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Schipper, Tijmen M.; de Vries, Siebrich; Goei, Sui Lin; van Veen, Klaas

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RUNNING HEAD: Promoting a Professional School Culture through Lesson Study? An Examination of School Culture, School Conditions, and Teacher Self-efficacy

# **Promoting a Professional School Culture through Lesson Study? An Examination of School Culture, School Conditions, and Teacher Self-efficacy**

Tijmen M. Schipper<sup>a,b\*</sup>, Siebrich de Vries<sup>b</sup>, Sui Lin Goei<sup>a,c</sup>, and Klaas van Veen<sup>b</sup>

<sup>a</sup> *Department of Human Movement and Education, Windesheim University of Applied Sciences, P.O. Box 10090, Campus 2-6, 8000 GB, Zwolle, The Netherlands, Phone #: +31(0)884699911.*

<sup>b</sup> *Department of Teacher Education, University of Groningen, Grote Kruisstraat 2/1, 9712 TS Groningen, The Netherlands, Phone #: +31(0)503636182.*

<sup>c</sup> *LEARN! Research Institute, VU University Amsterdam, Van der Boechorstraat 1, 1081 BT Amsterdam, The Netherlands, Phone #: +31(0)205988901.*

\*Corresponding author: [t.schipper@windesheim.nl](mailto:t.schipper@windesheim.nl) / ORCID: <https://orcid.org/0000-0002-3196-3809>

## **Promoting a Professional School Culture through Lesson Study? An Examination of School Culture, School Conditions, and Teacher Self-efficacy**

### **Abstract**

Professional school cultures, which can be characterized by teachers who take an inquiry stance and in which exchanging knowledge and collaboratively developing classroom material is common practice, receive increasing attention. However, teachers in many schools still often work in isolation and generally do not critically examine their practices. This could lead to decreased feelings of self-efficacy and could negatively impact teacher learning. To counteract such an isolationist school culture, Lesson Study, known for its integration of collaborative and inquiry-based features, could play an essential role. Using a quasi-experimental design ( $N = 60$ ) including two questionnaires, this study explores whether participating in Lesson Study influences teachers' perceptions of the school culture and conditions in their schools (such as leadership and collegial support), as well as their feelings of self-efficacy. The results reveal significant between-group differences in terms of efficacy in student engagement and significant within-group differences in the intervention group in terms of teacher autonomy and support from the school department leader as well as all teacher self-efficacy. This study could support school leaders who wish to implement, sustain or upscale Lesson Study practices in order to promote a professional school culture in their schools.

**Keywords:** lesson study; school leadership; professional school culture; school conditions; teacher self-efficacy.

## 1. Introduction

Traditionally, teaching has been described as a profession with a high degree of autonomy, which is often appreciated by teachers, but can easily lead to feelings of isolation from colleagues (Cochran-Smith & Lytle, 1992; Hargreaves, 2000; Levine & Marcus, 2010). An isolationist school culture in which collaboration between teachers is not common practice, seriously limits powerful learning environments (Schleicher, 2016), may cause professional struggles (Watson, 2006) and tends to weaken beliefs of confidence and self-efficacy (Hargreaves, 2000; Tschannen-Moran & Woolfolk Hoy, 2007). Given this context, an increasing amount of research stresses the importance of teacher professional development (PD) that includes effective characteristics that relate to collaborative inquiry and active learning, combined with a clear focus on the content as well as coherence with the school vision and teachers' knowledge and beliefs (Desimone, 2009; Opfer, 2016). Such collaborative forms of teacher professional learning could contribute to a more collaborative school culture (Patton & Parker, 2017) and have been shown to report positive effects on teachers' beliefs of self-efficacy and behavior as well as student achievement (McLaughlin & Talbert, 2006; Merchie, Tuytens, Devos, & Vanderlinde, 2016). Yet, the 'challenge of shifting the isolationist culture of schools to a more collaborative culture can be difficult' (Puchner & Taylor, 2006, p. 922). This study examines to what extent the rapidly growing and increasingly popular PD approach Lesson Study (LS) could foster this.

LS is a PD approach, originating from Japan, that integrates these effective features of PD (Dudley, 2013; Lewis & Perry, 2014). Research has shown that LS has the potential to strengthen professional (learning) communities (Chichibu & Kihara, 2013; Lewis, Perry, & Hurd, 2009), which, in turn, could increase teachers' feelings of confidence in their instructional behavior (Cajkler, Wood, Norton, & Pedder, 2014) and may lead to improved instructional teacher behavior and student learning (Lewis & Perry, 2017). Professional

learning communities are often related to professional school cultures (Cochran-Smith & Lytle, 1992; Hargreaves, 2000), and therefore, the quality of teacher learning within these communities cannot be separated from the school context in which it takes place (Opfer, 2016). Although accumulating evidence points to the influence of (the perceptions of) school conditions on teacher learning, such as school leadership, communication, resources, and collegial support (Admiraal et al., 2016; Huffman & Jacobson, 2003; Louws, Meirink, Van Veen, & Van Driel, 2017), the review by Van Driel, Meirink, Van Veen, and Zwart (2012) shows that the school organizational dimension is often neglected in most studies on PD. Opfer and Pedder (2011) argue that this focus on PD activities (the micro-context), without paying attention to school contextual influences (meso-context) or systemic influences (macro-context), may be caused by misunderstanding the nature of teacher professional learning. They propose to conceptualize teacher learning by focusing on the system in which learning takes place and to ‘understand under what conditions, why, and how teachers learn’ (p. 178).

School leaders turn out to be essential in creating the right conditions for teachers to learn (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006) due to their positional authority and control over school resources (McLaughlin & Talbert, 2006). Opfer (2016), for example, argues that instructional leadership affects participation in school embedded PD programs resulting in higher levels of self-efficacy beliefs. Furthermore, teachers’ perceptions of the school environment seem to influence their beliefs of self-efficacy (Ross & Bruce, 2007; Skaalvik & Skaalvik, 2010; Zee & Koomen, 2016). It is arguably the interplay between organizational factors and self-efficacy beliefs that affects teacher learning (Geijsel, Slegers, Stoel, & Krüger, 2009).

