**PROJECT-BASED LEARNING: PREDICTOR VARIABLES THAT INFLUENCE
TEACHER LEADERS' SELF-EFFICACY**

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Abstract

The purpose of the study was to (a) investigate teacher leaders' self-efficacy as it relates to the implementation of new instructional strategies [i.e. project-based learning] and (b) determined variables that predicted teacher leaders' self-efficacy. The sample population included 244 teachers who did and did not receive training prior to the implementation of project-based learning (PBL) within the school district. Significant differences in the self-efficacy of trained and untrained teachers were determined. Statistically significant relationships were found between teachers' self-efficacy and program familiarity, teacher excitement, teacher autonomy, principal excitement, and teacher training. The study emphasizes the important role leaders have when striving to create change. By targeting specific characteristics surrounding new program implantation, leaders can instill a sense of positive self-efficacy, possibly resulting in a more positive outcome during change.

Key Words: Self-Efficacy, Motivation, Teacher Leadership, Program Implantation, Training,

Statement of the Problem

Researchers contend that learning frequently occurs when students are provided opportunities to discover for themselves, especially within context (Blumenfeld, et. al., 1991; Clinchy, 1989; Lebow& Wagner, 1994). The use of projects in the classroom is one such way to garner the interest and efforts of students (Fogarty, 2009), thereby increasing student learning. Project-based learning (PBL) blends the objectives of traditional subject matter within a context of an authentic learning environment (Eskrootchi&Oskrochi, 2010). Project-based learning also promotes student's natural learning, as the projects tend to be attractiveto the students (Berman, 1997, 1999).

Despite the benefits of project-based learning (Blumenfeld, Krajcik, Marx, & Soloway, 1994; Blemenfeld, et al., 1991; Meyer, Turner, & Spencer, 1997; Turner, Meyer, Midgley, & Patrick, 2003), there are a variety of factors that may hinder teachers from improving instruction by integrating Project-based learning or other new initiatives with in their classrooms and becoming the leaders needed in 21st century schools (Patterson & Patterson, 2004). For example, Hammer (1997) noted that teachers often feel the friction between integrating strategies that promote student inquiry and the need to cover the content. Likewise, some teachers do not believe they have the skill required to integrate new learning initiatives in their classrooms. Bandura (1997) noted that if an individual believes that he/she will be successful, success ismore likely, because the individual is more likely to invest the required effort while managing any negativity or stress. Therefore, an increase in a teacher's self-efficacy, as it relates to new learning initiatives, my increase the likelihood of the use of new strategies, which could in turn increasing student learning and academic achievement.

Theoretical Framework

Self-Efficacy

Bandura (1986) providesa framework in behavior modification, which served as the groundwork for teacher efficacy. Bandura (1986) defined self-efficacy as "personal judgments of one's capabilities to organize and execute courses of action to attain designated goals on specific tasks" (p. 39). Self-efficacy beliefs influence the amount of effort and persistence teachers place on completing tasks and influence positive emotional reactions. Individuals with high self-efficacy have less stress and anxiety and are willing to put forth more effort because they do not fear failure due to the belief that they are capable (Zimmerman, 2000). Bandura (1993) stated, "The stronger the perceived self-efficacy, the higher the goal challenges people set for themselves and the firmer is their commitment to them" (p. 118).

Teacher Leadership

As education standards change and research finds new and innovated ways to boost achievement, teachers must lead that change in the classroom (Fay, 1992) and become teacher leaders amidst the fear of failure, which can thwart success (Zimmerman (2000). Suwaidi and Schoepp (2015) addressed Fay's (1992) definition of teacher leadership as

a practicing teacher, chosen by fellow faculty members to lead them in ways   determined by the context of individual school needs, who has formal preparation   and   scheduled   time   for   a leadership role which, to preserve the teacher mission, calls for neither managerial nor supervisory duties (p.1)

and noted that this definition emphasizes the importance of improving teaching. Patterson and Patterson (2004) also postulated that teacher leaders should emphasize improving classroom practice. Shillingstad, McGlamery, Davis, and Gilles (2015) concurred with this notion that teacher leaders improve the teaching and learning. "Effective teacher leaders draw upon their extensive knowledge of curriculum, best practices, and current research and courageously share their experiences and expertise with their mentees and peers" (Shillingstad et al., 2015, p. 13). According to Bandura (1986), for this leadership to occur, especially in the midst of implementing new instruction, teachers must believe that

they are capable of executing that instruction within their class rooms for success to occur.

