Leader-member Exchange, Cognitive Style, and Student Achievement

Dr. Chaney Mosley
Metro Nashville Public Schools
chaney.mosley@mnps.org

Dr. Thomas Broyles
Tennessee State University
tbroyle1@tnstate.edu

Dr. Eric Kaufman
Virginia Tech
ekaufman@vt.edu

Abstract

The purpose of this study is to explain how the quality of teacher-student relationships and the gap of cognitive styles between teachers and students impact student achievement. The population for the study was comprised of 11 career and technical education (CTE) teachers and 210 CTE students, representing six disciplines within CTE. The study occurred in a suburban high school in western North Carolina. Leader-member Exchange (LMX) theory and Adaption-innovation theory guided the research. Dyadic intensity between teachers and students predicts the quality of teacher-student relationships from both the teacher's perspective and the student's perspective. The quality of teacher-student relationships from the teacher's perspective predicts the quality of teacher-student relationships student's perspective. Further research is recommended to understand how leader-member exchange manifests in classroom settings and impacts student achievement.

Introduction

Is a teacher a leader? Answers to this question might vary, depending on one's personal philosophy and definition of leadership. Dewey (1933) posited that teachers are intellectual leaders of a social group. Further, in considering the commonly accepted notion that leadership is a process that involves influence, teachers are leaders given the manner in which they influence students in their classrooms. As Dewey (1933) noted, "Everything the teacher does, as well as the manner in which he does it, incites the child to respond in some way or another, and each response tends to get the child's attitude in some way or the other" (p. 59). Whether recognized or not, teachers emerge as leaders in classrooms, which are reflective of a quickly and ever changing society (Rallis, Rossman, Phelgar, & Abeille, 1995).

Numerous practitioners have examined the leadership of teachers (Berry, Johnson, & Montgomery, 2005; Childs-Bowen, Moller, & Scrivner, 2000; Crowther & Olsen, 1997; Frost, 2003; Frost & Durrant, 2003; Harris, 2003; Smylie, 2005; York-Barr & Duke, 2004). These investigations, however, viewed the leadership roles that teachers assume within their schools and among peers. The lack of agreement on teacher leadership and the corresponding ambiguity of the definition of this concept is evident throughout the scholarly literature. A general lack of empirical research related to teacher leadership is evident as well (Harris, 2003; York-Barr & Duke, 2004). From the literature, it is clear that concepts of teacher leadership typically focus on activities including shared decision making, idea sharing, mentoring other teachers, and serving in roles such as department head or lead teacher, among others. The present study employs a different description of teacher leadership.

Borrowing from Katyal and Evers (2004), we operationally define teacher leadership as the influence of teachers on students in terms of instructional guidance. This definition of teacher leadership allows the researchers to expand on the influential relationship between teachers and students in the present study. While there is little research on teacher leadership in this regard, some (Alexander, Elsom, Means, & Means, 1971; Farr, 2010; Katyal & Evers, 2004; Larkin, 1973) have advanced the notion of teachers as classroom leaders. A prominent example of teachers as classroom leaders comes from Teach for America, an alternative teacher licensure nonprofit organization that embodies the idea of teachers as leaders. As explained by Farr (2010), Teach for America, which builds a corps of recent college graduates that commit to teaching in high-need areas across the United States in an effort to combat educational inequity, trains its members in accordance with a leadership framework. This framework, appropriately called Teaching As Leadership, is grounded in principles of leadership "employed by successful leaders in any challenging context" (Farr, 2010, p. 4). By following the Teaching As Leadership framework, teachers trained through Teach for America continuously promote academic success in their classrooms, which is supported by significant, documented academic gains of their students (Farr, 2010). Undoubtedly, teachers influence the motivation of students in their classrooms.

Student motivation is a topic that solicits disagreement from professionals regarding what it is, where motivation originates, and what affects motivation. Early views of motivation held that it was internal, while later views posited that external forces were the cause of motivation (Schunk, Pintrich, & Meece, 2002). Assigning a derivative of motivation is challenging because of the multifaceted arguments and theories of motivation. The task of identifying a primary source is further complicated by the varying paradigms of learning. Bearing in mind that motivation can be a derived from teacher actions or student uniqueness, the relationships between teachers and students seem plausible for explaining student performance in the classroom. Therefore, studies of teacher leadership should focus on the dyadic relationships between teachers and students.

