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# Developing Self-Efficacy: Exploring Preservice Coursework, Student Teaching, and Professional Development Experiences

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**Abstract**

*To extend current understanding of school-based agriculture teacher development, this study explored the relationship between teacher development experiences and the self-efficacy of early career agriculture teachers. Three teacher development experiences were of interest: (a) preservice coursework, (b) student teaching, and (c) professional development. Teacher development experiences were analyzed in relation to classroom management self-efficacy, instructional strategies self-efficacy, leadership self-efficacy, science teaching self-efficacy, and math teaching self-efficacy. The relationships between development experiences and self-efficacy were analyzed through five linear regressions with teacher development experiences as independent variables and the five areas of self-efficacy as separate dependent variables. Only statistically insignificant relationships were identified for classroom management self-efficacy and instructional strategies self-efficacy. Student teaching and professional development were statistically significant, positive predictors of leadership self-efficacy. Professional development was also identified as a statistically significant, positive predictor of science teaching self-efficacy. Additionally, preservice coursework was a significant, positive predictor of math teaching self-efficacy. Findings are discussed in relation to the social cognitive theory, with emphasis on practical recommendations to enhance teacher development.*

**Keywords:** teacher development; self-efficacy; classroom management; instructional strategies; leadership; science teaching; math teaching

## Introduction and Theoretical Framework

Albert Bandura is credited with the seminal works on self-efficacy. Bandura identified self-efficacy as "…[individuals'] judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (1986, p. 391). Through extensive research, self-efficacy has emerged as an essential predictor of success in a wide range of tasks, including teaching (Bandura, 1995). In education, the self-efficacy of a teacher is referred to as teacher self-efficacy. The most commonly used definition for teacher self-efficacy states, "the teacher's belief in his or her capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context" (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998, p. 233). The current study explored the development of teacher self-efficacy among early career, school-based agricultural education (SBAE) teachers.

Self-efficacy, and teacher self-efficacy, are developed through four types of experiences: (a) mastery experiences, (b) vicarious experiences, (c) social persuasion, and (d) physiological and emotional states (Bandura, 1977, 1986). A mastery experience, the strongest potential developer of

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self-efficacy, refers to successfully completing a given task. Past success provides a roadmap for future success, thus enhancing self-efficacy (Bandura, 1986). Vicarious experiences, the second potential developer of self-efficacy, entails observing another individual complete a given task. Research suggests vicarious experiences are most powerful when the individual being observed is similar to the observer (Bandura, 1986). The third potential developer of self-efficacy, social persuasion, entails being told you can complete a given task. For example, a cooperating teacher telling a student teacher "you can do this" before a lesson, may enhance the self-efficacy of the student teacher (McKim & Velez, 2016). Finally, physiological and emotional states, the fourth potential developer of self-efficacy, refers to biological (e.g., sweaty palms) and psychological (e.g., nervousness) states when contemplating a given task. Perceptions of physiological and emotional states provide clues for the individual as to how successful or unsuccessful they will be when attempting a given task (Bandura, 1986). The process of self-efficacy development through the four previously described methods, which falls under the umbrella of social cognitive theory (Bandura, 1977, 1986), provides the theoretical foundation for this research.

We operationalized the theoretical foundation of self-efficacy by noting the presence of mastery experiences, vicarious experiences, social persuasion, and physiological and emotional states within preservice coursework, student teaching, and professional development (McKim & Velez, 2016; Tschannen-Moran et al., 1998; Woolfolk & Hoy, 1990). The presence of self-efficacy building opportunities within teacher development experiences was foundational to considering the relationship between teacher development experiences and SBAE teacher self-efficacy. The conceptual model (see Figure 1) illustrates the link between teacher development experiences, self-efficacy building experiences, and self-efficacy.