Methodology

The researchers sought to (a) investigate teacher self-efficacy as it relates to the implementation of new instructional strategies among trained and untrained individuals and (b) determine variables that impact teacher self-efficacy before implementation. The following questions guided the research:

1. Is there a significant difference between the self-efficacy of teachers who were and were not trained before implementation?

2. Is there a correlation between self-efficacy and a) familiarity with PBL, b) PBL excitement, c) teacher autonomy, d) beneficence of training, and e) principal excitement?

3. To what extent can does a) familiarity with PBL, b) PBL excitement, c) teacher autonomy, d) beneficence of training, and e) principal excitement predict a teacher's self-efficacy?

The target population included 300 teachers preparing to implement a new instructional strategy in the district [i.e. project-based learning]. This population was a convenience sample given the connections the researchers had with the district, the fact that the district was about to begin a new learning initiate (PBL). Two-hundred and fourty-four teachers responded to a voluntary perception survey about PBL implementation for a response rate of 82%. Both trained and untrained teachers completed the survey. Using a Likert-scale, teachers provided data regarding variables relating to the implementation of project-based learning, which included teacher self-efficacy, program familiarity, teacher excitement, teacher autonomy, principal excitement, and the effectiveness of training. Data was collected using an electronic survey and was analyzed using an independent samples t-test, Pearson's correlations and a multiple regression analysis.

Results

Research Question 1

The results of an independent sample t-test were significant, $t(193) = -3.01$, $p = .003$, suggesting that there was a difference in self-efficacy of teachers who were trained and not trained. Teachers with no training had a significantly lower mean for self-efficacy than those with training. Results of the independent sample t-test are presented in Table 2. Figure 2 shows the averages of self-efficacy by those who did and did not attend PBL Training.

Table 2

Independent Sample t-Test for Self-Efficacy by PBL Training

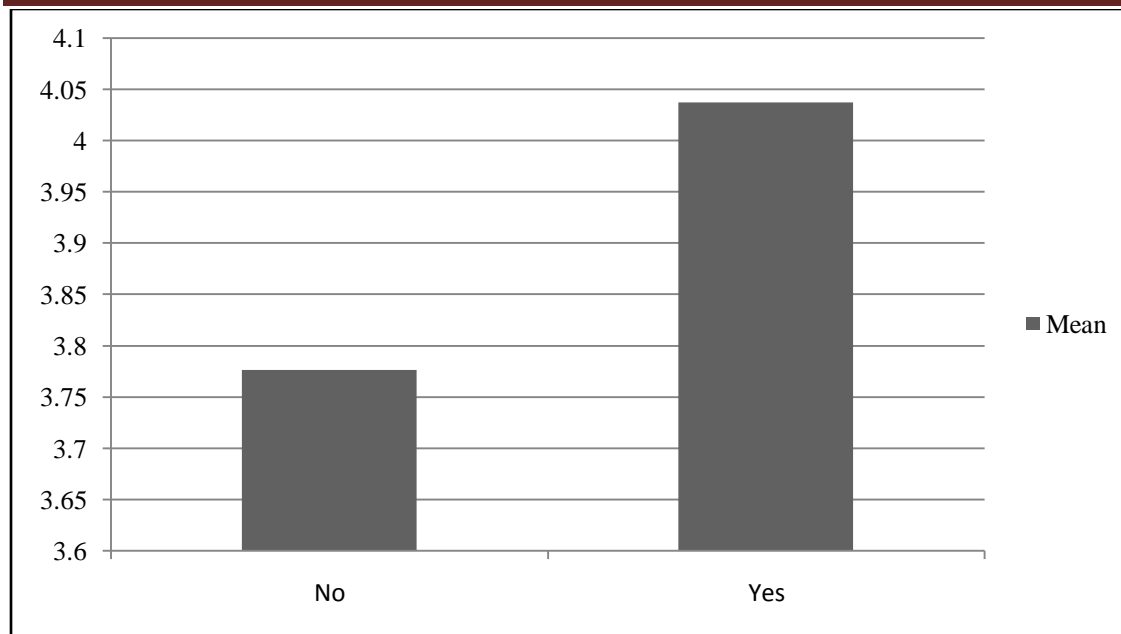| Variable	t(193)	p	Cohen's d	No Training		Training	
				M	SD	M	SD
Variable	-3.01	.006	0.39	3.78	0.74	4.04	0.58

