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STRUCTURED COMMUNICATION: EFFECTS ON TEACHING EFFICACY OF STUDENT TEACHERS

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Abstract

Teaching efficacy beliefs of agricultural science student teachers during field experiences may affect the number of student teachers entering the profession. The purpose of this study was to examine the effects implementing structured communication between cooperating teachers and student teachers would have on student teachers' self-perceived teaching efficacy during field experiences. The learning environment of field experiences must be more fully understood to explain why some student teachers enter the profession of agricultural science teaching and others do not. This study employed a quasi-experimental design with a nonrandom sample in a multiple time-series design. The average respondent in this study was a 23-year-old white undergraduate female located at a multiple-placement cooperating center. Respondents in an environment where the amount and type of communication between student teachers and cooperating teachers was structured were less efficacious when compared with respondents who were not in a structured communication setting. In addition, student teachers in a structured communication environment declined in their teaching efficacy measurements overall, whereas student teachers who were not involved in structured communication increased in self-perceived teaching efficacy levels.

Introduction

The National Council for Agricultural Education (The Council, 2002) created the plan titled, *Reinventing Agricultural Education for The Year 2020*. A major goal of this initiative was to provide "an abundance of highly motivated, well-educated teachers in all disciplines, pre-kindergarten through adult, providing agriculture, food, fiber and natural resource education" (The Council, p. 4). Therefore, agricultural education departments are charged to provide highly motivated and efficacious teachers to improve knowledge about agriculture in secondary schools. How can preparatory agricultural education professional programs achieve this charge? Does preservice teacher education provide skills and abilities, beliefs, and motivation to graduates of agricultural education departments?

The discipline of agricultural education continually faces a defacto shortage of qualified teachers to fill vacant positions in public schools (Camp, Broyles, & Skelton, 2002). Kantrovich (2007) reported that for the year 2006, there were 1,218 vacant positions out of 10,846.5 total positions. Despairingly, only 548 (70%) of 785 newly qualified agricultural education graduates chose to enter the profession (Kantrovich). The discipline of agricultural education graduates enough professionals to fill the positions available, yet many of those graduates choose not to enter the field of agricultural education. What factors contribute to a graduate's choice to enter the profession?

The field experience portion of teacher education programs is a significant element of preservice teacher preparation. Field experiences are most often accomplished through early field experiences and student teaching. Myers and Dyer (2004) stated being involved in early field experiences contribute to preservice teachers' decision to enter the profession of agricultural education at the secondary level. They also stated that preservice teachers in agricultural education programs alter their beliefs as a result of field experiences. Therefore, it can be concluded that student teacher field experiences can have dramatic effects upon the attitudes of those involved.

Student teaching has been found to be an important element of the teacher education program (Borne & Moss, 1990; Deeds, Flowers, & Arrington, 1991; Edwards & Briers, 2001; Harlin, Edwards, & Briers, 2002; Norris, Larke, & Briers, 1990). Furthermore, both early field and student teaching (field) experiences positively impact preservice teachers of agricultural education programs (Myers & Dyer, 2004).

Fritz and Miller (2003) concluded that student teachers should "reflect on their daily concerns and receive feedback… communicate with other student teachers and supervisors" (p. 51). Structured communication between the cooperating teacher and student teacher is an important portion of field experiences that needs to be addressed to understand beliefs held by student teachers. This study, which is part of a larger study, investigated the implementation of a communication form designed to encourage structured communication about student teachers' weekly performance and the efficacy levels held by the participants.

Theoretical Framework

The theoretical framework of the study is grounded in the theory of constructivism. Constructivism operates under the premise that learners create understanding through experience (Fosnot, 1996; Schuman, 1996). The central principle of constructivism outlines the construction of perspectives through individual experiences (Schuman). "What someone knows is grounded in perception of the physical and social experiences which are comprehended by the mind" (Johansson, 1991, p. 8).

Social constructivism will operate as the foundational principle for this study. Basic tenets of social constructivism present that knowledge is social in nature and knowledge is the result of social interaction rather than an individual experience (Doolittle & Camp, 1999). Learners are able to gain knowledge through the dynamic interplay of social interactions that clarify knowledge based on experiences which are rooted in cultural, social, and language-based interactions and neurological/biological construction.