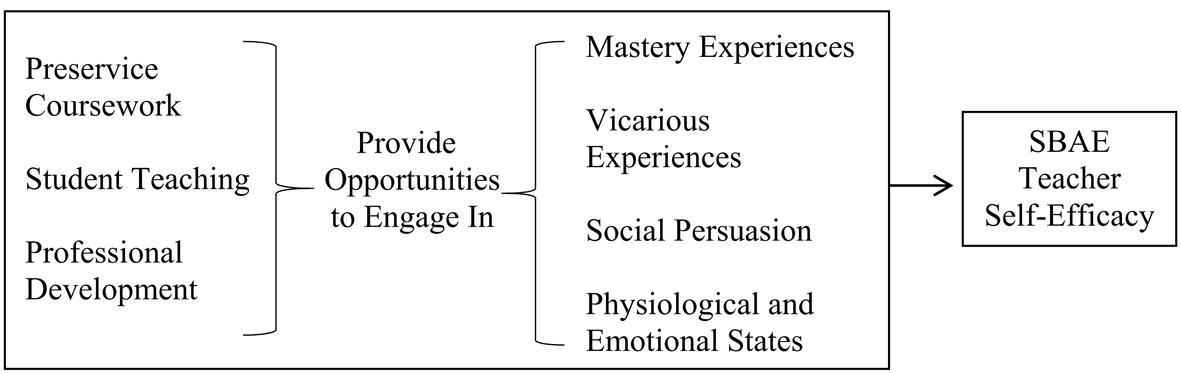


*Figure 1.* Conceptual model linking teacher development experiences, self-efficacy development, and SBAE teacher self-efficacy.

SBAE teacher self-efficacy has emerged as an important variable for a variety of reasons, including its positive association with career commitment (Blackburn & Robinson, 2008; Knobloch & Whittington, 2003; McKim & Velez, 2015, 2016; Swan, 2005; Whittington, McConnell, & Knobloch, 2006). As SBAE continues to struggle with teacher recruitment and retention, especially among early career teachers (Foster, Lawver, & Smith, 2014), research into the development of self-efficacy may offer insights to enhance the retention of new teachers.

Given the importance of self-efficacy to success in the classroom and teacher retention, educational research has explored methods for improving teacher self-efficacy. Knobloch (2001) pioneered self-efficacy development research in SBAE when he studied the relationships between early field experiences, peer teaching, and the self-efficacy of first year, undergraduate students in agricultural education. The research completed by Knobloch found involvement in early field experiences was not related to increased self-efficacy. However, for one of the two groups investigated, peer teaching was associated with increased self-efficacy. As a result, peer teaching, which combines mastery and vicarious experiences (McKim & Velez, 2016), was endorsed as a method to develop self-efficacy among undergraduate agricultural education students.

Continued self-efficacy research shifted analysis from students in preservice courses to student teachers and practicing teachers. Knobloch and Whittington (2002) undertook this research by exploring the relationship between teacher development experiences and the self-efficacy of student teachers through third year SBAE teachers in Ohio. Among the variables studied, collective teacher efficacy (i.e., feeling you are part of a larger, school-wide team helping students), perceived teacher preparation quality, and perceived student teaching quality explained 17% of the variance in teacher self-efficacy. Additional research has supported the relationship between a positive student teaching experience and increased self-efficacy (Knobloch, 2006; Whittington et al., 2006; Wolf, 2008).

The identified importance of student teaching in self-efficacy development warranted deeper investigation into the nuances of this experience. Within SBAE, research has focused on changes in self-efficacy during student teaching. Research has identified on-campus instruction, prior to student teaching, consistently increases self-efficacy (Harlin, Roberts, Briers, Mowen, & Edgar, 2007; Roberts, Harlin, & Ricketts, 2006; Roberts, Mowen, Edgar, Harlin, & Briers, 2007). Analyses of self-efficacy at the half-way point of student teaching has revealed a decrease in the self-efficacy of student teachers (Harlin et al., 2007; Roberts et al., 2006; Roberts et al., 2007). By the completion of student teaching, however, self-efficacy among student teachers returns to its highest level. This trend suggests instruction before student teaching enhances self-efficacy through positive mastery experiences (e.g., peer teaching), vicarious experiences (e.g., observing others teach), and social persuasion (e.g., encouragement from instructors). This initial surge of self-efficacy decreases as student teachers experience early challenges, resulting in negative mastery experiences and decreased self-efficacy. However, as the experience continues, student teachers gain additional mastery experiences in the classroom, increasing self-efficacy (McKim & Velez, 2016).

