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THE RELATIONSHIP BETWEEN TEACHER EFFICACY AND STUDENTS' ACADEMIC ACHIEVEMENT: A META-ANALYSIS

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We conducted a meta-analysis by synthesizing the results of 16 studies involving 4,130 teachers to explore whether or not the relationship between teacher efficacy and students' academic achievement was influenced by the scale used to measure teacher efficacy, and/or by the subfactors of teacher efficacy, length of teaching experience, location of the school, or the students' educational level. The results showed that the mean relationship between teacher efficacy and students' academic achievement was significant but the effect size was small. The results also indicated that the relationship was influenced by some teacher efficacy measures and subfactors, and by length of teaching experience. In studies in which the measure used was Gibson and Dembo's scale, in regard to classroom management, and in the case of teachers with fewer than 11 years of teaching experience, the relationship between teacher efficacy and student academic achievement was nonsignificant.

Keywords: teacher efficacy, students' academic achievement, length of teaching experience, school location, students' educational level, teacher efficacy scale.

Since the 1980s, a number of researchers have found that *teacher efficacy*, namely, teachers' belief that they can influence students' academic

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achievement and behavior even when the students lack academic motivation (e.g., Tschannen-Moran & Hoy, 2001), is associated with students' academic achievement (Klassen & Tze, 2014; Mohamadi & Asadzadeh, 2012). If teachers have confidence in their ability to teach and in their ability to influence student performance and motivation, they are more likely to have a positive impact on their students' academic outcomes (Skaalvik & Skaalvik, 2007). Mullin (2011) also stated that the correlation of teacher efficacy with student outcomes was stronger than was the correlation of teacher efficacy with other school climate variables.

Recently, however, several researchers have not found any correlation between teacher efficacy and student performance (e.g., Corkett, Hatt, & Benevides, 2011; Lee, Shin, & Kim, 2013). Kim (2012) argued that although teacher efficacy contributes positively to students' academic achievement, teachers' efficacy is not directly associated with their students' achievement. Klassen, Tze, Betts, and Gordon (2011) likewise showed that teacher efficacy has an indirect effect on student academic achievement via its effect on student behavior, motivation, and goal-setting. Findings on the relationship between teacher efficacy and students' academic achievement are, thus, inconsistent.

The conflicting results may be explained by the researchers' use of different measures based on different definitions of teacher efficacy. Researchers of teacher efficacy have typically drawn on two theories: Rotter's (1966) internal-external locus of control and Bandura's (1978) self-efficacy (Tschannen-Moran & Hoy, 2001). Researchers understand that, according to Rotter's theory, teacher efficacy is closely related to their belief as regards whether control of reinforcement lies externally, in the environment, or internally, within themselves (Tschannen-Moran & Hoy, 2001). Bandura (1986) suggested that human behavior is influenced by two kinds of expectations: *self-efficacy*, which is individuals' belief that they can achieve a certain level of performance in a given situation, and *outcome expectancy*, which is individuals' judgment about the likely consequences they expect to achieve from their actions.

Gibson and Dembo (1984) developed a teacher efficacy scale based on Rotter's (1966) and Bandura's (1978) theories. Factor analysis yielded a scale comprising two factors: personal teaching efficacy and general teaching efficacy. *Personal teaching efficacy* reflects teachers' belief that they have the skills and abilities to bring about student learning, and *general teaching efficacy* reflects the extent to which teachers believe that students are influenced more by the teacher than by external factors, such as intelligence quotient and family background. However, although Gibson and Dembo's scale is the most widely used measure of teacher efficacy, it has been criticized because of confusion about the concept of general teaching efficacy, which has been treated as if it were related to outcome expectancy. Bandura (1986) argued that general teaching efficacy

cannot be regarded as outcome expectancy, because outcome expectancy stems from the individual teacher's assessment of his or her own capabilities, whereas general teaching efficacy refers to the potential impact of teachers in general on their students' academic outcomes. In addition, Tschannen-Moran, Hoy, and Hoy (1998) pointed out that general teaching efficacy should be considered as an expected outcome of teachers individually, not as an outcome of teachers in general.

