

- ***H1:*** There is a positive correlation between teacher characteristics and teacher efficacy.
- ***H2:*** There is a positive correlation between subject of teachers and teacher efficacy.
- ***H3:*** There is a positive correlation between gender of teachers and teacher efficacy.
- ***H4:*** There is a positive correlation between experience of teachers and teacher efficacy.
- ***H5:*** There is a positive correlation between education level of teachers and teacher efficacy.
- ***H6:*** There is a positive correlation between teacher characteristics and teacher efficacy in student engagement.
- ***H7:*** There is a positive correlation between subject of teachers and teacher efficacy in student engagement.
- ***H8:*** There is a positive correlation between gender of teachers and teacher efficacy in student engagement.
- ***H9:*** There is a positive correlation between experience of teachers and teacher efficacy in student engagement.
- ***H10:*** There is a positive correlation between education level of teachers and teacher efficacy in student engagement.

H11: There is a positive correlation between teacher characteristics and teacher efficacy in instructional strategies.
H12: There is a positive correlation between subject of teachers and teacher efficacy in instructional strategies.
H13: There is a positive correlation between gender of teachers and teacher efficacy in instructional strategies.
H14: There is a positive correlation between experience of teachers and teacher efficacy in instructional strategies.
H15: There is a positive correlation between education level of teachers and teacher efficacy in instructional strategies.
H16: There is a positive correlation between teacher characteristics and teacher efficacy in classroom management.
H17: There is a positive correlation between subject of teachers and teacher efficacy in classroom management.
H18: There is a positive correlation between gender of teachers and teacher efficacy in classroom management.
H19: There is a positive correlation between experience of teachers and teacher efficacy in classroom management.
H20: There is a positive correlation between education level of teachers and teacher efficacy in classroom management.

METHODOLOGY

Meta-analysis was used as the research method that combined the research findings of the studies conducted on the teacher efficacy topic in Turkey. A meta-analysis and an empirical review of relevant literature that quantitatively accumulates the results from a number of studies, will provide evidence of statistical relations among the variables of interest (Hunter and Schmidt 1990). Therefore, dependent variables included in the analysis were teacher characteristics. This study mainly focuses on teachers' efficacy belief in student's engagement, instructional strategies, and classroom management.

Literature Search

An extensive literature search was conducted to identify both unpublished and published researches that examined the relationship between teacher characteristics and teacher efficacy to minimize potential availability bias. However, the search for studies to be used in the meta-analyses involved manual and computer methods. The computer search involved scanning the Council of Higher Education (YÖK), Google Academic, and Turkish National Academic Network, and Information Center (ULAKBÝM) databases using keywords such as efficacy, self-efficacy, and teacher efficacy. The manual search was conducted by published studies and dissertations. These keywords were used in each database to find the studies that reported the variables of interest. Thus, the initial search identified 32 studies.

In total, research reports have identified the provision of usable data for 17 independent samples. However, four of these studies (24%) were published, while 13 (76%) were unpublished dissertations.

Inclusion and Exclusion Criteria

To be included in this meta-analysis, studies had to meet four criteria. The studies used in this study should conform to the following criteria: (1) The study has to be an empirical research; (2) To be included in analyses, a study had to report parametric statistics with relevant variables; (3) The study had to report on correlations; (4) regression coefficients and path coefficients were excluded from the analysis; (5) Because of multiple methods of data collection, sometimes two studies were reached by the same author. For example, when one version of a study was collected as a dissertation, another version was found in a publication. If the two versions had been reached, then the unpublished one is only used.

Based on these criteria, 17 independent studies reporting 132 correlations teacher characteristics with teacher efficacy belief was identified. The dates for the studies ranged from 2007 to 2015, and the sample size was 7315 teachers.

Coding Procedures

All data were combined into one data set for this analysis. In situations where multiple studies were reported in one publication, each study was treated as an independent study. Dependent variables included in this analysis were teacher efficacy in student's engagement, instructional strategies, and classroom manage-

ment. Consequently, this study mainly focuses on teacher characteristics as a potential moderator. Demographic characteristics of participants included in this meta-analysis include experience, gender (males coded "1"; females coded "2"), education, and teaching subject. As part of the analysis, the following information was coded: (1) the correlations of teacher characteristics with teacher efficacy; (2) information on measures used; (3) the sample characteristics and sample sizes; and (4) the types of efficacy belief.

Meta-analytic Procedures

In this study, an indicator of effect size is chosen as the correlation coefficient. To be included in the analysis, independent group t test or one-way ANOVA statistic were converted to a correlation coefficient. The meta-analytical results were found by first converting all correlation coefficients to z scores; then averages were found in terms of the z scores; and then each averaged-z score was converted back to r. This resulted in overall mean weighted effect sizes for the justice variable's relationship on job satisfaction and organizational commitment.