Looking beyond the ebb and flow of self-efficacy during student teaching, Wolf, Foster, and Birkenholz (2010) concatenated a variety of experiences as mastery, vicarious, or social persuasion and explored their relationship to the self-efficacy of student teachers in Ohio. Vicarious experiences accounted for the largest proportion of self-efficacy variance. Specifically, observing a first year SBAE teacher accounted for 11% of overall teacher self-efficacy and 17% of instructional strategies self-efficacy among student teachers. Additionally, verbal feedback from a cooperating teacher, categorized as social persuasion, was positively correlated with overall teacher self-efficacy. However, the number of classes taught during student teaching, categorized as a mastery experience, was negatively associated with classroom management self-efficacy (Wolf et al., 2010).

In total, SBAE research suggests student teaching is an important crucible which includes components that support, and detract from, the development of teacher self-efficacy (Harlin et al., 2007; Roberts et al., 2006; Roberts et al., 2007; Wolf et al., 2010). In the current study, we add to existing literature by exploring the role of student teaching in self-efficacy development and expand existing understandings by looking into new areas of self-efficacy. Specifically, we explored the relationship between student teaching and instructional strategies self-efficacy, classroom management self-efficacy, leadership self-efficacy, math teaching self-efficacy, and science teaching self-efficacy.

Student teaching is not alone in its potential to increase SBAE teacher self-efficacy. Preservice coursework offers an environment to enhance teacher self-efficacy (McKim & Velez, 2016). Unfortunately, only a pair of studies have explored self-efficacy development during preservice coursework in SBAE (i.e., Stripling & Roberts, 2013a, 2013b). Research evaluated the impact of a math-focused teaching methods curriculum (i.e., included opportunities for students to learn a math-based curriculum, teach a math-based lesson, and observe peers teach math-based lessons) on the self-efficacy of preservice teachers in Florida. Analysis revealed the math-focused, preservice course failed to increase math teaching self-efficacy on a consistent basis. The limited research and inconclusive findings suggest additional research, like the current study, is needed.

In addition to student teaching and preservice coursework, professional development (i.e., educational opportunities for practicing teachers) may enhance the self-efficacy of SBAE teachers (McKim & Velez, 2016). Unfortunately, the literature falls largely silent on the role of professional development on the self-efficacy of SBAE teachers. However, the limited research suggests sustained professional development can enhance self-efficacy (Ulmer, Velez, Lambert, Thompson, Burris, & Witt, 2013). However, with limited research, additional investigation into the relationship between professional development and self-efficacy is warranted.

## Purpose and Objectives

The purpose of this research was to explore the relationship between three teacher development experiences (i.e., preservice coursework, student teaching, and professional development) and the self-efficacy of early career, SBAE teachers. Five areas of self-efficacy were considered: (a) instructional strategies, (b) classroom management, (c) leadership, (d) science teaching, and (e) math teaching. These areas were selected to represent a range of skills inherent within SBAE (Phipps, Osborne, Dyer, & Ball, 2008). Our research purpose was operationalized into the following objectives:

1. Describe the impact of preservice coursework, student teaching, and professional development perceived by early career, SBAE teachers.
2. Describe the self-efficacy of early career, SBAE teachers in instructional strategies, classroom management, leadership, science teaching, and math teaching.
3. Examine the relationship between perceived impact of teacher development experiences and self-efficacy.

## Methods and Procedures

The population of interest included all first through fifth year SBAE teachers in California, Idaho, Oregon, Utah, and Washington during the 2012-2013 school year ($N$ = 295). Names and contact information were collected from leaders in agricultural education from each state. Data collected for this study are part of a larger research project.

A census, using Dillman's (2000) tailored design method, was attempted during the middle of the 2012-2013 school year. Data were collected via Qualtrics with an option for individuals to complete a mailed questionnaire. A total of 150 useable questionnaires ($n$ = 150) were submitted, yielding a 51% response rate. Non-response bias was analyzed by comparing on-time to late responders using an independent samples $t$-test (Lindner, Murphy, & Briers, 2001; Miller & Smith, 1983). No statistically significant differences were discovered for the variables of interest; therefore, we utilized inferential statistics to generalize findings to the population of early career, SBAE teachers in California, Idaho, Oregon, Utah, and Washington during the 2012-2013 school year.