Despite the growing body of literature that approaches LS from different perspectives and in different contexts (Huang & Shimizu, 2016), studies that critically examine the school

culture and context in which LS is enacted, are still scarce (Hadfield & Jopling, 2016; Xu & Pedder, 2015) and the relationship between participating in LS and teachers' self-efficacy is hardly examined (Puchner & Taylor, 2006; Schipper, Goei, De Vries, & Van Veen, 2018; Sibbald, 2009) although it appears that working collaboratively may lead to higher levels of self-efficacy (Tschanen-Moran & Woolfolk Hoy, 2007). Furthermore, we did not find any notion in the LS literature of the relationship between teacher self-efficacy and perceptions of the school culture and conditions. Therefore, the central question guiding this study is: does participating in LS influence teachers' perceptions of the culture and conditions in their schools as well as their feelings of self-efficacy, and how do these constructs relate to each other? Using a quasi-experimental design with an explorative focus, this study adds to the limited number of (quasi-)experimental studies known in LS research (e.g., Lewis & Perry, 2017; Mutch-Jones, Puttick, & Minner, 2012; Schipper, Goei, De Vries, & Van Veen, 2018). The results are of particular interest for school leaders who consider to implement, sustain, or expand LS practices in their schools.

## **2. Conceptual framework**

### ***2.1. A professional school culture***

School cultures can be described in terms of the ethos and social environment in schools, consisting of the administrative and organizational structures and how these interact in order to promote (or constrain) teacher professional learning (Avalos, 2011). School cultures that enhance teacher learning in particular, are those in which teachers actively and collaboratively examine, share, and construct authentic classroom material and develop new knowledge on a regular basis and over a longer period of time (Desimone, 2009; Little, 2012; Levine & Marcus, 2010; Putnam & Borko, 2000; Van Driel, Meirink, Van Veen, & Zwart, 2012; Webster-Wright, 2009). Following Hargreaves' (2000) notion of professional learning

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cultures, we use the term professional school cultures to indicate schools in which teachers take (or develop) an inquiry stance in order to continually drive their professional growth, and where sharing knowledge and experiences as well as collaboratively developing classroom material are common practice and integrated in PD activities (Cochran-Smith & Lytle, 1999). This contrasts with school cultures that offer externally developed episodic PD opportunities which do not build on teachers' knowledge and day-to-day classroom challenges (McLaughlin & Talbert, 2006).

As learning in professional school cultures turns out to be a social and situated matter (Borko, 2004; Little, 2012), in literature, it is often related to communities of practice (Wenger, 1998), professional learning communities (Little, 2012; Stoll, Bolam, McMahon, Wallace, & Thomas, 2006) or communities of inquiry (Cochran-Smith, & Lytle, 1992; Jaworski, 2006). In particular, professional learning communities receive ample attention and are often related to professional school cultures (Cochran-Smith & Lytle, 1992; Hargreaves, 2000). According to Giles and Hargreaves (2006), professional learning communities emphasize three components: 'collaborative work and discussion among the school's professionals, a strong and consistent focus on teaching and learning within that collaborative work, and the collection and use of assessment and other data to inquire into and evaluate progress over time' (p. 126). Regardless of the community concept one adheres to, teachers who are part of a culture that embraces elements of communities as being collaborative, reflective, ongoing and learning-oriented (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006), report higher levels of commitment and enthusiasm to teach students, especially when the focus is on student learning (Levine & Marcus, 2010). In addition, collaborative inquiry of teachers can be seen as 'the engine for professional learning' and 'is one of the most powerful enablers of changes in practice that can influence student learning' (Katz & Dack, 2014, p.

36). However, in order to promote a professional school, it is vital to take essential school conditions into account (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006).

## ***2.2. Facilitating conditions to promote a professional school culture***

When studies on teacher professional learning examine the school context, a shared set of essential school conditions can be found (Louws, Meirink, Van Veen, & Van Driel, 2017). Generally, these conditions relate to the facilitated time teachers receive to participate in PD activities, the quality of collaboration between teachers, accessibility to and usage of resources, guidance and support from facilitators, experienced trust and support from colleagues and school leaders, and feelings of safety (Desimone, 2009; Guskey, 2000; McLaughlin & Talbert, 2006; Merchie, Tuytens, Devos, & Vanderlinde, 2016; Opfer & Pedder, 2011; Prenger, Poortman, & Handelzalts, 2017).

School leaders, in particular, play a pivotal role in creating and sustaining professional school cultures (Sperandio & Kong, 2018) as ‘they can create conditions fostering commitment to the collective good’ (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006, p. 236). Supportive school leadership and organizational structures within the school, and especially the way they are perceived by teachers, seem to influence the quality of learning in such cultures (Avalos, 2011; Huffman & Jacobson, 2003). McLaughlin and Talbert (2006) state that ‘because of their positional authority and control over school resources, principals are in a strategic position to promote or inhibit the development of a teacher learning community in their school’ (p. 56). As such, school leaders can act as effective change agents who ‘guide the school collaboratively to develop and articulate a shared vision, to learn collectively, to share personally and professionally, and to engage in meaningful long-range planning that provides support for teachers and students’ (Huffman & Jacobson, 2003, p. 242). It is also argued that school leaders can promote reflective inquiry by promoting (the use of) research and evaluation across the school and adopting a more systematic approach to



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collecting, analyzing and using data in daily teaching practice (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006).

Other frequently mentioned conditions that may facilitate (or hinder) the creation of effective professional learning cultures in schools can be distinguished at three levels: (1) individuals' feelings of autonomy or orientation to change, (2) group dynamics, communication, trust and positive working relationships as well as collegial support for working in professional learning communities, and (3) school contextual influences such as policy decisions, leadership, supportive human resource policies, school size, student population and the professional learning infrastructure (Admiraal et al., 2016; Levine & Marcus, 2010; Little, 2012; Louws, Meirink, Van Veen, & Van Driel, 2017; Stoll, Bolam, McMahon, Wallace, & Thomas, 2006). Addressing teachers' feelings of autonomy also means that teachers should be supported with sufficient time for their PD activities as well as the possibilities to decide collectively on educational quality matters and to have a say in how they spend their PD time (Admiraal et al., 2016). Structuring the various school contextual influences, a distinction can be made between structural and cultural school conditions (Imants & Van Veen, 2010). Examples of structural conditions are time, accessibility to resources, workload, organizational goals and policy, whereas cultural conditions refer to support and guidance from school leaders and PD facilitators, a shared vision, collective decision making, and the quality of collaboration between teachers (Louws, Meirink, Van Veen, & Van Driel, 2017). To what extent these conditions, whether being supportive or constraining, influence teacher learning, mainly relies on how these conditions are perceived by teachers and how they make sense of them in their workplace (Louws, Meirink, Van Veen, & Van Driel, 2017). Obviously, if teachers experience unsupportive school conditions, they may be hindered when trying to implement new classroom practices (Opfer, 2016).

