

Comparison and Evaluation of Four Models of Teacher Leadership

Pamela S. Angelle

The University of Tennessee, Tennessee, USA

Corey A. DeHart

Maryville City Schools, USA

Abstract

The purpose of this quantitative study was to employ confirmatory factor analysis (CFA) to compare the four-factor model of teacher leadership with three alternative models. The alternative models of teacher leadership include: (a) a two-factor model investigating teacher leadership as teacher-driven and principal-driven factors, (b) a three-factor model of teacher-driven factors of teacher leadership, and (c) a five-factor model in which a factor from the four factor model is split into two separate factors. While the fit indices indicated that the three-factor model provided the best model fit for the data used in this study, evaluation of CFA models of the strength and interpretability of the parameter estimates demonstrated that the four-factor model provides a better representation of teachers' perceptions of teacher leadership in a school. Though focused on the four-factor model of teacher leadership, this study filled a theoretical gap by examining educational leadership through the lens of teacher as the cornerstone.

Article Info

Article History:

Received
March, 28, 2015

Accepted
June, 10, 2016

Keywords:

*Teacher leadership,
Leadership models,
Factor analysis,
Quantitative study,
Fit indices*

Cite as:

Angelle, P. S. & DeHart, C. A. (2016). Comparison and evaluation of four models of teacher leadership, *Research in Educational Administration & Leadership*, 1(1), 85-119.

Introduction

Studies have documented the influence that effective school leadership has on both the achievement of students and the effectiveness of schools (Hallinger & Heck, 1996; Leithwood & Jantzi, 1999; Leithwood, Louis, Anderson, & Wahlstrom, 2004; Marzano, Waters, & McNulty, 2005; Murphy & Hallinger, 1988). As the notion of school leadership has expanded to include teachers, research has also expanded into an examination of the influence of teacher leadership on school improvement. Teacher leaders “lead within and beyond the classroom, influence others toward improved educational practice, and identify with and contribute to a community of teacher leaders” (Katzenmeyer & Moller, 2001, p. 6). Current research indicates that teacher leadership has a direct positive effect on school improvement, school effectiveness, and teacher morale (Frost & Harris, 2003; Gronn, 2000; Leithwood & Jantzi, 2000). However, in their review of the research on teacher leadership, Harris and Muijs (2002) noted that, while there is substantial evidence of the beneficial effects of teacher leadership, there is little research on the nature of teacher leadership, adding that there is a need for both empirical evidence of teacher leadership in action and for different models of teacher leadership.

A review of the literature revealed that only two instruments have been used to measure teacher leadership prior to 2009. Leithwood and Jantzi (1999) measured teacher leadership with three items from the 142-item Organizational Conditions and School Leadership Survey. The only other instrument to measure teacher leadership was one proposed in a thesis as part of a master’s degree program (Triska, 2007). Likewise, while some authors have applied existing models of leadership to the work done by teacher leaders (e.g., Keung, 2009; Webb, Neumann, & Jones, 2004), there have been very few models developed which apply specifically to teacher leadership. In 2008, Angelle, Taylor, and Olivier developed the 25-item Teacher Leadership Inventory (TLI) measuring teacher leadership. Using both exploratory and confirmatory factor analysis, the instrument was



pared to 17 items and a four-factor model of teacher leadership was developed from the TLI. The purpose of this quantitative study is to employ confirmatory factor analysis (CFA) to compare the four-factor model of teacher leadership with three alternative models. The alternative models of teacher leadership include: (a) a two-factor model investigating teacher leadership as teacher-driven and principal-driven factors, (b) a three-factor model of teacher-driven factors of teacher leadership, and (c) a five-factor model in which a factor from the original study is split into two separate factors.

This examination and comparison of models has implications for education and educational leadership. First, the models in question include both formal and informal roles of teacher leadership; prior measurements of teacher leadership generally only included formal roles appointed by the principal or other administrators. Second, a model of teacher leadership supported by sound research can be used by district and school leaders to gauge the extent of leadership among a school's faculty. Finally, this study has implications for future research as a valid and reliable instrument supported by statistical tests that can be used in further educational studies.

Conceptual Framework

Because this study is intended to explore the concept of teacher leadership, the four-factor model of teacher leadership proposed by Angelle and DeHart (2010) and based upon prior research (Angelle & Beaumont, 2006; Angelle et al., 2008) served as a conceptual framework. A preliminary depiction of the four-factor model of teacher leadership is shown in Figure 1.

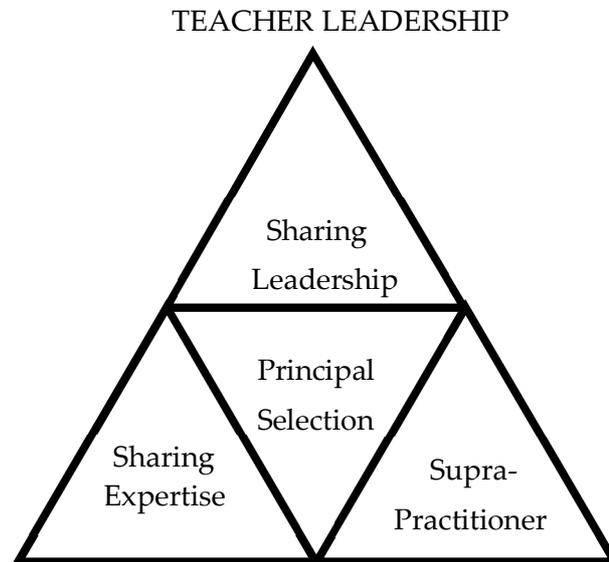


Figure 1. *The four-factor model of teacher leadership*

The first factor, Sharing Expertise (SE), focuses on the perceptions of teachers' pedagogical and classroom management skills as well as their willingness to share those skills with their fellow teachers. The second factor, Sharing Leadership (SL), describes a reciprocal relationship existing between the principal and the teachers in a school. This factor is composed of two sub-factors: Leadership Opportunities (SLO) and Leadership Engagement (SLE). The first sub-factor depends upon a principal's attitude toward offering opportunities for teachers to engage in leadership practices, while the second sub-factor reflects teachers' inclination to take on leadership responsibilities. The perceptions of teachers' willingness to go above and beyond their prescribed roles are indicated by the third factor, Supra-Practitioner (SP). The final factor, Principal Selection (PS), measures the teachers' perceptions that the principal controls which teachers may participate in leadership activities.



Review of the Literature

Teacher leadership has changed over the past three decades. Silva, Gimbert, and Nolan (2000) described the evolution of teacher leadership as occurring in three waves. During the first wave in the early 1980s, teacher leadership was focused on formal roles such as department head or grade level chair (Little, 2003; Silva, Gimbert, & Nolan, 2000). While these roles provided teachers with leadership opportunities, they were not designed to allow teachers to make significant changes to a school's instructional effectiveness (Evans, 1996; Silva et al., 2000; Wasley, 1991). During the second wave of reform beginning in the mid-1980s, teacher leadership roles sought to take advantage of the instructional knowledge of teachers, and positions such as curriculum developer and teacher mentor were established (Hart, 1995; Silva et al., 2000). Although these types of leadership positions focused more on the pedagogical than the managerial expertise of teachers, they were still fringe leadership positions without true authority (Wiggenton, 1992). The third wave of teacher leadership began in the late 1980s and early 1990s and continues today as an emphasis on collegiality, collaboration, and continuous learning (Darling-Hammond, 1988; Devaney, 1987; Lieberman, 1988; Little, 1988; Silva et al., 2000).

Like other forms of leadership, teacher leadership has been defined in many ways (see Table 1). Researchers have defined teacher leadership according to the teachers' influence on school culture (Katzenmeyer & Moller, 2001), their collaborative efforts (Lambert, 1998), their actions within their own classroom (Youitt, 2007), and their actions outside of classrooms (Katzenmeyer & Moller, 2001). In identifying teacher leadership, O'Connor and Boles (1992) identified specific leadership competencies including understanding politics, communication skills, and ability to change among others. Teacher leadership has also been connected to other leadership theories including instructional and participative leadership, leadership as an organizational phenomenon (Ogawa & Bossert, 1995), distributed leadership (Spillane, Halverson, & Diamond, 2001), and parallel

leadership (Crowther et al., 2002). One commonality present in all of the definitions reviewed above is that leadership in a school does not have to be instilled in a single person but rather can be dispersed and shared with all school staff. In discussing instructional leadership, Pellicer and Anderson (1995) supported this concept by stating that leadership “does not necessarily begin and end with the principal. Rather, instructional leadership must come from teachers if schools are to improve and teaching is to achieve professional status” (p. 16).