Teacher self-efficacy constructs were developed using established instruments and measured on a six-point scale from 1 "Strongly Disagree" to 6 "Strongly Agree." Classroom management and instructional strategies constructs originated from the Teacher's Sense of Efficacy Scale (TSES) long form (Tschannen-Moran & Woolfolk Hoy, 2001) and measured perceived ability establishing and enforcing classroom expectations (i.e., classroom management self-efficacy) and developing and implementing effective learning experiences (i.e., instructional strategies self-efficacy). The leadership self-efficacy construct was adapted from the Individual Leadership Factors Inventory (Simonsen, Velez, Birkenholz, & McKim, 2013) and measured the perceived abilities of teachers as leaders, including motivating students to reach their potential in and out of the classroom. The science teaching self-efficacy construct was developed from the Science Teaching Efficacy Belief Instrument (Riggs & Enoch, 1990) and measured the perceived ability of respondents to engage students in science learning experiences within SBAE curriculum. Math teaching self-efficacy was measured using a construct from the Ohio State University Teaching Confidence Scale for Math (Woolfolk Hoy, 2000) and measured the perceived ability of teachers to illuminate math concepts and practices within SBAE curriculum.

In addition to self-efficacy, we sought to describe the perceived impact of three teacher development experiences. More specifically, respondents rated the "degree to which [preservice coursework, student teaching, and professional development] had an impact on your [classroom management, instructional strategies, leadership, science teaching, and math teaching]." The impact of teacher development experiences was measured on a six-point scale from 1 "No Impact" to 6 "Extreme Impact" with an additional "Not Applicable" option for respondents who had not engaged in those experiences.

Face and content validity of the research instrument was analyzed by a panel of experts in agricultural education with minor wording changes suggested and implemented. Additionally, the research instrument was pilot tested with a group of 31 early career, SBAE teachers in a Midwestern state. Cronbach's alphas (i.e., instructional strategies *.83*; classroom management *.93*; leadership *.95*; science teaching *.75*; and math teaching *.91*) from the pilot test illustrate the constructs were reliable (Nunnally & Bernstein, 1994). Research objectives one and two, which are descriptive in nature, were completed using means and standard deviations. Research objective three, which sought to determine the relationships between teacher development experiences and self-efficacy variables, was completed using five linear regressions after data were found to meet the assumptions of regression. The significance level used in this study was set *a priori* at $\alpha < .05$.

## Findings

Respondents included 39 (26.00%) first year teachers, 32 (21.33%) second year teachers, 35 (23.33%) third year teachers, 25 (16.67%) fourth year teachers, and 19 (12.67%) fifth year teachers. The average age of respondents was 28.60 years old, with a range of ages from 23 to 64. The majority of teachers (67.78%) were female. Of the respondents, 83.33% went through a SBAE program, 71.33% held a bachelor's degree, 25.17% were certified in the Curriculum for Agricultural Science Education (CASE), and 89.93% taught agriculture courses for science credit.

Research objective one sought to describe the impact of preservice coursework, student teaching, and professional development on the classroom management, instructional strategies, leadership, science teaching, and math teaching of early career, SBAE teachers (see Table 1). Across the three teacher development experiences, student teaching consistently emerged as the most impactful experience (range of $M = 2.61$, $SD = 1.29$ to $M = 4.99$, $SD = 1.05$). Preservice coursework was identified as the least impactful experience in four of the five areas of teaching (range of $M = 3.58$, $SD = 1.24$ to $M = 4.30$, $SD = 1.01$) with the one exception in math teaching, in which professional development was identified as least impactful (*M* = 2.25, *SD* = 1.21). Across the five areas of teaching, the highest impact was perceived toward instructional strategies (range of *M* = 4.30, *SD* = 1.01 to *M* = 4.99, *SD* = 1.05). Alternatively, the lowest impact perceived was consistently in math teaching (range of *M* = 2.25, *SD* = 1.21 to *M* = 2.61, *SD* = 1.29).

