The design and validation of the enabling conditions for collective teacher efficacy scale (EC-CTES)

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Abstract

Purpose – High levels of collective teacher efficacy (CTE) within a school is known to be associated with improved student learning. CTE is a marker of the level of shared efficacy among teachers within a school. Knowledge of the levels of CTE within a school does not, though, support its development. To properly support school leaders in nurturing CTE, knowledge of the status of the enabling conditions for CTE within their schools is necessary to identify areas of strength and opportunities for improvement. Armed with such knowledge, school leaders can then begin the journey of cultivating CTE within their schools.

Design/methodology/approach – Drawing upon previous research, contextual predictors of collective efficacy were identified and a questionnaire was created. Confirmatory factor analysis was used to evaluate the proposed factor structure. Necessary revisions were completed and in phase 2 of the field test, a new instrument was validated using factor analysis.

Findings – The preliminary validation of the Enabling Conditions for Collective Efficacy Scale (EC-CTES) is presented in this paper. This study provides evidence in support of a factor model with five related first-order factors that describe the enabling conditions for CTE, which include: Empowered Teachers, Embedded Reflective Practices, Cohesive Teacher Knowledge, Goal Consensus, and Supportive Leadership. A conceptual framework for "Leading Collective Teacher Efficacy" is provided.

Research limitations/implications – The identification and measurement of the malleable, contextual factors that contribute to the formation of CTE has been lacking in previous research. While most of the previous research focused on the remote sources of CTE, very few studies have examined the proximate sources. Correlations between some factors were high, in particular Empowered Teachers and Supportive Leadership. Although there is evidence these factors can be seen as making unique contributions, future work will focus on the inclusion of additional items to more clearly make the distinction between the factors. In addition, there were limitations based on the sample in this study and future research should focus on a broader sample of participants.

Practical implications – While there are currently several CTE scales widely used in research, contextual factors that serve to enhance CTE in schools have not been captured in existing instruments. The identification of the contextual antecedents of CTE will be useful to system and school leaders because this information can be used to help inform their leadership practice as they work to help instill a greater sense of collective efficacy among the teaching faculty in their schools.

Social implications – CTE is of great interest to system and school leaders because it predicts teachers' willingness to invest the time and energy required to attain educational goals and results in greater effort. The productive behavior on the part of the adults in schools characterized by high levels of CTE leads to improved student outcomes.

Originality/value – This study detailed the design and validation of a teacher perception survey to capture information related to the dimensions associated with the enabling conditions of CTE.

Keywords Collective efficacy, Professional learning community, Leadership, Validation, Scale, Enabling conditions

Paper type Research paper

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Evidencing the enabling conditions for collective teacher efficacy

Introduction

There has been an increased interest in collective teacher efficacy (CTE) since its emergence as a factor that highly influences student achievement. CTE refers to "the perceptions of teachers in a school that the faculty as a whole can execute the courses of action necessary to have positive effects on students" (Goddard, 2001, p. 467). This definition highlights the importance of valuing teamwork and collaboration and the belief in collective responsibility, which requires an investment in professional capital. Hargreaves and Fullan (2012) noted that "if you want to accelerate learning in any endeavor, you concentrate on the group" (p. 89).

Research shows that when teachers share the belief that through their *collective actions* they can positively influence student outcomes, student achievement increases (Bandura, 1993; Eells, 2011; Goddard *et al.*, 2015; Ramos *et al.*, 2014; Sandoval *et al.*, 2011). Bandura (1993) was the first to generate interest in this area by demonstrating that the effect of perceived CTE on student achievement was stronger than the link between socioeconomic status and student achievement. Consistent findings have been reported in a number of other studies since (Goddard *et al.*, 2015; Ramos *et al.*, 2014; Sandoval *et al.*, 2011). In 2011, Eells conducted the first meta-analysis, synthesizing 26 available and relevant studies, in order to quantify the correlation between CTE and student achievement. Eells (2011) concluded that CTE "was strongly and positively associated with student achievement across subject areas, when using varied instruments, and in multiple locations" (p. 110).

The significant influence CTE has on student achievement results from the productive behaviors on the part of the adults in schools that are characterized by high levels of collective efficacy. Bandura (2000) noted "the higher the perceived collective efficacy, the higher the groups' motivational investments in their undertakings, the stronger their staying power in the face of impediments and setbacks, and the greater their performance accomplishments" (p. 78). CTE is of interest to school improvement researchers because it predicts a willingness to invest the time and energy required to attain educational goals and results in greater effort. "The expectations for attainment set by perceived collective efficacy influence the diligence and tenacity with which teachers approach their work" (Goddard *et al.*, 2004a, b, p. 420). Hoy *et al.*(2002) noted that "strong collective efficacy leads teachers to be more persistent in their teaching efforts, set high and reasonable goals, and overcome temporary setbacks and failures" (p. 90). This productive behavior on the part of the adults in the building leads to improved student outcomes. A number of impactful consequences associated with CTE and known to promote student achievement are outlined in Table I.

Sources of collective teacher efficacy

Bandura (1977, 1998) noted that collective efficacy is formed based on information cognitively processed from four sources of past experiences. These include mastery experiences, which are realized through repeated success. Mastery experiences are especially influential since they are based on direct evidence of one's own capabilities (Bandura, 1977). Mastery experiences become evident when teachers realize evidence of impact on student outcomes. Vicarious experiences are the second most influential source because when teams see others succeed, they "persuade themselves that if others can do it, they should be able to achieve at least some improvement in performance" (p. 197). The third source is what Bandura (1977) referred to as "verbal persuasion" and noted that teams can be "led through suggestion into believing they can cope successfully with what has overwhelmed them in the past" (p. 198). Finally, affective states also impact how teams cope. Teams are more likely to expect success when they have not experienced elevated levels of anxiety in the past.

Goddard *et al.* (2004a, b) expanded Bandura's (1977) conceptual model explaining the formation of perceived collective efficacy in schools and further highlighted the pivotal role of

Study	Positive consequences attributed to collective teacher efficacy
Boberg and Bourgeois (2016)	Educators promote higher levels of student emotional engagement
Caprara *et al.* (2003) Klassen (2010) Viel-Ruma *et al.* (2010) Ware and Kitsantas (2007)	Teachers express greater job satisfaction, experience less stress, and have greater commitment to the teaching profession
Chong *et al.* (2010)	Teachers hold higher expectations and greater academic press
Ciani *et al.* (2008)	Teachers design more mastery experiences for students and have less predominant performance goal orientations
Derrington and Angelle (2013)	There is a greater extent of teacher leadership
Gibbs and Powell (2011)	Exclusion is less widely used as a sanction for problem behavior
Goddard and Goddard (2001)	Teachers have higher individual teacher efficacy
Kirby and DiPaola (2011) Lyons *et al.* (2016) Wilcox *et al.* (2014)	Teachers engage parents and communities and make a concentrated effort to involve parents in authentic ways
Lee *et al.* (2011)	Teachers show greater commitment to students
Rauf *et al.* (2012)	Teachers have more positive attitudes toward professional development
Tiplic *et al.* (2015)	Beginning teachers are less likely to leave the profession
Urton *et al.* (2014)	Teachers have more positive attitudes toward remedial education
Wilcox *et al.* (2014)	Better qualities of academic goals, expectations, and learning opportunities Greater quality interventions for students at -risk of dropping out

Table I.
Positive consequences attributed to collective teacher efficacy

cognition in the interpretation of the four sources of efficacy. The authors noted that perceptions of efficacy for "collective pursuits arise from cognitive and metacognitive processing of the sources of efficacy belief-shaping information" (p. 6). Their theoretical model further explained that the four sources are cognitively processed in relation to (1) analysis of the teaching task and (2) assessment of teaching competence. Together, Bandura's (1977) and Goddard *et al.*'s (2004a, b) models explain how perceptions of a group's capabilities are cognitively formed, but both relegate contextual variables within schools as secondary considerations. Two studies, one by Ross *et al.* (2004) and another by Adams and Forsyth (2006), demonstrated the theoretical relevance of contextual factors as additional and significant efficacy-shaping sources.