Table 1.
Definitions of Teacher Leadership.

Author	Definition - Teacher leadership is:
Boles & Troen (1994)	“a collective form of leadership assumed by many individuals” in which teachers develop expertise by working collaboratively. (p. 19)
Childs-Bowen, Moller & Scrivner (2000)	“when teachers function in professional learning communities to affect student learning; contribute to school improvement; inspire excellence in practice; and empower stakeholders to participate in educational improvement.”(p. 28)
Crowther, Kaagen, Ferguson, & Hann (2002)	“essentially an ethical stance that is based on views of both a better world and the power of teachers to shape meaning systems. It manifests in new forms of understanding and practice that contribute to school success and to the quality of life of the community in the long term.” (p. 10)
Fullan & Hargreaves (1996)	“the capacity and commitment to contribute beyond one’s own classroom.” (p. 9)
Fullan (1994)	“inter-related domains of commitment and knowledge, including commitments of moral purpose and continuous learning and knowledge of teaching and learning, educational contexts, collegiality, and the change process.” (p. 246)
Katzenmeyer & Moller (2001)	leaders who lead “within and beyond the classroom, influence others towards improved educational practice, and identify with and contribute to a community of teacher leaders.” (p. 6)



Lambert (1998)	"broad-based, skillful involvement in the work of leadership." (p. 3) ^a
Miller, Moon, & Elko (2000)	"actions by teachers outside their classrooms that involve an explicit or implicit responsibility to provide professional development to their colleagues, to influence their communities' or districts' policies, or to act as adjunct staff to support changes in classroom practices among teachers." (p. 4)
Wasley (1991)	"the ability of the teacher leader to engage colleagues in experimentation and then examination of more powerful instructional practices in the service of more engaged student learning." (p. 170)
York-Barr & Duke (2004)	"the process by which teachers, individually or collectively, influence their colleagues, principals, and other members of school communities to improve teaching and learning practices with the aim of increased student learning and achievement." (pp. 287-288)
Youitt (2007)	when teachers "lead learning by embracing new methods of teaching and learning. They understand the importance of the relationship between teachers and students (and their families). These teachers also frequently engage the use of new technologies in their teaching, and understand the need for resourcing flexibility to support educational innovation." (p. 1)

Teacher leadership has been shown to have significant effects on the teacher leaders themselves including increased self-esteem (Katzenmeyer & Moller, 2001; Ovando, 1996), improved leadership skills (Lieberman et al., 1988; Ryan, 1999), improved pedagogical skills (Troen & Boles, 1992), greater self-efficacy (Katzenmeyer & Moller, 1996, 2001), and improved morale (Frost & Harris, 2003; Smylie, 1994). Besides the teacher leader, colleagues are positively affected by teacher leadership in the forms of assistance with instructional practice, support with disruptive students, and overcoming resistance to organizational change (Katzenmeyer & Moller, 2001; Lieberman & Miller, 2005; Ryan, 1999). Schoolwide effects of teacher leadership include increased school effectiveness

(Griffin, 1995; Hargreaves, 1991; Little, 1990; Ovando, 1996; Rosenholz, 1989; Taylor & Bogotch, 1994; Teddlie & Reynolds, 2000), greater acceptance of school reform (Weiss & Cambone, 1994), and improved implementation of new policies and procedures (Griffin, 1995). Finally, several studies have also shown that teacher leadership has had an indirect effect on student performance (Leithwood & Jantzi, 1998; Ovando, 1996; Silins, Mulford, & Zarins, 2002; Wong, 1996).

Method

This multi-site, quantitative study builds upon previous research on the Teacher Leadership Instrument (TLI) and the related four-factor model of teacher leadership. The four-factor model consists of the following factors: Sharing Expertise, Sharing Leadership, Supra-Practitioner, and Principal Selection. In their 2010 paper introducing this model, Angelle and DeHart stated that the factor of Sharing Leadership consisted of two separate sub-factors, Leadership Opportunities and Leadership Engagement. Partitioning the Sharing Leadership factor into two separate factors allows for three other distinct models of teacher leadership.

To compare models, confirmatory factor analyses of the proposed model and the three alternative models were conducted using existing data from the second administration of the TLI. Once the analyses were run, model fit statistics and parameter estimates for each of the models were compared. First, the fit statistics for each model individually were examined using the chi-square statistic (χ^2), the goodness-of-fit index (GFI), the parsimony goodness-of-fit index (PGFI), the non-normed fit index (NNFI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA). Then, indices which allow for comparison across several models were examined, including Akaike's (1987) information criterion (AIC), the Consistent AIC (CAIC), and the expected cross-validation index (ECVI). Finally, parameter estimates including factor loadings and



factor correlations for each of the models were examined for statistical and substantive significance.

Participants

Four districts within a 60 mile radius of one US university were contacted for participation in the study. Three districts agreed to participate, including Ashton County,¹ Coleman County and Gotham City school districts. With permission of the university and the school districts, principals were then invited to participate, resulting in 23 schools and 241 teachers. Primary schools are those with student ages approximately 5 years to ten years. Middle school ages are approximately 11 years – 13 years and high schools enroll students 14 years – 18 years of age. There are 15 schools in Ashton County – nine primary schools, four middle schools, and two high schools. Of these 15 schools, 11 agreed to participate. Coleman County school district is comprised of 12 schools – nine primary schools, one combination middle/high school, and two high schools, with five agreeing to participate. Finally, all seven schools in Gotham City school district participated in the study, which included four primary schools, two middle schools, and one high school.

The sample of 421 respondents included 84.3% female and 15.7% male respondents. Teaching experience ranged from a minimum of zero years to a maximum of 45 years, with a mean experience of 16 years. The mean number of years spent teaching at the current school was 9.1 years, ranging from 0 to 40 years. When asked if they held a leadership position at their school, 44.7% of the respondents affirmed that they did while 55.3% stated they did not hold a position of leadership. Of the 421 respondents, 30.4% held Bachelor's degrees, 45.4% held Master's degrees, and 19.4% had matriculated beyond the Master's level (Master's + 30 hours, 5.2%; Master's + 45 hours, 2.6%; Education Specialist, 9.7%; Ph.D., 1.9%). A small group of

¹ All district names are pseudonyms to insure confidentiality.

respondents (4.8%) answered “Other” in response to their degree level, indicating they had an associate degree, a technical certification, or some other education below the level of a Bachelor’s degree. A summary of respondents’ demographic information is shown in Table 2. Table 3 depicts the numbers and percentages of male teachers, female teachers, and all teachers who responded to the TLI survey for each school system. Also shown in this table are the numbers and percentages of male teachers, female teachers, and all teachers for the schools included in this survey, as well as the percentage of teachers from each school system who responded to the TLI.

The Models

To facilitate understanding, the models used for comparison in this study will be described along with graphical representations. The original four-factor model serves as the conceptual framework of this study and was described earlier along with definitions for each of the factors. Those four factors along with the two sub-factors of Sharing Leadership – Leadership Engagement and Leadership Opportunities – are used in different combinations to derive the following three alternative models. The original four-factor model and the three alternative models are depicted in Figure 2.

The two-factor model. In this alternative model, teacher leadership is explained wholly by two factors – the teacher-driven and the principal-driven leadership. Leadership attributed to teachers is composed of the factors of Sharing Expertise (SE) and Supra-Practitioner (SP) from the original four-factor model as well as the sub-factor of Leadership Engagement (SLE). Leadership attributed to the principal is composed of the Principal Selection factor from the original four-factor model and the sub-factor of Leadership Opportunities.



