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Stress Levels of Agricultural Science Cooperating Teachers and Student Teachers: A Repeated Measures Comparative Assessment

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Abstract

This study compared job stress levels of Texas agricultural science cooperating teachers and Texas agricultural science student teachers across a semester. The research objectives included describing secondary agricultural science cooperating teachers and student teachers perceptions of stressors, by time of semester (beginning, middle, and end), describing perceptions of frequency of stressors, by time of semester (early semester, mid semester, and late semester) among secondary agricultural science cooperating teachers and student teachers, and determining if differences existed between agricultural science student teachers' and cooperating teachers' based on perceptions of job stress and time of semester (early semester, mid semester, and late semester). Job stress severity declined among student teachers as the semester progressed and increased in cooperating teachers at the midpoint of the semester, but then declined toward the end of the semester. Job stress frequency increased in student teachers throughout the semester and declined in cooperating teachers at mid-semester with a slight increase at the end of the semester. Job pressure index scores showed similar trends with an increase throughout the student teaching semester.

Keywords: Teacher stress, Cooperating teachers, Student teachers, Agricultural science teachers

Introduction / Review of Literature

According to the American Institute of Stress (n.d.), there is not a widely accepted definition for the term *stress*. Stress is a term that holds a different meaning for different researchers across disciplines; the term can refer to various situations. For the purpose of this study, stress will be defined as "a condition or feeling experienced when a person perceives that demands exceed the personal and social resources the individual is able to mobilize… [and/or] physical, mental, or emotional strain or tension" (American Institute of Stress, para. 1).

The causes and consequences of stress are different for each individual person. A multitude of researchers have conducted studies to examine stress inflicted by culture (Warren-Findlow, 2010), relationships (Maguire, 2010), family (Diamond, 1991), parenting (Bronte-Tinkew, Horowitz, & Carrano, 2010), major events (e.g. Post-Traumatic Stress Disorder) (Katz, 2002), health problems (Pederson & Zachariae, 2010), school (Ratanasiripong, Sverduk, Hayashino, & Prince, 2010), work (Vagg & Spielberger, 1998), etc. Though the consequences of stress are based on each individual, the response to stress is nearly the same in all people. The

responses to stress can be physical, physiological, or emotional and have effects on efficiency and productivity.

It is common knowledge that teachers have a challenging job, in some cases working up to 17 hours more than those in a traditional 40-hour work week (Murray, Flowers, Croom, & Wilson, 2011). Hence, in many cases, teaching can be a stressful profession; nonetheless, the majority of teachers agreed that their jobs were rewarding (Strauss, 2002). Teaching can be a challenging career because of a lack of resources, too much paperwork, crowded classrooms, students with emotional problems, low pay, and high-stakes standardized testing (Strauss, 2002). Delnero and Montgomery (2001) noted that the phenomenon of increasing job responsibilities in agricultural education is well documented. Hillison (1996) noted that agriculture teachers are often forced to do more with less. They are responsible for supervising student projects, training career development event teams, preparing lessons, and evaluating their students (Straquadine, 1990). Murray et al. (2011) noted that those roles extend beyond the classroom to family responsibility, too. Torres, Lawver, and Lambert (2008) noted that recognizing the variety of roles and responsibilities of agriculture teachers is important in understanding their stress, because stress has been purported to be directly related to self-efficacy (Swan, Wolf, & Cano, 2011). Although teacher educators do their best to prepare beginning agriculture teachers for their profession, one area that may be overlooked is preparing new teachers to handle stress that comes with the job. Hence, researchers have noted that teacher preparation programs should prepare students to recognize stress factors and to employ effective coping mechanisms (Rieg, Paquette, & Chen, 2007).