Self-efficacy theory emerged from Albert Bandura's social cognitive theory. Bandura (1997) stated "perceived self-efficacy occupies a pivotal role in social cognitive theory because it acts upon the other class of determinants" (p. 35). Because self-efficacy is grounded in social cognitive theory, one of the primary tenets is reciprocal determinism. Bandura's triadic reciprocality (1986, 1997), as portrayed through the social cognitive theory, refers to the idea that personal factors (cognitive, affective, and biological), behavior, and external environment work collectively as determinants which impact each other bidirectionally in relation to self-efficacy. Therefore, self-efficacy can be analyzed as both a personal and a social construct given that individuals function individually and collectively (Knobloch, 2002).

Self-efficacy is "beliefs in one's capabilities to organize and execute the courses of action required producing given attainments" (Bandura, 1997, p. 3). Therefore, self-efficacy theory concludes how well knowledge and skills are acquired and learned as perceived by the individual. It should be noted that efficacy beliefs are defined and measured independently from performance. Performance is not an indicator of an individual's belief in their abilities nor does an efficacy belief determine performance of individuals.

Bandura (1977) classified teaching efficacy as a type of self-efficacy through his social learning theory. Teaching efficacy was initially defined as "the extent to which the teacher believes he or she has the capacity to affect student performance" (Berman, McLaughlin, Bass, Pauly, & Zellman, 1977, p. 137). It has also been further defined as "the teacher's belief in his or her capability to organize and execute action required to successfully accomplishing a specific teaching task in particular context" (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998, p. 22).

Bandura (1977) proposed that efficacy could be most affected early in the learning process. Consequently, most teaching efficacy research to date has centered on preservice teachers. A trend in agricultural education has seen numerous studies (Knobloch, 2002; Roberts, Harlin, & Ricketts, 2006; Rodriguez, 1997, Swan, 2005) toward teaching efficacy. Accordingly, this research has centered upon preservice teachers.

Likewise in a study of self-efficacy of preservice and beginning agricultural education teachers, Knobloch (2002) found there was little to no change in teacher efficacy during the first 10 weeks of the school year for preservice teacher and second and third year teachers. In a study examining the relationship between agricultural education student teachers' learning style, teacher heart, and teacher sense of efficacy, Swan (2005) found that efficacy lessened as they entered their field experiences. He concluded that these levels of teaching efficacy were quite different than that found by Knobloch.

Furthermore, Roberts et al. (2006) conducted a longitudinal examination of teaching efficacy of agricultural education student teachers. This study investigated the sub-constructs (student engagement, instructional strategies, and classroom management) and overall teaching efficacy of preservice teachers. Preservice teachers in the study had *Quite a Bit* of teaching efficacy at the beginning of the semester. By the middle of the 11-week field experience, efficacy levels had dropped, but the levels increased at the conclusion of the experience. This trend, of increasing from first measurement to the last, is consistent with Knobloch (2002).

In 1960, David Berlo developed the Source - Message - Channel - Receiver (SMCR) model. Berlo's model is prevalent in agricultural communication research partly because of its elegance and partly because of its simplicity. The SMCR model consists of four main areas: source, message, channel, and receiver. However, the model also considers feedback in order to make the model more complete. In this model, source is where a communication originates (Guth & Marsh, 2006). Message is the content of the communication. Channel is the medium used to transmit the message to the intended receiver. Receiver is the person(s) for whom the message is intended. Feedback is the receiver's reaction (as interpreted by the source) to the message. Noise is also referred to as static and encompasses anything (physical or intangible) that may inhibit any part of the SMCR process from occurring. The use of this model can readily be translated through the communication that occurs through the student teacher and cooperating teacher relationship. The cooperating teacher is considered the supervisor of the student teacher during the field experience, consequently they serve as the source of many communication roles such as subject matter expert, daily performance evaluator, and supervisor of the student teacher.

