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TEACHER EDUCATION & DEVELOPMENT | REVIEW ARTICLE

Teachers' professional development in school: A review study

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Abstract: This review study includes 43 articles from 2016 and 2017 focusing on teachers' professional development, as guided by the following twofold research question: "What characterizes teachers' professional development in school, and how does this development influence school improvement?" The review indicates that teachers' learning processes need to be developed if they are to lead to school improvement. It is not enough for researchers simply to study learning processes in schools; they must also conduct formative intervention studies. Ultimately, while conducting research on these processes, researchers should provoke and sustain an expansive transformation process led by and owned by practitioners—leaders and teachers *in the whole school*. Findings suggest that more research is needed to show how outside resource persons, such as researchers, can contribute to school development in collaboration with teachers and school leaders at work.

Subjects: Teacher Education & Training; Primary Education - Teacher Education & Training; Development Studies; Sustainable Development; Culture & Development; Teacher Training; Teachers & Teacher Education; Teaching & Learning; Continuing Professional Development



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PUBLIC INTEREST STATEMENT

This review article presents research focusing on teachers' professional development in school. It includes 43 articles from 2016 to 2017, representing 15 studies conducted in Asia, 15 in Europe, eight in the USA, three in Australia, one in Africa, and one in South America. The research question that framed the research was twofold. First, I wanted to describe what characterizes teachers' professional development in school. Second, I wanted to find out how this development can influence improvement throughout a school as a whole. Findings show that several factors influence teachers' professional development. These are leadership within a school, collaboration between outside resource people and schools, teacher collaboration, methods for teachers' professional development, and several contextual factors. The study concludes that few recent research projects in schools have taken the time to motivate all teachers to formulate and work towards a joint goal and thus to enhance development in whole schools.

Keywords: teachers' professional development; school improvement; leadership for teachers' learning; collaboration between researchers and schools; teacher collaboration

1. Introduction

Researchers long have recognized that teachers' professional development is essential to changing classroom practice, improving schools, and ameliorating pupils' learning outcomes (Borko, 2004). Professional learning often takes place in formal settings, such as professional development programmes, teaching research groups, and formal mentoring programmes (Timperley, 2011). Teachers also can learn through informal interactions that occur during peer teaching, collaborative planning, and mentoring between colleagues (Little, 2012). This article focuses on teachers' professional development that is job-embedded, contextualized, and sustained over time. It does not concentrate on isolated activities like workshops; rather, the review takes a hard look at workplace learning characterized by dynamic, ongoing interactive exchange between teachers (Kwakman, 2003; Little, 2012; Timperley, 2011). In so doing, this research takes the perspective of teachers' professional learning as emphasizing schools as the environment for development (Vescio, Ross, & Adams, 2008). Fullan (2007) posits that professional learning in context is the only education that ultimately changes classroom practices (p. 153). Moreover, there is strong evidence that professional development is best when embedded in the teachers' specific subject areas (Darling-Hammond, Chung, Andree, & Richardson, 2009). Meanwhile, schools with strong teacher communities seem to have higher student achievement (Bryk, Sebring, Allensworth, Luppescu, & Easton, 2010; Horn & Kane, 2015).

School leadership can create a learning environment at schools by helping teachers to identify their development needs, by encouraging experimentation, by finding and allocating resources to support teachers' learning, and by enhancing the implementation of new learning (Thoonen, Slegers, Oort, Peetsma, & Geijsel, 2011; Vanblaere & Devos, 2016). Adult learning also requires that we acknowledge teachers as the heart of decision-making around change—a key principle in understanding, engaging, and developing ownership in adult learning (Knowles, Holton, & Swanson, 2005). According to Walker (2007), a positive teacher learning culture depends on the presence and alignment of three components: structures, values, and relationships. In addition, leaders must take on the role of ensuring that proper learning conditions are in place at the school in order to create a culture of learning. Here, “culture” refers to the various ways that groups of people act and the beliefs that they connect to these actions (Wolcott, 2008). Forte and Flores (2014) assert that there must be an interplay between structure and culture if teachers are to learn together. Collaboration between teachers produces a number of benefits with significant impacts on their professional lives, thus playing an important role in professional teacher development strategy (Vangrieken, Dorchy, Raes, & Kyndt, 2015). For example, the International Survey on Teaching and Learning (The Teaching and Learning International Survey—TALIS, 2013) found that teachers using collaborative practices are more innovative in the classroom, have higher job satisfaction, and hold stronger self-efficacy beliefs (European Commission, 2013).