The relationship between student teachers and cooperating teachers is not a new area of research. Kitchel and Torres (2007) noted a common theme throughout research related to student teachers in agricultural education; cooperating teachers are important. Harlin, Edwards, and Briers (2002) reported that student teachers rated their relationship with their cooperating teacher as the most important student teaching element. Student teachers face the same challenges and stressors as cooperating teachers; additionally, they have their own set of stress factors. Fritz and Miller (2003) acknowledged that teachers experience frustrations and concerns related to their teaching, but these concerns may be more intense during student teaching. Kyriacou and Stephens (1999) listed several facets of the student teaching experience that may cause stress: 1) Being observed by university supervisors, 2) maintaining good discipline, 3) teaching workload, 4) contextual problems (where things are located, getting to know other teachers, moving to a new environment), and 5) examining their career choice. Other causes of stress for student teachers include, but are not limited to, lack of experience, conflict between advice and expectations, unclear perceptions of own status, and lack of strategies for coping with emergent situations (Rieg et al., 2007).

The American Psychological Association (n.d.) reported that new teachers face challenges every day. Many researchers in education sought to identify phases or stages of concern with beginning and student teachers. Moir (1990) proposed the phases of a first-year teacher's attitude toward teaching, based on the work of Fuller (1969) and Fuller and Case (1972). According to Moir (1990) first-year teachers begin the year in a phase called anticipation and, within a short period of time, move to survival phase. Survival is followed by disillusionment around mid-year. Rejuvenation kicks in at the beginning of the second semester followed by reflection and another period of anticipation. Arguably, student teachers are on a fast track compared to first year teachers. These phases happen within a semester. Understanding the phases student teachers and cooperating teachers go through during the student teaching

experience, as well as the timing during a semester or school year, are key in minimizing stress for teachers.

Stress and causes of stress, among teachers at various levels—student teacher to veteran teacher—are well noted in the literature. The similarities and differences among and between teachers at various levels are also noted, as are the important relationships between teachers at various levels (e.g. student teachers and cooperating teachers). However, a study of the stress levels of student teachers and secondary agriculture teachers serving in the role of cooperating teachers was not obvious in the literature, nor was the possible effect of measurement of stress across time. In addition, no literature was found regarding the effect of inservice teachers mentoring student teachers.

Theoretical and Conceptual Frameworks

The person-environment fit theory (French, Rodgers, & Cobb, 1974) is the most widely accepted framework for conceptualizing job stress among organization researchers (Chemers, Hays, Rhodewalt, & Wysocki, 1985; Edwards & Cooper, 1990; French & Caplan, 1972; Vagg & Spielberger, 1998) and served as the theoretical framework for this study. Person-environment fit theory posits that stress is a result of a poor match between "characteristics of the person (e.g. abilities, values) and the environment (e.g. demands, supplies)" (Edwards & Cooper, p. 293). When stress, due to incompatible interaction between the individual and the work environment, is experienced in the workplace, the psychological strain will occur and may cause stress-related physical and psychological disorders (French & Caplan, 1972; Vagg & Spielberger, 1998).

The Job Stress Survey (JSS) is grounded in person-environment fit theory and has been reported to be a useful data collection instrument for assessing occupational stress in a wide variety of work settings (Vagg & Spielberger, 1998). Thus, the JSS provided conceptual guidance for measuring stress in this study.

The JSS was created out of necessity. Other measures of job stress failed to either address perceived severity of stressors or confused the severity of stressors with the frequency of the occurrence of stressors (Vagg & Spielberger, 1998). The basic construct for the JSS came from the notion that "ideally, job stress measures should evaluate both the perceived severity of specific sources of stress in the workplace and how often each work-related stressor is experienced by the respondent during a specified period of time" (Vagg & Spielberger, 1998, p. 298). Frequency and severity measurement is significant because, although some events may cause participants to sense a severe amount of stress, those events may rarely or even never occur, therefore, reducing their overall impact (Vagg & Spielberger, 1998).