Table 1

*Perceived Impact of Teacher Development Experiences*

| | Preservice Coursework | | Student Teaching | | Professional Development | |
|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| Classroom Management | 3.58 | 1.24 | 4.87 | 0.97 | 3.79 | 1.24 |
| Instructional Strategies | 4.30 | 1.01 | 4.99 | 1.05 | 4.50 | 0.98 |
| Leadership | 4.20 | 1.20 | 4.94 | 0.95 | 4.45 | 1.13 |
| Science Teaching | 3.77 | 1.25 | 4.34 | 1.18 | 4.27 | 1.16 |
| Math Teaching | 2.45 | 1.16 | 2.61 | 1.29 | 2.25 | 1.21 |

*Note.* Teacher development experience items scaled from 1 “No Impact” to 6 “Extreme Impact.”

Research objective two sought to describe the self-efficacy of early career, SBAE teachers (see Table 2). Respondents reported the highest level of self-efficacy within classroom management (*M* = 5.01, *SD* = 0.69). Comparatively high levels of self-efficacy were also reported in instructional strategies (*M* = 4.90, *SD* = 0.63) and leadership (*M* = 4.80, *SD* = 0.68). However, a noticeably lower science teaching (*M* = 4.20, *SD* = 0.48) and math teaching (*M* = 4.04, *SD* = 0.94) self-efficacy was observed among respondents.

Table 2

*Self-Efficacy of Early Career, SBAE Teachers*

| | Minimum | Maximum | *M* | *SD* |
|---|---|---|---|---|
| Classroom Management | 3.29 | 6.00 | 5.01 | 0.69 |
| Instructional Strategies | 2.75 | 6.00 | 4.90 | 0.63 |
| Leadership | 2.75 | 6.00 | 4.80 | 0.68 |
| Science Teaching | 2.92 | 5.46 | 4.20 | 0.48 |
| Math Teaching | 1.00 | 6.00 | 4.04 | 0.94 |

*Note.* Self-efficacy items scaled from 1 “Strongly Disagree” to 6 “Strongly Agree.”

Research objective three sought to determine the relationship between teacher development experiences and self-efficacy. Within each of the following tables, the perceived impact of preservice coursework, student teaching, and professional development toward one area of teaching (i.e., classroom management, instructional strategies, leadership, science teaching, or math teaching) were simultaneously entered into a regression as independent variables with the corresponding area of self-efficacy as the dependent variable.

First, the relationship between teacher development experiences and classroom management self-efficacy was analyzed (see Table 3). The model was statistically significant ($F$ = 3.07, $p$-value = .030) and explained 7% of the variance ($R^2$ = .07) in classroom management self-efficacy. However, none of the teacher development experiences were identified as statistically significant predictors.

Table 3

*Teacher Development Experiences and Classroom Management Self-Efficacy*

| | Zero-order correlation ($r$) | $p$-value | $B$ | $SEB$ | $\beta$ | $p$-value |
|---|---|---|---|---|---|---|
| Preservice Coursework | .25 | .003 | .09 | .06 | .17 | .103 |
| Student Teaching | .23 | .006 | .10 | .07 | .15 | .123 |
| Professional Development | .05 | .523 | -.01 | .05 | -.02 | .851 |

*Note.* $R$ = .26, $R^2$ = .07, $F$ = 3.07, $p$-value = .030. Self-efficacy items scaled from 1 "Strongly Disagree" to 6 "Strongly Agree." Teacher development experience items scaled from 1 "No Impact" to 6 "Extreme Impact."

Next, the relationship between teacher development experiences and instructional strategies self-efficacy was analyzed (see Table 4). The final model was statistically insignificant ($F$ = 1.42, $p$-value = .241) and explained 3% of the variance ($R^2$ = .03) in instructional strategies self-efficacy.