Through a methodical review of the literature, a conceptual model was developed (Edgar, 2007) that postulates variables associated with teaching efficacy of student teachers during student teaching field experiences can be evaluated. This model incorporates Tschannen-Moran et al.'s (1998) model of efficacy combined with Berlo's (1960) SMCR model of communication to effectuate a model that encompasses the effects of communication and the social context of efficacy postulated by Bandura (1997). A major component of the model is the teaching context as outlined by Dunkin and Biddle (1974) that involves the variables of presage and context. These variables are influenced by the efficacy level held and the experiences held by the teacher and student. Teaching efficacy is an individually held belief and is an outcome of the interaction (process variable) between presage and context variables. This outcome will then be affected through communication between the cooperating teacher and the student teacher.

Purpose

Student teaching is the capstone experience in teacher education programs in agricultural education. Understanding the needs of student teachers during this phase of their professional training program is paramount to producing highly qualified and motivated professionals who will enter the profession. The purpose of this study, which is part of a larger study, was to examine the effects of implementing structured communication on teaching efficacy during the student teaching experience. A secondary purpose was to explore relationships between selected variables including gender, age, ethnicity, agriculture science experience, academic standing, agriculture work experience, and placement at cooperating center.

Based on consulted literature, the following hypotheses were developed to guide this study and tested *a priori* at the .05 level.

Ho_1: There is no difference in teaching efficacy of student teachers when cooperating teachers use a communication tool.

Ho2: There is no difference in teaching efficacy of student teacher when cooperating teachers use a communication tool in the presence of gender, age, ethnicity, agriculture science experience, academic standing, agriculture work experience, or placement at cooperating center.

Methods

This study employed a quasi-experimental design with a nonrandom sample in a multiple time-series design (#14) (Campbell & Stanley, 1963). A purposive sample of participants was needed to represent student teachers in agricultural education through a teacher education program.

The design of this study was employed as follows:

Fall 2006 student teachers (*n* = 20)	O_1	X_1	O_2	X_1	O_3
Fall 2005 student teachers (*n* = 27)	O_1		O_2		O_3
Fall 2004 student teachers (*n* = 35)	O_1		O_2		O_3

The first measurement of teaching efficacy (O_1) was taken at the end of the first 4 weeks of the semester in which the participant was involved in a field experience (student teaching). The second measurement of teaching efficacy (O_2) was taken during the fifth week of the 11-week field experience during the midsemester conference between student teachers and teacher education faculty of a university. The third (O_3) and final teaching efficacy measurement was taken at the end of the 11-week field experience. The intervention, or experimental variable (X_1), was introduced during the full field experience of the fall 2006 teacher education student teaching semester, incorporated weekly.

Procedures

Student teachers enrolled in field experience at Texas A&M University were selected as the sample for this study. This purposive sample was chosen to represent student teachers engaged in field experiences. This sample (*N* = 82) included three semesters of preservice students during the student teaching phase of their teacher education program. The control groups consisted of student teachers enrolled in field experience during the fall semesters of 2004 (*n* = 35) and 2005 (*n* = 27). The treatment group consisted of student teachers enrolled in field experience during the fall semester of 2006 (*n* = 20). Therefore, the researchers made the assumption that the results from this study can be inferred and inferential statistics are employed (Oliver & Hinkle, 1982). Judgments based on the findings from this study should be made with caution when generalizing to other groups of student teachers in agricultural education (Oliver & Hinkle).

The communication form employed in this study is an adaptation of a form used by the Department of Education at Florida State University. The communication form contains 12 sections of accomplished practices of the student teacher. The cooperating teacher rated the student teacher based on their observation of prescribed practices each week. Comments and recommendations fields were available for each accomplished practice to further describe observations of the student teacher. These fields were presented to the student teacher and cooperating teachers for use in reflection and skill improvements throughout the student teaching field experience. Directions on using the communication tool and the submission process were outlined in both a short and long form provided to cooperating teachers in the study.

Tschannen-Moran and Woolfolk Hoy (2001) developed the Teacher's Sense of Efficacy Scale (often referred to as the Ohio State Teacher Efficacy Scale (OSTES)). The OSTES consists of 24 items comprising three constructs, each of which contains eight items. The three constructs are quantified through scales named engagement, instruction, and classroom management. Scale values for respondents using the OSTES were as follows: 1 = nothing, 3 = very little, 5 = some influence, 7 = quite a bit, 9 = a great deal. The reliability coefficient (Cronbach's alpha) for each is as follows: engagement = .87, instruction = .91, and classroom management = .90. Subscale and total scores employing the OSTES can be used to assess teacher efficacy (Tschannen-Moran, 2000). Content validity of the OSTES was established through an expert panel and consulting existing literature (Tschannen-Moran & Woolfolk Hoy). Construct validity was established through factor analysis and comparison to existing instrumentation. Face validity was established through a series of field tests.