Spielberger, Reheiser, Reheiser, and Vagg (1999) developed the current JSS based on the Police Stress Survey (PSS) and the Teacher Stress Survey (TSS). Thirty of the 39 items found to be mutually applicable between the PSS and TSS were applied to the development of the JSS. Since the creation of the JSS, the questionnaire has been adapted and used in a multitude of diverse disciplines. Spielberger and Rehieser (1994) administered the JSS to 2,389 adults employed in university, corporate, and military settings. Torres, Lambert, and Lawver (2009) used the JSS to study secondary agriculture teachers and found that, although the teachers were not in a state of stress, the teachers were very close to being in a state of stress. They also found that one-third of the teachers did experience elevated levels of stress.

Researchers within educational research (Fuller, 1969; Fuller & Case, 1972; Moir, 1999), and specifically within agricultural education research (Fritz & Miller, 2003; Knobloch &

Whittington, 2003; Roberts, Harlin & Rickets, 2006; Robinson, Krysher, Haynes, & Edwards, 2010; Edgar, Roberts, & Murphy, 2011; Swan, Wolf, & Cano, 2011), posited that time is a critical variable in addressing issues facing pre-service, student, and first-year teachers. Using the JSS over a given period of time with student and cooperating teachers may build connections between stressors and the time involved, invested, or taken by these actions.

Purpose and Research Questions

The need to "prepare and provide an abundance of fully qualified and highly motivated agricultural educators at all levels" is noted in the *National Research Agenda of Agricultural Education and Communication*, RPA 4 (Osborne, 2007, p. 8). Pre-service agriculture teachers and in-service agriculture teachers are different levels of educators. In many cases, pre-service teachers transition to in-service teachers through the threshold of the student teaching experience. During this experience, the relationship between cooperating teachers and student teachers has been reported to be influential and important (Harlin et al., 2002; Kitchel & Torres, 2007). Because stress has been noted to affect in-service agriculture teachers (Torres et al., 2009), it would seem reasonable to question how stress affects pre-service student teachers. Furthermore, previous studies examined stress levels of in-service agriculture teachers by collecting data at one point during a semester, which may lead one to further question whether stress levels are constant across time. Therefore, the purpose of this study was to examine stress levels of agricultural science student teachers and their cooperating teachers throughout the semester. The following three research questions guided the study:

1. What are agricultural science student teachers' and cooperating teachers' perceptions of stressors, by time of semester (beginning, middle, and end)?
2. What are agricultural science student teachers' and cooperating teachers' perceptions of frequency of stressors, by time of semester (early semester, mid semester, and late semester)?
3. Do differences exist between agricultural science student teachers and cooperating teachers based on perceptions of job stress and time of semester (early semester, mid semester, and late semester)?

Procedures

The target populations for this study were secondary agricultural science teachers and agricultural science student teachers during the spring 2010 field practicum, as part of the teacher education program at Texas University. A total of 27 student teachers enrolled in the student teaching field practicum and their cooperating teachers (n = 61) were invited to participate.

The data collection instrument used in this study was the Job Stress Survey (JSS), developed by Spielberger and Vagg in 1999. The questionnaire consisted of three sections: the first section of the questionnaire sought to measure each subject's perceived severity of 30 stressful work-related events on a 1 to 9 summated rating scale; the first item, "assignment of disagreeable duties," was listed in the instrument's instructions as an example of an item that produces an average amount of stress or a 5 on the 9-point scale. Therefore, subjects were asked to respond to the 29 remaining items in the first section based on the first example. The second section sought to measure subjects' perceived frequency of the same 30 items presented in the

first section, on a 0 to 9 scale of frequency of occurrence. The third section sought to determine the subjects' age and gender.

The JSS (Spielberger & Vagg, 1999) served as the basis for the multi-mode data collection instrument developed for this study. The design and format of both modes of the data collection instrument were guided by Dillman, Smyth, and Christian (2009). Both modes of questionnaires were near identical in format; however, the logistics of distributing and collecting a paper questionnaire to each of the cooperating teachers, via mail in the same timeframe as the student teachers, did not seem reasonable when considering the additional time needed to follow up for nonresponse. Therefore, the researchers closely followed Dillman et al.'s (2009) recommendations for mixed mode data collection.