Table 2. *Demographic Information of TLI Respondents*

		Female			Male			Total		Mean
		count	% of females	% of all teacher participants	count	% of males	% of all teachers	count	%	
Teaching Experience	0 to 5 years	77	21.7%	18.3%	10	15.2%	2.4%	87	20.7%	16.0 years
	6 to 15 years	119	33.5%	28.3%	22	33.3%	5.2%	141	33.5%	
	16 to 30 years	113	31.8%	26.8%	26	39.4%	6.2%	139	33.0%	
	30+ years	46	13.0%	10.9%	8	12.1%	1.9%	54	12.8%	
Years at present school	1 to 5 years	169	47.6%	40.1%	31	47.0%	7.4%	200	47.5%	9.1 years
	6 to 10 years	66	18.6%	15.7%	12	18.2%	2.9%	78	18.5%	
	11 to 15 years	53	14.9%	12.6%	9	13.6%	2.1%	62	14.7%	
	16 to 20 years	25	7.0%	5.9%	4	6.1%	1.0%	29	6.9%	
	20+ years	42	11.8%	10.0%	10	15.2%	2.4%	52	12.4%	
Position of leadership	Yes	150	42.3%	35.6%	38	57.6%	9.0%	188	44.7%	
	No	205	57.7%	48.7%	28	42.4%	6.7%	233	55.3%	
Highest degree earned	BA/BS	103	29.0%	24.5%	25	37.9%	5.9%	128	30.4%	
	Masters	172	48.5%	40.9%	19	28.8%	4.5%	191	45.4%	
	Masters + 30	17	4.8%	4.0%	5	7.6%	1.2%	22	5.2%	
	Masters + 45	8	2.3%	1.9%	3	4.5%	.7%	11	2.6%	
	Specialist	33	9.3%	7.8%	8	12.1%	1.9%	41	9.7%	
	PhD/EdD	5	1.4%	1.2%	3	4.5%	.7%	8	1.9%	
	Other	17	4.8%	4.0%	3	4.5%	.7%	20	4.8%	
School Level	Elementary	212	62.7%	52.6%	11	16.9%	2.7%	223	55.3%	
	Middle	56	16.6%	13.9%	24	36.9%	6.0%	80	19.9%	
	High	70	20.7%	17.4%	30	46.2%	7.4%	100	24.8%	

Table 3.

Comparison of Teacher Respondents to All Teachers in Participating School Systems by Gender

	Teacher Respondents				All Teachers in Participating Schools				% of All Teachers Responding
	Male		Female		Male		Female		
	Count	%	Count	%	Count	%	Count	%	
Ashton County	25	11.8%	187	88.2%	74	19.9%	298	80.1%	57.0%
Coleman County	14	17.7%	65	82.3%	74	33.5%	147	66.5%	35.7%
Gotham City	27	20.8%	103	79.2%	95	26.8%	259	73.2%	36.7%
Total	66	15.7%	355	84.3%	243	25.7%	704	74.3%	44.5%

The three-factor model. In this model, teacher leadership is explained only by the three factors which comprised the teacher-driven leadership component of the two-factor model. However, the three factors (SE, SP, and SLE) are not combined into one all-encompassing factor of teacher-driven leadership. The survey items which corresponded with principal-driven leadership are not included in this model.

The five-factor model. The final model used for comparison is a modification of the four-factor model. This model consists of the original components of Sharing Expertise, Supra-Practitioner, and Principal Selection and the two sub-factors of Leadership

Opportunities and Leadership Engagement. These two sub-factors were derived from the Sharing Leadership factor.

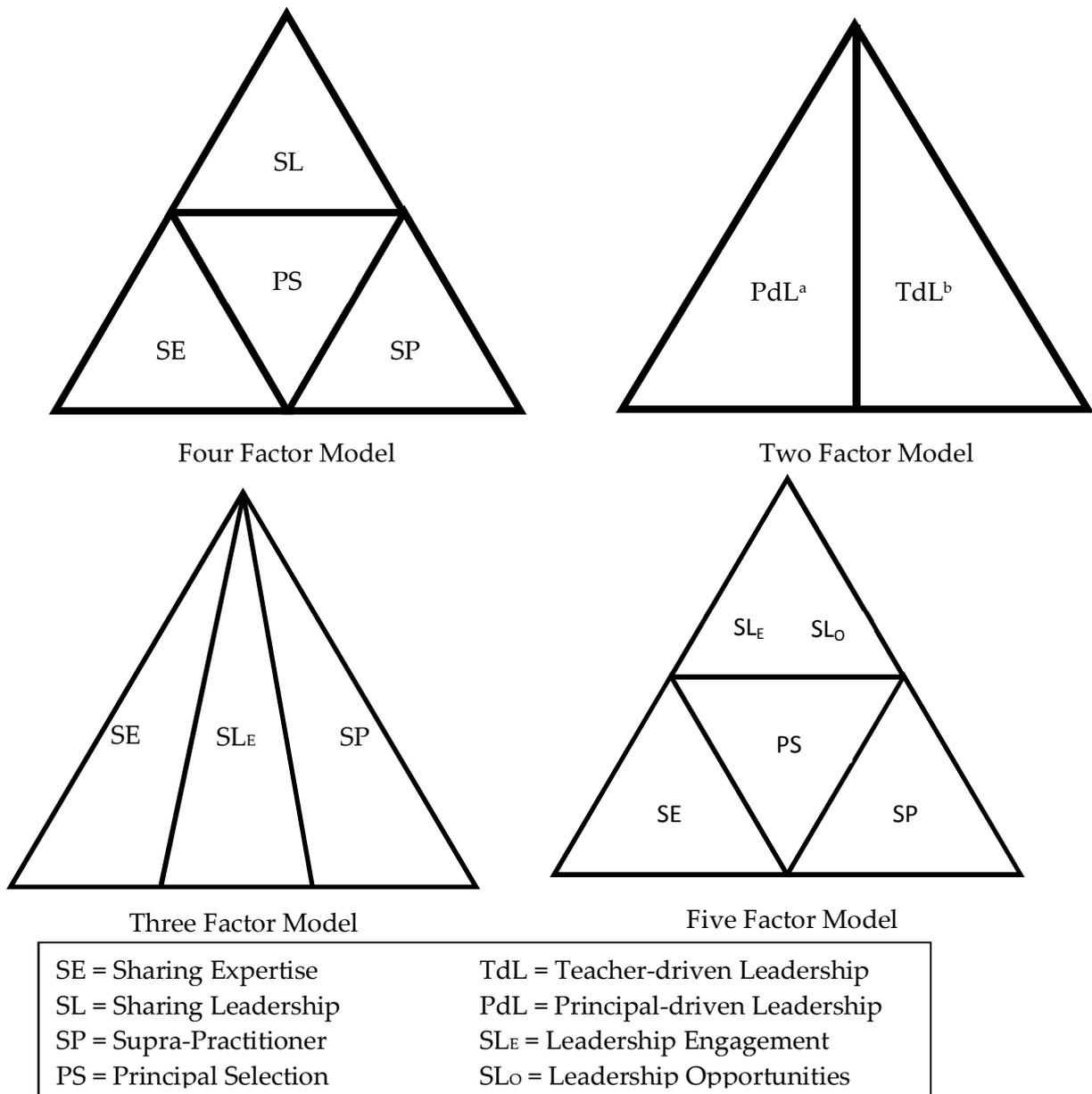


Figure 2. The four models of teacher leadership.

a. Principal-driven Leadership composed of Leadership Opportunities and Principal Selection; b. Teacher-driven Leadership composed of Sharing Expertise, Supra-Practitioner, and Leadership Engagement.

Findings

Confirmatory factor analysis was conducted on all four models using LISREL 8.72. Path diagrams indicate the error variances, factor loadings (standardized regression coefficients), and factor correlations. Path diagrams and parameter estimates for the two-, three-, four-, and five-factor models are presented in Appendices A – D. A correlation matrix for teachers' responses to the TLI is found in Appendix E. As part of the statistical analysis; LISREL produces several fit statistics which are used to assess how well the proposed models fit the data. Brown (2006) identified three categories of fit indices: (a) absolute fit indices, (b) fit indices which adjust for model parsimony, and (c) comparative fit indices. Brown recommends that researchers report at least one index from each of these three categories. Harrington (2009) also included a category called predictive fit indices which are used to compare two or more non-nested models. The absolute ($\chi^2, \chi^2/df$, GFI), parsimony (RMSEA, PGFI), and comparative (CFI, NNFI) fit indices for each of the four models are shown in Table 4. Also included are the 90% confidence intervals for the RMSEA values and recommended values for good model fit. The predictive fit indices (AIC, CAIC, ECVI) for each of the models are shown in Table 5. The 90% confidence interval for the ECVI is also included.