Ross *et al.* (2004) examined the antecedents of CTE and determined that school processes had a stronger influence than prior achievement (a proxy used for mastery experiences) on the collective efficacy of teachers in elementary schools. The researchers noted that school processes that contributed to a cohesive, supportive environment were likely to contribute to each of the four sources of efficacy information. For example, they noted that social interactions (among teachers and with administrators) influence whether teachers interpret prior achievement scores as evidence of mastery experiences. In relation to vicarious experiences, the researchers noted that a "heightened interaction among teachers provides opportunities to observe the contribution of the collective to individual success" thus, "increasing perceptions of their individual and collective success and expectations for the future" (p. 167). When considering affective states, the researchers also noted that, "social processes that generate peer support are likely to reduce the effects of negative emotions on collective teacher efficacy beliefs" (p. 167).

Adams and Forsyth (2006) also demonstrated that contextual variables "add power to explanations of collective teacher efficacy" (p. 625) over and above the effects of the four

sources identified by Bandura. They found that contextual predictors of collective efficacy influenced teachers' analysis of the teaching task, lending empirical support for the "theoretical proposition that contextual factors are sources of collective efficacy beliefs" (p. 638). They argued for the need to broaden efficacy sources to include environment factors and differentiated between two types of sources of collective efficacy. The criterion they used to differentiate was in relation to the "proximity of occurrence to present teaching realities by which efficacy sources exist" (p. 630). They called for a need to classifying mastery experiences, vicarious experiences, verbal persuasion, and affective states as "remote" sources because "they occurred at some time in the past" (p. 630) and present contextual conditions as "proximate" sources because they "have a day in and day out influence on the teaching tasks" (p. 630). Bandura (1986) also noted that efficacy is not merely a judgment of past experiences and events and that unique circumstances surrounding the future task and behavior also factor into the cognitive process.

With the foundation in regard to the theoretical importance of contextual factors as efficacy-shaping sources laid, there is a need to identify school characteristics associated with CTE. In their call to develop professional capital, Hargreaves and Fullan (2012) argued that teaching is profoundly affected by the environment and we must "do something about the school as a whole" (p. 20) in order to make significant improvements. It would be beneficial to researchers and educational leaders to have a tool that could be used to measure the antecedents of collective efficacy as it would provide direction regarding areas in which to focus improvement efforts. Furthermore, it is the conditions within specific school contexts that educational leaders can directly influence, and therefore, there is a need for a valid and reliable instrument to measure the antecedents of CTE.

Other researchers have developed scales to investigate the context-specific nature of CTE. For example, Abedini *et al.* (2018) developed and validated the English Language Teacher Collective Efficacy Scale (ELTCES), which reflects the contextual specificity of English Language Teachers. Chu (2016) developed a scale that was designed to investigate special education teachers' perceptions of their collective efficacy for teaching culturally and linguistically diverse (CLD) students. In both cases, the researchers drew upon existing models and added context-specific language. For example, the sample item from Chu's (2016) scale "teachers in my school are confident they will be able to motivate every student, including students with disabilities from CLD backgrounds" (p. 44) closely reflects language from Goddard and Hoy's (2003) Collective Efficacy Scale (CE-Scale) "teachers here are confident they will be able to motivate their students."

The researchers in this study were interested in examining the enabling conditions within schools that affect collective efficacy perceptions. Even though there are several collective efficacy scales, including the ones that have been developed to capture the context-specific nature of CTE (briefly described earlier), contextual factors that contribute to professional capital, such as the nature of teachers' collaborations, opportunities for teachers to make decisions on important issues related to school improvement, staff cohesion, and leadership practices are not captured in current instruments. Collective efficacy scales are designed to capture the degree to which collective efficacy is present in a school and therefore measure teachers' future-oriented perceptions about their collective ability to motivate students, deal with disciplinary issues, and facilitate student learning. They are not designed to measure the antecedents of CTE, which would perhaps be more useful for school and district leaders in shaping their efforts to improve CTE in the institutions under their care.

Research question

This study was guided by the question: What conditions enable CTE in schools? While there are instruments that measure the extent to which CTE is present in schools, there is no widely

used instrument available to measure the antecedents of CTE. Hence, the purpose of this study was to produce a scale to measure the enabling conditions for collective efficacy. The first step in the development of the scale was to conduct a literature review.

Literature review

A literature review was conducted in an effort to identify malleable contextual factors that foster the development of collective efficacy in schools. Studies were selected according to the following procedures: Educational Resources Information Center (ERIC) and EBSCO databases were searched for peer-reviewed articles written in English and published since 2000. The search terms included "collective efficacy" and "teachers or educators" and were extended beyond titles to include keywords contained in the articles. The resulting hits (104) were examined in order to determine if the article was based on research that examined the antecedents of CTE. Initial screening was conducted by examining article titles and abstracts and skimming the content. Articles that focused solely on teacher efficacy and/or student efficacy were excluded. Articles that reported on the validation of collective efficacy scales were also excluded. Many articles reported on the consequences of CTE (Table I). Ten articles reported information related to the antecedents of CTE. Additional articles (4), some published earlier than 2000, were located by examining the references cited in the original 10 articles. Further screening involved reading the full reports to determine which articles reported on the *malleable* antecedents of CTE.

While the reciprocal relationship between individual teacher efficacy and CTE has been established in previous research (Gibbs and Powell, 2011; Goddard and Goddard, 2001; Kurz and Knight, 2003; Skaalvik and Skaalvik, 2007), individual teacher efficacy as an antecedent of CTE was not of interest in this particular study because empirical evidence demonstrates that both are formed through the cognitive processing of the four sources of past experience (Bandura, 1998). The authors of this study were interested in examining the contextual factors that influence teachers' cognitions in regard to those four sources.

Prior achievement has also been shown to highly predict collective efficacy in schools (Bandura, 1993; Chong *et al.*, 2010; Goddard, 2001; Ross *et al.*, 2004). Prior achievement is often used as a proxy measure for mastery experiences and for that reason, it was not examined in this study. In addition, socioeconomic status is another contextual variable empirically demonstrated to influence CTE (Bandura, 1993; Hoy *et al.*, 2003) but was not of interest here because its non-manipulability.

The themes outlined in the research studies that examined the malleable, contextual antecedents of CTE are described in the section that follows.

Teacher leadership and influence

Adams and Forsyth (2006) found that enabling school structures independently accounted for the most variability in perceptions of CTE. They differentiated enabling school structures (procedures that lead to problem-solving among members) from hindering school structures (procedures that force conformity to rigid rules and regulations) and found a significant relationship between enabling structures and CTE. In other words, when the conditions are set for teachers to come together to determine solutions to challenges of practices and hierarchy is flattened, it helped in fostering a sense of collective efficacy. In 2002, Goddard found that an increase of 1 standard deviation in CTE was associated with 0.41 standard deviation increase in teacher influence. Where teachers had the opportunity to influence important, instructionally relevant school decisions, they also tended to have stronger beliefs in the combined ability of the faculty to positively impact student achievement. Derrington and Angelle (2013) also demonstrated a clear and strong relationship between the extent of

teacher leadership and collective efficacy in schools. Items that ranked high on the survey administered centered on sharing ideas and improving student learning. The researchers noted that one highly ranked item reported the extent to which teachers shared new ideas with others through grade level and department meetings. The highest rated item in the instrument was the statement, "Teachers discuss ways to improve student learning" (p. 5).