Table 4

*Teacher Development Experiences and Instructional Strategies Self-Efficacy*

| | Zero-order correlation ($r$) | $p$-value | $B$ | $SEB$ | $\beta$ | $p$-value |
|---|---|---|---|---|---|---|
| Preservice Coursework | .14 | .113 | .06 | .06 | .09 | .322 |
| Student Teaching | .13 | .115 | .04 | .06 | .08 | .425 |
| Professional Development | .12 | .153 | .05 | .06 | .08 | .399 |

*Note.* $R$ = .18, $R^2$ = .03, $F$ = 1.42, $p$-value = .241. Self-efficacy items scaled from 1 "Strongly Disagree" to 6 "Strongly Agree." Teacher development experience items scaled from 1 "No Impact" to 6 "Extreme Impact."

The third regression analyzed the relationship between teacher development experiences and leadership self-efficacy (see Table 5). The model was statistically significant ($F$ = 12.20, $p$-value < .001) and explained 22% of the variance ($R^2$ = .22) in leadership self-efficacy. Two experiences (i.e., student teaching and professional development) were statistically significant, positive predictors of leadership self-efficacy. Based on standardized coefficients (i.e., $\beta$), we identified perceived impact of student teaching on leadership ($\beta$ = .32, $p$-value = .001) as the strongest predictor of leadership self-efficacy followed by the perceived impact of professional development on leadership ($\beta$ = .23, $p$-value = .015).

Table 5

*Teacher Development Experiences and Leadership Self-Efficacy*

| | Zero-order correlation ($r$) | $p$-value | $B$ | $SEB$ | $\beta$ | $p$-value |
|---|---|---|---|---|---|---|
| Preservice Coursework | .27 | .002 | .01 | .05 | .01 | .885 |
| Student Teaching | .40 | <.001 | .23 | .07 | .32 | .001 |
| Professional Development | .35 | <.001 | .14 | .06 | .23 | .015 |

*Note.* $R$ = .47, $R^2$ = .22, $F$ = 12.20, $p$-value < .001. Self-efficacy items scaled from 1 "Strongly Disagree" to 6 "Strongly Agree." Teacher development experience items scaled from 1 "No Impact" to 6 "Extreme Impact."

Next, we analyzed the relationship between teacher development experiences and science teaching self-efficacy (see Table 6). The model was statistically significant ($F$ = 5.68, $p$-value = .001) and explained 12% of the variance ($R^2$ = .12) in science teaching self-efficacy. The perceived impact of professional development on science teaching was the only statistically significant, positive predictor ($\beta$ = .29, $p$-value = .002) of science teaching self-efficacy.

Table 6

*Teacher Development Experiences and Science Teaching Self-Efficacy*

| | Zero-order correlation ($r$) | $p$-value | $B$ | $SEB$ | $\beta$ | $p$-value |
|---|---|---|---|---|---|---|
| Preservice Coursework | .17 | .045 | .04 | .03 | .10 | .273 |
| Student Teaching | .20 | .019 | .02 | .04 | .04 | .658 |
| Professional Development | .30 | <.001 | .12 | .04 | .29 | .002 |

*Note.* $R$ = .34, $R^2$ = .12, $F$ = 5.68, $p$-value = .001. Self-efficacy items scaled from 1 "Strongly Disagree" to 6 "Strongly Agree." Teacher development experience items scaled from 1 "No Impact" to 6 "Extreme Impact."

In the final regression, we analyzed the relationship between teacher development experiences and math teaching self-efficacy (see Table 7). The model was statistically significant ($F$ = 9.63, $p$-value < .001) and explained 21% of the variance ($R^2$ = .21) in math teaching self-efficacy. The perceived impact of preservice coursework on math teaching was the only statistically significant, positive predictor ($\beta$ = .31, *p*-value = .009) of math teaching self-efficacy.

Table 7

*Teacher Development Experiences and Math Teaching Self-Efficacy*

| | Zero-order correlation (*r*) | *p*-value | *B* | *SEB* | *β* | *p*-value |
|---|---|---|---|---|---|---|
| Preservice Coursework | .44 | <.001 | .23 | .09 | .31 | .009 |
| Student Teaching | .37 | <.001 | .06 | .08 | .09 | .435 |
| Professional Development | .36 | <.001 | .09 | .08 | .13 | .275 |

*Note.* $R$ = .46, $R^2$ = .21, $F$ = 9.63, *p*-value < .001. Self-efficacy items scaled from 1 "Strongly Disagree" to 6 "Strongly Agree." Teacher development experience items scaled from 1 "No Impact" to 6 "Extreme Impact."