Figure 2. *Self-Efficacy mean by PBL Training*

Research Question 2

A correlation matrix was created among research variables: a) familiarity with PBL, b) PBL excitement, c) teacher autonomy, d) beneficence of training, e) principal excitement, and d) self-efficacy among teachers that were trained in PBL implementation. Given the research question, the researchers were mainly concerned with correlations between the research variables and self-efficacy. Spearman's correlation analyses revealed significantly positive correlations betweenteacher self-efficacy with regards to implementing PBL and (a) familiarity with PBL ($r = .25$; $p< .05$), (b) PBL excitement ($r = .40$; $p< .05$), (c) teacher autonomy ($r = .32$; $p< .05$), and (d) beneficence of training ($r = .26$; $p< .05$),but not with (e)principal excitement ($r = .05$; $p> .05$).These correlations indicate that as one variable tends to increase, the other variable also tends to increase. Table 3 shows the full correlation matrix.

Table 3

Correlation Matrix Among Familiarity with PBL, PBL excitement,Teacher Autonomy, Beneficence of Training, Principal Excitement, and Self-Efficacy of Trained Teachers

	1	2	3	4	5	6
1) Self-Efficacy	-					
2) Familiarity with PBL	0.25*	-				
3) PBL Excitement	0.40*	0.14	-			
4) Full Autonomy	0.32*	0.13	0.19	-		
5) Beneficence of Training	0.26*	0.10	0.28*	-0.09	-	
6) Principal Excitement	0.05	-0.07	0.36*	-0.05	0.12	-

Note. * $p \le .05$.

A correlation matrix was created among research variables: a) familiarity with PBL, b) PBL excitement, c) teacher autonomy, d) beneficence of training, e) principal excitement, and d) self-efficacy among teachers that were *not* trained in PBL implementation. Given the research question, the researchers were mainly concerned with correlations between research variables and self-efficacy. Spearman's correlation analyses revealed significantly positive correlations between teacher self-efficacy with regards to implementing PBL and (a) familiarity with PBL (r = .32; p< .05), (b) PBL excitement (r = .53; p< .05), (c) teacher autonomy (r = .22; p< .05), and (d) principal excitement (r = .30; p< .05), but not with (e) beneficence of training (r = .10; p> .05). These correlations indicate that as one variable tends to increase, the other variable also tends to increase. Table 4 shows the full correlation matrix.

Table 4

Correlation Matrix Among Familiarity with PBL, PBL excitement, Teacher Autonomy, Beneficence of Training, Principal Excitement, and Self-Efficacy of Untrained Teachers

	1	2	3	4	5	6
1) Self-Efficacy	-					
2) Familiarity with PBL	0.32*	-				
3) PBL Excitement	0.53*	0.37*	-			
4) Full Autonomy	0.22*	0.11	0.03	-		
5) Beneficence of Training	0.10	0.12	0.07	0.01	-	
6) Principal Excitement	0.30*	0.02	0.55*	0.05	0.01	-

Note. * p ≤ .05.