School leadership

Goddard *et al.* (2015) studied the relationship between instructional leadership, teacher collaboration, and collective efficacy and how this relationship impacted student learning. The first finding was that principals' instructional leadership strongly predicted the degree to which teachers' collaborations were focused on instructional improvement. Schools where principals were reported by teachers to frequently monitor instruction, and where they provide relatively strong instructional guidance, were characterized by high levels of collective work among teachers to improve instruction. The second finding was that teachers' collaboration for instructional improvement was a strong direct predictor of collective efficacy. When teachers' collaborations were centered on instructional improvement in schools, it was "more likely to build real capability and hence, enhance the resolve of teachers that they possess the ability necessary to achieve student learning goals" (p. 504). The third finding was that the principals' instructional leadership was a significant, positive predictor of collective efficacy beliefs through its influence on teachers' collaborative work. Finally, the researchers also found that perceived collective efficacy was a significant positive predictor of differences among schools in student achievement. The researchers noted that the "more robust the sense of collective efficacy characterizing the schools in our sample, the greater their levels of student achievement, even after controlling for school and student background characteristics and prior levels of student achievement" (p. 525).

Goal consensus

Kruz and Knight (2003) found a strong relationship between goal consensus and CTE in high schools. Also, Ross *et al.* (2004) identified teacher ownership as a unifying theme that predicted CTE, and they noted that one of the school processes that had the strongest effect on CTE was shared school goals (cf., Kruz and Knight, 2003; Ross *et al.*, 2004). There are also two meta-analyses that provide additional insight into the effect of goal setting on student achievement. In Robinson *et al.*'s (2009) investigation of school leadership practices that impacted student achievement, establishing goals and high expectations was the second-equal highest leadership practice, with an effect size of 0.42. Robinson *et al.* (2009) noted that "goal setting - for both teacher and student learning - is part of a cycle of evidence-based assessment, analysis, and determination of next steps" (p. 109). They also noted that a consequence of goal setting was an increased sense of efficacy. In the absence of goals, monitoring progress and knowing collective impact becomes problematic. Goal setting was also a dimension of effective school leadership identified in Marzano and Waters's (2009) meta-analysis. Marzano and Waters's (2009) pointed out that the need for a collaborative goal-setting process has been highlighted by researchers for at least four decades, and it was a decade ago in which that statement was made.

Teachers' knowledge of each other's work

Newmann *et al.* (1989) found that CTE was significantly associated with teachers' knowledge of other teachers' courses. The researchers noted that "knowledge and coordination of curriculum could boost efficacy through the sharing of technical information that actually improves the effectiveness of teaching and may also facilitate constructive interaction among

teachers, which reduces the kind of social isolation that can lead to feelings of inadequacy" (p. 235). When teachers knew more about what went on in other classrooms in the school, their perceptions about the ability of their colleagues were influenced.

Cohesion

Cohesion is defined as the degree to which teachers agree with each other about what constitutes effective assessment and instructional practices. Ross *et al.* (2004) found that the more cohesive the faculty, the more likely they were to give into social persuasion. The researchers believed the reason for this was because the more cohesive the staff, the more likely they would be aware of each other's concerns. The awareness of concerns was then useful in building persuasive arguments about the important role that individuals contributed to the team. Ross *et al.* (2004) further pointed out that the greater cohesion, the more opportunities teachers had to experience successful collaboration, and the "social processes that generated peer support were likely to reduce the effects of negative emotions on collective efficacy beliefs" (p. 167).

Effective systems of intervention

DuFour *et al.* (2010) noted that "teachers in schools with effective systems of interventions and enrichment have a stronger sense of both self-efficacy and collective efficacy" (p. 212). The authors also pointed out that the culture of high expectations in schools was created through the shared conviction of the faculty's collective abilities to positively impact student achievement.

The overall findings from the literature review demonstrated malleable contextual factors that precede CTE, which included teacher leadership and influence on important school decisions, goal consensus, teachers' knowledge of each other's work, faculty cohesion, instructional leadership, and effective interventions. The extant research on the antecedents of CTE, described earlier, was used to inform the development of the survey. The phases of development along with the results, followed by a discussion, conclusion, and suggestions for future research are outlined in the sections that follow.

Phase 1 – preliminary instrument development and field test

Instrument development

The first step in developing a teachers' perception survey to provide clear evidence to school leaders about the enabling conditions of CTE at their school focused on developing questions to elicit meaningful feedback regarding the known enabling conditions as identified in the literature review including Advanced Teacher Influence, Goal Consensus, Teachers' Knowledge of Each Others' Work, Cohesive Staff, Responsiveness of Leadership, and Effective Systems of Intervention. The questionnaire was conceptualized in a theoretical model using six first-order factors (see Figure 1).

A total of 18 statements (see Table II) were developed for the preliminary survey including three statements for each of the identified enabling conditions. Care was taken to avoid the inclusion of ambiguous terminology and double-barrelled statements. The 18 statements were shared with a small group of educators (obtained through a convenience sample) in order to obtain feedback regarding clarity. Finally, each item was formed into a six-point Likert-like scale using "levels of agreement" anchors (Strongly Disagree, Disagree, Somewhat Disagree, Somewhat Agree, Agree, Strongly Agree).

Data collection

Data from a convenience sample for the field test of the preliminary questionnaire was provided to the first author by administrators who had used the survey in their districts. In

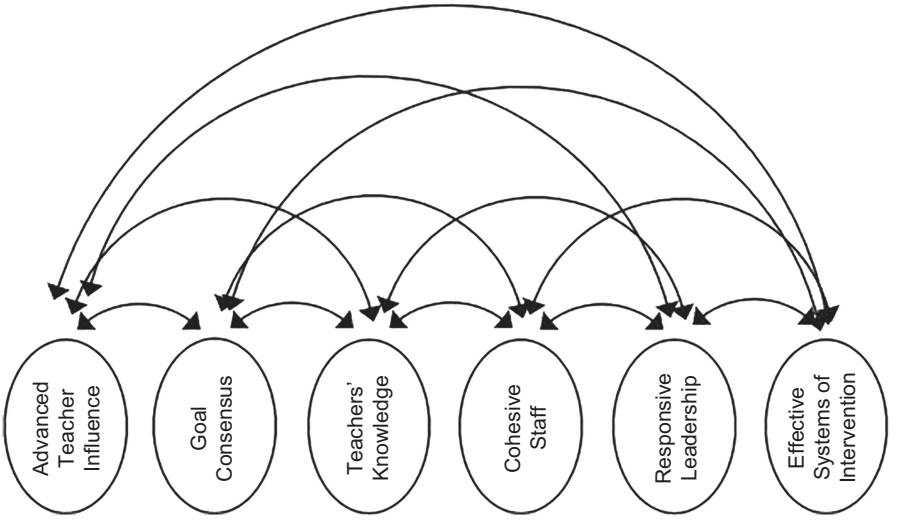

Figure 1.
Proposed factor structure for preliminary enabling condition of CTE questionnaire

Study	Positive consequences attributed to collective teacher efficacy
Advanced teacher influence	Teachers are entrusted to make important decisions on school-wide issues
	Teachers are provided authentic leadership opportunities
	Teachers have a voice in matters related to school improvement
Goal consensus	Improvement goals are established and understood by all faculty
	There is consensus on school goals among staff
	Teachers actively participate in setting school-wide improvement goals
Teacher knowledge	I know about the classroom management strategies my colleagues use in their classrooms
	I know about the feedback my colleagues provide to students
	I am aware of the teaching practices used by others on staff
Cohesive staff	The staff holds shared beliefs about effective instructional approaches
	The staff agrees about what constitutes effective classroom instruction
	The staff agrees about assessment strategies that are the most effective
Responsive leadership	Administrators help us carry out our duties effectively
	The leaders show concern for the staff
	The leaders protect the staff from issues that detract us from focusing on learning and teaching
Effective systems of intervention	There is a system in place to ensure high levels of success for all students
	There are systems in place for tracking and monitoring at-risk students
	Students meet with success because of interventions that are in place

Table II.
Eighteen statements included in the preliminary enabling conditions for collective teacher efficacy questionnaire

total, 136 complete sets of responses from teachers were provided. As this data was collected by district administrators, as part of their day-to-day work, the data did not include sample information (i.e. school type, year level taught, etc.). The sample size ($N = 136$) provided was deemed sufficient for preliminary analysis as it met the minimum of 5:1 ratio for confirmatory factor analysis (CFA) recommended by Bentler and Chou (1987).