Publication Bias Check

Publication bias is the term for what occurs whenever the research that appears in the published literature is systematically unrepresentative of the population of completed studies (Rothstein et al. 2005). Random effects model was preferred according to heterogeneity tests conducted for teacher efficacy ($Q47=155.770$, $p< 0.05$), teacher efficacy in student engagement ($Q33=149.38$, $p< 0.05$), teacher efficacy in instructional strategies ($Q32= 99.409$, $p<0.05$), and teacher efficacy in classroom management ($Q33= 101.937$, $p<0.05$). Two publication bias tests were used to evaluate the potential presence and degree of potential publication bias: The Begg and Mazumdar rank correlation test (tau b = 0.04; p > .05) and (b) the trim and fill test supplemented with the funnel plot. Furthermore, all analyses were conducted using computer programs.

RESULTS

Results of the meta-analysis conducted to establish the relationship between teacher characteristics and teacher efficacy are provided in Table 1. As predicted, the five types of teacher characteristics showed different associations with teacher efficacy. It was found that the subject of teachers correlated positively with teacher efficacy ($r=0.08$, $p<0.01$). The 95 percent confidence interval for subject of teachers on teacher efficacy ranged from 0.03 to 0.13. Thus, this indicates the hypothesis that the subject of teachers will have a significant relationship with teacher efficacy was confirmed. Teachers' gender and efficacy beliefs were not significantly correlated ($r = 0.02$, $p > 0.05$). The 95 percent confidence interval for gender of teachers on their efficacy beliefs ranged from - 0.02 to 0.05. Thus, this indicates the hypothesis that the gender will have a significant relationship with teacher efficacy was rejected.

There is a positive correlation between teacher efficacy and experience ($r=0.16$; $p < 0.01$). The 95 percent confidence interval for experience on teacher efficacy ranged from 0.12 to 0.20. Thus, this indicates that the hypothesis that experience will have a significant relationship with teacher efficacy was confirmed. Teachers' education levels and efficacy beliefs were significantly correlated ($r=0.07<0.01$). The 95 percent confidence interval for education level of teachers on their efficacy beliefs ranged from 0.02 to 0.11 thus, indicating that the hypothesis that gender will have a significant relationship with teacher efficacy was confirmed. Teachers' overall characteristics were positively related to teacher efficacy ($r=0.08$; $p < 0.01$). The 95 percent confidence interval for teacher characteristics on teacher efficacy ranged from 0.06 to 0.10.

Table 1: Meta-analysis of relations between teacher characteristics and teacher efficacy

	Number studies	*Point estimate*	*Lower limit*	*Upper limit*	*Z-value*	*P-value*
Subject	7	0.079	0.027	0.131	2.958	0.003
Gender	15	0.018	-0.018	0.054	0.966	0.334
Experience	12	0.162	0.122	0.201	7.881	0.000
Education	9	0.065	0.016	0.113	2.626	0.009
Overall	43	0.078	0.057	0.100	7.141	0.000

Table 2: Meta-analysis of relations between teacher characteristics and teacher efficacy in student engagement

	Number studies	*Point estimate*	*Lower limit*	*Upper limit*	*Z-value*	*P-value*
Subject	6	0.122	0.062	0.182	3.947	0.000
Gender	10	-0.007	-0.053	0.040	-0.271	0.786
Experience	7	0.207	0.153	0.260	7.306	0.000
Education	7	0.053	0.002	0.109	1.883	0.060
Overall	30	0.083	0.056	0.110	6.029	0.000

Thus, this indicates that the hypothesis that the teacher characteristics will have a significant relationship with teacher efficacy was confirmed.

Table 2 presents the results of the meta-analysis concerning the relations between the subject of teachers and teacher efficacy in student engagement. Therefore, teachers' subject were found to have a significant relationship with teacher efficacy in student engagement ($r=0.12$; $p < 0.01$). The 95 percent confidence interval for the subject on teacher efficacy in student engagement ranged from 0.06 to 0.18. However, this indicates that the hypothesis that the subject of teacher will have a significant relationship with teacher efficacy in student engagement was confirmed.