Nearly forty years ago, Brophy and Good (1974) identified a gap in the research of teacher-student relationships. They asserted, "one flaw in much of the research that has looked at naturalistic behavior in classrooms has been the stress upon teacher behavior directed toward the entire class rather than toward individual students" (p. 3). Investigating interactions between teachers and students, while treating students as an entire class or group, would not be troublesome if teachers did not vary their interactions from one student to another; however, this is not the case (Brophy & Good, 1974). While some studies examining the teacher as leader and the corresponding impact on students have taken place at the college level—as demonstrated later in the literature review—relatively few have undertaken the challenge of investigating the concept of teacher as leader in the secondary setting. Brophy and Good (1974) cautioned against applying findings from studies using college students to the secondary setting because students in secondary education may be less motivated than college students. Therefore, an empirical investigation of the dyadic relationships between teachers and students at the secondary level and the corresponding effects on student achievement is timely. The present study investigates the phenomenon of teacher-student relationships and the corresponding impact of such relationships on student achievement.

Problem Statement

In a classroom, relationships inevitably form between teachers and students. The type and quality of relationships between teachers and students can vary depending on a variety of factors. Leader-member exchange (LMX) theory reasons that subordinates who have a high-quality relationship with their leader are willing to do more than is required (Northouse, 2010). If a teacher, as a classroom leader, could foster high-quality relationships with all students, then, would students, as subordinates, be willing to work harder in the classroom? If so, total student achievement and learning outcomes might increase. While many leadership theories have been empirically applied to educational settings, studies of LMX theory involving K-12 education are virtually nonexistent. When considering LMX, antecedents of relationship quality are of interest. One such precursor to the quality of relationships between teachers and students could be the difference in cognitive style.

Cognitive style, as explained in Kirton's (2003) adaption-innovation (A-I) theory, references one's preference for solving problems. A-I theory refers to the differences between individual preferences for solving problems as cognitive gap (Kirton, 2003) and describes the detrimental effects of cognitive gap when working with others. A benefit of applying A-I theory to an educational context is the potential that the theory offers for facilitating positive working relationships between teachers and students. A-I theory holds that problems of communication and collaboration increase as the gap between peoples' cognitive styles increases (Kirton, 2003). If large cognitive gaps exist between teachers and students, causing problems in the dyadic relationship, it is possible that student achievement will be negatively impacted.

Involving cognitive style in the investigation of teacher-student relationships may lead to a deeper understanding of the phenomenon. A lack of understanding exists with regard to how cognitive gap and teacher-student relationship quality interact with one another and impact student achievement. As teachers strive to lead students to academic success, the present research has the potential to alter the ways in which teachers interact with students.

Literature Review

The need for simultaneously exploring teacher-student relationships and cognitive styles is identified in the literature numerous times. Kirton, Bailey, and Glendinning (1991) suggested that investigating the impact of cognitive style on interactions between teachers and students would enhance the understanding of the educational process. Therefore, "continued research into cognitive style in the educational context must include consideration of the cognitive styles of the pupils and their place in the complex interaction of teachers" (Kirton, Bailey, & Glendinning, 1991, p. 454). Further, Jablokow, Vercellone-Smith, and Richmond (2009) call for an investigation of cognitive gaps between teachers and students and how such gaps impact the educational experience. Because the actions of teachers influence how relationships between students and teachers develop, educators need to understand the messages they unintentionally send to students and the impact those messages may have (Puccio, Talbot, & Joniak, 1993). Specifically, many are concerned about how cognitive style differences could impact student achievement.

According to Jablokow, Vercellone-Smith, and Richmond (2009), educational outcomes may be enhanced when the cognitive styles of students and teachers match. However, after examining cognitive style in a college setting, Friedel and Rudd (2009) suggested that more research was needed regarding cognitive gap between students and teachers in different academic settings where teachers and students collaborate. The high school classroom affords an opportunity for expanding the research. Jablokow, Vercellone-Smith, and Richmond (2009) agree, encouraging future research that explores cognitive gap between teachers and students, the impact of cognitive gaps on student and teacher perceptions of one another, and the potential effects that cognitive gap may have on student achievement. The cognitive style of the teacher could lead to the "instructor inadvertently favoring students with cognitive styles closer to his or her own; or possibly believing a student has a low cognitive level, when in fact the student has high intelligence, but has a greatly dissimilar cognitive style" (Friedel & Rudd, 2009, p. 42).

LMX is a measure of the quality of the relationship between a leader and a subordinate, but relationship quality can be impacted by a variety of factors including duration of the relationship, intensity of the relationship, or possibly cognitive style. A-I theory explains that communication problems between people worsen as the gap of cognitive style increases. Considering the destructive potential of a large cognitive gap between two people, examining the effects of cognitive gap on relationship quality in an educational setting is critical. Friedel and Rudd (2009) warned that while student engagement may not be impacted by cognitive gap, a difference in style between teachers and students could impact relationships with other classroom components such as a student's preference for completing assignments or a teacher's use of subjective assessments. A lack of understanding exists with regard to how cognitive gap and teacher-student relationship quality interact with one another and impact student achievement.