Data analysis

The data were investigated for outliers, missing data, or anomalies, and the data were deemed sufficiently clean to move to factor analysis. In the first instance given the existence of a

theorized model, as outline in the literature review, CFA, using the Lavaan Package (0.6–4) for *R* (Yves, 2012), was used to evaluate the proposed factor structure. The primary purpose of running CFA in this case was to examine the relationships among the latent and manifest variables in order to verify the proposed factor model (Schreiber *et al.*, 2006). In order to evaluate model fit, multiple goodness-of-fit indices have been developed for CFA. This investigation used the Chi-squared test, Tucker Lewis Index (TLI), root mean square error of approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). The Chi-squared test is typically a reasonable measure of fit for models with less than 200 cases but can be less reliable for models with more cases when the test statistics are often statistically significant. The interval of TLI is 0–1 with closer to 1 indicating a stronger relationship between variance and covariance (Schreiber *et al.*, 2006), and TLI values above 0.90 indicate model fit (Hu and Bentler, 1999). The SRMR is an absolute measure of fit and is defined as the standardized difference between the observed correlation and the predicted correlation. It is positively biased, and that bias is greater for small *N* and for low df studies. Because the SRMR is an absolute measure of fit, a value of zero indicates perfect fit; a value less than 0.08, preferably less than 0.05, is generally considered a good fit (Hu and Bentler, 1999). The acceptable value for RMSEA is below 0.08 (Browne and Cudeck, 1993; Bryne, 1998).

Results

The initial results of the CFA indicated that the proposed factor model was not an acceptable fit (Chi-square = 248.554, df = 120; TLI = 0.873; RMSEA = 0.089 [0.073–0.104]). Given poor fit disconfirmed the proposed theoretical model, it was decided to investigate alternate possible underlying structures of the data. To achieve this, exploratory factor analysis (EFA) was used. This is because EFA methods have been traditionally used to explore underlying factor structure of a set of observed variables without imposing a preconceived structure on the outcome (Child, 1990). The intention is to determine if there was a more appropriate model to describe the data that might be discovered. Parallel analysis, using the Psych Package for *R*, was used and suggested that a five-factor model provided best fit both empirically (TLI = 0.954; RMSEA = 0.058 [0.019–0.075]) and theoretically and provided the best direction for further development and sampling. This five-factor model (see Figure 2) retained the original factors of Advanced Teacher Influence, Goal Consensus, and Responsive Leadership, introduced a new factor, Assessment as Feedback, and collapsed Teacher Knowledge and Cohesive Staff into a single factor, Cohesive Teacher Knowledge. While the five-factor model seemed most promising, given the limited sample size, it was deemed necessary to further develop and investigate the five-factor model and test it with a larger sample.

Phase 2 – updated instrument development and field test

Instrument refinement

The five-factor model that emerged in Phase 1 of this study was used as the basis for developing an updated questionnaire. To this end, three items, included in the original subscale entitled "Effective Systems of Intervention" were removed, and additional items were constructed to fit within the updated theorized framework. The updated questionnaire included 31 statements (see Table III). Items were formed into a six-point Likert-like scale using "levels of agreement" anchors with greater discrimination at the positive end (Strongly Disagree, Disagree, Somewhat Agree, Agree, Very Much Agree, Strongly Agree).

Data collection

In the final step of this phase, the updated questionnaire was administered to a convenience sample using Zoho Survey. The survey link was shared by the first author among three

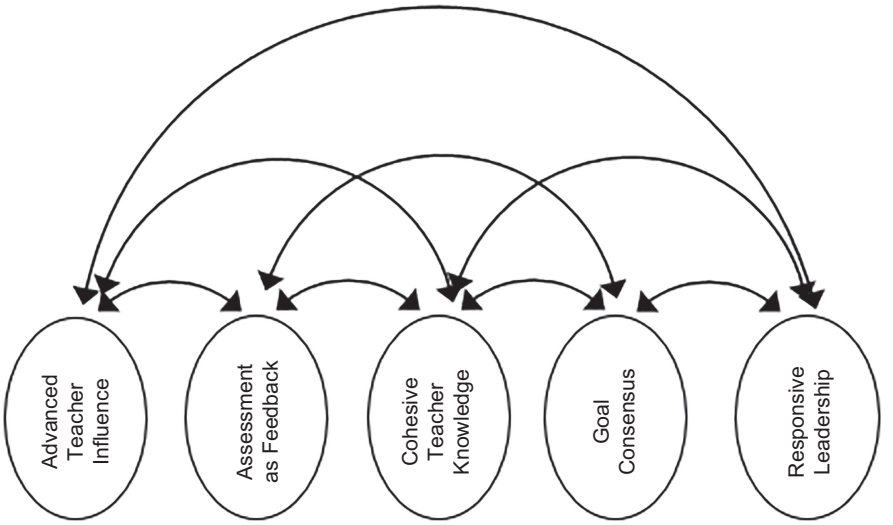

Figure 2.
Updated factor structure for enabling condition of CTE questionnaire

district administrators to use with schools under their supervision to provide feedback about the enabling conditions for collective efficacy from the perspective of school-based stakeholders. Two districts were in Ontario, Canada, and the third was in New Jersey, in the United States of America. Participants included teachers, teacher leaders, administrators, and support staff, from Kindergarten to Grade 12, with a range of teaching experiences. As this data was collected by district administrators, as part of their day-to-day work, the data did not include sample information (i.e. school type, year level taught, etc.). A total of 438 participants from 42 schools, located in urban, suburban, and rural settings, provided responses. This was deemed sufficient to proceed with analysis as it met the 5:1 ratio for CFA recommended by Bentler and Chou (1987).

Data analysis

The data were investigated for outliers, missing data, or anomalies, and the data were deemed sufficiently clean to move to factor analysis. As in phase 1, given the existence of a theorized model, CFA, using the Lavaan Package (0.6–4) for *R* (Yves, 2012), was used to evaluate the proposed factor structure. Again, to evaluate model fit, the Chi-squared test, TLI, RMSEA, and SRMR were used. In conducting the CFA, when necessary, modification indices and standardized residuals were considered to determine if model respecification was necessary. Composite Reliability (CR), an indicator of the shared variance among the observed variables, was also calculated for each factor. There is some debate about an acceptable threshold for CR among authors with a key factor being the number of items in each scale. Netemeyer *et al.* (2003) have indicated that it is reasonable for a narrowly defined construct to meet a minimum threshold of 0.80. Finally, descriptive and estimates of reliabilities for the final set of factors were calculated.