A previously developed instrument (Kasperbauer & Roberts, 2007; Roberts et al., 2006) was utilized to collect background and demographic data. This instrument was developed to coincide with the teaching efficacy instrument used in this study. Background/demographics section consisted of seven items: gender, age (years), ethnicity, placement at cooperating center, semesters of high school agricultural education courses completed, academic standing, and agriculture work experience. Dillman (2000) stated that questions having ready-made answers, such as demographic questions, gain more accurate responses. Face and content validity was established through an expert panel in the Department of Agricultural Leadership, Education, and Communications at Texas A&M University.

Communication form data were collected during the fall 2006 semester only. These data were used to validate the implementation of the treatment in the study (fall 2006, $n = 20$). Data were collected each of the 11 weeks of the field experience through a communication form available to cooperating teachers via the Internet or through print. After adaptation of the communication form for use in this study, the researcher contacted, via telephone, each cooperating center used for the fall 2006 semester to ascertain the best method to receive and send data on structured communication. The cooperating centers were then mailed paper and electronic copies of the cover letter, consent form, communication form, and long and short directions of use for the communication form. The tailored design method (Dillman, 2000) was employed to collect data pertaining to implementation of the communication form. Follow-up reminders were sent to nonrespondents each Tuesday after the week the communication form was due. Follow up contacts were made via phone the following Friday.

Analysis of Data

Data were analyzed by using SPSS version 15.0 for Windows statistical package. Demographics and background characteristics were assessed using descriptive statistics—means, frequencies, and standard deviations. In order to ascertain the influence of the independent variable, use of the communication tool, upon the dependent variable teaching efficacy, data collected on contextual variables (gender, age, ethnicity, agriculture science experience, academic standing, agriculture work experience, or placement at cooperating center) were used as covariates during data analysis. Repeated measures mixed design and repeated measures analysis of covariance were utilized to further delineate the findings of this study.

Data were collected from the participants on the independent variable (communication tool data) of study every week for the duration of the student teaching field experience for the treatment group (fall 2006) only. This information was compiled and entered into a data base for statistical analysis. Level of implementation of the treatment was determined through data collection during the duration of field experiences for the treatment group. Cooperating teachers who did not turn in forms weekly were acknowledged as not implementing the communication form (independent variable), that is, the treatment was not administered by the cooperating teachers. Accordingly, data collected from student respondents who were deemed not administered the treatment and consequently not used in analysis in this study.

Data were analyzed for normalcy, and an outlier was identified when descriptive statistics were employed. Further investigation of the data, revealed through box plot analyses identified the specific case contained in the treatment group (n = 20). This case was identified and removed from further data resulting in a final population for data analysis (N = 81, treatment group (n = 19). Judd and McClelland (1989) argue outlier removal is desirable, honest, and important.

Summary of Findings

The average respondent in this study was a 23-year-old white undergraduate female located at a multiple-placement cooperating center (a school site with two student teachers). A majority (61.7%) of respondents were female, and the remaining were male (38.3%). Mean age of all groups was 23 with a range of 21 to 47. The majority (96.3%) of respondents indicated that they were white. The next largest percentage (2.5%) of respondents indicated that they were Hispanic/Latino. A greater percentage (44.4%) of respondents indicated they had taken 7-8 semesters of agricultural science while in secondary schools. The second largest percentage (21.0%) of respondents indicated they never enrolled in agricultural science in high school. The majority (74.1%) of respondents indicated that they were undergraduates. This was followed by 9.9% of respondents indicated being graduates seeking certification and a graduate degree. The leading percentage (38.3%) of respondents indicated that prior agriculture work experience was avocational. The second prevailing percentage (21.0%) of respondents indicated prior agriculture work experience as part-time employment. Student teachers in this study were placed at cooperating centers by themselves (48.1%) or placed with another student teacher (51.9%).