In the Netherlands, where this study took place, Dutch school leaders work in one of

the most decentralized decision-making cultures (OECD, 2012), meaning that decisions are relatively often made on the school-level and less on a national level. In that sense, Dutch school leaders face little restrictions when considering how they want to implement PD activities in their schools. However, a recently published report by the Dutch Council for Secondary Educational (2018) shows that Dutch school leaders are little involved in PD activities of teachers and more than half of the secondary school leaders state that they rarely or never stimulate teachers to learn collaboratively in teams. This context is important to consider when implementing LS.

### *2.3. Teacher self-efficacy*

The concept of self-efficacy was introduced by Bandura (1977) who defined it as an assessment of one's own capabilities to reach a desired level of performance in a specific task. More specifically in the teaching context, teacher self-efficacy can be defined as 'teachers' belief or conviction that they can influence how well students learn, even those who may be difficult or unmotivated' (Guskey & Passaro, 1994, p. 628). The underlying assumption is that when teachers feel more confident to execute a certain type of teacher behavior, they tend to focus more on improving related teaching activities (Summers, Davis, & Woolfolk Hoy, 2017; Tschannen-Moran & Woolfolk Hoy, 2001).

Teachers with a high sense of self-efficacy are expected to enable a classroom environment that promotes student learning by involving students in a meaningful way and effectively manage students' misbehavior (Zee & Koomen, 2016). Levels of self-efficacy are raised if teachers associate particular teaching behavior with success, which is then expected to lead to better performances, whereas teachers' associations with failure have the opposite effect (Tschannen-Moran & Woolfolk Hoy, 2007). Although a vast amount of accumulated evidence from the last decades point at the influence of teacher self-efficacy on teachers' beliefs and instructional behavior as well as student achievement (Klassen & Tze, 2014;

Klassen, Tze, Betts, & Gordon, 2011; Tschannen-Moran & Woolfolk Hoy, 2001; 2007; Zee & Koomen, 2016), its (causal) relation with teaching performance or student achievement is less established (Klassen & Tze, 2014). This may be due to the complex nature of self-efficacy which ‘might rather have an indirect effect on such outcomes’ (Zee & Koomen, 2016, p. 985), meaning that teacher self-efficacy would arguably impact personal characteristics first (e.g., job satisfaction or engagement) (Klassen & Tze, 2014), before influencing external measures such as student achievement or evaluations of teaching performance. In addition, caution is needed not to overstate the importance of teacher self-efficacy without paying attention to contextual characteristics and conditions (Bandura, 2012; Klassen & Tze, 2014). After all, self-efficacy has often been illustrated as reciprocally interacting with the environment (Bandura, 2012; Schunk & Meece, 2006), such as the school climate, structure and teachers’ sense of a community in their school (Skaalvik & Skaalvik, 2007; 2010; Tschannen-Moran & Woolfolk Hoy, 2007). Moreover, the impact of school conditions on teacher learning appears to be mediated by feelings of self-efficacy (Geijsel, Slegers, Stoel, & Krüger, 2009; Oude Groote Beverborg, Slegers, Endedijk, & Van Veen, 2015; Zee & Koomen, 2016). In particular, the role of school leadership seems to have a strong link with teacher self-efficacy (Geijsel, Slegers, Stoel, & Krüger, 2009; Wilkins, 2017), stressing that ‘principals who used their leadership to provide resources for teachers and to buffer them from disruptive factors but allowed teachers flexibility over classroom affairs created a context that allowed strong self-efficacy beliefs to develop’ (Tschannen-Moran & Woolfolk Hoy, 2007, p. 947). It is furthermore argued that collaboration between teachers, an inquiry stance, and teacher self-efficacy are linked (Puchner & Taylor, 2006). It appears that the more opportunities for teachers to collaborate, such as observing each other’s practices and giving each other positive feedback, the higher the levels of teacher self-efficacy (Tschannen-Moran & Woolfolk Hoy, 2007). Since these characteristics are at the heart of LS

Promoting a Professional School Culture through Lesson Study? An Examination of School Culture, School Conditions, and Teacher Self-efficacy (Lewis & Perry, 2014), one can expect that LS could affect teachers' self-efficacy (Schipper, Goei, De Vries, & Van Veen, 2018).

However, when relevant school conditions are not taken into account, there seems to be a link between teacher self-efficacy and work related stress due to time pressure and emotional exhaustion (Skaalvik & Skaalvik, 2007; 2010). Therefore, 'self-efficacy beliefs can be developed through training or professional development settings' (Klassen & Tze, 2014, p. 73), provided that facilitating school conditions are well-embedded in the school environment (Opfer, 2016; Tschannen-Moran & Woolfolk Hoy, 2007).

#### ***2.4. Lesson Study as a means to enhance a professional school culture and teacher self-efficacy***

LS is a professional learning approach that combines many critical features of high quality professional learning (Lee Bae, Hayes, Seitz, O'Connor, & DiStefano, 2016; Lewis & Perry, 2014; 2017; Takahashi, 2014). It is situated in day-to-day practice and 'involves teachers in active learning about content, is driven by data and goals, and is sustained, intensive, collaborative, and practice-based' (Perry & Lewis, 2009, p. 366). These features can also be found in the characterization of a professional school culture: LS is about teachers who take an inquiry stance, share knowledge and experiences, and develop classroom material collaboratively (Lewis, Perry, & Hurd, 2009). Therefore, if facilitating conditions are taken into account (Hadfield & Jopling, 2016; LeeBae, Hayes, Seitz, O'Connor, & DiStefano, 2016; Schipper, Goei, De Vries, & Van Veen, 2017), LS has the potential to enhance a professional school culture.

LS originated more than a century ago in Japan where it is deeply embedded in schools at local, regional, and national level (Xu & Pedder, 2015). It reached China in the 1950s and began to spread rapidly around the globe since the late 1990s (Huang & Shimizu, 2016; Xu & Pedder, 2015), particularly after the influential publication by Stigler and Hiebert

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(1999). As a result, various adaptations of LS have unfolded suiting the local school contexts (Dudley, 2013; Holmqvist, 2011; Pang, 2006; Perry & Lewis, 2009; White & Lim, 2008).