Dillman et al. (2009) noted that using multiple modes of data collection may introduce measurement error, because people may answer the same question differently when the question is presented in different modes. To minimize the potential for measurement error associated with mixed mode data collection, a panel of eight experts—all of whom are considered experts in the areas of agricultural education, instrument development, and research methodology—were provided a paper copy of the instrument and e-mailed a link to the Web-based electronic instrument and then asked if they had any concern that respondents may respond differently, based upon the mode of the questionnaire.

Content validity of the data collection instrument was determined by the previously noted panel of experts. Each of the experts assessed the "…appropriateness and representativeness of the items…" on the questionnaire (Ary et al., 2006, p. 256). Experts were asked to pay close attention to the wording of the questions to ensure that each question would make sense to the intended population. Several revisions to wording or examples were made based on the feedback from the expert panel; however, the researchers did not believe any of the changes were substantial enough to change the original intent of the question.

Construct validity was assessed in several previous studies through exploratory and confirmatory factor analyses (see Spielberger & Vagg, 1999). Development of constructs and testing of JSS were previously outlined and resulted in the commercial JSS data collection instrument published by Psychological Assessment Resources, Inc. in 1999. Because the items used in this study were based upon the items and constructs previously determined to be valid, the constructs were considered valid.

Reliability was determined by conducting a pilot test for each mode of the data collection instrument (paper and web-based electronic) using the same three-round data collection method used in this study. Reliability for the student teacher instrument was determined by conducting a pilot test using individuals with similar characteristics of the student teachers in the sample population, in this case the 17 student teachers during the fall semester 2009. After three rounds of data collection using the paper data collection instrument, a total of 44 useable responses were collected. Reliability for the cooperating teacher instrument was determined by conducting a pilot test using individuals with similar characteristics of the cooperating teachers in the sample population, in this case the 28 cooperating teachers during the fall semester 2009. After three rounds of data collection, using the web-based electronic data collection instrument, a total of 67 useable responses were collected. Cronbach's alpha coefficients were calculated for the JS-S, JS-F, and JS-X scales for the paper and web-based electronic questionnaires, which ranged from .90 to .97. Using the data collected for this study,

post hoc Cronbach's alpha coefficients were calculated for the JS-S, JS-F, and JS-X scales of each round, which yielded coefficients ranging from .93 to .95.

Data Collection

Dillman et al. (2009) served as the primary guidance for data collection for this study. Data collection for student teachers and cooperating teachers was conducted using the same instrument but through different modes: student teacher data were collected via a researcher-administered paper questionnaire and cooperating teacher data were collected via a Web-based electronic questionnaire. Data were collected at three points during the spring semester in 2010: round 1, the first two weeks of February; round 2, the last week of March and first week in April; and round 3, the second and third weeks in May.

Student teacher data were collected the week before student teachers began their student teaching field practicum (early semester); during their mid semester conference (mid semester), on-campus; and immediately following their student teaching field practicum, upon returning to campus (late semester). Because all student teachers (n = 27) participated in three rounds of data collection—one student teacher did not complete the third-round questionnaire—no follow up measures were taken to account for nonresponse error.

Personalized e-mail invitations were sent to cooperating teachers for each round of data collection. Each invitation explained the purpose of the study, explained that they would be asked to participate three times during the semester, and included a link to the web-based electronic questionnaire. To maximize response rate, up to three invitations were sent to each cooperating teacher for each round of data collection. As electronic questionnaires were completed during each round, the names of the individuals who had responded were removed from the correspondence list of cooperating teachers. Response rates for each round are summarized in Table 1. Although response rates, in some cases, were greater than indicated in Table 1, only complete and useable responses are indicated.