Results

CFA was used to evaluate the proposed factor structure. The initial results indicated that the proposed model was not acceptable (Chi-square = 2728.517, df = 424; TLI = 0.809; RMSEA = 0.111 [0.107,0.115]; SRMR = 0.085). Modification indices and factor loadings were

Enabling conditions	Question
Advanced teacher influence	Teachers are entrusted to make important decisions on school-wide issues
	Teachers are provided authentic leadership opportunities
	Teachers have a voice in matters related to school improvement
	Teachers actively participate in setting school-wide improvement goals
	Teachers' ideas and expertise are valued
	Teachers are involved with planning initiatives to improve student learning
Assessment as feedback	Teachers develop common conceptions of progress with students and other teachers in the school
	School leaders regularly acknowledge the accomplishments of individuals and teams within the school
	The faculty continually re-examines the extent to which teaching practices support the learning of all students
	The faculty examines multiple sources of evidence when considering student progress and achievement over time
	Teachers regularly seek feedback from students and use it to adjust their instruction
	Teachers regularly determine how their work furthers the school's vision and goals
	Teachers engage in discussions about the relative merit of the teaching practices they are currently using
Cohesive teacher knowledge	The faculty holds shared beliefs about instructional approaches that are most effective for student learning
	The faculty agrees about what constitutes effective classroom instruction
	The faculty agrees about assessment strategies that are the most impactful
	I am aware of the classroom management strategies used by other teachers
	I am aware about the feedback my colleagues provide to students
	I am aware of the teaching practices used by other teachers in this school
Goal consensus	Improvement goals are established and understood by all faculty
	There is consensus on school goals among the faculty
	The school-wide goals for improvement are realistic
	There is a process in place for teachers to collaborate when setting goals for improvement
	School-wide improvement goals are clear and specific
	Teachers are committed to school improvement goals
Responsive leadership	School leaders support us in carrying out our duties effectively
	School leaders show concern for the faculty
	School leaders protect the faculty from issues that might distract the focus from learning and teaching
	School leaders ensure there is time for teachers to focus on school-wide improvement initiatives
	School leaders take into account the faculty's opinions when initiating actions that affect their work
	School leaders ensure the faculty has access to materials that support meeting school-wide improvement initiatives

Table III.
Statements included in the second version of the enabling conditions for collective teacher efficacy questionnaire

examined to identify potential model specification issues with the major concern being items loading on more than one factor or fitting poorly. As a result, one question was respecified, and 12 items were removed. The updated questions were reviewed, and the factor descriptors updated as Empowered Teachers, Embedded Reflective Practices, Cohesive Teacher Knowledge, Goal Consensus, and Supportive Leadership. Deleted questions are included in Table IV.

CFA was used to evaluate the updated factor structure. Results indicated acceptable fit (Chi-square = 490.581, df = 142; TLI =0.942; SRMS = 0.037; RMSEA = 0.075 [0.068,0.082]). Figure 3 provides a visual representation of the final factor model including loadings. CRs for

Teachers actively participate in setting school-wide improvement goals
Teachers are involved with planning initiatives to improve student learning
Teachers develop common conceptions of progress with students and other teachers in the school
Teachers regularly determine how their work furthers the school's vision and goals
Teachers engage in discussions about the relative merit of the teaching practices they are currently using
I am aware of the classroom management strategies used by other teachers
I am aware about the feedback my colleagues provide to students
I am aware of the teaching practices used by other teachers in this school
There is consensus on school goals among the faculty
Teachers are committed to school improvement goals
School leaders ensure there is time for teachers to focus on school-wide improvement initiatives
School leaders take into account the faculty's opinions when initiating actions that affect their work
School leaders ensure the faculty has access to materials that support meeting school-wide improvement initiatives

Table IV.
Deleted and omitted statements

each of the factors were Empowered Teachers (0.91), Embedded Reflective Practices (0.84), Cohesive Teacher Knowledge (0.86), Goal Consensus (0.88), and Supportive Leadership (0.93).

It was noted that there were high correlations between several factors. To address this, a series of alternate models were considered including a second-order factor model as well as models that collapsed pairs of factors with correlations greater than 0.90 including Empower Teachers and Supportive Leadership, Empowered Teachers and Goal Consensus, and Embedded Reflective Practices and Cohesive Teacher Knowledge. Results for these analyses are provided in Table V including a difference of Chi-square test against the updated model. Ultimately it was deemed that the final updated model, including five factors, was the best fit. The descriptive and estimates of reliabilities for the final items are also included in Table VI.

Discussion

High levels of CTE within a school is known to be associated with improved student learning. CTE is a marker of the level of shared efficacy among teachers within a school. Knowledge of the levels of CTE within a school does not, though, support its development. To properly support school leaders in nurturing CTE then, knowledge of the status of the enabling conditions for CTE within their schools is necessary to identify areas of strength and opportunities for improvement. Armed with such knowledge, school leaders and administrators can then begin the journey of cultivating CTE within their schools.

This study has provided an overview of the development and psychometric validation of a scale to provide exactly this type of feedback. The EC-CTES included the following five subscales: Empowered Teachers, Embedded Reflective Practices, Cohesive Teacher Knowledge, Goal Consensus, and Supportive Leadership. Of all models investigated, this was deemed the most appropriate and was considered to have good fit from both a technical (Chi-square = 490.581, df = 142; TLI =0.942; SRMS = 0.037; RMSEA = 0.075 [0.068,0.082]) and theoretical perspective. Each of these factors is expanded on in the discussion that follows.

Empowered Teachers was focused on collecting evidence of teacher leadership and influence within the school. This has been deemed important as past research identified the strong and positive relationship between teacher influence (Goddard, 2002; Ross *et al.*, 2004), teacher leadership (Derrington and Angelle, 2013), and CTE. Indeed, when teachers feel disempowered, efficacy is diminished. Whereas, on the other hand, when leaders empower teacher teams by providing them decision-making power on important issues related to