Working in LS entails small groups of teachers who collaboratively follow ‘inquiry cycles’ (Lewis, Perry, Friedkin, & Roth, 2012) of designing, teaching, studying, and evaluating live classroom lessons, so-called ‘research lessons’ (Dudley, 2013), in order to promote teacher instructional practice and, in turn, student learning (Lewis & Perry, 2017). By focusing explicitly on student learning, teachers are able to thoroughly examine every step of the teaching process by exploring *how* students learn in addition to knowing *what* and *how much* they learn (Cerbin, 2011).

In terms of the intended outcomes of participating in LS, the rapidly growing body of research on LS indicates that LS increases teachers’ inquiry stance, attitudes, and self-efficacy beliefs (Lewis, Perry, & Hurd, 2009; Puchner & Taylor, 2006; Schipper, Goei, De Vries, & Van Veen, 2017; Sibbald, 2009; Xu & Pedder, 2015) as well as (pedagogical content) knowledge and skills (Coenders & Verhoef, 2018; Leavy & Hourigan, 2016; Lewis, Perry, & Hurd, 2009; Schipper, Goei, De Vries, & Van Veen, 2018; Takahashi & McDougal, 2016; Vrikki, Warwick, Vermunt, Mercer, & Van Halem, 2017). Furthermore, it contributes to teachers’ commitment to improve their instructional practice on the one hand and building a community of inquiry and practice on the other hand (Huang & Shimizu, 2016; Lewis, Perry, & Hurd, 2009; Lewis, Perry, & Murata, 2006; Lieberman, 2009; Xu & Pedder, 2015). Participating in LS also seems to affect tools that support collegial learning such as lesson plans and resources that reveal and promote student learning (Cajkler, Wood, Norton, Pedder, & Xu, 2015; Lee Bae, Hayes, Seitz, O’Connor, & DiStefano, 2016; Lewis, Perry, & Murata, 2006). Lastly, there is evidence of improved student learning and achievement (Dudley, 2013; Norwich & Ylonen, 2013; Lewis & Perry, 2017).

Although the evidence base for effective LS practice is growing, the context in which

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LS takes place still seems to be ‘under-theorized’ (Hadfield & Jopling, 2016, p. 204).

Facilitating conditions necessary to enhance a professional school culture, can be distinguished at different levels. Huang and Shimizu (2016) distinguish macro- and micro-level conditions in terms of constraints and challenges in adapting, sustaining and scaling-up LS practices. Macro-level conditions refer to cultural teaching values in the PD system and professional learning communities as well as organizational structures and routines. Micro-level conditions refer to conditions that influence the effectiveness of LS processes such as the involvement of a ‘knowledgeable other’ (Takahashi, 2014), the availability of high quality resources and the necessary ‘critical lenses’ of teachers (i.e. a researcher lens, a curriculum developer lens and a student lens). Hadfield and Jopling (2016) also distinguish these levels, but add a third level of the school context (meso-level) to this distinction which relates to the school’s ‘values and beliefs that underpin practice; the language used to describe it and justify its outcomes; the material conditions within which it is enacted; and the time, resources and practical arrangements provided, as well as the formal and informal roles and relationships of those involved’ (Hadfield & Jopling, 2016, p. 205).

Essential conditions for implementing LS are also found. A distinction often seems to be made between organizational conditions as mentioned above, and personal conditions such as beliefs of confidence (Xu & Pedder, 2015). The review by Xu and Pedder (2015) shows that the most frequently mentioned constraints in LS implementation processes relate to a lack of time for teachers to engage in LS as well as weak leadership support ‘to create favorable conditions for teachers to implement and sustain LS practice’ (p. 44). According to this review, school leaders can facilitate LS teams in terms of time, accessibility to resources and policy, but can also create a safe environment by paying attention to the existing school culture leading to increased feelings of confidence. In addition to strong leadership, Perry and Lewis (2009) also highlight the importance of a strong knowledgeable teacher leader, or LS

facilitator, who is involved in the LS process and connected to support features. In the following section we elaborate on the focus of this study.

### **3. Present study**

This study examines whether participating in LS influences teachers' perceptions of the professional culture and conditions in their schools as well as their feelings of self-efficacy, and how these constructs relate to each other. Based on the review of the literature above, a professional school culture is defined as a school context in which teachers take an inquiry stance, share knowledge and experiences, and develop teaching material collaboratively.

School conditions refer to supportive leadership, collective support for a professional school culture, communication and collegial support within the school, the teacher autonomy teachers experience (e.g., to participate in school innovations and to take responsibility for their own practice), and supportive Human Resources (HR) policy. Teacher self-efficacy relates to three categories of beliefs: efficacy beliefs in terms of student engagement, instructional strategies, and classroom management. The following four research questions are used to answer the central research question of this study:

1. Does participating in LS contribute to teachers' perceptions of a professional school culture?
2. Does participating in LS influence teachers' perceptions of the school conditions that foster or hinder a professional school culture?
3. Does participating in LS influence teachers' beliefs of self-efficacy?
4. To what extent do teachers' perceptions of the culture and conditions in their schools as well as their beliefs of self-efficacy relate to each other over the course of the intervention period?

## **4. Method**

### ***4.1. Context and participants***

Initially, 140 teachers from eight different secondary schools in the Western and Northern part of the Netherlands, consisting of 75 intervention group teachers and 49 comparison group teachers in the first cohort (2015-2016), and 13 intervention group and three comparison group teachers in the second cohort (2016-2017), were invited to participate in this study. All teachers were informed about the research objectives and procedure by e-mail and participation was voluntary.

Intervention group teachers were only included if they had participated in at least two LS cycles during one academic year (in cohort 1 or 2). In each school a group of teachers from the same cluster of teaching subjects served as the comparison group. The comparison group teachers were only included if they did not participate in LS. However, they were allowed to participate in other PD activities given the fact that the Dutch Ministry of Education allows secondary school teachers to spend 10% of their annual working hours (166 hours) on relevant teacher PD (50% as part of the schools' collective PD and 50% as part of individual PD activities (Dutch Council for Secondary Education, 2016). Schools were asked to compile a list of a similar amount of teachers from the same subject cluster that could serve as a comparison group. Due to participation in other activities and projects, this group turned out to be much smaller than the intervention group.