Research Purpose and Questions

The present study expands upon existing research in the areas of LMX and cognitive style by investigating how the quality of teacher-student relationships and the gap of cognitive styles between teachers and students impact student achievement as demonstrated by student scores on a standardized end of course test. The study is guided by the following research questions:

1. What are the relationships between cognitive gap between teachers and students, dyadic intensity, LMX quality, and student achievement?
2. What dimensions of teacher-student relationships affect LMX quality from the teacher perspective?
3. What dimensions of teacher-student relationships affect LMX quality from the student perspective?
4. What are the effects of cognitive gap, teacher LMX, and student LMX on student achievement?

Methodology

This study took place in the Career and Technical Education (CTE) department of a suburban high school in western North Carolina. The high school has a population of just over 800 students who learn in forty-four classrooms and five CTE laboratories spread throughout the school.

As the present study utilized the census sampling method, the population was comprised of CTE teachers (N = 11) and their students (N = 210) in classes that each teacher identified for participation. Lodico, Spaulding, and Voegtle (2006) explained that in census sampling, the researchers survey all known members of an identified population. Because the present study investigates dyadic relationships between teachers and students, it was necessary to employ the census sampling method to feasibly complete the quantitative strand. Cooper and Schindler (2003) indicated that a census study is fitting when determined to be necessary for successful execution of the investigation.

The participant sample represented six CTE disciplines: (a) agriculture, (b) business and information technology, (c) family and consumer sciences, (d) health occupations, (e) marketing, and (f) trade and industrial education. The selection of the school used for the case study was motivated by: (a) quantity of CTE teachers in the school, (b) geographic proximity of the school to the researchers' residence, (c) the suitability of the school for the present study, and (d) the willingness of the school to grant access to teachers and students. Selecting the population for the present study in the way described represents two major sampling schemes of mixed methods research: critical case and maximum variation. Onwuegbuzie and Collins (2007) explained that critical case sampling involves the selection of a sampling and group because their inclusion provides insight into the phenomenon of interest. Maximum variation references the selection of individuals to maximize the range of perspectives.

Instrumentation and Data Collection

We used four instruments to gather information that, in turn, was used to answer the research questions: (a) the Kirton Adaption-Innovation Inventory (KAI), (b) researcher-developed surveys for students and teachers, (c) the Leader-member Exchange 10 item scale (LMX-SLX), and (d) the North Carolina CTE end-of-course tests. Specifically, the KAI was used to measure the cognitive style of teachers and students, the researcher-developed survey was used to measure dyadic intensity, the LMX-SLX was used to measure the perceived quality of dyadic relationships between teachers and students, and the North Carolina CTE end-of-course tests were used to measure student achievement in CTE classes. Additionally, demographic information was collected from teacher and student participants. Specifically, teacher participants were asked to provide demographic data regarding years of teaching experience, primary CTE discipline, level of education, teaching preparation, age, sex, and ethnicity or race. Student participants were asked to provide demographic data regarding age, sex, ethnicity or race, and grade point average. Also, participants were asked to indicate their interest in participating in an interview to explore the development of teacher-student relationships.

The LMX-SLX was administered to all teacher (N=11) and student (N=210) participants in the present study by the researchers. The teacher participants were asked to complete one LMX-SLX with teacher as referent for each student, while student participants were asked to complete the LMX-SLX with student as referent. The researcher-developed survey was administered to all teacher and student participants by the researchers. This survey was coded with a unique alphanumeric identifier corresponding with the name of each participant in the study. The KAI was administered to all teacher and student participants in the present study by the researchers. The demographic data collector was administered to all teacher and student participants by the researchers. Once participants completed all instruments, we transferred responses and scores into a database in preparation for data analysis. Teacher participants in the study administered the CTE end-of-course tests. Each teacher provided student grades on the CTE end-of-course tests to the researchers.

Data Analysis

Pearson product-moment correlation coefficients were computed to answer research question one: what are the relationships between cognitive gap between teachers and students, dyadic intensity, LMX quality, and student achievement? Pearson product-moment correlation coefficients are the most common type of correlation, "which measures the degree of relationship between two continuous variables" (Coolidge, 2006, p.162). Research question 2 asked which dimensions of teacher-student relationships affect LMX quality from the teacher perspective; research question 3 asked which dimensions of teacher-student relationships affect LMX quality from the student perspective. These questions were analyzed using forced entry regression. Research question four explored the effects of cognitive gap, teacher LMX, and student LMX on student achievement, and was analyzed using the method of path analysis. According to Fraenkel and Wallen (2000), "path analysis is used to test the possibility of a causal connection among three or more variables" (p. 366). For the present study, the research developed a five variable path model (Figure 1), showing how the variables are related to one another.