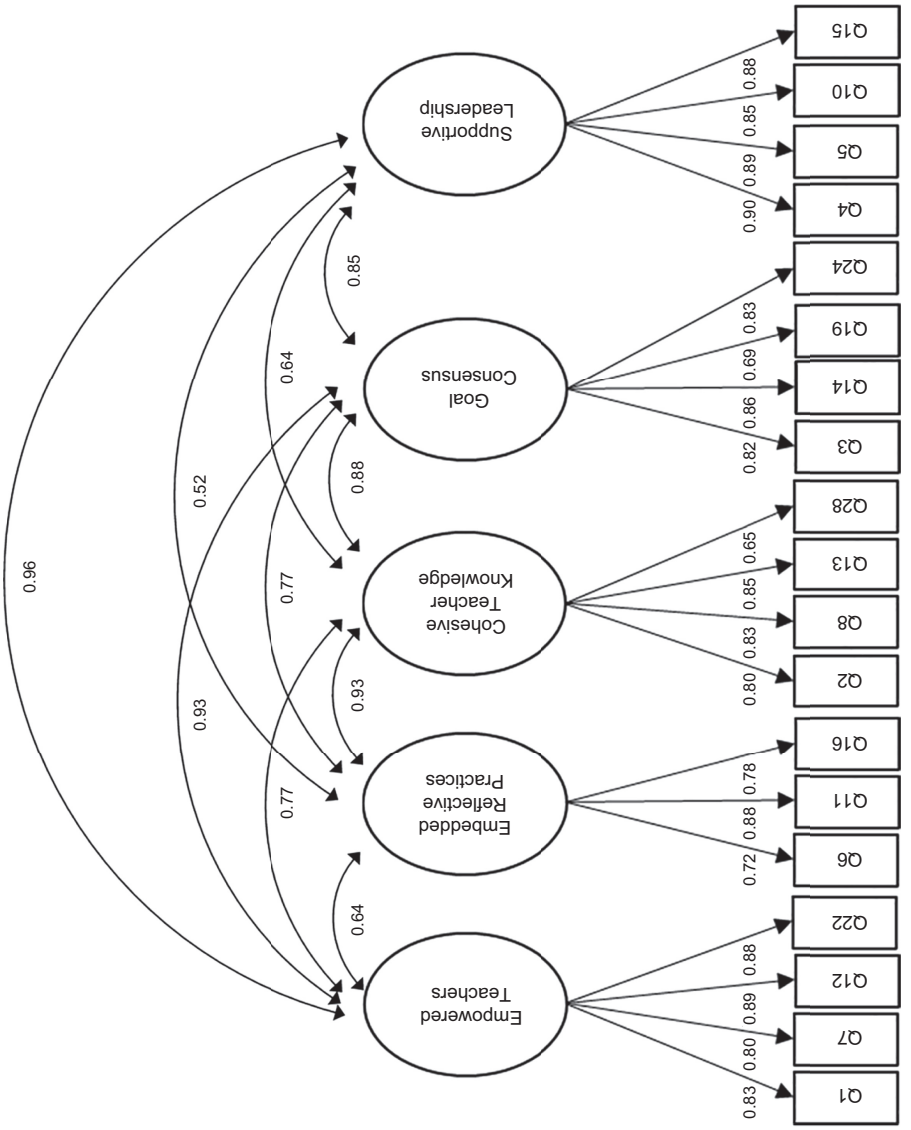

Figure 3.
Final factor model for enabling condition of CTE questionnaire

school improvement, not only is professional capital built, but also efficacy becomes enhanced. This factor was made up of four items with CR of 0.91. Sample items for this factor included "Teachers are provided authentic leadership opportunities" and "Teachers have a voice in matters related to school improvement."

Cohesive Teacher Knowledge was focused on teachers' knowledge about each other's practice and the extent to which teachers agree about what constitutes sound pedagogy. This factor was made up of four items with CR of 0.86. A sample item included "Teachers are aware of the teaching practices used by other teachers in this school." Agreement with this statement would suggest that vicarious sources are at play in fostering collective efficacy. Vicarious experiences, the second most potent source of collective efficacy, occur through observation. In order to capitalize on vicarious experiences, teachers need opportunities to learn more about each other's work through peer observation. This will also help to create a more cohesive staff.

Goal Consensus is a factor focused on knowledge about shared goals and the processes in place for establishing goals. This was considered important as Schechter and Qadach's (2012) study demonstrated distinctive patterns between perceived uncertainty and a lack of CTE. Teachers' ambiguity and uncertainty (stemming from lack of information about decisions and outcomes) impacted their collective efficacy and therefore, willingness to persevere against the challenges faced in schools. However, the researchers concluded that processes that enable teachers to learn and react effectively in uncertain and dynamic environments can mediate teachers' uncertainty. Goal setting and gaining consensus on goals is a process that can be put in place to help mediate teachers' uncertainty. Furthermore, Ross *et al.*'s (2004) research identified that school processes (including goal setting) had a stronger effect on CTE than prior student achievement. This factor was made up of four items with CR of 0.88. Sample items included "The school-wide goals for improvement are realistic at this school" and "School-wide improvement goals are clear and specific."

Embedded Reflective Practices focused on the processes by which teams work together to examine sources of student evidence to help inform their work. "When instructional improvement efforts result in improved student outcomes that are validated through sources of student learning data, educators' collective efficacy is strengthened. Evidence of collective impact, in turn, reinforces proactive collective behaviors, feelings, thoughts, and motivations"

Table V.
Summary of results for analysis of alternate models based on high correlations between factors

Model	χ^2	df	TLI	SRMS	RMSEA	$\Delta\chi^2$	df	*p*-value
Final updated model	488.4	142	0.943	0.038	0.075 [0.067, 0.082]			
Second-order factor	865.5	147	0.885	0.079	0.106 [0.099, 0.112]	377.037	5	$p < 0.001$
E + SL	578.2	146	0.931	0.046	0.082 [0.075, 0.089]	89.774	4	$p < 0.001$
EMP + G	609.2	146	0.926	0.048	0.085 [0.078, 0.092]	120.77	4	$p < 0.001$
ERP + CTK	539.2	146	0.937	0.043	0.078 [0.071, 0.086]	50.803	4	$p < 0.001$

Table VI.
Descriptive statistics of final factors

Factor	*N*	Mean	SD	Composite reliability
Empowered teachers	438	3.969	1.107	0.91
Embedded reflective practices	438	4.214	0.894	0.84
Cohesive teacher knowledge	438	4.047	0.912	0.86
Goal consensus	438	4.088	0.946	0.88
Supportive leadership	438	4.163	1.24	0.93

(Donohoo *et al.*, 2018, p. 42). Embedded reflection in light of evidence helps to uncover cause-and-effect relationships (quality teaching causes student learning) and would therefore highlight first-hand mastery experiences and vicarious experiences for teacher teams. Teachers come to realize the positive results of their own efforts, other's efforts, and their combined efforts through processes that enable embedded reflective practices. This factor was made up of three items with CR of 0.84. Sample items for this factor included "Teachers regularly seek feedback from students and use it to adjust their instruction" and "The teaching staff continually re-examines the extent to which teaching practices support the learning of all students." Embedded reflective practices are at the heart of teachers' collaborative work. Teachers become empowered, build consensus on goals, and develop greater cohesion when reflection in light of student evidence is embedded in their common practices.

Finally, the factor *Supportive Leadership* centered upon ideas such as school leadership's approach to buffering teachers from distractions and the recognition of individual and team accomplishments. This factor was made up of four items with CR of 0.93. Sample items included "School leaders support teachers in carrying out their duties effectively" and "School leaders show concern for the teaching staff." The inclusion of a single factor that focuses on the supportive role of the leader might, however, be misleading. When considering the survey in its entirety, the leader plays an important role in nurturing the conditions for the remaining four factors to be realized as well. It is our view, that within the practice of leadership, the normative expectations for teachers' collaborations are set. School leaders also establish the processes and procedures that help to empower teachers and ensure that teachers are regularly reflecting on their practice in light of evidence. They create the conditions to foster collaboration, increase teachers' knowledge of each other's work, and build greater cohesion among their staff. They can also establish a process for gaining consensus on school goals. As such, we propose that it is only through careful nurturing, by leadership, to ensure that all the conditions for CTE are in place that CTE is effectively developed within schools. The result is enhanced teacher efficacy and CTE leading to the greatest likelihood of improved student learning outcomes. In support of this, we propose the conceptual framework outlined in Figure 4.

Conclusion

This paper highlighted the importance of CTE to ensuring optimal outcomes for students. Building upon this, the evidence informed enabling conditions for CTE were examined. The identification and measurement of the malleable, contextual factors that contribute to the formation of CTE have been lacking in previous research. While most of the previous research focused on the remote sources of CTE, very few studies have examined the proximate sources. The identification of the contextual antecedents of CTE will be useful to system and school leaders because this information can be used to help inform their leadership practice as they work to help instill a greater sense of collective efficacy among the teaching faculty in their schools. This study details the design and validation of a teacher perception questionnaire to capture information related to the dimensions associated with the enabling conditions of CTE.