Teachers were only included if their pre- and post-test data of both questionnaires and both collection moments could be matched. As a result, 61 teachers from eight secondary schools (60 teachers in the first cohort and one teacher in the second cohort) could be matched using a unique personal code consisting of letters of teachers' names and numbers of their date of birth. After the first explorative analysis of the data, one extreme outlier was found in the intervention group. This teacher was removed from the dataset due to a substantial amount



of missing data (57 of 66 items on the pre-test SPLCS questionnaire reported as ‘I don’t know’). Eventually, the total sample consists of 60 teachers from eight different secondary schools of which the sample descriptions are given in Table 1. Each school was involved in one of three LS projects led by three Dutch universities. Two of these projects were funded by the Dutch Ministry of Education, Culture and Science, resulting in seven of the eight participating schools.

Testing for baseline differences using independent t-tests yielded no significant differences in terms of teacher characteristics (age, teaching experience, qualification, and subject) between both groups. Based on these results we can assume that both groups are comparable.

<TABLE 1 NEAR HERE>

#### ***4.2. Intervention***

The intervention consisted of at least two LS cycles over the course of one academic year, consisting of the core LS features as described in section 2.4. Several variations between LS teams were found in terms of team composition (content specific or interdisciplinary), time allocation, the use of case students and whether the team was guided by an external or internal LS facilitator (Table 2). Internal LS facilitators are teachers from the same schools as the LS team, who fulfill the role as a LS facilitator (Schipper, Goei, De Vries, & Van Veen, 2017).

The unequal distribution of allocated time draws particular attention. In two schools (#6 and #7) this substantial amount of allocated hours was a result of project funding which resulted in a full afternoon per week allocated for LS. In the remaining schools, the time allocation for participating in LS was partly funded from teachers’ PD funds.

<TABLE 2 NEAR HERE>

### ***4.3. Research instruments and data-analysis***

#### *4.3.1. School as Professional Learning Community Scan (SPLCS)*

An adapted version of the Dutch *SPLCS* (Schenke et al., 2015) was used for which permission was granted by its first author. The questionnaire distinguishes school contextual elements and conditions of a professional learning community and is intended for school leaders as well as teachers. It consists of 66 items equally divided over 11 subscales. All 66 items can be scored on a five-point Likert scale ranging from ‘entirely not applicable’ to ‘entirely applicable’. The option to select a sixth category ‘I don’t know’ was available in case teachers were not able to answer certain questions. The latter option corresponded with a missing value for the particular item. We estimated that filling in the questionnaire would take between ten and fifteen minutes.

The questionnaire was distributed at the beginning (September/October) and at the end (June/July) of the academic year of the two cohorts. Since the questionnaire was sent out twice (pre-test and post-test), teachers were asked to focus on the current situation of the school context. This deviates from the original questionnaire in which teachers are asked to answer each question for the current situation as well as a desired situation. One subscale, ‘PD possibilities’ (six items), was excluded from the analysis since it did not include items that were related to a professional school culture as defined in section 2.1. The included subscales are presented in Table 3, including an example item and the reliability values (Cronbach’s Alpha) for each subscale. This resulted in high to very high reliable subscales, except for one subscale (#8) which yielded a moderate outcome in terms of its reliability.

<TABLE 3 NEAR HERE>

#### *4.3.2. Teachers’ Sense Self-Efficacy Scale (TSES)*

A Dutch online version (Goei & Schipper, 2016) of the well-known long form of the *TSES*

Promoting a Professional School Culture through Lesson Study? An Examination of School Culture, School Conditions, and Teacher Self-efficacy (Tschannen-Moran & Woolfolk Hoy, 2001) was utilized to measure teachers' self-efficacy. The questionnaire consists of 24 items equally divided over three subscales measured on a nine-point Likert scale ranging from 1 ('nothing') to 9 ('a great deal'). The estimated time to fill in this questionnaire was no more than ten minutes. Consistent with the SPLCS, the TSES was distributed at the beginning (September/October) and at the end (June/July) of the academic year of the two cohorts.

Cronbach's Alpha measures (obtained in the pre-test) were calculated to assess internal consistency. This resulted in reliable subscales: (a) efficacy in student engagement' ( $\alpha = .75$ , e.g., 'How much can you do to help students think critically?'), (b) efficacy in instructional strategies ( $\alpha = .79$ , e.g., 'How well can you respond to difficult questions from your students?'), and (c) efficacy in classroom management' ( $\alpha = .91$ , e.g., 'How much can you do to calm a student who is disruptive or noisy?').

#### ***4.4.Data-analysis procedure***

Baseline differences between both groups were examined using independent t-tests. This yielded no significant differences in terms of starting values in both instruments. Subsequently, the pre-test data were checked for normality using Kolmogorov-Smirnov tests. Most of the subscales in both groups appeared to be normally distributed. However, four SPLCS subscales in the intervention group and two SPLCS subscales in the comparison group turned out to be non-normally distributed. This applies to all professional school culture subscales in the intervention group (subscale 1 'Sharing of knowledge and experiences' ( $D(37) = .16, p < .05$ ), subscale 2 'Developing classroom material collaboratively' ( $D(37) = .15, p < .05$ ), subscale 3 'Inquiry stance' ( $D(37) = .16, p < .01$ )), as well as one school contextual condition subscale (subscale 6 'Support from the school board' ( $D(37) = .19, p < .01$ )). In the comparison group, it applies to one professional school culture subscale (subscale 2 'Developing classroom material collaboratively' ( $D(23) = .20, p < .05$ ) and one school

contextual condition subscale (subscale 8 'Human resources favoring PLC's' ( $D(23) = .19, p < .05$ ).

Since the data in the majority of subscales were normally distributed and the assumption of sphericity was not violated, we decided to use repeated-measures ANOVA tests which tend to be robust (Field, 2013). These tests were deployed to measure differences between both groups over time in terms of teachers' perceptions regarding a professional school culture (research question #1), school conditions (research question #2) as well as differences in teachers' self-efficacy (research question #3). Within-group differences were examined with paired t-tests (or Wilcoxon Signed Rank tests in case of non-normally distributed subscales).

Pearson's correlation analyses were conducted to answer the last research question focusing on how teachers' perceptions of the culture and conditions in their schools as well as their beliefs of self-efficacy relate to each other. We used the difference between post-test and pre-test outcomes as variables to compute correlations between the three constructs. Since we found no significant differences between self-efficacy and school conditions nor school culture, we decided not to conduct additional (multiple regression) analyses.