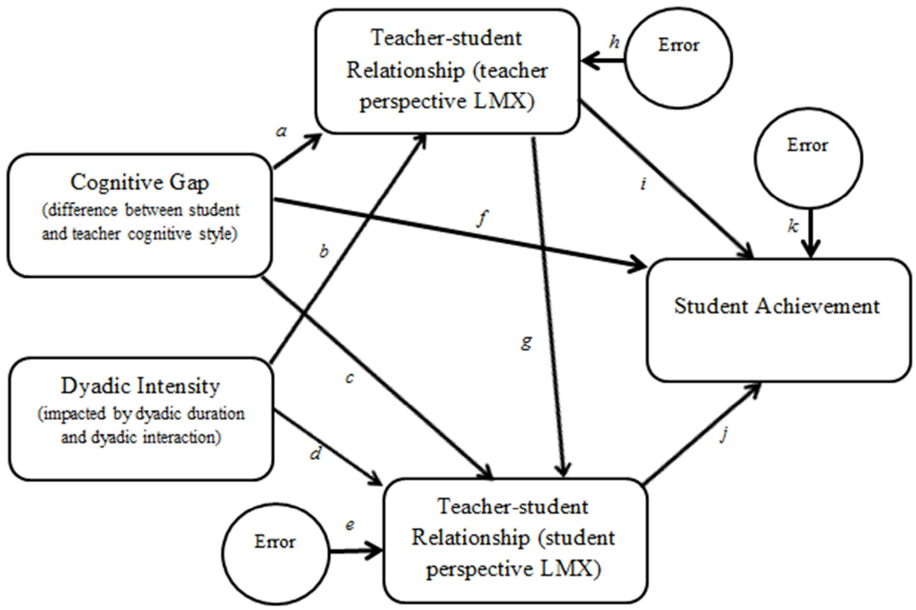

Figure 1. Five variable path model.

Results

There were 11 teachers who participated in the present study, five female and six male. All teacher participants were white, ranging in age from 31 to 51 and over. The teaching experience of teacher participants ranged from a first-year teacher to more than 26 years of teaching, representing six unique disciplines of Career and Technical Education (CTE). Four of the teachers earned certification through a traditional teacher preparation program, while the remaining seven were alternatively certified. Of the 11 teachers who participated, two reported the highest level of education completed as something other than a bachelor's, master's, or doctoral degree. Five held a bachelor's degree and four held a master's degree.

The student participant group was comprised of 210 students; however, not all participants provided complete demographic data. Of those who did provide demographic data, 113 were female and 92 male. All of these students were enrolled in a CTE class. Five racial/ethnic groups were represented by the students including Hispanic/Latino of any race (n=3), American Indian or Alaska Native (n=3), Native Hawaiian or Pacific Islander (n=1), White (n=196), and two or more races (n=3). Student participants ranged in age from 14 to 19. Table 1 shows the mean, standard deviation, minimum and maximum scores for teacher KAI, student KAI, cognitive gap, dyadic intensity, teacher LMX, student LMX, and student achievement.

Table 1

Means, Standard Deviations, Minimums, and Maximums for Teacher KAI, Student KAI, Cognitive Gap, Dyadic Intensity, Teacher LMX, Student LMX, and Student Achievement.

Variable	n [f]	*M*	*SD*	Min	Max
Teacher KAI[a]	11	94.64	12.59	79	123
Student KAI[a]	210	92.12	10.71	68	127
Cognitive Gap[b]	210	11.46	9.82	0	49
Dyadic Intensity[c]	210	6.67	8.33	2	59
Teacher LMX[d]	210	41.39	6.26	25	50
Student LMX[d]	210	41.45	6.04	14	50
Student Achievement[e]	206	86.72	9.13	51	100

Note. [a]KAI scores can range from 32-160. [b]Cognitive gap scores are the difference between Teacher KAI and Student KAI and can range from 0-128. [c]Dyadic intensity scores have a lower limit of 2 and do not have an identified upper limit. [d]LMX scores can range from 10-50. [e]Student achievement scores can range from 0-100. [f]Missing data were excluded.

Research Question 1: What are the relationships between the cognitive gap between teachers and students, dyadic intensity, LMX quality, and student achievement?