Model Comparisons

Four-factor Model vs. Two-factor Model

Examination of the chi-square statistics for the four-factor model ($\chi^2_{(113)} = 263.731, p < .01$) and the two-factor model ($\chi^2_{(118)} = 492.317, p < .01$) indicated that both models demonstrated a poor fit to the data. However, due to sensitivity to sample size, χ^2 is rarely used as a sole indicator of model fit (Brown, 2006; Byrne, 2010; Kline, 2005; Thompson, 2004). One method proposed to address this problem was the ratio of χ^2 to degrees of freedom (χ^2/df) (Jöreskog & Sörbom, 1993). Kline (2005) suggested a χ^2/df ratio less than 3 to be an



indicator of good model fit. The four-factor model demonstrated good fit ($\chi^2/df = 2.33$),

Table 4.
Absolute, Parsimony, and Comparative Fit Indices for the Two-, Three-, Four-, and Five-Factor Models of Teacher Leadership

	Absolute Fit Indices			Parsimony Fit Indices			Comparative Fit Indices		
	<i>df</i>	χ^2	χ^2/df	GFI	RMSEA	90% CI for RMSEA	PGFI	CFI	NNFI
Recommended values for good model fit		$p > .05^a$	$< 3^b$	$\geq .90^a$	$\leq .06^c$		$\geq .50^d$	$\geq .95^e$	$\geq .95^e$
Two-factor model	118	492.317 ($p < .01$)	4.17	.962	.087	[.079, .095]	.742	.933	.923
Three-factor model	41	86.974 ($p < .01$)	2.12	.988	.052	[.037, .067]	.614	.982	.975
Four-factor model	113	263.731 ($p < .01$)	2.33	.980	.056	[.048, .065]	.723	.973	.968
Five-factor model	109	260.493 ($p < .01$)	2.39	.980	.058	[.049, .067]	.698	.973	.966

Note: *df* = degrees of freedom; χ^2 = chi-square; GFI = goodness-of-fit index; RMSEA = root mean square error of approximation; PGFI = parsimony goodness-of-fit index; CFI = comparative fit index; NNFI = non-normed fit index.

^aJöreskog & Sörbom, 1993. ^bKline, 2005. ^cCudeck & Brown, 1993. ^dMulaik et al., 1989. ^eHu & Bentler, 1999.

Table 5.
Predictive Fit Indices for the Two-, Three-, Four-, and Five-Factor Models of Teacher Leadership

	ECVI	90% CI for ECVI	AIC	CAIC
Two-factor model	1.339	[1.185, 1.511]	562.317	738.809
Three-factor model	0.326	[0.271, 0.399]	136.974	263.040
Four-factor model	0.818	[0.715, 0.940]	343.731	545.437
Five-factor model	0.830	[0.726, 0.951]	348.493	570.369

Note: N = 421. ECVI = expected cross validation index; CI = confidence interval; AIC = Akaike's information criterion; CAIC = consistent AIC.

whereas the ratio for the two-factor model indicated poor fit ($\chi^2/df = 4.17$).

Values for the GFI, CFI, and NNFI also suggested good model fit for the four-factor model (GFI = .980, CFI = .973, NNFI = .968) but only adequate fit for the two-factor model (GFI = .962, CFI = .933, NNFI = .923). For the two-factor model, both the RMSEA and the low end of the 90% confidence interval for the RMSEA fell above the suggested cutoff point of .06 (RMSEA = .087, CI [.079, .095]). However, the same values for the four-factor model (RMSEA = .056, CI [.048, .065]) indicated good fit to the data. Although the PGFI for the two-factor model was slightly higher than the four-factor model (.742 and .723, respectively), this is to be expected considering the more parsimonious nature of the two-factor model. Finally, all three predictive indices for the four-factor model (ECVI = .818, CI [.715, .940]; AIC = 343.731; CAIC = 545.437) were lower than those for the two-factor model (ECVI = 1.339, CI [1.185, 1.511]; AIC = 562.317; CAIC = 738.809), providing further support that the four-factor model resulted in better fit.

Four-factor Model vs. Three-factor Model

For the three-factor model, the chi-square showed poor model fit ($\chi^2 = 86.974$, $p < .01$) but the ratio of chi-square to degrees of freedom indicated good fit ($\chi^2/df = 2.12$). Other goodness-of-fit indices for the three-factor model indicated slightly better fit than the four-factor model (GFI = .988 vs. .980, RMSEA = .052 vs. .056, CFI = .982 vs. .973, NNFI = .975 vs. .968 for the three-factor and four-factor models, respectively). The PGFI, which accounts for model parsimony, was not as strong in the three-factor model (.614) as in the four-factor model (.723). Examination of the predictive fit indices revealed better fit for the three-factor model over the four-factor model (ECVI = 0.326 vs. 0.818, AIC = 136.974 vs. 343.731, CAIC = 263.040 vs. 545.437 for the three-factor and four-factor models, respectively).

Four-factor Model vs. Five-factor Model

Similar to the other three models, the chi-square for the five-factor model demonstrated poor model fit ($\chi^2 = 260.493$, $p < .01$). The ratio of chi-square to degrees of freedom indicated good model fit ($\chi^2/df = 2.39$), but not as good as that for the four-factor model ($\chi^2/df = 2.33$).

Other goodness-of-fit indices indicated no appreciable differences between the five-factor and four-factor models (GFI = .980 vs. .980, RMSEA = .056 vs. .058, PGFI = .723 vs. .698, CFI = .973 vs. .973, NNFI = .968 vs. .966 for the four-factor and five-factor models, respectively). Predictive fit indices for the four-factor model were lower than those for the five-factor model, indicating better fit for the former (ECVI = 0.818 vs. 0.830, AIC = 343.731 vs. 348.493, CAIC = 545.437 vs. 570.369 for the four-factor and five-factor models, respectively). While the four-factor model shows only marginally better fit than the five-factor model, further information is gained by examining the factor correlations in the five-factor model. Correlations among the latent factors in the five-factor model were moderate to strong except for the correlation between Leadership Engagement (SL_E) and Leadership Opportunities (SL_O). The correlation between these two factors ($\rho = .98$) supported collapsing both factors into a single factor (Brown, 2006).

Three-factor vs. Four-factor Revisited

While the fit indices indicated that the three-factor model provided the best model fit for the data used in this study, evaluation of CFA models should also include a close inspection of the strength and interpretability of the parameter estimates (Brown, 2006; Schwarzer, Bäßler, Kwiatek, & Schröder, 1997). A closer examination of the fit indices and the parameters of all four models as well as a review of prior research provide support for retaining the four-factor model of teacher leadership.

Fit indices. As described earlier, the fit indices for the three-factor model indicated better model fit than those for the four-factor model. Of all of the fit statistics, the χ^2 statistic exhibited the greatest discrepancy between the two models ($\chi^2 = 86.974$ and 263.731 for the three-factor and four-factor models, respectively). However, χ^2 is expected to be large relative to the degrees of freedom (Jöreskog & Sörbom, 1993), and the df for the four-factor model was nearly three times that of the three factor model ($df = 41$ and 113 for the three-factor and four-factor models, respectively). The fit index of χ^2/df adjusts for this effect, and yet the values for χ^2/df for the two models did not differ greatly ($\chi^2/df = 2.12$ and 2.33 for the three-factor and four-factor models, respectively). Similarly, other fit indices did not have highly

disparate values between the two models including the GFI, CFI, and NNFI.

Furthermore, values for the PGFI were not as expected. The PGFI accounts for model complexity, and more parsimonious models (i.e., those having fewer parameters) should result in higher PGFI values. However, with 25 parameters, the PGFI for the three-factor model (.614) was lower than that for the four-factor model (.723) consisting of 40 parameters.

Finally, examination of the root mean square error of approximation (RMSEA) provided doubt of the better fit of the three-factor model over the four-factor model. While both RMSEA values were acceptable, there was marginal difference between the two. Additionally, the 90% confidence interval for the RMSEA provides evidence of the precision of the point estimate (Brown, 2006; Byrne, 2009). With a .030 difference between the upper and lower bounds of the confidence interval, the RMSEA for the three-factor model exhibited less precision than that for the four-factor model (difference = .017). Also, the upper bound of the RMSEA for the four-factor model (.065) was slightly better than that for the three-factor model (.067).