Given the relatively small research sample, we were not able to examine differences between schools, teachers' background characteristics, and LS teams (team composition, use of 'case pupils' (Dudley, 2013), type of LS facilitator, and allocated time for LS).

## **5. Results**

### ***5.1. Changes in teachers' perceptions of a professional school culture***

Table 4 reports the mean scores and standard deviations for the professional school culture subscales for both groups in the pre-test as well as post-test measures. Although the post-test mean scores in the intervention group all increased slightly, whereas this is not the case in the

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comparison group, repeated-measures ANOVA tests show no significant differences between both groups over time. In addition, no significant within-group results were found.

<TABLE 4 NEAR HERE>

### ***5.2.Changes in teachers' perceptions of the school conditions***

The mean scores and standard deviations of the subscales that measure teachers' perceptions of the school contextual conditions are presented in Table 5. It becomes clear that several conditions already yield relatively high pre-test mean scores. This applies in particular to subscale 4 ('shared support for PLC's',  $M = 3.83$ ) and subscale 10 ('collegial support',  $M = 3.81$ ), indicating that these necessary conditions for promoting a professional school culture were already perceived by teachers from both groups.

Consistent with the professional school culture subscales, no significant between-group differences were found in terms of school conditions using repeated-measures ANOVA tests. However, examining the within-group differences using paired  $t$ -tests (and its non-parametrical counterpart), two subscales show significant increases over time in the intervention group. This applies to subscale 5 ('Teacher autonomy') ( $t(36) = -2.19, p < .05$ ) and to subscale 7 ('Support from the school department leaders') ( $t(36) = -2.21, p < .05$ ). No significant differences were found in the comparison group.

<TABLE 5 NEAR HERE>

### ***5.3.Changes in teachers' self-efficacy***

Following the same statistical procedure for the TSE subscales, one significant subscale ('Efficacy in student engagement') was found between both groups over time in favor of the intervention group ( $F(1.00, 58.00) = 8.64, p < .01$ ). Within-group analyses showed that all three subscales in the intervention group significantly increase (Table 6): 'Efficacy in student engagement' ( $t(36) = -2.79, p < .01$ ), 'Efficacy in instructional strategies' ( $t(36) = -3.64, p <$

.01), and 'Efficacy in classroom management' ( $t(36) = -2.57, p < .05$ ). Again, no significant differences were found in the comparison group.

<TABLE 6 NEAR HERE>

#### ***5.4. Relationship between the three constructs***

This section examines how the three constructs (professional school culture, school conditions and teacher self-efficacy) relate to each other. Correlation analyses (Table 7) yielded (highly) significant correlations between all subscales of the professional school culture and the subscales of the school conditions, except for subscales 1 ('Sharing of knowledge and experiences') and 6 ('Support from the school board'), subscale 1 and 9 ('Communication favoring PLC's') as well as subscale 3 ('Inquiry stance') and 6. From this we can derive that the perceptions of most of the school conditions and school culture elements seem to relate to each other over the course of the intervention period. However, no significant relationships were found between either school culture or conditions and teacher self-efficacy.

<TABLE 7 NEAR HERE>

## **6. Conclusion and discussion**

This explorative study examined whether LS influences teachers' perceptions of the school culture and conditions as well as teachers' beliefs of self-efficacy, and how these constructs relate to each other. Regarding the first research question focusing on teachers' perceptions of the school culture, the results show that over the course of the intervention period, no significant differences were found between groups. Although we found post-test increases in the intervention group on all three professional school culture subscales, it can be argued that in order to see significant increases, more time participating in LS is needed to structurally change (perceptions of) the school culture using LS (Hiebert & Stigler, 2017). Changing a school culture and teachers' inquiry stance not only demands sufficient time to participate in

effective PD, but also needs to be linked to student learning, the school vision and curricular reforms (Cochran-Smith & Lytle, 2001). It is unclear whether this was the case in the included schools. One can also argue that the intervention group teachers' baseline perceptions were already relatively high which makes it difficult to increase even further. Another potential reason for not finding significant changes, as argued in the conceptual framework, is that the school culture is closely linked to essential school conditions (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006).

The school conditions were addressed in the second research question. Significant within-group increases were found in the intervention group in terms of teachers' perceptions of their autonomy and support from the school department leader. These are important findings as they may relate to the earlier notion that the Dutch school system allows relatively much freedom for school leaders to implement PD activities such as LS (OECD, 2012). The teacher autonomy subscale contains items that may relate to LS such as 'teachers experience the possibilities to make collaborative decisions about educational content and material'. Items also refer to experienced autonomy by teachers in terms of having a say in how they would like to spend their PD time. Increased feelings of autonomy could have been enabled by the freedom in each LS team to formulate a research objective that relates to teachers' daily practice. In addition, LS seems to promote a collaborative environment despite the difficulty that 'even with collaboration, teachers must maintain autonomy' and teachers 'need to be able to decide when and how to collaborate' (Puchner & Taylor, 2006, p. 928). Based on these outcomes, it can be assumed that especially the school department leaders seem to have supported or influenced this process. This could be explained in terms of the generally small-scale implementation of LS in schools (Lewis & Perry, 2017), which is often supported by school department leaders and not necessarily by the school boards in larger secondary schools. It would be worthwhile to examine whether this would change when LS expands

within these schools and how this works for schools that decide to implement LS on a schoolwide level. Despite these promising results, no significant differences in terms of school conditions were found between groups. Therefore, increases in the intervention group may also have been influenced by something else.

Regarding the third research question, the results showed that the subscale ‘efficacy in student engagement’ significantly differs between both groups over time, in favor of the LS group. Furthermore, all three subscales showed significant increases in the LS group. It stresses that LS is able to contribute to feelings of self-efficacy as earlier described (Puchner & Taylor, 2006), especially in terms of promoting self-efficacy feelings in the context of engaging all students in the classroom (Schipper, Goei, De Vries, & Van Veen, 2017). Apparently, the focus on student learning within LS, promoted by using ‘case pupils’ (Dudley, 2013), seems to enable this. As more evidence clearly points at a link between teacher self-efficacy and LS (Puchner & Taylor, 2006; Sibbald, 2009), it would be interesting to conduct more research that focuses on clear (causal) patterns between teacher self-efficacy, the school context (culture and conditions) and how this affects teacher behavior. Mixed-method approaches could add to the predominantly qualitative focus in research on LS (Lewis & Perry, 2017).