Pearson product-moment correlation coefficients were computed to assess the relationships between the cognitive gap between teachers and students, dyadic intensity, LMX quality, and student achievement. Three statistically significant relationships were identified among the various dimensions of teacher-student relationships; specifically, the relationships between dyadic intensity and teacher LMX, dyadic intensity and student LMX, and teacher LMX and student LMX were significant. There was a weak, positive relationship between dyadic intensity and teacher LMX ($r=.15$, $p<0.05$). A weak, positive relationship was found between dyadic intensity and student LMX ($r=.21$, $p<.01$). Also, the correlation coefficient revealed a moderate, positive relationship between teacher LMX and student LMX ($r=.43$, $p<.01$). Table 2 presents a summary of correlation coefficients for the dimensions of teacher-student relationships under investigation.

Table 2

Correlation Matrix for Hypothesized Path Model Variables.

	Cognitive	Dyadic	Teacher	Student	Student

		Gap	Intensity	LMX	LMX	Achievement
Cognitive Gap	Pearson Correlation	-				
Dyadic Intensity	Pearson Correlation	-.03	-			
Teacher LMX	Pearson Correlation	-.04	.15*	-		
Student LMX	Pearson Correlation	.08	.21**	.43**	-	
Student Achieve.	Pearson Correlation	-.02	.11	.10	.13	-

Note. *p<0.05; **p<0.01.

Research Question 2: What dimensions of teacher-student relationships affect LMX quality from the teacher perspective?

A forced entry regression analysis was conducted to determine which dimensions of teacher-student relationships affect LMX quality from the teacher perspective. According to Keith (2006), forced entry regression is appropriate for explanatory research, and has the advantage of providing the direct effect of each independent variable on the dependent variable. Table 3 shows the results of the regression analysis. Though the variable of dyadic intensity (b=.112, t=2.171, p<0.05) had a significant effect on teacher LMX, the overall regression is not statistically significant (F=2.561, p>0.05).

Table 3

Regression Output for Teacher LMX (X_3) on Cognitive Gap (X_1) and Dyadic Intensity (X_2).

Model Summary

Model	R	R^2	Adjusted R Square	Std. Error of the Estimate
1	.155 [a]	.024	.015	6.215

a. Predictors: (Constant), Cognitive Gap, Dyadic Intensity.

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	197.824	2	98.912	2.561	.080
Residual	7996.157	207	38.629		
Total	8193.981	209			

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	40.928	.752		54.410	.000		
Cognitive Gap	-.025	.044	-.039	-.569	.570	.999	1.001
Dyadic Intensity	.112	.052	.149	2.171	.031*	.999	1.001

Note. *p<0.05; **p<0.01. [a]Dependent Variable: Teacher LMX.

Research Question 3: What dimensions of teacher-student relationships affect LMX quality from the student perspective?

A forced entry regression analysis was conducted to determine which dimensions of teacher-student relationships affect LMX quality from the student perspective. Table 4 shows the results of the regression analysis. The three variables of cognitive gap, dyadic intensity, and teacher LMX, in combination, account for 21.4% of the variance in student LMX. The overall regression is statistically significant (F=18.656, p<0.01). The variables of dyadic intensity (b=.107, t=2.356, p<0.05) and teacher LMX (b=.395, t=6.550, p<0.01) had a significant effect on student LMX.

Table 4

Regression Output for Student LMX (X_4) on Cognitive Gap (X_1), Dyadic Intensity (X_2), and Teacher LMX (X_3).

Model Summary

Model	R	R^2	Adjusted R Square	Std. Error of the Estimate
1	.462[a]	.214	.202	5.396

a. Predictors: (Constant), Cognitive Gap, Dyadic Intensity, Teacher LMX.

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1629.686	3	543.229	18.656	.000**
Residual	5998.338	206	29.118		
Total	7628.024	209			

Coefficients

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	23.651	2.555		9.258	.000		
Cognitive Gap	.064	.038	.103	1.672	.096	.997	1.003
Dyadic Intensity	.107	.045	.147	2.356	.019*	.977	1.024
Teacher LMX	.395	.060	.410	6.550	.000**	.976	1.025

Note. *p<0.05; **p<0.01. [a]Dependent Variable: Student LMX.

Computation of additional path coefficients

A third forced entry regression analysis was conducted to calculate the path coefficients that represent the effects of teacher LMX, cognitive gap, and student LMX on student achievement. Table 5 shows the results of the regression analysis. The three variables of teacher LMX, cognitive gap, and student LMX, in combination, account for 2.1% of the variance in student achievement. The overall regression is not statistically significant (F=1.456, p>0.05). None of the variables in the model had a significant effect on student achievement.