Bandura (1997) insisted that all items in teacher efficacy scales should be phrased as "can do" statements, so that they are a measure of personal ability and competence, not just a reflection of personal beliefs and thoughts. However, not all the statements designed to assess general teaching efficacy in Gibson and Dembo's (1984) scale conform to this dictate, for example, "The hours in my class have little influence on students compared to the influence of their home environment." Munoz (2008) found that the relationship of student academic achievement with personal teaching efficacy differed from its relationship with general teaching efficacy. Thus, recognizing the ambiguity of the concept of teacher efficacy, Tschannen-Moran and Hoy (2001) developed the 24-item Teachers' Sense of Efficacy Scale, consisting of three dimensions: classroom management, instructional strategies, and student engagement. Bandura (1997) also developed a scale to measure teachers' sense of efficacy, consisting of 30 items and seven subscales.

Another likely reason for the inconsistent results on the correlation between teacher efficacy and student academic performance is that context matters. As self-efficacy is strongly context-dependent (Bandura, 2006), teacher efficacy may vary from one situation to another. As Tschannen-Moran and Hoy (2001) also believe that teacher efficacy is context-specific, the structure of their scale reflects the various domains of teaching-related expertise. Other researchers have suggested that the impact of teacher efficacy on student academic performance depends on the work domain (Donald, 2009; Mohamadi & Asadzadeh, 2012), the subject being taught (Donald, 2009), or the teacher's experience (Wolters & Daugherty, 2007). For example, experienced teachers report greater teacher efficacy than novice teachers do (Darling-Hammond, 2000).

The relationship between teacher efficacy and students' current academic achievement may also be affected by student variables, such as gender (Munoz, 2008), prior academic achievement level (Guo, Connor, Yang, Roehrig, & Morrison, 2012), and grade level, which was based on the classification used by Throndsen and Turmo (2013) of seven grade levels. School variables are also likely to influence the relationship between teacher efficacy and student academic performance, for example, the location of the school, that is, whether the school is in an urban, rural, or suburban location (Milner, 2012).

Therefore, there is a need to aggregate the inconsistent results on the relationship between teacher efficacy and students' academic achievement, and to make a comparative analysis in which the context of each study is taken into account. However, to our knowledge, there have been only a few attempts to integrate the various findings on the teacher efficacy–student academic achievement relationship. Although Eells (2011) found that collective teacher efficacy has a strong positive association with students' academic achievement, the collective teacher efficacy construct applies to group performance and beliefs rather than to individual teachers' beliefs or performance (Henson, 2002). Thus, the relationship between individual teacher efficacy and students' academic achievement cannot be identified from Eells's study. Klassen and Tze (2014) showed that there is a statistically significant, but weak, association between teachers' psychological characteristics—such as personality and teacher efficacy—and teaching effectiveness. However, as Klassen and Tze used both teaching performance and student academic achievement as outcome variables, it is difficult to identify the exact relationship between teacher efficacy and student academic performance. In addition, these researchers did not consider contextual factors, such as school, student, and teacher variables.

Our purpose in this study was to synthesize previous findings on the relationship between teacher efficacy and students' academic achievement and to identify factors that affect this relationship. Our specific objectives were (a) to calculate an overall effect size for the correlation between teacher efficacy and students' academic achievement, and (b) to explore whether or not the relationship was influenced by which of the scales researchers used to measure teacher efficacy, and/or by the subfactors of teacher efficacy, students' level of education (kindergarten, elementary, middle, or high school), length of teachers' professional experience, and school location (urban, rural, or suburban). We addressed these objectives using meta-analytic techniques by means of which we identified sources of interstudy variability and could detect associations between these studies.

Method

Sample

We searched for relevant studies using Web of Science, Science Direct, ProQuest, and Google Scholar databases, primarily using the search strings (teacher efficacy or teacher's self-efficacy) and (student's achievement or student's performance). We limited the search to material published in or after 1984, because it was in 1984 that Gibson and Dembo developed their scale.