Table 1

Summary of Response Rates for Each Round of Data Collection

	Round 1		Round 2		Round 3	
	n	%	*n*	%	*n*	%
Student Teacher	27	100.0	27	100.0	26	96.3
Cooperating Teacher	46	75.4	38	62.3	42	68.9

Nonresponse error was a relevant concern for cooperating teacher data; therefore, procedures for handling response bias were followed as outlined as *Method 1* in Lindner Murphy, and Briers (2001). The relatively small number of respondents for each round did not allow for a parametrically-amenable, dichotomous grouping of at least 30 respondents. Therefore, nonparametric comparisons were made between early and late respondents using the Mann–Whitney *U* test to compare the scale variables of interest, JS-S, JS-F, and JS-X, which served as the dependent variables for each round. Dichotomously-split early and late respondent groups (Miller & Smith, 1983) served as the independent variable for each round. Mann-

Whitney *U* tests yielded no significant differences ($p < .05$) between early and late respondent data (see Table 2); therefore, external validity did not threaten the generalizability of the findings of this study to the target population (Lindner, et al., 2001; Radhakrishna & Doamekpor, 2008).

Table 2

Comparison of Early to Late using Mann-Whitney U Test

			Mdn		
Scale	*U*	*z*	*Early*	*Late*	*p*
Round 1 – Early (*n* = 23) to Late (*n* = 23)					
JS-S	288.5	-0.67	4.77	4.97	.503
JS-F	255.5	-0.19	3.75	3.62	.852
JS-X	244.0	-0.44	0.63	0.66	.660
Round 2 – Early (*n* = 19) to Late (*n* = 19)					
JS-S	216.0	-1.03	5.00	4.93	.305
JS-F	124.0	-1.54	3.97	2.97	.124
JS-X	140.0	-1.06	0.63	0.49	.287
Round 3 – Early (*n* = 21) to Late (*n* = 21)					
JS-S	233.5	-0.44	4.53	4.87	.658
JS-F	198.5	-0.55	3.93	3.53	.580
JS-X	204.0	-0.42	0.61	0.49	.678

Data Analysis

Data were analyzed using SPSS® version 17.0 for Windows™ platform computers. The purpose of research question one was to describe agricultural science student teachers' and cooperating teachers' perceptions of stressors by time of semester. The mean and standard deviation for each of the three rounds (early semester, mid semester, and late semester) are indicated in Table 3 for the items associated with the Job Stress Severity (JS-S) Scale. Stressor items are reported in the order presented in the data collection instrument. The JS-S scale is purported to be an indicator of respondents' average rating of *perceived severity* of the 30 stressor items. The first item, "assignment of disagreeable duties," is not reported for the JS-S scale because respondents are informed that assignment of disagreeable duties typically elicits a 5 on the 9-point scale; thus, respondents are asked to use that as a standard basis for comparison for their other responses.

The purpose of research question two was to describe agricultural science student teachers' and cooperating teachers' perceptions of frequency of stressors by time of semester. The mean and standard deviation for each of the three rounds (early semester, mid semester, and late semester) are indicated in Table 3 for the 30 items associated with the Job Pressure Frequency (JS-F) Scale. The JS-F scale is purported to be an indicator of the *average frequency of occurrence* of the 30 stressor items in the six months preceding the individual measurement.

The purpose of research question three was to determine if differences existed between agricultural science student teachers and cooperating teachers based on perceptions of job stress and time of semester (early semester, mid semester, and late semester). The JS-X scale was

purported to be an estimate of the *overall level of occupational stress* experienced by respondents; therefore, it was used as a summary measure of the previous scales. According to Spielberger and Vagg (1999), "The JS-X score based on all 30 items is computed by multiplying the Severity rating for each item by its Frequency rating, summing these products, and dividing by 30" (p. 14).