Table 5

Regression Output for Student Achievement (X_4) on Cognitive Gap (X_1), Teacher LMX (X_2), and Student LMX (X_3).

Model Summary

Model	R	R^2	Adjusted R Square	Std. Error of the Estimate
1	.145[a]	.021	.007	9.097

a. Predictors: (Constant), Teacher LMX, Cognitive Gap, Student LMX.

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	361.361	3	120.454	1.456	.228
Residual	16716.309	202	82.754		
Total	17077.670	205			

Coefficients

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	76.786	5.145		14.924	.000		
Teacher LMX	.073	.113	.051	.648	.518	.811	1.233
Cognitive Gap	-.027	.065	-.029	-.413	.680	.986	1.014
Student LMX	.174	.117	.115	1.488	.138	.808	1.238

Note. *p<0.05; **p<0.01. [a]Dependent Variable: Student Achievement.

Research Question 4: What are the effects of cognitive gap, teacher LMX, and student LMX on student achievement?

Using the three multiple regression models previously examined, a path analysis was conducted to determine the causal effects of cognitive gap, teacher LMX, and student LMX on student achievement. The path coefficients, which are the standardized regression coefficients, are presented in the path model shown in Figure 2. The data partially support the path model, as the path coefficients from dyadic intensity to teacher LMX, dyadic intensity to student LMX, and teacher LMX to Student LMX are statistically significant. None of the paths to student achievement, however, were statistically significant. The statistical significance of the second regression model, student LMX, and the path coefficients from dyadic intensity to teacher LMX and teacher LMX to student LMX, indicate the potential indirect effect of dyadic intensity on student LMX.

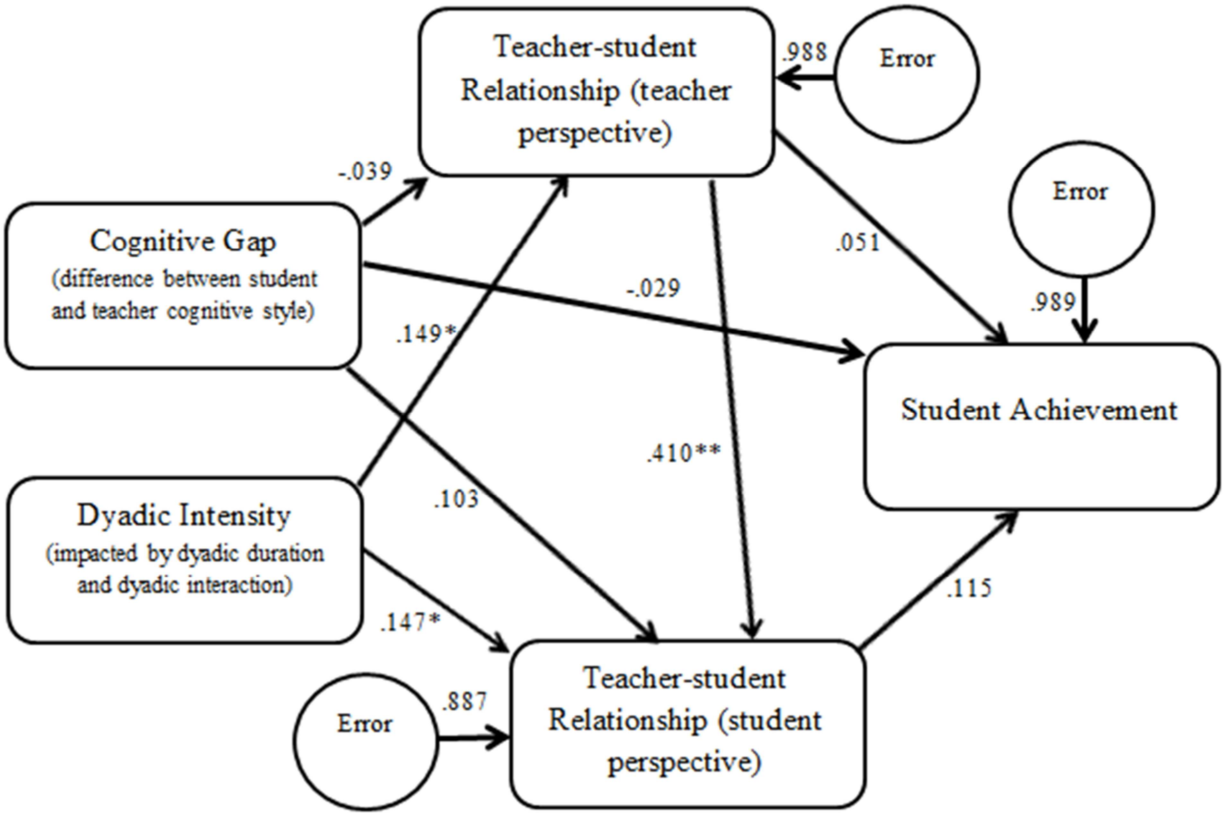

Figure 2. Solved model of the effects of cognitive gap, dyadic intensity, teacher LMX, and student LMX on student achievement (*p<0.05; **p<0.01).