Parameters. The primary difference between the two models is the presence of observed variables which include actions attributable to the school principal in the four-factor model but not in the three-factor model. However, the two models do share the latent factors of Sharing Expertise, Supra-Practitioner, and Leadership Engagement. These three factors are comprised of 11 observed variables. When the factor loadings for these 11 variables are compared between the two models (Table 6), the four-factor model results in higher factor loadings for all but two of the variables (Items 4 and 10). Thus, even though the indices are less fitting for the four-factor model, this model explains more of the variance in the observed variables than does the three-factor model.

Furthermore, CFA results of the two-factor and five-factor models provided evidence that the factors which include principal behaviors are distinct constructs with strong factor loadings and that Leadership Engagement, the teacher-driven component of Sharing Leadership, should not be separated from Leadership Opportunities, the principal-driven component of Sharing Leadership. In the two-factor model, the correlation between Teacher-Driven Leadership



(TdL) and Principal-Driven Leadership (PdL) ($r = -.95$) indicated that teacher perceptions of principal actions which contribute to teacher leadership are uniquely different from actions attributed to teachers. The factor loadings for the PdL factor ranged from good ($\lambda_{11} = .57$) to very good ($\lambda_{15} = .63$; $\lambda_{17} = .70$) to excellent ($\lambda_8 = .85$; $\lambda_9 = .90$; $\lambda_{10} = .82$). Thus, a significant amount of the variance in the observed variables for this factor was explained. Also, in the five-factor model, the correlation between Leadership Engagement and Leadership Opportunities approached the value of 1 ($r = .98$). According to Brown (2006), these two factors are measuring the same construct and should be collapsed into a single latent factor.

Table 6.
Common Factor Loadings for the Three- and Four-factor Models of Teacher Leadership

Latent Factor	Survey Item #	Factor Loading	
		Three-factor Model	Four-factor Model
Sharing Expertise	1	0.556	0.574
	2	0.783	0.800
	3	0.902	0.941
	4	0.911	0.879
	7	0.678	0.748
Supra Practitioner	8	0.845	0.878
	9	0.906	0.927
	10	0.867	0.862
Leadership Engagement	5	0.830	0.847
	6	0.871	0.887
	13	0.674	0.776

Related research. Unlike the three-factor model, the four-factor model includes the actions of the principal, and research has shown the pivotal role of the principal in developing and sustaining teacher leadership. For example, many of the roles occupied by teacher leaders are administrative in nature (Barth, 1999). These roles are generally under the purview of the principal, and so teacher leaders and principals must collaborate on these responsibilities (Harris & Muijs, 2005; Katzenmeyer & Moller, 1996; Malen, Ogawa, & Krantz,

1990, Smylie & Denny, 1990). In order for this collaboration in leadership to take place, principals must be willing to support and encourage teacher leadership (Boles & Troen, 1996; Crowther et al., 2002; York-Barr & Duke, 2004).

One way that principals can support teacher leadership is by offering teachers opportunities to be involved in leadership activities. The factor of Leadership Opportunities, absent from the three-factor model, represents this attitude in the school administration. In a case study of two demographically similar schools undergoing school reform, Hart (1995) found more successful change in the school in which the principal “deliberately structured visible opportunities for [the teachers] to exert leadership” (p. 495). If teacher leadership is to be developed within a school, it is “essential for principals to create opportunities for teachers to lead” (Childs-Bowen et al., 2000, p. 31).

Of course, providing leadership opportunities does no good unless teachers are willing to engage in these leadership activities (Acker-Hocevar & Touchton, 1999). Smylie (1992) surveyed 116 teachers to explore teachers’ inclinations to engage in decision-making associated with school leadership. The results indicated that the principal-teacher relationship was the only statistically significant influence on teachers’ willingness to participate in administrative decisions (Smylie, 1992). The pivotal role of the principal in facilitating productive teacher leader–principal relationships is emphasized in the literature (Barth, 2001; Childs-Bowen et al., 2000; Crowther et al., 2002; Hart, 1994; Lieberman, 1988; Little, 1988). In turn, these relationships play a key factor in the effectiveness of teacher leaders (LeBlanc & Shelton, 1997; Silva et al., 2000).

Other theories of leadership support this notion of the principal and teachers’ collaborative roles in leadership activities. Participative leadership (York-Barr & Duke, 2004) focuses on the decision-making processes of all stakeholders in a school. Ogawa and Bossert (1995) state that leadership is an organizational phenomenon not confined to specific roles, but rather distributed throughout a network of roles. In describing the concept of distributed leadership, Spillane et al. (2001) asserted that leadership should be distributed throughout an “interactive web of actors” (p. 23) including both principals and teachers. Finally, parallel leadership is “a process whereby teacher leaders and their principals engage in collective action to build school capacity” (Crowther et al., 2002, p. 38).

Summary. Further review has demonstrated that the four-factor model provides a better representation of teachers' perceptions of teacher leadership in a school than the three-factor model. The fit indices, while more indicative of model fit for the three-factor model, were not substantially different, and both PGFI and RMSEA indices actually indicated better fit for the four-factor model. Furthermore, nine out of eleven factor loadings for observed variables shared by both models were stronger in the four-factor model than the three-factor model. Additionally, factor loadings and latent factor correlations from the two-factor and five-factor models provided evidence that the principal's role contributed to the understanding of teacher leadership. This contribution was further supported by prior research in the teacher leadership literature.

Discussion

In this final section, the unusual results of negative factor loadings and negative correlations will be discussed in relation to the four-factor model. Then, implications for both theory and practice will be addressed.

Negative Loadings and Correlations

In the two-factor model, three items resulted in negative factor loadings. In the four-factor model, one factor was negatively correlated with the other factors. These negative values deserve further discussion.

Negative loadings of the two-factor model. For the latent factor of Principal-driven Leadership (PdL), three of the observed variables had negative factor loadings ($\lambda_{12} = -.90$, $\lambda_{14} = -.94$, $\lambda_{16} = -.72$). These observed variables also comprise the component of the Sharing Leadership factor (SL) attributed to the principal in the four-factor model and the factor of Leadership Opportunities (SL_o) in the five-factor model. According to their critical ratios, these factor loadings were significant, and the latent factor of PdL explained 81%, 88%, and 52% of the variance in items 12, 14, and 16, respectively. The other three variables associated with PdL had significant, positive loadings and comprised the factor of Principal Selection (PS) in the four- and five-factor models.

The differences between these two sets of loadings indicated that respondents who score high on items 12, 14, and 16 would score low

on items 11, 15, and 17, and vice versa. These results showed that these two sets of items should not belong to the same factor. This supported the four-factor model's SL factor. Furthermore, the significant loadings for all six of the items demonstrated that the respondents recognized the behaviors described in the items as being attributed to principals rather than teachers. This was supported by the very strong, negative correlation ($r^2 = .95$) between the factors of Principal-driven Leadership and Teacher-driven Leadership in the two-factor model. Together, these two results – the difference in loading direction and the significant loadings – provide further preference for the four-factor model over the three-factor model by recognizing the contribution of principal behaviors to the concept of teacher leadership.

Negative correlations of the four-factor model. For the four-factor model, the factor of Principal Selection (PS) correlated negatively with each of the other factors. This indicates that a respondent scoring high on SE, SL, or SP will score low on PS, and vice-versa. By reverse-coding the three observed variables which correspond to PS (items 11, 15, and 17), positive correlations could be achieved. Reverse-coding is often used with negatively-worded items (Tabachnick & Fidell, 2007). However, items 11, 15, and 17 were not negatively worded, and thus should not be reverse-coded. Reverse-coding would only serve to distort the meaning of the construct of Principal Selection.

For example, item 11 was *“administrators object when teachers take on leadership responsibilities.”* Reverse-coding this item would be similar to re-wording the item to read *“administrators do not object when teachers take on leadership opportunities,”* or, to word the item positively, *“administrators approve when teachers take on leadership responsibilities.”* Such a revision changes the latent factor from one focused on principals who control the avenues to leadership in a school to one focused on principal support for teachers taking leadership initiative. These are two completely different concepts. The same reasoning applies to the other two items for the factor of Principal Selection. While these items may suggest a negative perception of the principal, they are not necessarily negatively worded.