Field's (2009) outline of methods for analyses and interpretation of the data served as the primary guidance for the multivariate analyses. Tabachnick and Fidell (2007) served as a secondary source of guidance. A multivariate analysis of variance (MANOVA) was used to determine the effect of academic position and time of semester on teacher stress. A MANOVA is the appropriate analysis when

> multiple independent and/or dependent variables and the measured variables are likely to be dependent on each other (i.e., to correlate)…. Thus, multivariate analysis allows for the examination of two variables while simultaneously controlling for the influence of the other variables on each of them. (Newton & Rudestam, 1999, p. 137)

A MANOVA was conducted using JS-X scores as the dependent variables and using academic position (i.e. student teacher or cooperating teacher) and time of semester (beginning, middle, and end) as the independent variables. Because of the longitudinal nature of these analyses, only the responses of those individuals who responded to all three rounds of data collection were analyzed; agricultural science student teachers (n = 25) and cooperating teachers (n = 25). The alpha level was set *a priori* at .05. Degrees of freedom, F ratio, p-value, effect size (η_p^2), and power ($1 - \beta$) were reported for each analysis, when appropriate. Effect sizes were interpreted according to Tabachnick and Fidell (2007) who noted MANOVA guidelines for small (η_p^2 = .10), medium (η_p^2 = .25), and large (η_p^2 = .40) effects.

Findings

It is important to note that these findings are limited to the secondary agricultural science cooperating teachers and student teachers during the spring 2010 field practicum, as part of the teacher education program at Texas University. To address research questions one, a summary of student teachers' and cooperating teachers' perceptions of stressors are presented in Table 3 by academic position and round of measure. The JSS has been reported to measure perceptions of stressors on a 9-point scale: 1 = Low, 5 = Moderate; 9 = High. Based on JS-S measures of *job stress severity*, student teachers' average rating of perceived severity of the 30 stressor items was greatest at the beginning of the semester and less in the two subsequent measures. None of the three measures exceeded "moderate" levels of stress. Cooperating teachers' average rating of perceived severity of the 30 stressor items remained relatively consistent throughout the semester, near the "moderate" level of stress. It is important to note that job stress severity is only one component of the JS-X composite score.

Table 3

Summary of Job Stress Severity (JS-S) by Time of Semester

	Round 1				Round 2				Round 3			
	M	*SD*	Min	Max	*M*	*SD*	Min	Max	*M*	*SD*	Min	Max
Student Teacher	5.00	1.12	1.3	6.50	3.62	1.47	1.3	7.3	3.79	1.30	1.7	7.0
Cooperating Teacher	4.67	1.23	1.5	7.07	4.85	1.18	1.4	7.2	4.60	1.27	1.8	7.5

Note: Round 1 = Early Semester, Round 2 = Mid Semester, Round 3 = Late Semester; Student Teachers = Round 1 (*n* = 27), Round 2 (*n* = 27), Round 3 (*n* = 26); Cooperating Teachers = Round 1 (*n* = 46), Round 2 (*n* = 38), Round 3 (*n* = 42); Scale: 1 = Low, 5 = Moderate; 9 = High; Min and Max for each round indicate the mean minimum and mean maximum for each round.

The second measure of the JSS is the JS-F, which measured the *average frequency of occurrence* of the 30 stressor items and served as the measure to address research question two. The JS-F measures the frequency of stressors on a 9-point scale; one being a single occurrence and increasing at single intervals up to "9+," which accounted for 9 or more occurrences. Based on JS-F measures of *job stress frequency*, student teachers' on average experienced stressor items least often at the beginning of the semester and more frequently in the two subsequent measures. Cooperating teachers' on average experienced stressor items on a relatively consistent frequency throughout the semester (see Table 4).