To determine the indirect effect of dyadic intensity on student LMX, the path from dyadic intensity to teacher LMX was multiplied times the path from teacher LMX to student LMX. To calculate the total effect of dyadic intensity on student LMX, the direct effect was added to the indirect effect. Table 6 shows the direct, indirect, and total effects of dyadic intensity and teacher LMX on student LMX.

Table 6

Standardized Direct, Indirect, and Total Effects of Dyadic Intensity and Teacher LMX on Student LMX.

Variable	Direct Effect	Indirect Effect	Total Effect
Teacher LMX	.410	-	.410
Dyadic Intensity	.147	.061	.208

Discussion and Conclusions

All three statistically significant relationships highlighted by Pearson product-moment coefficients were explained through analysis of the path model. First, there was a weak, positive relationship between dyadic intensity and teacher LMX. Results of the path analysis showed a statistically significant causal relationship between dyadic intensity and teacher LMX, indicating that increased teacher-student interactions caused a higher-quality teacher-student relationship from the teacher's perspective. A weak, positive relationship was found between dyadic intensity and student LMX. Results of the path analysis showed a statistically significant causal relationship between dyadic intensity and student LMX, indicating that increased teacher-student interactions caused a higher-quality teacher-student relationship from the student's perspective. Also, the correlation coefficient revealed a moderate, positive relationship between teacher LMX and student LMX. Results of the path analysis showed a statistically significant causal relationship between teacher LMX and student LMX, indicating that a higher-quality teacher-student relationship from the teacher perspective caused a higher-quality teacher-student relationship from the student perspective.

Graen and Uhl-Bien (1995) suggested that leaders provide all subordinates with access to LMX processes, indicating that leaders set the pace for LMX development; however, the three phases of leadership-making explain that subordinates can initiate further growth. All dyadic relationships begin with the stranger phase, but enhanced working relationships must occur through an offer made by either person in the dyad, allowing dyads to move to advanced stages of development (Graen & Uhl-Bien, 1995). In cases where the offer may be initiated from the subordinate, though, the leader controls the speed of dyadic relationship development. In order for progression to occur, though, both members of the dyad must be amenable to an enhanced relationship. Still, in the case of teachers and students, if the teacher does not agree to advance the relationship, it can never evolve. Therefore, we conclude that the quality of teacher-student relationships from the student perspective is dependent on teacher-student relationships from the teacher perspective. Just as leaders should be encouraged and trained in making partnership offers to all subordinates to make the LMX process more equitable and to increase the leadership of managers (Graen & Uhl-Bien, 1995), teachers as leaders, at the pre-service and in-service levels, should receive professional development and instruction in developing teacher-student relationships.

We hypothesized that teacher LMX and student LMX would also affect student achievement; however, this hypothesis was not supported by the data. This finding contradicted leader-member exchange theory, which suggests that subordinates who have low-quality relationships with their leaders do minimal work (Dansereau, Graen, & Haga, 1975). Further, those who have high-quality relationships with their leaders may offer more time and energy on tasks, may demonstrate increased commitment to tasks, and may assume greater responsibility (Dansereau, Graen, & Haga, 1975). In the present study, though, the quality of relationships between teachers and students did not affect student achievement. We concede, though, that the measure of student achievement in the present study did not reflect the extent to which students were committed to tasks or assumed responsibility as a learner in the classroom because achievement was measured by performance on a standardized test.

We hypothesized that cognitive gap would affect the quality of teacher-student relationships from both the teacher and student perspective. This relationship, however, was not statistically significant in the present study. This result substantiates the findings of Friedel and Rudd (2009). In their study, Friedel and Rudd (2009) showed that cognitive gap between students and instructors had little to no effect on student engagement. We suggests that over the duration of a course, students learn to cope with cognitive style differences, which explains why the cognitive gap did not have a significant effect. This claim is made based on the previous position of Jablokow, Vercellone-Smith, and Richmond (2009), who suggested that learning from a teacher whose style is different could facilitate coping behavior.

We conclude that dyadic intensity is a predictor of the perceived quality of teacher-student relationships from both the teacher perspective and the student perspective. Further, the perceived quality of teacher-student relationships from the teacher perspective is a predictor of the perceived quality of teacher-student relationships from the student perspective. Relating results of the present study to previous research is difficult in that no prior studies of LMX or cognitive style have simultaneously investigated teacher-student dyads and student achievement.