Selection was made on the basis of three criteria: (a) studies that had been found to be reliable and valid measures of teacher efficacy and in which the level

of students' academic achievement was reported; (b) studies in which data were available on number of participants and in which correlation coefficients were reported, as requirements for calculating standard error; and (c) studies written in the English language. We selected 16 studies involving 4,130 teachers.

Procedure

First, we coded sample size, the correlation coefficient (r) for the relationship between teacher efficacy and students' academic achievement; the scale used in the research to assess teacher efficacy; and subfactors of teacher efficacy, the students' education level, teachers' number of years of experience, and school location. Second, we assessed heterogeneity using the homogeneity Q statistic to determine whether to use a random or fixed-effects model. We also calculated the I^2 index using the chi-square test as a measure of heterogeneity (by percentage). We calculated weighted correlation coefficients (weighted average r) using sample size, and computed mean z scores and 95% confidence intervals (CI). We also applied the fail-safe N and tolerance level tests to confirm whether or not we could safely ignore publication bias. All analyses were carried out using the meta-analysis with interactive explanations program.

Results

The results are shown in Table 1. Overall, the Q-value was significant (Q = 340.24, $p < .001$, $I^2 = 71.49\%$), indicating that effect sizes were not homogeneous across studies. Thus, we calculated random effects. The overall correlation between teacher efficacy and students' academic achievement was significant ($r = .10$, $p < .001$), although the mean effect size was small to medium. Rosenthal's fail-safe N was 1,687, indicating that more than 1,687 opposite results would be needed to overturn this finding. As the tolerance level was 500, which is less than the fail-safe N, the finding can be considered robust.

The weighted mean correlation between teacher efficacy and students' academic achievement was significant when teacher efficacy was measured with Bandura's (1997) scale ($r = .07$, $p < .001$) or the scale developed by Tschannen-Moran and Hoy in 2001 ($r = .12$, $p < .001$), but not with the 1984 Gibson and Dembo scale ($r = .01$, $p > .05$). The findings were robust for studies in which Bandura's, Gibson and Dembo's, and Tschannen-Moran and Hoy's scales were used. The weighted mean correlation between teacher efficacy and students' academic achievement was statistically significant when the subfactors of teacher efficacy were about instructional strategies ($r = .11$, $p < .001$), student engagement ($r = .03$, $p < .001$), or personal teaching efficacy ($r = .19$, $p < .001$), but not when the subfactors of teacher efficacy were about classroom management ($r = .12$, $p > .05$) or general teaching efficacy ($r = .05$, $p > .05$). With the exception of general teaching

Table 1. *Correlations Between Teacher Efficacy and Students' Academic Achievement*

	k *n*	Sample *r*	Weighted *z*	Average	95% confidence interval	Q	I^2 (%)	Fail-safe *N*	Tolerance level	Robust Yes/No
Total										
Teacher efficacy–student achievement	98	14,215	.10	4.98***	[0.06, 0.14]	340.24***	71.49	1,687	500	Y
Teacher efficacy scale										
Tschannen-Moran and Hoy	30	1,886	.12	5.62***	[0.04, 0.15]	81.03***	49.11	175	160	Y
Gibson and Dembo	52	3,602	.01	4.79	[0.08, 0.15]	217.92***	76.60	557	270	Y
Bandura	6	5,388	.07	5.75***	[0.05, 0.10]	5.78	13.52	46	40	Y
Other	10	3,339	.04	0.78	[-0.06, 0.15]	33.43***	79.08	0	60	N
Subfactors of teacher efficacy										
Instructional strategies	10	766	.11	4.78***	[0.06, 0.15]	41.53*	59.07	65	60	Y
Student engagement	9	548	.03	5.49***	[0.14, 0.31]	13.61	41.20	60	55	Y
Classroom management	9	548	.12	1.52	[-0.03, 0.28]	20.71*	61.39	65	55	Y
General teaching efficacy	26	1,799	.05	0.79	[-0.06, 0.16]	136.23***	81.65	0	140	N
Personal teaching efficacy	29	3,366	.19	6.08***	[0.12, 0.24]	62.17***	54.97	566	155	Y
Students' – education level										
Kindergarten	6	144	.07	1.90	[-0.01, 0.15]	1.90	0	0	40	N
Elementary school	64	10,965	.09	2.78***	[0.05, 0.12]	237.76***	73.50	430	330	Y
Middle school	14	444	.18	7.95***	[0.13, 0.22]	23.81	49.61	10	80	N
High school	14	2,662	.07	2.78*	[0.02, 0.11]	49.14***	71.51	1,500	80	Y
Teaching experience										
< 11 years	10	168	-.01	2.91	[-0.17, 0.15]	2.91	0	181	60	Y
11–15 years	28	2,928	.13	3.58***	[0.06, 0.21]	155.25***	82.61	505	150	Y
> 15 years	16	6,818	.10	4.32***	[0.05, 0.14]	29.08*	48.42	147	90	Y