Table 4

Summary of Job Stress Frequency (JS-F) by Time of Semester

	Round 1				Round 2				Round 3			
	M	*SD*	Min	Max	*M*	*SD*	Min	Max	*M*	*SD*	Min	Max
Student Teacher	0.90	1.13	0.0	4.5	3.01	1.75	0.4	7.7	3.44	1.51	1.0	8.2
Cooperating Teacher	3.74	1.28	0.9	6.0	3.45	1.46	0.8	7.1	3.68	1.45	0.7	7.8

Note: Round 1 = Early Semester, Round 2 = Mid Semester, Round 3 = Late Semester; Student Teachers = Round 1 (*n* = 27), Round 2 (*n* = 27), Round 3 (*n* = 26); Cooperating Teachers = Round 1 (*n* = 46), Round 2 (*n* = 38), Round 3 (*n* = 42); Min and Max for each round indicate the mean minimum and mean maximum for each round.

The purpose of research objective 3 was to determine if differences existed between agricultural science student teachers' and cooperating teachers' based on perceptions of job stress and time of semester (beginning, middle, and end). The JS-X score is a composite score, derived by multiplying the average of the severity scores severity of stressors and the average frequency of occurrence. JS-X scores were calculated as outlined by Spielberger and Vagg (1999); using all 30 items, JS-X scores were computed by multiplying the severity rating for each item (JS-S) by its frequency rating, then summing the products and dividing by 30.

Based on these calculations, the minimum possible JS-X score would be 0.00, if an individual reported experiencing none of the stressors (JS-F score of 0). According to

Spielberger and Vagg, the average individual in a managerial or professional occupation possessed a JS-X score of 20.19 (*SD* = 10.06). Compared to the average individual, student teachers' and cooperating teachers' scores were below the average individual in a managerial or professional occupation.

Post hoc tests (Bonferroni) revealed that compared to the beginning of the semester, the stress level of teachers was not different at the middle of the semester (p = .062), but was significantly greater at the end of the semester (p = .013). The mean stress level was not significantly different (p = <.05) between the middle of the semester and the end of the semester.

Table 5

Summary of Stress Levels of Student Teachers and Cooperating Teachers, Based on JS-X Scores Across a Spring Semester

		Round 1		Round 2		Round 3	
	n	*M*	*SD*	*M*	*SD*	*M*	*SD*
Student Teacher	25	4.78	6.75	13.21	12.39	14.34	11.15
Cooperating Teacher	25	17.52	7.89	16.42	7.81	16.42	9.07

Note: Round 1 = Early Semester, Round 2 = Mid Semester, Round 3 = Late Semester; the average individual in a managerial or professional occupation possessed a JS-X score of 20.19 (*SD* = 10.06).

Multivariate interaction (academic position x time of semester) was significant Λ = .70, $F(2, 47) = 9.92$, $p < .001$, $\eta_p^2 = .297$, $1 - \beta = .978$), indicating that the effect of time of semester on the stress level of teachers differed, based on academic position. Summary of multivariate analyses of variance were presented in Table 6.

Table 6

Multivariate Analyses of Variance for Stress Levels

Variable	Wilk's Λ	F	p	η_p^2	$1 - \beta$
Time of semester	.792	6.18(2,47)	.004	.208	.871
Time of semester x Academic position	.703	9.92(2,47)	<.001	.297	.978

Conclusions, Implications, and Recommendations

The *National Research Agenda of Agricultural Education and Communication* (Osborne, 2007), RPA 4, indicated the need to "prepare and provide an abundance of fully qualified and highly motivated agricultural educators at all levels" (Osborne, 2007, p. 8). Because stress has been noted to affect agricultural science teachers in a previous study (Torres et al., 2009), this study addressed the RPA by examining stress levels of agricultural science student teachers and their cooperating teachers during an academic semester—different levels at different times through the teacher preparation program.