In the first phase, the development of the questionnaire drew on the relevant literature related to CTE and its associated antecedents. Preliminary data was analyzed and as a result, the proposed survey was altered. During the second phase, data was collected and subsequently analyzed to evaluate model fit. This study provides evidence in support of a factor model with five related first-order factors that describe the enabling conditions for CTE: Empowered Teachers, Embedded Reflective Practices, Cohesive Teacher Knowledge, Goal Consensus, and Supportive Leadership. It is noted that correlations between some

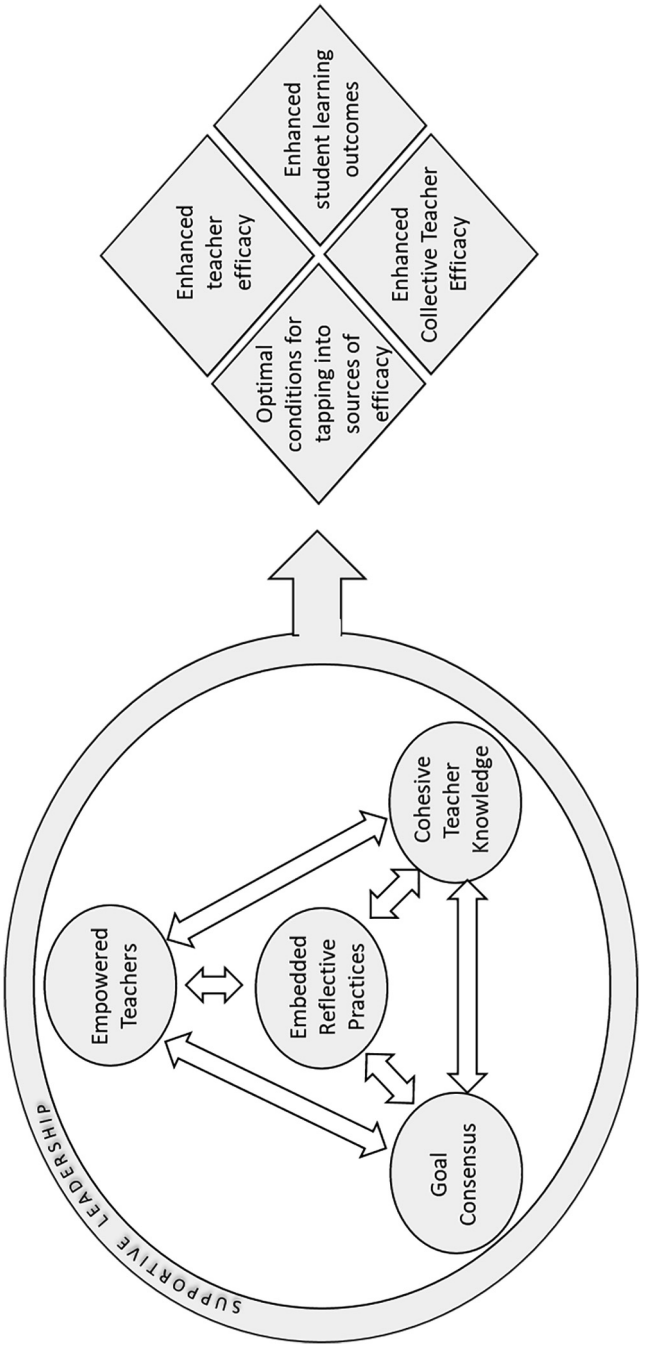

Figure 4.
Conceptual framework: leading for collective teacher efficacy

factors were high, in particular Empowered Teachers and Supportive Leadership. Although there is evidence these factors can be seen as making unique contributions, future work will focus on the inclusion of additional items to more clearly make the distinction between the factors. It would also be useful to pursue studies focused on other aspects of validity evidence including consequences and/or more specifically interpretability of scores as proposed by O'Leary *et al.* (2017). In addition, there were limitations based on the sample in this study and future research should focus on a broader sample of participants. Finally, future studies might also focus upon examining the relationships between the elements of the scale validated in this study and CTE scales such as Tschannen-Moran's Collective Teacher Beliefs Scale or Goddard and Hoy's CE-Scale, teacher efficacy, and measures of student learning to provide greater insight into the relationships between these variables.

References

Abedini, F., Bagheri, A. and Sadighi, F. (2018), "Exploring Iranian Collective teacher efficacy beliefs in different elt settings through developing a context–specific english language teacher collective efficacy scale", *Teacher Education and Development Cogent Education*, Vol. 5 No. 1, pp. 1-33.

Adams, C. and Forsyth, P. (2006), "Proximate sources of collective teacher efficacy", *Journal of Educational Administration*, Vol. 44 No. 6, pp. 625-642.

Bandura, A. (2000), "Exercise of human agency through collective efficacy", *Current Directions in Psychological Science*, Vol. 9 No. 3, pp. 75-78.

Bandura, A. (1993), "Perceived self-efficacy in cognitive development and functioning", *Educational Psychologist*, Vol. 28 No. 2, pp. 117-148.

Bandura, A. (1998), "Personal and collective efficacy in human adaptation and change", in J.G., Adair, D., Belanger and K.L., Dion (Eds), *Advances in Psychological Science, 1, Personal, Social, and Cultural Aspects*, Psychology Press, Taylor & Francis, pp. 51-71.

Bandura, A. (1977), "Self efficacy: toward a unifying theory of behavioural change", *Psychological Review*, Vol. 84 No. 2, pp. 191-215.

Bandura, A. (1986), *Social Foundations of Thought and Action: A Social Cognitive Theory*, Prentice Hall, Englewood Cliffs, NJ.

Bentler, P.M. and Chou, C.P. (1987), "Practical issues in structural modeling", *Sociological Methods and Research*, Vol. 16, pp. 78-117.

Boberg, J. and Bourgeois, S. (2016), "The effects of integrated transformational leadership on achievement", *Journal of Educational Administration*, Vol. 54 No. 3, pp. 357-374.

Browne, M.W. and Cudeck, R. (1993), "Alternative ways of assessing model fit", in Bollen, K.A. and Long, J.S. (Eds), *Testing Structural Equation Models*, Sage, Newbury Park, CA, pp. 136-162.

Byrne, B.M. (1998), *Structural Equation Modeling with Lisrel, Prelis, and Simplis: Basic Concepts, Applications, and Programming*, Erlbaum, Mahwah, NJ.

Caprara, G., Barbaranelli, C., Borgogni, L., Petitta, L. and Rubinacci, A. (2003), "Teachers', school staff's and parents' efficacy beliefs as determinants of attitudes toward school", *European Journal of Psychology of Education*, Vol. 18 No. 1, pp. 15-31.

Chong, W., Klassen, R., Huan, V., Wong, I. and Kates, A. (2010), "The relationships among school types, teacher efficacy beliefs, and academic climate: perspective from Asian middle schools", *The Journal of Educational Research*, Vol. 103 No. 3, pp. 183-190.

Child, D. (1990), *The Essentials of Factor Analysis*, 2nd ed., Cassel Educational Limited, London.

Chu, S. (2016), "Developing a scale to investigate in-service special education teacher efficacy for serving students from culturally and linguistically diverse backgrounds", *Journal of Curriculum and Teaching*, Vol. 5 No. 1, pp. 39-51.

Ciani, K., Summers, J. and Easter, M. (2008), "A top-down analysis of high school teacher motivation", *Contemporary Educational Psychology*, Vol. 33, pp. 533-560.

Derrington, M. and Angelle, P. (2013), "Teacher leadership and collective efficacy: connections and links", *International Journal of Teacher Leadership*, Vol. 4 No. 1, pp. 1-13.

Donohoo, J., Hattie, J. and Eells, R. (2018), "The power of collective efficacy", *Educational Leadership*, Vol. 75 No. 6, pp. 41-44.

DuFour, R., DuFour, R., Eaker, R. and Karhanek, G. (2010), *Raising the Bar and Closing the Gap: Whatever it Takes*, Solution Tree Press, Bloomington, IN.

Eells, R. (2011), *Meta-Analysis of the Relationship between Collective Efficacy and Student Achievement*, Dissertation, Loyola University of Chicago, Chicago, Illinois.

Gibbs, S. and Powell, B. (2011), "Teacher efficacy and pupil behaviour: the structure of teachers' individual and collective beliefs and their relationship with numbers of pupils excluded from school", *British Journal of Educational Psychology*, Vol. 82 No. 4, pp. 564-584.