Table 1 continued

	k *n*	Sample *r*	Weighted *z*	Average	95% confidence interval	Q	I^2 (%)	Fail-safe *N*	Tolerance level	Robust Yes/No
School location										
The whole country	24	9,298	.09	3.08***	[0.03, 0.15]	161.12***	85.81	249	130	Y
Urban	33	1,862	.08	5.25*	[0.02, 0.15]	48.41*	33.90	42	175	N
Rural	9	636	.20	4.26***	[0.09, 0.25]	11.23	46.57	18	55	N
Suburban	10	364	.07	2.61*	[0.02, 0.12]	48.84***	81.57	1,514	60	Y

Note. * $p < .05$, *** $p < .001$.

efficacy, the findings were robust. The weighted mean correlation between teacher efficacy and students' academic achievement was statistically significant for teachers of students in elementary school ($r = .09$, $p < .001$), middle school ($r = .18$, $p < .001$), and high school ($r = .07$, $p < .05$), but not for kindergarten teachers ($r = .07$, $p > .05$). The findings were robust for elementary and high school students. The weighted mean correlation between teacher efficacy and students' academic achievement was significant in the case of teachers with more than 11 years of professional experience (11–15 years: $r = .13$, $p < .001$; >15 years: $r = .10$, $p < .001$) but not for teachers with fewer than 11 years of professional experience ($r = -.01$, $p > .05$). All these results were robust. The weighted mean correlation between teacher efficacy and students' academic achievement was significant for schools in all locations (the whole country: $r = .09$, $p < .001$; urban: $r = .08$, $p < .05$; rural: $r = .20$, $p < .001$; suburban: $r = .07$, $p < .05$). However, the findings relating to rural and urban areas were not robust.

Discussion

We synthesized previous results of the correlation between teacher efficacy and students' academic achievement. Our meta-analysis results showed that teachers' efficacy was positively related to their students' academic achievement, which is consistent with results of previous studies (e.g., Caprara, Barbaranelli, Steca, & Malone, 2006; Klassen & Tze, 2014). Thus, we concluded that if teachers believe that they can influence student academic performance, they bring more enthusiasm to their teaching, and this may positively affect student performance. However, the mean effect size for the correlation between teacher efficacy and students' academic achievement was small in our meta-analysis result, and the effect was heterogeneous, implying that the relationship is influenced by other variables. Our results showed that some measures used by researchers to assess the subfactors of teacher efficacy, students' education level, teachers' years of professional experience, and school location influenced the relationship.

The first factor that we considered was that the relationship between teacher efficacy and their students' academic achievement may depend on which scale is used for the measurement. We found that in studies in which the researchers used the scale developed by Tschannen-Moran and Hoy (2001) or Bandura's (1997) scale (e.g., Caprara et al., 2006), the results showed that teacher efficacy was positively related to students' academic achievement, but in studies in which the researchers had used Gibson and Dembo's (1984) scale (e.g., Munoz, 2008), the results showed that the relationship was not positive. This suggests that there are important differences between Gibson and Dembo's scale and the two other scales. For example, not all the items in Gibson and Dembo's scale include the "can do" phrasing that Bandura (1997) argued was essential in order for

efficacy scales to perform the function of measuring teachers' personal ability and competence rather than being a reflection of personal beliefs and thoughts, furthermore, general teaching efficacy rarely predicts teacher efficacy (Woolfolk & Hoy, 1990). Our results support the contention by previous researchers (e.g., Kim & Kim, 2004) that Gibson and Dembo's scale should be restructured. The inconsistency of the results relating to the relationship between teacher efficacy and students' academic achievement that have been reported in existing studies may be attributable to the use of this scale.