There is a negative correlation between gender and teacher efficacy in student engagement ($r = -0.01$, $p > 0.05$). The 95 percent confidence interval for teacher gender on teachers' efficacy beliefs in student engagement ranged from -0.05 to 0.04. Thus, this indicates that the hypothesis that the gender will have a significant relationship with teacher efficacy in student engagement was rejected. Teacher experience were found to be significantly related to the teachers' efficacy beliefs in student engagement ($r=0.21$; $p < 0.01$). The 95 percent confidence interval for teachers' experience on teacher efficacy in student engagement ranged from 0.15 to 0.26. Thus, this indicates that the hypothesis that experience of teacher will have a significant relationship with teacher efficacy in student engagement was confirmed. There is a positive correlation between teacher efficacy in student engagement and education level ($r=0.05$; $p < 0.05$). The 95 percent confidence interval for education levels on teacher efficacy in student engagement ranged from 0.02 to 0.11. Thus, this indicates that the hypothesis that education level will have a significant relationship with teacher efficacy in student engagement was confirmed. Finally, the teacher characteristics was positively correlated with teacher efficacy in student engagement ($r=0.08$; $p < 0.01$). The 95 percent confidence interval for teacher characteristics on teachers' efficacy in student engagement beliefs ranged from 0.06 to 0.11.

The relationship between teacher characteristics and teacher efficacy in instructional strategies are shown in Table 3. However, it was found that the subject of teachers was correlated positively with teacher efficacy in instructional strategies ($r=0.08$, $p<0.01$). The 95 percent confidence interval for subject of teachers on teacher efficacy ranged from 0.03 to 0.14. Thus, this indicates that the hypothesis that the subject of teachers will have a significant relationship with teacher efficacy in instructional strategies was confirmed. Teachers' gender and efficacy beliefs in instructional strategies were not significantly correlated ($r =0.01$, $p > 0.05$). The 95 percent confidence interval for the gender of teachers on their efficacy beliefs ranged from -0.03 to 0.07. Thus, this indicates that the hypothesis that gender will have a significant relationship with teacher efficacy was rejected. In addition, there is a positive correlation between teacher efficacy in instructional strategies and experience ($r=0.17$; $p < 0.01$). The 95 percent confidence interval for experience on teacher's efficacy ranged from 0.12 to 0.23. Thus, this indicates that the hypothesis that experience will have a signifi-

Table 3: Meta-analysis of relations between teacher characteristics and teacher efficacy in instructional

	Number studies	*Point estimate*	*Lower limit*	*Upper limit*	*Z-value*	*P-value*
Subject	6	0.084	0.025	0.142	2.795	0.005
Gender	10	0.013	-0.031	0.056	0.567	0.571
Experience	6	0.172	0.118	0.225	6.211	0.000
Education	7	0.037	0.014	0.088	1.413	0.158
Overall	29	0.067	0.041	0.092	5.144	0.000

cant relationship with teacher efficacy in instructional strategies was confirmed. Teachers' education levels and efficacy beliefs in instructional strategies weren't significantly correlated (r=0.04; $p < 0.05$). The 95 percent confidence interval for education level of teachers on their efficacy beliefs in instructional strategies ranged from 0.01 to 0.09. Thus, this indicates that the hypothesis that gender will have a significant relationship with teacher efficacy in instructional strategies was confirmed. Teachers' overall characteristics were positively related to teacher efficacy (r=0.07; $p < 0.01$). The 95 percent confidence interval for teacher characteristics on teacher efficacy in instructional strategies ranged from 0.04 to 0.09. Thus, this indicates that the hypothesis that teacher characteristics will have a significant relationship with teacher efficacy in instructional strategies was confirmed.

Table 4 presents the results of the meta-analysis concerning the relations between the subject of teachers and teacher efficacy in classroom management. However, teachers' subject were found to have a significant relationship with teacher efficacy in classroom management (r=0.10; $p < 0.01$). The 95 percent confidence interval for subject on teacher efficacy in student engagement ranged from 0.06 to 0.14. Thus, this indicates that the hypothesis that the subject of teacher will have a significant relationship with teacher efficacy in classroom management was confirmed. There is a negative correlation between gender and teacher efficacy in classroom management ($r = -0.01$, $p > 0.05$). The 95 percent confidence interval for teacher gender on teachers' efficacy beliefs in classroom management which ranged from -0.04 to 0.02. Thus, this indicates that the hypothesis that gender will have a significant relationship with teacher efficacy in classroom management was rejected. Teacher experience were found to be significantly related to the teachers' efficacy beliefs in classroom management (r=0.17; $p < 0.01$). The 95 percent confidence interval for teachers' experience on teacher efficacy in classroom management ranged from 0.14 to 0.21. Thus, this indicates that the hypothesis that experience of teacher will have a significant relationship with teacher efficacy in classroom management was confirmed. Furthermore, there is a positive correlation between teacher efficacy in classroom management and education level (r=0.05; $p < 0.05$). The 95 percent confidence interval for education levels on teacher efficacy in classroom management ranged from 0.01 to 0.08. Thus, this indicates that the hypothesis that education level will have a significant relationship with teacher efficacy in classroom management was confirmed. Finally, teacher characteristics were positively correlated with teacher efficacy in classroom management (r=0.07; $p < 0.01$). The 95 percent confidence interval for teacher characteristics on teachers' efficacy in classroom management beliefs ranged from 0.05 to 0.09.