## Conclusions, Recommendations, and Implications

The purpose of this research was to analyze the relationships between preservice coursework, student teaching, and professional development and the classroom management, instructional strategies, leadership, science teaching, and math teaching self-efficacy of early career, SBAE teachers in California, Idaho, Oregon, Utah, and Washington. Before exploring the relationships between teacher development experiences and self-efficacy, we explored the means of respondents related to self-efficacy and teacher development experiences. Our analysis revealed teachers were most efficacious in classroom management and instructional strategies, findings congruent with existing research in SBAE (Blackburn & Robinson, 2008; Wolf et al., 2010). The strength of self-efficacy in classroom management and instructional strategies are in contrast to the comparatively low self-efficacy purported in science teaching and math teaching.

STEM education and the illumination of science and math content within SBAE curriculum are important elements of the continued relevance of the discipline (Phipps et al., 2008). Therefore, low math and science teaching self-efficacy implies a potential disconnect between evolution of the discipline and the self-efficacy of early career teachers. Lower math and science teaching self-efficacy scores are especially alarming considering the effects of reduced self-efficacy (Bandura, 1977, 1986). Bandura posited low self-efficacy will result in individuals less likely to attempt a task. Early career teachers with low math and science teaching self-efficacy may not attempt to illuminate math and science within their classroom; therefore, precluding themselves from potential, self-efficacy building mastery experiences in math and science teaching.

As an intervention, we recommend vicarious experiences in math and science teaching to increase the self-efficacy of early career, SBAE teachers. Vicarious experiences (i.e., observing another individual successfully complete a task) are most effective when the observer is similar to the observed individual (Bandura, 1986; Wolf et al., 2010). Therefore, we recommend early career teachers observe fellow early career teachers, identified as effective illuminators of math and science, teach within their classrooms. Facilitation of these vicarious experiences could occur at professional development workshops, in person, or through a video recording of the effective science and math illuminators.

In addition to providing vicarious experiences related to math and science teaching, we recognize the impact respondents perceived from the student teaching experience. In fact, respondents reported student teaching was the most impactful experience toward their classroom management, instructional strategies, leadership, science teaching, and math teaching. Student teaching offers the most sustained opportunities for mastery experiences in teaching (i.e., successfully completing a task) when compared to preservice coursework and professional development (McKim & Velez, 2016). Therefore, cooperating teachers and university supervisors should work together to ensure student teachers have positive, mastery experiences related to classroom management, instructional strategies, leadership, science teaching, and math teaching. Ensuring student teachers successfully enact important teaching practices provides a roadmap for continued success as student teachers transition into early career teachers.

The higher perceived impact of student teaching, when compared to professional development and preservice coursework, should not imply a lack of value. From a self-efficacy perspective, preservice coursework provides a foundation of interspersed social persuasion, vicarious experiences, and mastery experiences which elevate the self-efficacy of preservice teachers to a level needed to find success during student teaching and early in a career (McKim & Velez, 2016). Additionally, professional development offers targeted experiences which can address significant needs among practicing teachers. Facilitators of preservice coursework and professional development should consider opportunities to provide more social persuasion, vicarious experiences, and mastery experiences for preservice and practicing teachers in classroom management, instructional strategies, leadership, science teaching, and math teaching. However, the question of efficient distribution of effort remains. In an effort to answer where we should invest time to impact early career teachers, we analyzed the relationship between teacher development experiences and self-efficacy.