Many presume that teacher collaboration contributes to professional development and instructional improvement (DuFour & Fullan, 2012). Research on teachers' professional development also indicates that site-based teacher teams positively influence teacher engagement in terms of new instructional practices (Garet, Porter, Desimone, Birman, & Yoon, 2001). According to Borko (2004), participation and discourse practices can enhance teacher learning by supporting professional critique, reflection, and collaboration. However, research also shows that many schools and teacher educators struggle to foster constructive interactions (Van Es, 2012). Research further emphasizes that openness in expressing disagreement is important for constructive dialogue and learning in teacher collaboration (Dobie & Anderson, 2015; Grossman, Wineburg, & Woolworth, 2001).

One widely used collaborative model for teachers is the lesson study (LS) method. A lesson study cycle starts with teachers working with an established common goal, along with a series of lesson planning sessions culminating in the enactment and observation of the research lessons (Lewis, Perry, & Murata, 2006). The different phases of LS serve as a key part of the practice architecture (Kemmis & Grootenboer, 2008), or the preconditions affecting how LS has been enacted in classrooms and schools. According to LS, the goal setting for the pupils' learning and development should be aligned with the school's development goals (Lewis, Fischman, Riggs, & Wasserman, 2013).

There is an important caveat to be addressed: despite the increasing popularity of collaborative models, the associated changes in teaching are often subtle, and dramatic changes are rare (Ermeling & Yarbo, 2016). One reason for this nuance is that teachers construct visions of classroom practice based on deeply rooted cultural routines and preconceived notions of effective and ineffective teaching (Stigler & Hiebert, 1999). The teachers are constrained by their "horizons of observation" (Hutchins, 1996) and may need outside experts to expand their visions of what is possible. These outside experts can be local scientists, researchers, or university faculty (Ermeling & Yarbo, 2016).

Research also shows that teachers can be development leaders in their own schools. For instance, Alexandrou and Swaffield (2014) demonstrate that teacher leadership can facilitate broader professional development within school communities. MacBeath and Dempster (2008) present five principles for teacher leaders in their work: First, they should focus on the learning of everyone in the school. Second, they should create and sustain conditions that favour learning. Third, they should engage in explicit, transparent, and inquiry-based dialogue. Fourth, they should allow everyone to influence school operations; and fifth and finally, they should maintain internal and external accountability in order to examine how the results align with their school's goals and principles. Of course, there also are some conditions that allow teacher leadership to flourish, including professional trust (Smylie, Mayrowetz, Murphy, & Louis, 2007), perceived autonomy (Scribner, Sawyer, Watson, & Myers, 2007), supportive administrators, and time and resources, such as structural and organizational assets along with space and time (Birky, Shelton, & Headley, 2006).

The aforementioned studies served as a starting point for the current review of recent research focusing on teachers' professional development in school, ultimately leading to a twofold research question: "What characterizes teachers' professional development in school, and how does this development influence school improvement?" This research aims to describe the most recent research findings focusing on teachers' professional development in school and to analyse and discuss these findings with regard to school improvement, meaning improvement throughout the whole school. First, the following sections present the rationale for the included research studies. The methodology section also includes how the analysis was conducted. I then present the Cultural Historical Activity Theory (CHAT) as a theoretical framework for analysing and discussing the findings while focusing on how teachers' professional development in school influences school improvement. This theory emphasizes collective development and is therefore relevant as a new theoretical perspective in educational research that considers the role of teachers' professional development in school-wide improvement. The analysis and discussion section includes theories and research that illuminate, support, and elaborate on the presented findings. Finally, the article ends with some concluding remarks.

