Examining the Relationships Between Self-Efficacy and Information Sources Among Agriscience Teachers in Texas

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Introduction

Self-efficacy is "the conviction that one can successfully execute the behavior required to produce the outcomes" (Bandura, 1977, p. 79). Teaching self-efficacy refers to teachers' perceived ability to plan and carry out teaching responsibilities (Tschannen-Moran et al., 1998). Self-efficacy beliefs result from subjective inferences drawn from four psychological sources of information: mastery, vicarious experience, verbal persuasion, and physiological body arousals (Bandura, 1997; Tschannen-Moran et al., 1998). Self-efficacy is extensively researched in math, science, and psychology (e.g., Mohamadi & Asadzadeh, 2012; Wang et al., 2017) and agriscience teaching because of its positive association with teaching and learning outcomes (e.g., McKim & Velez, 2016; Stripling & Roberts, 2013; Swan et al., 2011; Wolf, 2011). Findings by these scholars affirm Albert Bandura's assertion on the relationship between teaching self-efficacy and the four information sources (e.g., McKim & Velez, 2016; Wolf, 2011). Nevertheless, most studies concur that mastery experience is the most influential source of teaching self-efficacy (e.g., Mohamadi & Asadzadeh, 2012; Tschannen-Moran et al., 1998), while others suggest vicarious experiences (e.g., McKim & Velez, 2016; Wolf, 2011). Most agricultural education studies regard preservice, early career, student teaching, and teacher education courses but affirm prior findings on teaching self-efficacy (e.g., Swan et al., 2011; Wolf, 2011). The current research examined the relationship between self-efficacy and the four information sources using a sample of high school agriscience teachers.

Conceptual Framework

The study followed Bandura's (1997) social cognitive theory of self-efficacy and the cyclical teacher efficacy model (Tschannen-Moran et al., 1998). Four principal sources of information, "enactive mastery experience, vicarious experience, verbal/ social persuasion, and physiological and affective states," create efficacy beliefs through cognitive processing and reflective thought (Bandura, p. 79). The theories postulate a positive relationship between teaching self-efficacy and three sources except for physiological body arousals.

Methodology

The study examined differences in the distributions of agriscience teaching self-efficacy scores and the relationship between them and teaching self-efficacy. A cross-sectional survey design aided in answering the research objectives (Johnson, 2001). An online survey was shared via Qualtrics with a convenience sample of 122 agriscience teachers from high schools in Texas. The instrument's post hoc reliability tests yielded Cronbach's alpha coefficient values well within acceptable levels of .70 and above (Nunnally, 1978). The dependent variable, self-efficacy, was measured using the short version of the Teachers' Self-Efficacy Scale ([TSES] Tschannen-Moran & Woolfolk Hoy, 2001) containing 12 items depicting three self-efficacy domains - classroom management, student engagement, and classroom instruction, each measured on a nine-point Likert type scale (1 = cannot do at all – 9 = certainly can do). The independent variables- sources of self-efficacy were measured using the Pfitzner-Eden's (2016) scale (SSE) containing 16 items depicting mastery experience, social/verbal persuasion, vicarious experience, and physiological body arousal, each measured on a nine-point Likert type scale (1 = exactly false – 9 = exactly true). SPSS was utilized to conduct Friedman ANOVA ([RO1] Conover, 1999), Pearson's product-moment correlation (RO2), and forced multiple linear regression ([RO3] Field; 2018).

Results

RO1 compared agriscience teaching self-efficacy scores. A Friedman ANOVA revealed statistically significant differences in teachers' mean self-efficacy scores for classroom management, student engagement, and classroom instruction at .05 alpha level set a priori, $\chi 2(2) = 35.72$, $p < .001$. Boxplots visually revealed the lowest score for student engagement self-efficacy, necessitating its enhancement. A *post hoc* analysis using pairwise comparisons with a Bonferroni correction on each combination of self-efficacy variables further revealed the largest statistically significant differences between classroom management and student engagement (Conover, 1999).

RO2 determined the strength and magnitude of the relationship between the information sources and agriscience teaching self-efficacy. Pearson correlation analysis showed a statistically significant, strong positive correlation between teaching self-efficacy and mean mastery experience, $r_{\mathbf{p}} = 0.51$, $p < .001$, 95% CI [0.37, 0.63]; a statistically significant moderate positive correlation between teaching self-efficacy and vicarious experience, $r_{\mathbf{p}} = 0.48$, $p < .001$, 95% CI [0.32, 0.60]; and a statistically significant, moderate relationship between teaching self-efficacy and verbal persuasion indicated, $r_{\mathbf{p}} = 0.30$, $p < .001$, 95% CI [0.13, 0.45]. On the contrary, a statistically significant, weak negative correlation was reported between teaching self-efficacy and psychological arousal, $r_{\mathbf{p}} = -0.23$, $p = .011$, 95% CI [-0.39, -0.06].

RO3 examined variance in agriscience teaching self-efficacy due to efficacy information sources. Multiple linear regression analysis was statistically significant at .05 alpha level, $F(4,117) = 15.14$, $p < .001$, $R^2 = 0.34$. $R^2 = 0.34\%$, implying the four information sources collectively explained approximately 34% of the variance in teaching self-efficacy. Further assessment of the unstandardized *beta* values of the independent variables revealed that mastery experience was the most impactful, $B = 0.31$, $t(117) = 4.16$, $p < .001$ trailed by vicarious experience, $B = 0.18$, $t(117) = 2.85$, $p = .005$. Verbal persuasions and psychological arousal did not have an impact.

Conclusions and Implication

The hierarchy of self-efficacy scores across teaching self-efficacy domains reveals low student engagement self-efficacy. This threatens effective agriscience learning and calls for identifying resources to build teachers' student engagement self-efficacy. The relational analysis results corroborate Bandura's (1997) assertion that self-efficacy is positively related to mastery, vicarious and verbal experiences, and negatively to physiological arousals. The findings suggest that the sources are essential for quality learning and that agriscience teachers should be exposed to them, particularly mastery experiences. In addition, multiple linear regression revealed a non-significant impact of verbal persuasion, contrary to prior efficacy scholars (e.g., Tschannen-Moran & Woolfolk Hoy, 2001). The non-impact calls for additional research to help explain the reported statistics and underscores the need to expose the teachers to more verbal persuasion alongside other sources of self-efficacy. Verbal persuasions seemingly lose value in unfriendly school environments (see Greenglass & Burke, 2003). Future research should focus on specific aspects of agricultural science programs that present challenges in engaging students in learning and utilize longitudinal studies and psychophysiology tools to capture realistic measures of self-efficacy as a cognitive process.

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