Implications for Theory

Christensen and Demski (2002) stated that theory is useful because “it provides structure for organizing our thoughts about some set of phenomena” (p. 6). Theories of educational leadership abound, and many, such as participative leadership, distributed leadership, and parallel leadership, include teachers as a component of leadership (Crowther et al., 2002; Spillane et al., 2001; York-Barr & Duke, 2004). Though focused on the four-factor model of teacher leadership, this study filled a theoretical gap by examining educational leadership through the lens of teacher as the cornerstone. Moreover, important insights from this work connect the model to established theories and theoretical constructs and also contribute to a better understanding of teacher leadership as a theory.

The need for effective school leadership has been spurred by issues of high stakes accountability and school reform (Little, 2003) with teachers as a component of leadership. For example, the theory of distributed leadership (Spillane et al., 2001) proposes that leadership is constituted within a “web of actors” (p. 23) which includes principals, teachers, and other stakeholders in the community. In discussing leadership as an organizational phenomenon, Ogawa and Bossert (1995) state that leadership is spread out over a network of roles which includes teachers. While leadership in an organization should be viewed as a group effort, there can exist situations which demand a closer inspection of specific individuals within the group. The four-factor model of teacher leadership fills this gap by offering a lens which focuses on the leadership practices of the teachers within a school. Furthermore, the leadership activities outlined in the four-factor model include those of both formal and informal teacher leaders.

Each of the factors in the four-factor model explain different attributes of teacher leadership, and each of these factors can be related to established theories or theoretical constructs. The factor of Sharing Expertise describes teachers’ willingness to share skills and knowledge with their colleagues. A related theoretical construct is Prosocial Organizational Behavior (Brief & Motowidlo, 1986) described as behavior directed towards a fellow member of an organization with the intention of promoting the welfare of that member. The factor of Sharing Expertise is also reflected in the theory of Situated Learning and Communities of Practice (Lave &

Wenger, 1991) in which the members of a common practice share information and experiences for the purpose of learning from each other.

As previously mentioned, the theories of distributed leadership (Spillane et al., 2001) and parallel leadership (Crowther et al., 2002) both stress the importance of the factor of Sharing Leadership from the four-factor model. In these theories, the teachers and administrators engage in shared decision-making. This principal-teacher relationship is expressed in the Sharing Leadership factor's two components of Leadership Opportunities, wherein principals provide leadership opportunities for teachers, and Leadership Engagement, wherein teachers take advantage of these opportunities to accept leadership responsibilities.

The third factor of Supra-Practitioner is characterized by teachers' willingness to go above and beyond their prescribed roles. This characterization is similar to the theories of Organizational Citizenship Behavior and Extra-Role Behavior. Organ (1988) described Organizational Citizenship Behavior as "behavior that is discretionary, not directly or explicitly recognized by the formal reward system, and that in the aggregate promotes the effective functioning of the organization" (p. 4), while Extra-Role Behaviors were similarly defined as "behaviors which benefit the organization and/or is intended to benefit the organization, which is discretionary and which goes beyond existing role expectations" (Van Dyne, Cummings, & McLean Parks, 1995, p. 218).

Finally, the factor of Principal Selection describes perceptions that the principal selects specific teachers to engage in leadership activities while restraining others from those same responsibilities. These behaviors are similar to the formation of in-groups and out-groups as described in Leader-Member Exchange theory (Dansereau, Graen, & Haga, 1975). By only allowing certain teachers to engage in leadership roles, a principal creates an in-group, excluding other teachers who are then considered part of the out-group. Out-group members may feel resentment towards members of the in-group and may downplay the importance of leadership activities.

The four-factor model has implications for advancing the theoretical perspective of teacher leadership. As described above, the four-factor model focuses mainly on teachers' participation in educational leadership and includes both formal and informal roles.



The model also incorporates theoretical concepts from several other theories, bringing them together in one model. Based upon empirical research, the four-factor model offers a theoretical perspective from which teacher leadership may be examined.

Implications for Practice

In an effort to respond to high stakes initiatives, educational reform efforts expect teachers to assume more responsibility and leadership (Bartlett, 2004; Little, 2003). Collegiality and collaboration among teachers are becoming the norm, and teachers in leadership positions have proven beneficial in helping their colleagues to adapt to these changes (Katzenmeyer & Moller, 2001; Lieberman & Miller, 2005). These teacher leaders occupy both formal and informal roles within a school (Darling-Hammond et al., 1995; Harris & Muijs, 2005; MacBeath, 1998; Smylie & Mayrowetz, 2009). Research has demonstrated direct and indirect positive effects of teacher leaders on the self-esteem, pedagogical skills, self-efficacy, and morale of their fellow teachers, as well as positive effects on student engagement and student performance (Frost & Harris, 2003; Leithwood & Jantzi, 2000; Katzenmeyer & Moller, 1996, 2001; Ovando, 1996; Silins & Mulford, 2002; Smylie, 1994; Troen & Boles, 1992).

School principals and superintendents must be prepared to measure teacher leadership, both formal and informal, as these reforms continue. While further testing of the Teacher Leadership Inventory and the four-factor model of teacher leadership is warranted, they both show considerable promise for providing a means to gauge school-wide teacher leadership. School and district leaders may use the TLI along with the four-factor model to assess levels of teacher leadership practices in a school and plan appropriate professional development. Providing leadership training to teachers who undertake these roles is crucial for developing effective leadership (Andrew, 1974; Lieberman & Miller, 1999; Welch et al., 1992).

Furthermore, school principals can look to the four-factor model as a guide for developing teacher leadership within their schools. By recognizing that activities such as sharing expertise and going beyond prescribed roles are a function of leadership, principals can recognize and reward the efforts of those teachers. Understanding

the relationship between the sub-factors of Leadership Opportunities and Leadership Engagement can make principals more effective in extending leadership roles to all faculty members. Similarly, an awareness of the inverse effect of Principal Selection on teachers' desires to engage in leadership may cause principals to offer leadership responsibilities to a wider range of teachers. Overall, principals' understanding of the four-factor model may lead to greater recognition, fostering, and valuing of teacher leadership within a school, thereby increasing teachers' willingness to engage in leadership roles (LeBlanc & Shelton, 1997; Smylie, 1992).

Even before becoming a part of a school's faculty, teachers should be exposed to leadership training as part of the teacher training programs in institutions of higher education. As early as 1974, Andrew noted that there must be "a major change in existing patterns of teacher training" (p. 2) if teachers are to take on leadership roles. The four-factor model of teacher leadership provides an outline of skills and attitudes for teacher training programs as they strive to include leadership training for future teachers. Novice teachers who have been exposed to the concepts of the four factors included in this model may be more likely to seek out and engage in leadership opportunities, thus addressing the calls for improved preparation of future teacher leaders (Katzenmeyer & Moller, 1996; Ovando, 1996; Silva et al., 2000).

With increasing accountability, principals and superintendents must be prepared to measure teacher leadership, both formal and informal. While further testing of the Teacher Leadership Inventory and the four-factor model of teacher leadership is warranted, they both show considerable promise for providing a means to gauge school-wide teacher leadership. School and district leaders may use the TLI along with the four-factor model to assess levels of teacher leadership practices in a school and plan appropriate professional development. The four-factor model of teacher leadership provides an outline of skills and attitudes for teacher training programs as they strive to include leadership training for future teachers.

Conclusion

From high-stakes testing to increased accountability to professional learning communities, reform efforts have affected many aspects of the educational process. The roles and responsibilities of



teachers must change to accommodate these efforts. Teacher leadership encompasses many of these changes which teachers must adopt. Collaboration, shared decision-making, extra-role responsibilities, and the role of the principal in guiding teacher participation are ways that leadership opportunities are offered to teachers to respond to these reform efforts. When teacher leadership occurs in schools, positive effects extend to the teacher leaders, to their colleagues, and, most especially, to the students. The four-factor model of teacher leadership can provide administrators the means to assess the levels of teacher leadership, to identify areas of strengths and weaknesses, and to plan professional development to encourage teacher leadership in their schools. For researchers, this model also offers a means to examine formal and informal teacher leadership from a theoretical standpoint.