Unfortunately, our model for classroom management self-efficacy and instructional strategies self-efficacy offered little to no guidance regarding the impact of the three identified teacher development experiences. From the perspective of self-efficacy, we can attribute this lack of statistically significant relationships to other experiences, like early career teaching (McKim & Velez, 2016; Tschannen-Moran et al., 1998; Woolfolk & Hoy, 1990). At minimum, respondents to this study had been practicing teaching for three months when data were collected. Three months of teaching would have exposed responding teachers to a cornucopia of mastery experiences related to classroom management and instructional strategies. We suggest the unexplained variance in classroom management and instructional strategies self-efficacy was largely attributed to the success or failures experienced as the teacher in their own classroom. From this conclusion, we recommend research within agricultural education explore specific experiences occurring early in the career of SBAE teachers (e.g., class sizes, use of mentors, curriculum used, social persuasion from fellow teachers) to identify potential predictors of classroom management and instructional strategies self-efficacy. As a template for this investigation, we encourage researchers use the work of Wolf et al. (2010), which explored similar relationships among student teachers.

In our remaining analyses of leadership, science teaching, and math teaching self-efficacy, significant relationships emerged, providing valuable insight into opportunities to enhance self-efficacy. To improve clarity and application of findings, we will discuss each teacher development experience separately and the related self-efficacy area(s).

## Preservice Coursework

The perceived impact of preservice coursework toward math teaching was a significant, positive predictor of math teaching self-efficacy. These findings suggested an increased focus on math teaching during teacher education courses relates to significantly higher levels of math teaching self-efficacy among early career, SBAE teachers. These findings contrast previous research which failed to identify a relationship between a math-enhanced teacher education course and the math teaching self-efficacy of preservice teachers (Stripling & Roberts, 2013a, 2013b). Potentially, this suggests focusing on math during preservice coursework does not yield an immediate increase in math teaching self-efficacy (i.e., point in time measured by past research) but may yield a self-efficacy increase early in the career of the teacher (i.e., point in time measured in our research). It is difficult to support this proposition using existing thinking on self-efficacy; however, we propose attention to math teaching during preservice coursework may serve to introduce the notion of SBAE teachers being math illuminators. Preservice teachers who acknowledge SBAE teaching includes illuminating math may be more prepared to enact mastery experiences related to math teaching during student teaching and early in their career, resulting in higher math teaching self-efficacy.

**Student Teaching**

The perceived impact of student teaching was a significant, positive predictor of leadership self-efficacy. This finding implies additional emphasis on leadership during student teaching is connected to increased leadership self-efficacy. In practice, this finding suggests mastery experiences (e.g., coaching a career development team, leading an FFA meeting, managing an advisory board meeting, teaching leadership content), vicarious experiences (e.g., observing a cooperating teacher lead meetings, observing other teachers/administrators in the school lead students), and social persuasion (e.g., positive reinforcement from cooperating teacher and/or university supervisor about leadership abilities) should be utilized during student teaching to support enhanced leadership self-efficacy among early career, SBAE teachers.

**Professional Development**

For the final teacher development experience, the perceived impact of professional development was a positive predictor of both leadership and science teaching self-efficacy. These findings suggest engaging in professional development focused on leadership and science teaching is associated with increased leadership and science teaching self-efficacy. These findings could be the result of additional mastery experiences, vicarious experiences, and social persuasion occurring during professional development sessions (McKim & Velez, 2016); however, these findings may also be the result of selection bias (i.e., teachers efficacious in leadership and science teaching more likely to attend professional development related to leadership and science teaching). While this selection bias is plausible, past research within science teaching self-efficacy has identified engagement in a science-based professional development experience (i.e., CASE) increases self-efficacy among participants (Ulmer et al., 2013). Regardless of the potential for selection bias, professional development related to science teaching and leadership within SBAE can serve as a valuable tool for the development of self-efficacy among early career teachers. We recommend facilitators of professional development collaborate with experts in science education and leadership development to offer mastery experiences, vicarious experiences, and social persuasion related to science teaching and leadership.

In this research, we sought new insights into SBAE teacher development, self-efficacy, and the relationship between teacher development experiences and self-efficacy. Our intent was to expand existing knowledge by investigating sparsely studied areas of teacher development (i.e., preservice coursework and professional development) and self-efficacy (i.e., leadership, math teaching, and science teaching). From this investigation, we identified important recommendations to enhance the self-efficacy and subsequent success of early career, SBAE teachers. As we continue the work of developing high quality teachers, we encourage persistent efforts through research and practice to develop and maintain efficacious teachers.

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