Goddard, R.D. (2001), "Collective efficacy: a neglected construct in the study of schools and student achievement", *Journal of Educational Psychology*, Vol. 93 No. 3, pp. 467-476.

Goddard, R.D. (2002), "Collective efficacy and school organization: a multilevel analysis influence in schools", *Theory and Research in Educational Administration*, Vol. 1, pp. 169-184.

Goddard, R.D. and Goddard, Y. (2001), "A multilevel analysis of the relationship between teacher and collective efficacy in urban schools", *Teaching and Teacher Education*, Vol. 17 No. 7, pp. 807-818.

Goddard, R.D., Goddard, Y., Kim, E. and Miller, R. (2015), "A theoretical and empirical analysis of the roles of instructional leadership, teacher collaboration, and collective beliefs in support of student learning", *American Journal of Education*, Vol. 121 No. 4, pp. 501-530.

Goddard, R., Hoy, W. and Woolfolk Hoy, A. (2004a), "Collective efficacy beliefs: theoretical developments, empirical evidence, and future directions", *American Educational Research Association*, Vol. 33 No. 3, pp. 3-13.

Goddard, R., LoGerfo, L. and Hoy, W. (2004b), "High school accountability: the role of perceived collective efficacy", *Educational Policy*, Vol. 18 No. 3, pp. 403-425.

Hargreaves, A. and Fullan, M. (2012), *Professional Capital: Transforming Teaching in Every School*, Teachers College Press, New York, NY.

Hoy, W., Sweetland, S. and Smith, P. (2002), "Toward an organizational model of achievement in high schools: the significance of collective efficacy", *Educational Administration Quarterly*, Vol. 38 No. 1, pp. 77-93.

Hoy, W.K., Smith, P.A. and Sweetland, S.R. (2003), "A test of a model of school achievement in rural schools: the significance of collective efficacy", in Hoy, W.K. and Miskel, C.G. (Eds), *Theory and Research in Educational Administration*, Information Age, Greenwich, CT, pp. 185-202.

Hu, L. and Bentler, P.M. (1999), "Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives", *Structural Equation Modeling: A Multidisciplinary Journal*, Vol. 6 No. 1, pp. 1-55.

Kirby, M. and DiPaola, M. (2011), "Academic optimism and community engagement in urban schools", *Journal of Educational Administration*, Vol. 49 No. 5, pp. 54-562.

Klassen, R. (2010), "Teacher stress: the mediating role of collective efficacy beliefs", *The Journal of Educational Research*, Vol. 103 No. 5, pp. 342-350.

Kurz, T.B. and Knight, S. (2003), "An exploration of the relationship among teacher efficacy, collective teacher efficacy, and goal consensus", *Learning Environments Research*, Vol. 7 No. 2, pp. 111-128.

Lee, J., Zhang, Z. and Yin, H. (2011), "A multilevel analysis of the impact of a professional learning community, faculty trust in colleagues and collective efficacy on teacher commitment to students", *Teaching and Teacher Education*, Vol. 27 No. 5, pp. 820-830.

Lyons, W., Thompson, A. and Timmons, V. (2016), "We are inclusive. We are a team. let's just do it: commitment, collective efficacy, and agency in four inclusive schools", *International Journal of Inclusive Education*, Vol. 20 No. 8, pp. 889-907.

Marzano, R. and Waters, T. (2009), *District Leadership that Works: Striking the Right Balance*, Solution Tree Press, Bloomington, IN.

Newmann, F.M., Rutter, R.A. and Smith, M.S. (1989), "Organizational factors that affect school sense of efficacy, community, and expectations", *Sociology of Education*, Vol. 62, pp. 221-238.

Netemeyer, R., l., Bearden, W., O. and Sharma, S. (2003), *Scaling Procedures: Issues and Applications*, SAGE, England.

O'Leary, T., Hattie, J. and Griffin, P. (2017), "Actual interpretations and uses as aspects of validity", *Educational Measurement: Issues and Practice*, Vol. 36 No. 2, pp. 16-22.

Ramos, M., Silva, S., Pontes, F., Fernandez, A. and Nina, K. (2014), "Collective teacher efficacy beliefs: a critical review of the literature", *International Journal of Humanities and Social Science*, Vol. 4 No. 7, pp. 179-188.

Rauf, P., Aluwi, A. and Noor, N. (2012), "The effect of school culture on the management of professional development in secondary schools in Malaysia", *The Malaysian Online Journal of Educational Science*, Vol. 2 No. 3, pp. 41-51.

Robinson, V., Hohepa, M. and Lloyd, C. (2009), *School leadership and Student Outcomes: Identifying what Works and Why. Best Evidence Synthesis Iteration [BES]*, Ministry of Education, New Zealand.

Ross, J., Hogaboam-Gray, A. and Gray, P. (2004), "Prior student achievement, collaborative school processes, and collective teacher efficacy", *Leadership and Policy in Schools*, Vol. 3 No. 3, pp. 163-188.

Sandoval, J., Challoo, L. and Kupczynski, L. (2011), "The relationship between teachers' collective efficacy and student achievement at economically disadvantaged middle school campus", *I-managers Journal of Educational Psychology*, Vol. 5 No. 1, pp. 9-23.

Schechter, C. and Qadach, M. (2012), "Toward an organizational model of change in elementary schools: the contribution of organizational learning mechanisms", *Educational Administration Quarterly*, Vol. 48 No. 1, pp. 116-153.

Schreiber, J.B., Nora, A., Stage, F.K., Barlow, E.A. and King, J. (2006) "Reporting structural equation modeling and confirmatory factor analysis results: a review", *The Journal of Educational Research*, Vol. 99 No. 6, pp. 323-338.

Skaalvik, E. and Skaalvik, S. (2007), "Dimensions of teacher self-efficacy and relations with strain factors, perceived collective teacher efficacy, and teacher burnout", *Journal of Educational Psychology*, Vol. 99 No. 3, pp. 611-625.

Tiplic, D., Brandmo, C. and Elstad, E. (2015), "Antecedents of Norwegian beginning teachers' turnover intentions", *Cambridge Journal of Education*, Vol. 45 No. 4, pp. 451-474.

Urton, K., Wilbert, J. and Hennemann, T. (2014), "Attitudes towards inclusion and self-efficacy of principals and teachers", *Learning Disabilities: A Contemporary Journal*, Vol. 12 No. 2, pp. 151-168.

Viel-Ruma, K., Houchins, D., Jolivette, K. and Benson, G. (2010), "Efficacy beliefs of special educators: the relationships among collective efficacy, teacher self efficacy, and job satisfaction", *Teacher Education and Special Education*, Vol. 33 No. 3, pp. 225-233.

Ware, H. and Kitsantas, A. (2007), "Teacher and collective efficacy beliefs as predictors of professional commitment", *The Journal of Educational Research*, Vol. 100 No. 5, pp. 303-310.

Wilcox, K., Angelis, J., Baker, L. and Lawson, H. (2014), "The value of people, place and possibilities: a multiple case study of rural high school completion", *Journal of Research in Rural Education*, Vol. 29 No. 9, pp. 1-18.

Yves, R. (2012), "lavaan: an R package for structural equation modeling", *Journal of Statistical Software*, Vol. 48 No. 2, pp. 1-36, available at: http://www.jstatsoft.org/v48/i02/.

Further reading

Field, A.P. (2009), *Discovering Statistics Using SPSS*, SAGE, London.

Hattie, J. (2017), "Visible learning plus [chart]", available at: https://visible-learning.org/wp-content/uploads/2018/03/VLPLUS-252-Influences-Hattie-ranking-DEC-2017.pdf.

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