Lastly, the fourth research question focused on the relationship between the three constructs addressed in the three research questions above. It appeared that a strong link exists between teachers’ perceptions of the professional school culture and their perceptions of the school conditions over the course of the intervention period. One of the school conditions subscales that does not seem to correlate with two of the professional school culture subscales (subscale 1 ‘sharing of knowledge and experiences’ and subscale 3 ‘inquiry stance’), is subscale 6 that focuses on the experienced support from the school board. Again, this could mean that the school board is not always involved in the LS process, whereas experienced



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support from departments leaders does seem to relate to all three professional school culture subscales.

Given earlier evidence of a link between school contextual conditions and teacher self-efficacy (Geijsel, Slegers, Stoel, & Krüger, 2009; Skaalvik & Skaalvik, 2007; 2010; Tschannen-Moran & Woolfolk Hoy, 2007), it is quite surprising that we found no significant link between teachers' beliefs of self-efficacy and the school culture nor school conditions. One of the reasons could be that the teacher self-efficacy questionnaire (TSES) items are more focused on the classroom context as opposed to the school culture and conditions. Another reason, consistent with earlier statements in the context of vocational education and training (Oude Groote Beverborg, Slegers, & Van Veen, 2015), is that most of the teachers in this study work in relatively large schools with multiple levels of subsystems (various teams, departments, and cognitive tracks).

Although this study yields interesting and relevant outcomes, especially for school leaders who consider implementing or expanding LS practices in their schools, there are also several limitations in addition to the limitations mentioned above. First of all, the research sample is relatively small. A bigger sample and a more equal distribution between both groups could have led to even clearer patterns and differences between both groups, which could then be used to make more generalizable statements.

Secondly, giving the limited sample size, it was not possible to look for individual teacher variation (such as age, background, experience, perceptions) which may impact a professional school culture (Howell & Saye, 2016) and for differences between LS teams (characteristics such as team composition (content specific versus interdisciplinary), subject clusters, use of case students, time allocation and an internal or external LS facilitators), or differences between schools (characteristics such as the implementation process, the role of the school leader, but also student population, demographic factors etc.). Although all LS

teams followed the LS cycles as intended, analyzing on these different levels would add to knowledge about different LS variations and its impact.

Thirdly, contrary to the extensive use of the TSES questionnaire in educational research literature, the SPLCS questionnaire is not utilized extensively in international contexts. It is not clear if the questionnaire contains ‘typical’ Dutch items which are perceived differently in other international contexts. Furthermore, the SPLCS focuses on the professional culture in the school and not specifically on the culture in the LS team. Therefore, the questionnaire does not take smaller organizational subsystems into account. It is not plausible that results of a small LS team impact the school culture of a relatively large secondary school.

A final limitation refers to the duration of the intervention period of one academic year and the time between the intervention and the post-test. The duration of the intervention may not have been sufficient to yield structural changes in teacher behavior (Desimone, 2009). A longitudinal design could address these issues and could compensate for temporary increases during post-test measures. Such a design could also detect how comparison group teachers will behave over a longer period of time and how they are influenced by the varied PD activities in which they participated.

## **7. Future directions**

Given the clear importance of school (department) leaders in guiding LS processes, further research could examine what specific leadership roles and behavior promote teacher learning through LS most. Perry and Lewis (2009), for example, argue that distributed leadership could be an important leadership style in implementing and guiding LS processes. Such leadership may provide a forum for leadership teams ‘to discuss ideas, voice differences of opinion or doubts, and develop a vision for the lesson study work; it also enabled the work logistically by spreading it among several people’ (p. 386). It would be relevant to find out

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how school leaders currently fulfill this role and how they could promote LS practices, not only focusing on implementing LS, but also on sustaining and upscaling LS practices.

This study is one of the few attempts to gain more knowledge about creating a professional school culture through LS, but clearly more LS research is needed to address this issue. However, it would be recommended for further research to not only focus on creating a professional school culture, but also on how to sustain such a culture and what the role of the school leader should be in this respect. In terms of sustaining a professional school culture, Stoll, Bolam, McMahon, Wallace, and Thomas (2006) argue that sustaining change requires a ‘broad range of people in ‘chains of influence’’ that spread improvements, using existing resources, sharing responsibility, active engagement to secure outside support, and developing capacity that enable people to learn from each other (p. 247). It would be worthwhile to examine the role of these ‘chains of influence’ in the context of Lesson Study.

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**TABLES**

**Table 1.** Sample descriptions ( $N = 60$ ).

	Intervention group	Comparison group
Amount of teachers	37 (range: 2-12 teachers per school)	23 (range: 1-5 teachers per school)
Female (%)	20 (54.1%)	13 (56.5%)
Age (years)	$M = 42.6, SD = 12.0$ (range: 24-61)	$M = 44.1, SD = 13.0$ (range: 22-64)
Teaching experience (years)	$M = 14.9, SD = 11.0$ (range: 2-39)	$M = 14.3, SD = 10.4$ (range: 1-37)
Teaching experience at current school (years)	$M = 9.4, SD = 7.6$ (range: 1-39)	$M = 11.2, SD = 8.4$ (range: 1-32)
Teacher qualification (%)	M.Ed.: 17 (45.9%) B.Ed.: 17 (45.9%) In training: 3 (8.1%)	M.Ed.: 13 (56.5%) B.Ed.: 9 (39.1%) In training: 1 (4.3%)
Teaching subject (%)	Languages: 17 (45.9%) Social sciences: 13 (35.1%) Sciences: 4 (10.8%) Other: 3 (8.1%)	Languages: 12 (52.2%) Social sciences: 10 (43.5%) Sciences: 1 (4.3%) Other: 0%

*Notes:* The table contains post-test values. Teacher qualification ‘in training’ refers to teachers’ final stage of their B.Ed./M.Ed. program. The subcategory ‘languages’ consists of Dutch, English, German, French, and Spanish. The subcategory ‘social sciences’ consists of Economics, History, Geography, and Civics. The subcategory ‘sciences’ consists of Mathematics, Physics, Chemistry, and Biology. The subcategory ‘other’ refers to Health and Arts subjects.