2. Methods

2.1. Literature search rationale

To answer the twofold research question, I conducted a search on the subject of pedagogy in the ISI WEB of Science (search undertaken 20. December 2017) using the search strings "teacher learning," "teacher professional development," "school-based development," and "school change."

The search focused on the years of 2016 and 2017 in order to encompass the most recent research. Intending to obtain an overview of previous research published in international periodicals relating to teachers' professional development, I obtained 607 hits for all of the search strings together after narrowing the search down to "education and educational research." Articles were included if they dealt with basic education in primary and secondary school.¹ Exclusion criteria included articles that dealt with network learning using digital tools and the internet, newly trained teachers, special education, informal learning, and teachers' individual learning. These significant areas each most certainly would benefit most from separate review studies. In this way, the present study focused on experienced teachers in basic education at schools where they collaborated with other teachers.

Based on the abstracts of the identified articles, I selected a set of 154 articles for thorough reading. After reading all 154 articles, a final set of 43 articles were chosen on basis of the same exclusion and selection criteria listed above, 25 articles from 2016 and 18 articles from 2017. Altogether, 33 of these articles followed qualitative methods, seven employed quantitative research, and three involved a mixed-method approach. The published studies came from all over the world with 15 taking place in Asia, 15 in Europe, eight in the USA, three in Australia, one in Africa, and one in South America. None of these articles included reviews. The selected papers offered both breadth and depth, offering insight into the twofold research question of what characterizes teachers' professional development in school, and how it influences school improvement.

2.2. Analysis strategy

When examining the articles, I sought to pinpoint their main findings. I structured and compressed the articles by coding and categorizing the texts in selective, open, and axial analysis processes (Strauss & Corbin, 1990, 1998), rendering their essence reportable (Garfinkel, 1967; Sachs, 1992). This selective analysis process enables selection of a core category; in this study, the core category had been chosen in advance: teachers' professional development in school. According to Strauss and Corbin (1990), new content can fill predefined categories when using the constant comparative method of analyses. This open analysis process produced five main categories on the same horizontal level: (1) leadership for teachers' professional development, (2) outside resource persons and schools collaborating for teachers' professional development, (3) teacher collaboration, (4) methods for teachers' professional development, and (5) contextual factors influencing teachers' professional development. Furthermore, sub-categories can be developed by asking "when," "how," "under what conditions," and "what does it lead to" during axial coding (Strauss & Corbin, 1990, 1998). These question words structure the descriptions of information extracted from the articles. For instance, this study concentrates on teachers' professional development *in school*, so "when" was decided on beforehand. When articles included the teachers' subject areas, this information is included in the introductory description of each article. Meanwhile, the question of "under what conditions" provides information about the study context. I also have developed a main category presenting contextual factors because research studies especially tend to focus on these factors.

These main categories provide the backbone of this study's presentation of the articles and their findings. The articles are presented under headings corresponding to their main findings, a descriptive presentation. The discussion of the articles also includes the studies' samples and school levels as well as geographic location. Most of the studies are qualitative in nature, and the findings thus present situational knowledge that must be understood in context (Wolcott, 2008). Because of this situational nature, I provide a brief description of activity aiming to contribute to professional development found by asking "how." To analyse and discuss the findings, I use CHAT and the activity system (Engeström, 1987, 2001). Charmaz. (2014) asserts that the first analyses conducted using the constant comparative method creates the scale for further analyses. Accordingly, I employ CHAT and the activity system to pursue the analyses across

studies. As such, the next section more fully describes CHAT and activity systems before moving into a description of the articles based upon the aforementioned categories.

3. Cultural historical activity theory

Emphasizing development and learning in social settings, CHAT was developed by Leontèv (1978, 1981) based on Vygotsky's thoughts and ideas (Wertsch, 1981). Adherents to CHAT believe that internalization and externalization processes continuously operate at every level in human activity (Engeström, 1999; Leontèv, 1981; Wertsch, 1981). The concept of expansive learning relates to externalization or creative processes, meaning that teachers in a collective community can see possibilities and create something new "that is not yet there" (Engeström & Sannino, 2010, p. 2).