Research Question 3

To determine if self-efficacy could be predicted by any of the selected research variables, a multiple linear regression was conducted. An analysis of the data from trained teachers was conducted first. The results of the regression were significant, $F(5,244)$ = 4.535, p< .05, R^2 = 0.24, suggesting that all variables accounted for 24% of the variance in teacher self-efficacy. Individual predictor variables were examined further and only teacher autonomy (B = 0.164, p< .05)significantly predicted teacher self-efficacy. Results of the multiple linear regression are presented in Table 5.

Table 5

Results for Multiple Linear Regression with Familiarity with PBL, PBL excitement, Teacher Autonomy, Beneficence of Training, Principal Excitement Predicting Self-Efficacy of Trained Teachers

Source	B	SE	β	t	p
Familiarity with PBL	0.16	0.66	0.18	1.70	.060
PBL Excitement	0.19	0.09	0.22	1.77	.093
Teacher Autonomy	0.16	0.10	0.23	2.17	.033*
Beneficence of Training	0.14	0.09	0.17	1.54	.126
Principal Excitement	0.02	0.07	0.03	0.31	.754

Note. $F(5,244) = 4.535$, $p < .05$, $R^2 = 0.24$

An analysis of the data from non-trained teachers was then conducted. The results of the regression were significant, $F(5,244) = 17.211$, $p < .01$, $R^2 = 0.34$, suggesting that all variables accounted for 34% of the variance in teacher self-efficacy. Individual predictor variables were examined further and PBL excitement ($B = 0.426$, $p < .05$) and teacher autonomy ($B = 0.198$, $p < .05$) significantly predicted teacher self-efficacy. Results of the multiple linear regression are presented in Table 6.

Table 6

Results for Multiple Linear Regression with Familiarity with PBL, PBL excitement, Teacher Autonomy, Beneficence of Training, Principal Excitement Predicting Self-Efficacy of Untrained Teachers

Source	B	SE	β	t	p
Familiarity with PBL	0.12	0.06	0.12	1.73	.08
PBL Excitement	0.42	0.07	0.45	5.41	.00*
Teacher Autonomy	0.19	0.07	0.17	2.70	.00*
Beneficence of Training	0.12	0.10	0.07	1.15	.24
Principal Excitement	0.04	0.07	0.04	0.56	.57

Note. $F(5,244) = 17.211$, $p < .05$, $R^2 = 0.34$

Implications and Discussion

According to Beaton and Zwick (1992), the primary goals of school reform initiatives are to assure that schools increase performance in academic achievement.Successful reform initiatives can be impacted byvariables such as teacher self-efficacy as well as teacher buy-in of the newinitiative, which could be attributed to the beneficence of training, familiarity of the new initiative, attitudes of teacher autonomy, and the excitement of a teacher and/or principal. A lack of attention to these and other variables may thwart the success of a new implementation (Patterson & Patterson, 2004).

This study sought to specifically explore factors that might impact teachers' self-efficacy. Ashton and Web (1986) and Ross (1992) have suggested that higher levels of teacher self-efficacy can be linked to increased student academic performance. It was no surprise to the researchers that trained teachers has significantly higher levels of self-efficacy regarding their ability to be successful at PBL implementation. Further analyses determined that it is vital for teachers to become familiar with the program to be implemented, possess some level of excitement towards implementation, as well as feel that some sort of autonomy will be retained. As it relates to trained teachers, retaining a level of autonomy was the factor that impacted self-efficacy the most. As it relates to untrained teachers, excitement toward the implementation was the most important factor.

The researchers conclude that leaders implementing change have the ability to instill a sense of positive self-efficacy, which could, in turn, better promote academic achievement. Leaders implementing change must ensure that teachers are familiar with the changes about to take place and believe that a sense of autonomy within the classroom will be retained. Teachers must also have a sense of excitement towards the implementation. Ultimately, if change leaders can increase a stronger sense of perceived self-efficacy among their teachers through the emphasis of the aforementioned factors, the higher the goal challenges teachers will set for themselves and the firmer their commitment to them will become (Bandura, 1993).

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