**Table 2.** Composition of intervention group ( $n = 37$ )

School	Amount of teachers		LS team composition	Subject cluster(s)	Use of case students	Time allocation (hours)	LS Facilitator
	Male	Female					
1	1	2	Content specific	Languages	Yes	27	External
2	5	0	Content specific	Social sciences	Yes	27	External
3	2	0	Content specific	Social sciences	Yes	27	External
4	0	4	Content specific	Languages	Yes	27	External
5	3	0	Content specific	Social sciences / sciences	Yes	27	External
6	0	4	Interdisciplinary	Languages / sciences	No	166	Internal
7	2	2	Interdisciplinary	All clusters	No	166	Internal
8	4	8	Content specific	All clusters	Yes	85	Ex- & internal

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**Table 3.** Subscales school as PLC scan

Subscale	Example item	$\alpha$
<i>Professional school culture</i>		
1. Sharing of knowledge and experiences	'Teachers share their knowledge and experience with beginning teachers at our school'	.89
2. Developing classroom material collaboratively	'Teachers collaboratively integrate new topics in their classroom practice at our school'	.80
3. Inquiry stance	'Teachers use available data, such as students' test results, to systematically improve their practice at our school'	.87
<i>School contextual conditions</i>		
4. Shared support for PLC's	'Teachers are willing to contribute to changes/innovations at our school'	.87
5. Teacher autonomy	'Teachers take responsibility for the quality of their practice at our school'	.84
6. Support from the school board	'The school board supports teachers to experiment with new classroom material'	.87
7. Support from school department leaders	'The department leaders facilitate teachers in time and space to share their knowledge and experience'	.92
8. Human resources favoring PLC's	'Targeted policy has been established at our school, in order for teachers to continually develop themselves in accordance with the vision and ambitions of the school'	.66
9. Communication favoring PLC's	'At our school, teachers and school leaders are in dialogue about the quality of our education'	.87
10. Collegial support	'We respect each other in our school'	.89

Note: Reliability values are obtained in the pre-test.

**Table 4.** Mean scores and standard deviations for professional school culture.

	Intervention group (n = 37)		Comparison group (n = 23)	
	Pre-test M(SD)	Post-test M(SD)	Pre-test M(SD)	Post-test M(SD)
<i>Professional school culture</i>				
1. Sharing of knowledge and experiences	3.32 (.81)	3.40 (.58)	3.57 (.82)	3.55 (.76)
2. Developing classroom material collaboratively	3.10 (.64)	3.29 (.69)	3.20 (.86)	3.50 (.67)
3. Inquiry stance	2.90 (.94)	3.16 (.99)	2.83 (.77)	2.82 (1.17)

**Table 5.** Mean scores and standard deviations for school contextual conditions.

	Intervention group (n = 37)		Comparison group (n = 23)	
	Pre-test M(SD)	Post-test M(SD)	Pre-test M(SD)	Post-test M(SD)
<i>School conditions</i>				
4. Shared support for PLC's	3.83 (.69)	3.96 (.58)	4.06 (.62)	4.00 (.66)
5. Teacher autonomy	3.20 (.91)	3.47 (.87)*	3.59 (.64)	3.51 (.81)
6. Support from the school board	3.22 (1.02)	3.47 (.89)	3.46 (.79)	3.46 (.79)
7. Support from the school department leaders	3.20 (1.15)	3.58 (.89)*	3.51 (1.23)	3.63 (1.07)
8. Human resources favoring PLC's	3.14 (.87)	3.10 (.85)	2.78 (.93)	2.63 (.78)
9. Communication favoring PLC's	3.59 (.78)	3.64 (.83)	3.74 (.75)	3.86 (.66)
10. Collegial support	3.81 (.82)	3.95 (.74)	4.09 (.65)	4.10 (.72)

Note: \*  $p < .05$  (two-tailed).



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**Table 6.** Mean scores and standard deviations for teachers' self-efficacy.

	Intervention group ( <i>n</i> = 37)		Comparison group ( <i>n</i> = 23)	
	Pre-test <i>M</i> ( <i>SD</i> )	Post-test <i>M</i> ( <i>SD</i> )	Pre-test <i>M</i> ( <i>SD</i> )	Post-test <i>M</i> ( <i>SD</i> )
1. Efficacy in student engagement	6.04 (.60)	6.30 (.60)**	6.14 (.78)	5.98 (.63)
2. Efficacy in instructional strategies	6.28 (.70)	6.57 (.70)**	6.26 (.80)	6.38 (.54)
3. Efficacy in classroom management	6.91 (.73)	7.09 (.63)*	7.01 (.84)	7.02 (.85)

Note: \**p* < .05 (two-tailed). \*\**p* < .01 (two-tailed).

**Table 7.** Pearson correlations among school culture, school conditions and self-efficacy

Subscales	1	2	3	4	5	6	7	8	9	10	11	12	13
PSC 1	1												
PSC 2	.55**	1											
PSC 3	.57**	.33**	1										
SC 4	.38**	.51**	.32*	1									
SC 5	.38**	.42**	.52**	.45**	1								
SC 6	.25	.40**	.24	.40**	.52**	1							
SC 7	.34**	.53**	.41**	.35**	.48**	.67**	1						
SC 8	.36**	.45**	.41**	.39**	.48**	.49**	.38**	1					
SC 9	.23	.29*	.44**	.28*	.35**	.36**	.55**	.36**	1				
SC 10	.45**	.40**	.35**	.32*	.32*	.36**	.43**	.32*	.28*	1			
TSE 1	-.19	-.01	-.04	-.25	.04	.15	.11	-.08	.12	-.18	1		
TSE 2	.11	.13	.19	.09	.08	.24	.20	.01	.10	.01	.35**	1	
TSE 3	-.07	.03	-.09	-.04	-.03	.10	.06	-.05	.18	-.04	.44**	.48**	1

Notes: The intercorrelations were measured using difference variables of each construct (*N* = 60). \**p* < .05 (two-tailed); \*\**p* < .01 (two-tailed). PSC = Professional School Culture (subscale 1 'Sharing of knowledge and experiences', 2 'Developing classroom material collaboratively, and 3 'Inquiry stance'), SC = School conditions (subscale 4 'Shared support for PLC's', 5 'Teacher autonomy', 6 'Support from the school board', 7 'Support from the school department leaders', 8 'HR favoring PLC's', 9 'Communication favoring PLC's', and 10 'Collegial support'), TSE = Teacher Self-efficacy (subscale 1 'Student engagement', 2 'Instructional strategies', and 3 'Classroom management').