We also analyzed the results for subfactors of teacher efficacy. We found that in the previous studies we included in our meta-analysis, the relationship between teacher efficacy and students' academic achievement was significant when instructional strategies and student engagement were used as the criteria to measure teacher efficacy, but not when classroom management was the criterion. Our results support the contention that teacher efficacy is context-specific (e.g., Mohamadi & Asadzadeh, 2012). Teacher efficacy in the context of instructional strategies and student engagement is about teachers' confidence in their teaching methods and their ability to motivate students, which are both factors closely allied to academic achievement. In contrast, teacher efficacy in the context of classroom management relates to whether or not teachers have the ability to control students' disruptive behavior in the classroom and to ensure that students follow classroom rules. Thus, teacher efficacy in classroom management may be less relevant to student academic performance than the other two factors are.

We found that general teaching efficacy was not associated with students' academic achievement, although this finding was not robust. This corroborates Munoz's (2008) finding that personal teaching efficacy and general teaching efficacy affect students' academic achievement differently. It is also consistent with the finding reported by Tschannen-Moran et al. (1998) that the two dimensions of Gibson and Dembo's (1984) scale are either only weakly correlated or there is no correlation, and our finding is also consistent with the argument that teacher efficacy cannot be accounted for by teachers' belief concerning their potential influence in general on students. A measurement of teacher efficacy must, rather, be based on the individual teacher's personal capabilities (Bandura, 1997; Woolfolk & Hoy, 1990). Our finding that general teaching efficacy was not associated with students' academic achievement, raised doubts for us about whether or not general teaching efficacy can be considered as a dimension of teacher efficacy and supports the argument that general teaching efficacy should be considered as a separate construct from personal teacher efficacy.

Another finding from our meta-analysis was that the relationship between teacher efficacy and students' academic achievement depends on the length of the teacher's professional experience. In the case of teachers who had a number of years of professional experience, teacher efficacy was positively associated

with student academic achievement, but in the case of novice teachers, the correlation was nonsignificant. This result is in line with other reports that the association between teacher efficacy and student academic performance depends on the length of the teacher's experience (e.g., Wolters & Daugherty, 2007), and this implies that teachers with more experience who demonstrate great teacher efficacy are more likely than are novice teachers with great teacher efficacy to attain tangible results in terms of the level of academic performance of their students. However, the other variables we included in our meta-analysis, namely, students' education level and school location, had no influence on the relationship between teacher efficacy and students' academic achievement.

There are some limitations in the procedure and method we used to perform the meta-analysis. First, although we used several search engines, it is possible that we did not retrieve all relevant studies. Second, one criterion for inclusion of study results in the analysis was that correlation coefficients were reported, so that we were able to calculate standard error. Previous researchers have used various statistical methods, including analysis of variance, but they did not all report correlation coefficients. This meant that we excluded some relevant studies. Third, there were some variables that we could not analyze because of the small number of studies in which data were reported. The findings on the influence of the academic subject, student gender, and the level of student academic achievement on the relationship between teacher efficacy and students' academic achievement were not robust in this study. Further research is needed for firm conclusions to be drawn about these potential moderators.

Nevertheless, according to the results of our meta-analysis, we can conclude that teacher efficacy enhances students' academic achievement. The mixed findings about the relationship between teacher efficacy and students' academic achievement may be attributable to variability of other factors, including the choice of teacher efficacy scale used by the researcher, the subfactors of teacher efficacy, and the length of teaching experience.

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