Implications and Recommendations

As teachers are leaders of student success, LMX theory and the results of the present study offer multiple implications for teachers. Results of the present study highlight areas where LMX could be emphasized in an educational context. As Graen and Uhl-Bien (1995) explained, when a leader makes LMX available to all subordinates, there is an increased potential for the development of high quality relationships; however, Othman, Ee, and Shi (2010) highlighted limitations of LMX theory and argued that, in some cases, high-quality LMX could be dysfunctional. Further, antecedents and outcomes of such unhealthy interpersonal interaction within a group were identified (Othman, Ee, & Shi, 2010). While increased interaction outside of the class can be a positive step toward developing high quality relationships, teachers should use caution and monitor how teacher-student relationships develop to prevent dysfunction.

Existing literature reveals that favoritism by the leader, reliance on impression management by the followers, and perceptions of unfairness may lead to dysfunctional relationships within group settings (Othman, Ee, & Shi, 2010). Othman, Ee, and Shi (2010) proposed that dysfunctional high-quality LMX occurs in accordance with two circumstances: a) "the flawed assessment of a member by a leader," (p. 341), and b) when members "use upward influence tactics to create a favourable impression of themselves" (p. 341). Consideration of these concerns is important when applying LMX theory to an educational context where the teacher is leader and students are subordinates. Because of this, teachers must exercise caution when developing relationships with students and strive to not form initial impressions and expectations that may impact LMX development.

Also of important note are implications for A-I theory in education. According to Jablokow, Vercellone-Smith, and Richmond (2009), it is highly unlikely that a teacher's cognitive style will match more than a few students in a given class. This was true in the present study. In the present study, the relationships between cognitive gap and teacher-student relationships and student achievement were not statistically significant in the path model; however, an awareness that diverse cognitive styles exist in a classroom could remind teachers to be mindful when designing lessons and provide flexibility with structure to meet the needs of all learners.

Based on data analysis and a synthesis of the findings, we recommend two specific areas for future inquiry related to leader-member exchange and cognitive style in secondary educational settings: (a) investigate the impacts of leader-member exchange and cognitive style on student achievement using alternative indicators of student achievement, and (b) examine the impacts of leader-member exchange and cognitive style on student achievement outside of the context of career and technical education (CTE). Each recommendation for future research is addressed.

We endorse future investigation of the impacts of leader-member exchange and cognitive style on student achievement using alternative indicators of student achievement. In the present study, student scores on a state-administered standardized test represented student achievement. In secondary education, and most certainly in CTE, there are multiple indicators of student achievement including formative and summative assessment measures made by teachers, performance-based measures where students demonstrate achievement through practical application, and culminating scores in the form of semester grades that represent student achievement throughout the course of a semester. Inserting semester grades into the model would subject the measure of student achievement to teacher subjectivity; however, consideration of student performance on classroom assignments is critical to a greater understanding of the potential impact that leader-member exchange has on student achievement.

Also, we encourage an examination of the effects of leader-member exchange and cognitive style on student achievement outside the context of CTE. CTE students experience coursework and learn skills that are applicable in the workforce beyond high school through an experiential approach (Stone & Alfeld, 2004). Because of the nature of teacher-student interaction required in CTE courses, teacher-student relationships may develop in a different manner, given the increased frequency of one-on-one coaching and feedback required in CTE classes. CTE naturally lends itself to a more student-centered, authentic approach to instruction (Newman & Wehlage, 1995), whereas other secondary education coursework may not. As leader-member exchanges may manifest differently outside the context of CTE, investigating effects of leader-member exchange and cognitive style on student achievement in non-CTE classes is necessary to advance an understanding of the phenomenon.

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Author Biographies

Chaney Mosley, PhD, is the Director of Career and Technical Education for Metropolitan Nashville Public Schools and an Adjunct Assistant Professor of Agricultural Education in the Department of Agricultural and Environmental Sciences at Tennessee State University. His research areas of interest include teacher leadership, problem solving, teaching and learning in career and technical education.

Thomas Broyles, PhD, is an Extension Associate Professor and State Program Leader of 4-H / Youth Development in the Department of Agricultural and Environmental Sciences at Tennessee State University. His research areas of interest include problem solving, decision-making, teaching and learning.

Eric Kaufman, PhD, is an Associate Professor of Leadership Education in the Department of Agricultural and Extension Education at Virginia Tech University. His research areas of interest include collaborative leadership in community and volunteer settings, group cohesion, group exchange structures, and problem solving.