DISCUSSION

This meta-analysis summarizes the existing data concerning teacher characteristics in relation to their efficacy beliefs. Therefore, the specific issues which were examined dealt with the (a) teacher efficacy of studying three types of efficacy beliefs: student engagement, instructional strategies, and classroom management; and (b) teacher characteristics (teaching subject, gender, education, and experience). An extensive literature search was executed to identify both published and unpublished reports that examined the relationship between teachers' self-efficacy and teacher characteristic to minimize potential availability bias. These were used in each database to find the studies that reported the variables of interest. The initial search identified 32 studies. In total, research reports have identified the provision of usable data for 17 independent samples. Four of these studies were published and 13 were unpublished dissertations. In this study, the indicator of effect size is chosen

Table 4: Meta-analysis of relations between teacher characteristics and teacher efficacy in classroom

	Number studies	*Point estimate*	*Lower limit*	*Upper limit*	*Z-value*	*P-value*
Subject	6	0.097	0.056	0.138	4.639	0.000
Gender	10	-0.012	-0.044	0.019	-0.764	0.445
Experience	7	0.173	0.137	0.209	9.255	0.000
Education	7	0.046	0.010	0.083	2.469	0.014
Overall	30	0.068	0.050	0.086	7.329	0.000

as the correlation coefficient. As predicted, the three types of efficacy beliefs of teachers showed different associations with teacher characteristics.

It was found that subject of teachers is correlated positively with teacher efficacy. Teachers' subject also was found to have a significant relationship with teacher efficacy in student engagement, instructional strategies, and classroom management. In light of these findings, it can be said that teacher efficacy can be differentiated according to their subject, especially in students. This is followed by classroom management and instructional strategies, respectively. On the other hand, teachers' gender and efficacy beliefs were not significantly correlated. It has also been found in three types of teacher efficacy. Multiple studies explored the relationship of gender and teacher efficacy (Anderson et al. 1988; Raudenbush et al. 1992; Klassen and Chiu 2010; Titrek et al. 2014). Therefore, the results of these studies were quite contradictory. In this study, it was determined that gender did not make a significant effect in teaching efficacy beliefs.

Teacher education level was found to be significantly related to teacher efficacy in student engagement, teacher efficacy in instructional strategies, and teacher efficacy in classroom management. Subsequently, there is a positive correlation between teacher efficacy and experience. Subgroup analyses conducted for teacher characteristic variables revealed that experience of teachers is correlated more strongly with teachers' efficacy beliefs. Studies have shown that teachers with less teaching experience, report lower teacher efficacy than those with more experience (Fives and Buehl 2010; Wolters and Daugherty 2007). Bandura (1997) stated that mastery experiences is the most powerful source of the four major influences on teachers' self-efficacy beliefs, which for some teachers, comes from actual teaching accomplishments with students. Similarly, Tschannen-Moran and Woolfolk Hoy (2007) asserted that efficacy beliefs are raised if a teacher perceives his or her teaching performance to be successful. Thus, their future performances will likely be proficient. On the other hand, efficacy beliefs are lowered if a teacher perceives the performance as a failure. Thus, future performances will also fail too. Tschannen-Moran et al. (1998) also noted that in assessing beliefs about their teaching capability, teachers make two related judgments: the requirements of an anticipated teaching task and an assessment of their personal teaching competence in light of those requirements. Finally, it was seen that teacher characteristics is positively correlated with overall teacher efficacy. The overall effect sizes for teacher efficacy was small. In the light of these findings, it can be stated that the teacher characteristics is not a critical determinant of the efficacy beliefs of teacher.

CONCLUSION

The findings of the study indicate that subject of teachers is correlated positively with teacher efficacy. It can be said that teacher efficacy can be differentiated according to their subject, especially in student engagement. In this study, it was determined that gender did not make a significant effect in teaching efficacy beliefs. Teacher education level was found to be significantly related to teacher efficacy in student engagement, teacher efficacy in instructional strategies, and teacher efficacy in classroom management. Subsequently, there is a positive correlation between teacher efficacy and experience. Subgroup analyses conducted for teacher characteristic variables revealed that experience of teachers is correlated more strongly with teachers' efficacy beliefs. As a conclusion, it was seen that teacher characteristics is positively correlated with overall teacher efficacy.

RECOMMENDATIONS

The result of present study determined that the overall effect sizes for teacher efficacy was small. In the light of these findings, it can be stated that the teacher characteristics is not a critical determinant of the efficacy beliefs of teacher. In this respect, it is recommended that researchers should prefer antecedents except the teacher characteristics in research on teacher efficacy.

NOTE

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