Three rounds of data were collected from 27 student teachers and more than 40 cooperating teachers in the spring semester of 2010, in Texas. Job stress severity (JS-S) declined among student teachers as the semester progressed. This supports Laughlin's (1984) findings that teachers' perceptions of stress were decreased by support from colleagues. Job stress severity (JS-S) increased in cooperating teachers at the midpoint of the semester, but then declined toward the end of the semester. This conclusion is supported by Moir (1990) in work related to first year teachers. Job stress frequency (JS-F) increased in student teachers throughout the semester and declined in cooperating teachers at mid-semester with a slight increase at the end of the semester. Job pressure index (JS-X) scores showed similar trends with an increase throughout the student teaching semester. This supports the finds of Rieg, Paquette, and Chen (2007) where student teachers experienced varied and significant responsibilies throughout their student teaching semester. Cooperating teachers showed a decrease in job pressure index at mid semester followed by a slight increase at the end of the semester. These findings also support Torres et al.'s (2009) findings that secondary agricultural science teachers experienced elevated levels of stress. However, the question arises, are stressors constant with secondary agricultural science teachers and student teachers across the school year?

Stress levels of student teachers and cooperating teachers were significantly different, with a medium effect size. Stress levels were also significantly different between measurements, across the semester, with a small effect size. Therefore, student teachers' and cooperating teachers' stress levels were not only different when observed holistically (student teachers vs. cooperating teachers), but student teachers' and cooperating teachers' stress levels were also different at each point of data collection across the semester (beginning, middle, and end). This implies that, even though the student teachers' and cooperating teachers' job responsibilities are similar, there are different factors throughout the semester that effect student teacher stress levels when compared to the factors that effect cooperating teacher stress levels. This finding is supported by research conducted by Reig et al.'s (2007) finding and Torres et al.'s (2009) findings related to both student teachers and cooperating teachers job responsibilities and related stress.

Many previous studies have investigated characteristics, perceptions, and numerous influential factors of student teachers and in-service agriculture teachers. These studies have mainly investigated the relationship between cooperating teachers and the student teacher whom they mentor during their field practicum (Harlin et al., 2002). Very few, if any, studies have investigated the influences of one on the other, e.g. the effects of a student teacher on their cooperating teacher. Given the large range between the minimum and maximum values of both JS-S and JS-F scales, there was an obvious difference between individuals who were student teachers and individuals who were cooperating teachers. Those differences may have contributed to the wide range of stress levels and frequency across the semester and begs the question whether differences were due to programmatic differences or individual situations. Given that the results of this study indicate that differences exist between student teachers' and cooperating teachers' stress levels and that this study is among the first to investigate stress levels of student teachers, there is need for further investigation whether student teachers affect the stress level of their cooperating teacher during their field practicum.

Knowing there is a difference between the stress levels of student teachers and cooperating teachers, additional inquiry is necessary to determine if specific indices of stress, e.g., lack of support and job pressure (see Torres et al., 2009), affect student teachers and in-service agriculture teachers in the same manner. Additionally, the differing levels of stress

across a semester (three repeated measurements) investigated in this study would suggest that further investigation is necessary to determine if stress levels of student teachers and in-service agriculture teachers differ not only across semesters but also between semesters.

Most agricultural education studies related to pre-service education have been limited to single measures (Swan, Wolf, & Cano, 2011). Because significant differences existed between measurements across a semester, it is not unreasonable to question how many studies may have had differing results if measurements were taken at a different point or multiple points during a semester. Perhaps equally important when considering research related to school-based instruction, could differences exist between semesters? Much of the research related to student teachers has been conducted in the spring semester, arguably because most agriculture teacher education programs only conduct student teaching internships during the spring semester. Therefore, when reasonable and appropriate, researchers should give further consideration to repeated measures or longitudinal analyses.

Although it is possible that stress levels may have influenced response rate, that was not one of the research questions associated with this study and yet another limitation of this study. It would not be methodologically responsible for the researchers to attempt place causation regarding response rate in this study. It is, however, advisable that researchers in future stress-related studies of student teachers or cooperating teachers attempt to measure potential effects of stress on response rate.

Lastly, the question arises: Does having a student teacher contribute to the stress a cooperating teacher experiences? This study did not investigate if differences existed between stress levels of in-service teachers and in-service teachers who were serving as cooperating teachers; therefore, any potential effect of mentoring a student teacher on the stress levels of cooperating teachers is not known and should be investigated further.

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