Total measured constructs gathered through the OSTES instrument are shown in Table 1 for the control, treatment, and combined groups. Mean scores for total measurement in the control group (n=62) for the three measurement points were 7.20 (SD = .86), 6.84 (SD = .92), and 7.38 (SD = .87), respectively. Mean scores for the treatment group (n = 19) at the three measurement points were 7.05 (SD = .75), 6.74 (SD = .83), and 6.84 (SD = .72), respectively. Overall mean scores for the combined groups (N=81) were 7.17 (SD = .84, 6.82 (SD = .89), and 7.25 (SD = .87). Mean score analysis showed a general trend of decline from first to second measurement and a subsequent increase in mean score from second to third measurements of overall teaching efficacy. Treatment group mean scores declined from first to third measurement whereas the control groups showed an increase.

Table 1
Comparison of the Means of Teaching Efficacy of All Measured Constructs

	1st measurement		2nd measurement		3rd measurement	
	M	*SD*	*M*	*SD*	*M*	*SD*
Control Group (n = 62)	7.20	.86	6.84	.92	7.38	.87
Treatment Group (n = 19)	7.05	.75	6.74	.83	6.84	.72
Overall Group (N = 81)	7.17	.84	6.82	.89	7.25	.87

Note. Scale: 1 = *nothing*, 3 = *very little*, 5 = *some influence*, 7 = *quite a bit*, 9 = *a great deal*.

Null hypothesis one stated there is no difference in teaching efficacy of student teachers when cooperating teachers use a communication tool. To determine whether a difference existed in teaching efficacy between groups, repeated measures mixed design analysis was used. Sphericity assumption was met (*Mauchly's W* = .98, p = .55). Analysis results for teaching efficacy (see Table 2) provided a significance level of p = .01 (F = 6.18) and for teaching efficacy/treatment group interaction of p = .048 (F = 3.11). These significance levels of $p < .05$ suggest there was a significant difference in teaching efficacy throughout the three data collection points and that the groups varied differently. However, the overall model was not significant (Between Groups, F = 2.63 and p = .11). The null hypothesis was held tenable and not rejected.

Table 2
Teaching Efficacy Mean Comparison

Source	*df*	SS	MS	*F*	*p*	η^2	Power
Within Groups							
Teaching Efficacy (TE)	2	4.21	2.11	6.18	.01*	.08	.89
TE x Treatment Group	2	2.11	1.06	3.11	.048*	.04	.59
Error	148	50.39	.34				
Total	152						
Between Groups							
Treatment Group	1	3.81	3.81	2.63	.11	.03	.36
Error	74	107.47	1.45				

Note. Sphericity assumption met (*Mauchly's W* = .98, p = .56).
*p significant < .05.

Further data analysis revealed through within-subject contrasts significance on treatment group and teaching efficacy from the second to the third measurement. Significance was also found in teaching efficacy of all groups from the first to the second measurement and from the second to the third measurement. The contrast did reveal a significant interaction (F = 5.49, p = .02) between teaching efficacy and treatment group from level two to level three. Thus, the treatment and control groups differed in the way their teaching efficacy changed during the second half of their experience.

Null hypothesis two stated there is no difference in teaching efficacy of the student teacher when cooperating teachers use a communication tool in the presence of gender, age, ethnicity, agriculture science experience, academic standing, agriculture work experience, or placement at cooperating center. To determine whether a difference existed in importance, repeated measures analysis was used. Sphericity assumption was met (*Mauchly's W* = .97, *p* = .40). Analysis results for teaching efficacy with covariates (see Table 3) provided a significance level of $p = .04$ ($F = 3.29$). The significance level of $p = .04$ suggests there were differences in teaching efficacy throughout data collection points. The overall model was not significant (Between Groups, $p = .25$); therefore, the null hypothesis was held tenable and not rejected.