References

- Acker-Hocevar, M., & Touchton, D. (1999, April). *A model of power as social relationships: Teacher leaders describe the phenomena of effective agency in practice*. Paper presented at the annual meeting of the American Educational Research Association, Montreal, Quebec, Canada.
- Akaike, H. (1987). Factor analysis and AIC. *Psychometrika*, 52(3), 317-332.
- Andrew, M. D. (1974). *Teacher leadership: A model for change*. (ATE Bulletin No. 37). Washington, DC: Association of Teacher Educators.
- Angelle, P. S., & Dehart, C. A. (2011). Teacher perceptions of teacher leadership: Examining differences by experience, degree, and position. *NASSP Bulletin*, 95(2), 141 – 160.
- Angelle, P. S., & Dehart, C. (2010, April). *Measuring the extent of teacher leadership: Construction, testing, and factors in the Teacher Leadership Inventory*. Paper presented at the meeting of the American Educational Research Association, Denver, CO.
- Angelle, P. S., Taylor, D. L., & Olivier, D. (2008, March). *School improvement through increased leadership capacity: Preliminary construction of a measure of teacher leadership*. Paper presented at the meeting of the American Educational Research Association, New York, NY.

- Angelle, P. S., & Beaumont, J. B. (2006, November). *Teacher leadership: A definitional perspective from principals and teachers*. Paper presented at the meeting of the University Council of Educational Administration, San Antonio, Texas.
- Barth, R. S. (1999). *The teacher leader*. Providence, RI: The Rhode Island Foundation.
- Barth, R. S. (2001). Teacher leader. *Phi Delta Kappan*, 82(6), 443–449.
- Bartlett, L. (2004). Expanding teacher work roles: A resource for retention or a recipe for overwork? *Journal of Educational Policy*, 19(5), 565–582.
- Boles, K., & Troen, V. (1994, April). *Teacher leadership in a professional development school*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.
- Boles, K., & Troen, V. (1996). Teacher leaders and power: Achieving school reform from the classroom. In G. Miller & M. Katzenmeyer (Eds.), *Every teacher as a leader: Realizing the potential of teacher leadership* (pp. 41–62). San Francisco: Jossey-Bass.
- Brief, A. P., & Motowidlo, S. J. (1986). Prosocial organizational behaviors. *The Academy of Management Review*, 11(4), 710-725.
- Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York, NY: Guilford Press.
- Byrne, B. M. (2010). *Structural equation modeling with AMOS: Basic concepts, applications, and programming* (2nd ed.). New York, NY: Routledge.
- Childs-Bowen, D., Moller, G., & Scrivner, J. (2000). Principals: Leaders of leaders. *NASSP Bulletin* (616), 84, 27–34.
- Christensen, P. O., & Demski, J. S. (2002). Accounting policies in agencies with moral hazard and renegotiation. *Journal of Accounting Research*, 40(4), 1071-1090.
- Crowther, F., Kaagan, S., Ferguson, M., & Hann, L. (2002). *Developing teacher leaders: How teacher leadership enhances school success*. Thousand Oaks, CA: Corwin Press.
- Cudeck, R. L., & Browne, M. W. (1993). Alternative ways of assessing model fit. IN K. A. Bollen & J. Scott Long (Eds.), *Testing structural equation models* (pp. 1-9). Newbury Park, CA: Sage
- Dansereau, F., Graen, G., & Haga, W. J. (1975). A vertical dyad linkage approach to leadership within formal organizations: A longitudinal investigation of the role making process. *Organizational Behavior and Human Performance*, 13(1), 46–78.



- Darling-Hammond, L. (1988). Policy and professionalism. In A. Lieberman (Ed.), *Building a professional culture in schools* (pp. 55–77). New York, NY: Teachers College Press.
- Darling-Hammond, L., Bullmaster, M. L., & Cobb, V. L. (1995). Rethinking teacher leadership through professional development schools. *Elementary School Journal*, 96(1), 87–106.
- Devaney, K. (1987, March). *The lead teacher: Ways to begin*. Paper prepared for the Task Force on Teaching as a Profession, Carnegie Forum on Education and the Economy. Berkeley, CA: Author.
- Evans, R. (1996). *The human side of school change*. San Francisco, CA: Jossey-Bass.
- Frost, D., & Harris, A. (2003). Teacher leadership: Towards a research agenda. *Cambridge Journal of Education*, 33(3), 479–498.
- Fullan, M. G. (1994). Teacher leadership: A failure to conceptualize. In D. R. Walling (Ed.), *Teachers as leaders* (pp. 241–253). Bloomington, IN: Phi Delta Kappa Educational Foundation.
- Fullan, M., & Hargreaves, A. (1996). *What's worth fighting for in your school* (2nd ed.). New York, NY: Teachers College Press.
- Griffin, G. A. (1995). Influences of shared decision making on school and classroom activity: Conversations with five teachers. *Elementary School Journal*, 96(1), 29–45.
- Gronn, P. (2000). Distributed properties: A new architecture for leadership. *Educational Management Administration & Leadership*, 28(3), 317–338.
- Hallinger, P., & Heck, R. H. (1996). Reassessing the principal's role in school effectiveness: A review of empirical research, 1980 – 1995. *Educational Administration Quarterly*, 32(1), 5–44.
- Hargreaves, A. (1991, April). *Restructuring restructuring: Postmodernity and the prospects for educational change*. Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL.
- Harrington, D. (2009). *Confirmatory factor analysis*. New York, NY: Oxford University Press.
- Harris, A., & Muijs, D. (2002). *Teacher leadership: A review of the research*. Retrieved February 10, 2010, from www.ncsl.org.uk/researchpublications
- Harris, A., & Muijs, D. (2005). *Improving schools through teacher leadership*. Berkshire, England: Open University Press.

- Hart, A. W. (1994). Creating teacher leadership roles. *Educational Administration Quarterly*, 30(4), 472–497.
- Hart, A. W. (1995). Reconceiving school leadership: Emergent views. *Elementary School Journal*, 96(1), 9–28.
- HU, L., & Bentler, P. M. (1999). Cutoff criteria for fit indices in covariance structure analysis: Conventional versus new alternatives. *Structural Equation Modeling*, 6(1), 1-55.
- Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8: User's reference guide*. Mooresville, IN: Scientific Software.
- Katzenmeyer, M., & Moller, G. (1996). *Awakening the sleeping giant: Leadership development for teachers*. Thousand Oaks, CA: Corwin Press.
- Katzenmeyer, M., & Moller, G. (2001). *Awakening the sleeping giant: Helping teachers develop as leaders (2nd ed.)*. Thousand Oaks, CA: Corwin Press.
- Keung, C. C. (2009). Revitalizing teacher leadership via bureaucratic-professional practices: A structural equation model. *The Asia-Pacific Education Researcher*, 18(2), 283–295.
- Kline, R. B. (2005). *Principles and practice of structural equation modeling (2nd ed.)*. New York, NY: Guilford.
- Lambert, L. (1998). *Building leadership capacity in schools* [NetLibrary version]. Alexandria, VA: ASCD. Retrieved from <http://www.netlibrary.com.proxy.lib.utk.edu:90/Details.aspx>
- Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*. Cambridge, UK: Cambridge University Press.
- LeBlanc, P. R., & Shelton, M. M. (1997). Teacher leadership: The needs of teachers. *Action in Teacher Education*, 19(3), 32–48.
- Leithwood, K., & Jantzi, D. (1998, April). *Distributed leadership and student engagement in school*. Paper presented at the annual meeting of the American Educational Research Association, San Diego, CA.
- Leithwood, K., & Jantzi, D. (1999). The relative effects of principal and teacher sources of leadership on student engagement with school [Supplemental issue, December]. *Educational Administration Quarterly*, 35, 679–706.
- Leithwood, K., & Jantzi, D. (2000). Principal and teacher leadership effects: A replication. *School Leadership and Management*, 20(4), 415–434.