Table 3
Teaching Efficacy Mean Comparison in the Presence of Contextual Variables

Source	*df*	SS	MS	*F*	*p*	η^2	Power
Within Groups							
Teaching Efficacy (TE)	2	.31	.15	.43	.65	.01	.12**
Interactions							
TE x Gender	2	.31	.16	.44	.64	.01	.12**
TE x Age	2	.94	.47	1.33	.27	.02	.28**
TE x Placement	2	.26	.13	.37	.69	.01	.11**
TE x AgSc Semesters	2	.69	.34	.97	.38	.01	.22**
TE x Academic Standing	2	.01	.01	.01	.99	.01	.05**
TE x Ethnicity	2	.06	.03	.08	.92	.01	.06**
TE x Ag Work Exp.	2	.40	.20	.56	.57	.01	.14**
TE x Treatment Group	2	2.32	1.16	3.29	.04*	.05	.62**
Error	134	47.36	.35				
Total	152						
Between Groups							
Treatment	1	1.99	1.99	1.36	.25	.02	.21**
Error	67	97.97	1.46				

Note. Sphericity assumption met (*Mauchly's W* = .98, *p* = .42).
**p* significant < .05, ** power computed using alpha = .05.

Conclusions, Discussion, and Implications

Based on analysis of the data, it was concluded that implementation of structured communication protocol between the cooperating teacher and student teacher did not create a change in student teacher teaching efficacy. Both the treatment group and control group dropped initially in teaching efficacy from the first to the second measure, but scores increased toward the third measurement. However, a difference was found in the comparison from the control group to the treatment group at the conclusion of the experience. This difference raises many conclusions and implications from this study. Because teaching efficacy is a form of self-efficacy, it is dependent of the perception of the individual of their perceived abilities. The difference shown in the data describes a lowered perception by the treatment group in which communication was invoked through the cooperating teacher. One conclusion surmised by the researcher through data analysis is that individuals more discriminately judged their abilities through involvement in the treatment as opposed to those who did not consistently communicate with a cooperating teacher about many aspects of the field experience.

Another plausible outcome was seen in the difference of teaching efficacy inferred through communication and feedback; student teachers felt that their abilities were criticized, which would lead to a lowered sense of teaching efficacy. Putnam and Borko (2000) stated it has been a struggle for teacher educators to understand how much knowledge and the kinds of environments which creates meaningful experiences.

Presumably, the intervention of structured communication may cause student teachers to be more grounded in their perception of their beliefs about teaching because of the implementation of structured communication during field experiences. Although communication should be an integral part of the cooperating teacher and student teaching experience, its impact should constantly be monitored and be made aware of to teacher educators and cooperating teachers of student teachers.

The presence of contextual variables was not a significant determinant through this analysis. A difference was shown, although it was not significant from the second to the third measurement in teaching efficacy levels from control to the treatment group. This may be explained by the student teachers reflecting on their abilities and with more feedback from the cooperating teacher; they may be more firmly grounded in their abilities but rate their abilities less because of a more involved communication than groups measured without a structured communication tool being administered. Because this study looked into teaching efficacy and not skill level rating, we can only conclude that student teachers were more aware of the needs of being an agriculture science teacher and the perception of those abilities.

Knobloch (2002) found that at the end of 10 weeks of teaching experience, first-year teachers had the lowest efficacy, and preservice teachers held the highest level of teacher efficacy. Although the treatment group of study in this study contradicted other research on teaching efficacy (Roberts, et al., 2006; Rodriguez, 1997; Swan, 2005), Knobloch's deduction that different teaching experiences influenced student teacher development and efficacy level may have precedence here as well. This difference in experience can not be correlated to the student teachers experience because they have no previous student teaching experience, but cooperating teachers in this study were asked to use a communication tool they had little experience in using. This may have raised the expectations of the cooperating teachers upon the levels of communication needed towards student teacher, which resulted in more in-depth criticism of student teachers during the field experience.

Communication can make a positive impact on teaching efficacy held by student teachers if only by grounding their beliefs in a more authentic assessment of teaching performance. Many questions have occurred through this research that should be further investigated to explain preservice teacher efficaciousness. Recommendations include further research towards the implementation of structured communication during field experiences at other universities involved in teacher education. It is also recommended that preservice students be educated about communication received from supervisors during field experiences. A further recommendation includes educating cooperating teachers on proper methods of feedback towards student teachers in the field experience. Tschannen-Moran et al. (1998) stated:

> Specific performance feedback from supervisors, other teachers, even students, can be a potent source of information about how a teacher's skills and strategies match the demands of a particular teaching task. Specific performance feedback provides social comparison information, that is, whether the teaching performance outcomes are adequate, inferior, or superior to others in a similar teaching situation. (p. 20)

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