- Leithwood, K., Louis, K. S., Anderson, S., & Wahlstrom, K. (2004). *How leadership influences student learning*. Retrieved March 22, 2010, from <http://www.wallacefoundation.org/SiteCollectionDocuments/WF/Knowledge%20Center/Attachments/PDF/HowLeadershipInfluences.pdf>
- Lieberman, A. (1988). Teachers and principals: Turf, tension, and new tasks. *Phi Delta Kappan*, 69(9), 648–653.
- Lieberman, A., & Miller, L. (1999). *Teachers: Transforming their world and their work*. New York, NY: Teachers College Press.
- Lieberman, A., & Miller, L. (2005). Teachers as leaders. *The Educational Forum*, 69, 151–159.
- Lieberman, A., Saxl, E. R., & Miles, M. B. (1988). Teacher leadership: Ideology and practice. In A. Lieberman (Ed.), *Building a professional culture in schools* (pp. 148–166). New York, NY: Teachers College Press.
- Little, J. W. (1988). Assessing the prospects for teacher leadership. In A. Lieberman (Ed.), *Building a professional culture in schools* (pp. 78–106). New York, NY: Teachers College Press.
- Little, J. W. (1990). The persistence of privacy: Autonomy and initiative in teachers' professional relations. *Teachers College Record*, 91(4), 509–536.
- Little, J. W. (2003). Constructions of teacher leadership in three periods of policy and reform activism. *School Leadership and Management*, 23(4), 401–419.
- MacBeath, J. (Ed.). (1998). *Effective school leadership: Responding to change*. London: Paul Chapman.
- Malen, B., Ogawa, R. T. & Krantz, J. (1990). What do we know about school-based management? A case study of the literature – a call for research. In W. H. Clune & J. F. Witte (Eds.) *Choice and control in American education, Vol. 2: The practice of choice, decentralization, and school restructuring*. New York, NY: Falmer Press.
- Marzano, R. J., Waters, T., & McNulty, B. A. (2005). *School leadership that works: From research to results*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Miller, B., Moon, J., & Elko, S. (2000). *Teacher leadership in mathematics and science: Casebook and facilitator's guide*. Portsmouth, NH: Heinemann.

- Mulaik, S. A., James, L. R., Van Alstine, J., Bennett, N., Lind, S., & Stillwell, C. D. (1989). Evaluation of goodness of fit indices for structural equations models. *Psychological Bulletin*, 105, 430-45.
- Murphy, J., & Hallinger, P. (1988). Characteristics of instructionally effective school districts. *Journal of Educational Research*, 81(3), 175-181.
- O'Connor, K., & Boles, K. (1992, April). *Assessing the needs of teacher leaders in Massachusetts*. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.
- Ogawa, R. T., & Bossert, S. T. (1995). Leadership as an organizational quality. *Educational Administration Quarterly*, 31(2), 224-243.
- Organ, D. W. (1988). *Organizational citizenship behavior: The good soldier syndrome*. Lexington, MA: Lexington Books.
- Ovando, M. N. (1996). Teacher leadership: Opportunities and challenges. *Planning and Changing*, 27(1), 30-44.
- Pellicer, L. O., & Anderson, L. W. (1995). *A handbook for teacher leaders*. Thousand Oaks, CA: Corwin Press.
- Rosenholz, S. (1989). *Teachers' workplace: The social organization of schools*. New York, NY: Teachers College Press.
- Ryan, S. (1999, April). *Principals and teachers leading together*. Paper presented at the annual meeting of the American Educational Research Association, Montreal, Quebec, Canada.
- Silins, H., & Mulford, B. (2002). Schools as learning organizations – effects on teacher leadership and student outcomes. *School Effectiveness and School Improvement*, 15(3-4), 443-466.
- Silins, H. C., Mulford, W. R., & Zarins, S. (2002). Organizational learning and school change. *Educational Administration Quarterly*, 38(5), 613-642.
- Silva, D. Y., Gimbert, B., & Nolan, J. (2000). Sliding the doors: Locking and unlocking possibilities for teacher leadership. *Teachers College Record*, 102(4), 779-804.
- Smylie, M. A. (1992). Teacher participation in school decision-making: Assessing willingness to participate. *Educational Evaluation and Policy Analysis*, 14(1), 53-67.
- Smylie, M. A. (1994). Redesigning teachers' work: Connections to the classroom. In L. Darling-Hammond (Ed.), *Review of research in education* (Vol. 20, pp. 129-177). Washington, DC: American Educational Research Association.



- Smylie, M. A., & Denny, J. W. (1990). Teacher leadership: Tensions and ambiguities in organizational perspective. *Educational Administration Quarterly*, 26(3), 235–259.
- Smylie, M. A., & Mayrowetz, D. (2009). Footnotes to teacher leadership. In L. J. Saha & A. G. Dworkin (Eds.), *International handbook of research on teachers and teaching* (pp. 277–289). New York, NY: Springer Science + Business Media.
- Spillane, J. P., Halverson, R., & Diamond, J. B. (2001). Investigating school leadership practice: A distributed perspective. *Educational Researcher*, 30(3), 23–28.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston, MA: Pearson/Allyn & Bacon.
- Taylor, D. L., & Bogotch, I. E. (1994). School-level effects of teachers' participation in decision making. *Educational Evaluation and Policy Analysis*, 16(3), 302–319.
- Teddlie, C., & Reynolds, D. (Eds.).(2000). *International handbook of school effectiveness research*. London: Sage.
- Thompson, B. (2004). *Exploratory and confirmatory factor analysis: Understanding concepts and applications*. Washington, DC: American Psychological Association.
- Triska, J. W. (2007). *Measuring teacher leadership*. (Masters thesis, Humboldt State University, 2007). Retrieved on May 6, 2010 from *Humboldt Digital Scholar* at <http://humboldt-dspace.calstate.edu/xmlui/bitstream/handle/2148/180/5-15-07thesis.pdf?sequence=1>
- Troen, V., & Boles, K. (1992, April). *Leadership from the classroom: Women teachers as the key to school reform*. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.
- Van Dyne, L., Cummings, L. L., & McLean Parks, J. (1995). Extra role behaviors: In pursuit of construct and definitional clarity. In L. L. Cummings & B. M. Staw (Eds.), *Research in organizational behavior* (Vol. 17, pp. 215-285).
- Wasley, P. A. (1991). *Teachers who lead: The rhetoric of reform and the realities of practice*. New York, NY: Teachers College Press.
- Weiss, C. H., & Cambone, J. (1994). Principals, shared decision making, and school reform. *Educational Evaluation and Policy Analysis*, 16(3), 287–301.

- Webb, P. T., Neumann, M., & Jones, L. C. (2004). Politics, school improvement, and social justice: A triadic model of teacher leadership. *The Educational Forum*, 68(3), 254–262.
- Welch, M., Sheridan, S., Connell, M., Fuhriman, A., Hart, A. W., & Stoddart, T. (1992). Preparing professionals for educational partnerships: An interdisciplinary approach. *Journal of Educational and Psychological Consulting*, 3(1), 1–23.
- Wiggenton, E. (1992). A vision of teacher leadership. In the teachers' voice. In C. Livingston (Ed.), *Teachers as leaders: Evolving roles* (pp. 167–173). Washington, DC: NEA.
- Wong, K. (1996). *Prospects. Special analyses. Final report*. Report for the Department of Education, Washington DC. Retrieved from <http://eric.ed.gov/PDFS/ED402656.pdf>
- York-Barr, J., & Duke, K. (2004). What do we know about teacher leadership? Findings from two decades of scholarship. *Review of Educational Research*, 74(3), 255–316.
- Youitt, D. (2007). Teacher Leadership: Another way to add value to schools. *Perspectives on Educational Leadership*. Winmalee, New South Wales: Australian Council for Educational Leaders. Retrieved from http://www.acel.org.au/fileadmin/user_upload/documents/perspectives_in_education/Perspectives_November_2007.pdf

About the authors:

Pamela Angelle is Associate Professor and Graduate Program Coordinator in Educational Leadership and Policy Studies at The University of Tennessee, Knoxville, Tennessee, US. Dr. Angelle's research interests include teacher leadership and organizational conditions and contexts which contribute to a collegial school community. As a member of the UCEA-BELMAS ISLDN, she is also involved in research on international perspectives of social justice. Email: pangelle@utk.edu

Corey DeHart is a physics instructor at Maryville High School, one of the top ranked public high schools in Tennessee, USA. After teaching science and math for 19 years, Dr. DeHart served as an evaluator of science and math programs for the state of Tennessee and as a Clinical Assistant Professor at The University of Tennessee. Email: cdehart@utk.edu