According to Vygotsky (1978), learning is a process starting at the social and external level before it is internalized at the internal level. At the individual level, the person's learning should be supported in his or her zone of proximal development (Vygotsky, 1978). Vygotsky (1978) defined the zone of proximal development (ZPD) as "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (p. 86). Engeström (1987) has expanded on this individual definition of the concept and defines the zone of proximal development in this way: "It is the distance between the present everyday actions of the individuals and the historically new form of the societal activity that can be collectively generated [...]" (p. 174). Language and discourse play a key role in the processes of changing activities (Engeström & Sannino, 2011; Sannino, 2008; Vygotsky, 1978, 2000), as for instance when external resource persons and school leaders and teachers collaborate in their "shared meeting ground" (Engeström & Toivainen, 2011, p. 35). Adopting ideas from each other in shared meetings also can lead to developmental transfer (Engeström & Sannino, 2010), from school to teacher education and vice versa.

In the frame of CHAT, the researcher can be considered a formative interventionist. The role of teacher educators as formative interventionist researchers is to provoke and sustain an expansive transformation process led by leaders and teachers who take ownership of the process (Engeström & Sannino, 2010). Such a researcher conducts studies together with the practitioners, as when creating and using mirror data (Cole & Engeström, 2007), functioning as a "collective mirror" for the participants (Engeström, 2000). Contradictions are the driving force for change in CHAT, and these contradictions can be made visible by using the activity system as the unit of analyses. CHAT forms the basis of analysis across the articles contained in this review. I have complemented this analysis with the perspective of the activity system described in the next section.

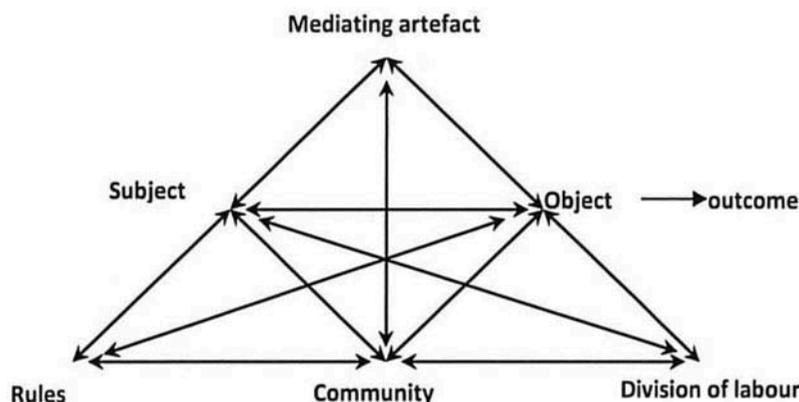
3.1. The activity system

Leontèv expanded on Vygotsky's theory while CHAT formed the basis of the activity system theory (Engeström, 1987, 1999, 2001; Engeström & Miettinen, 1999). In the collective activity model, human activity is structured and visualized by several triadic relations, as shown in Figure 1 below.

The minimum elements of an activity system include subject, mediating artifacts (signs and tools), object, rules, community, and division of labour and outcome (Cole & Engeström, 1993; Engeström, 1987, 2001). These factors make up several triadic relations, and these relations are (re)presented in the activity system.

Mediated actions are integrated into the system in the upper triangle. Mediating artifacts function as intermediary aids. Leontèv (1981) points out that "the object is the true motive" (p. 59) for people's actions. The system shows the close connection between the context and the acting subject, which can be either an individual or a group of people (Engeström, 1999). Context is not reduced to something that just surrounds, but is interwoven in the actions, becoming a single process. The actions exist only in relation to the context that is visualized by the three triangles at the bottom of the activity system (Cole, 1996). The context sets the premises and possible

Figure 1. The complete activity system (Engeström, 1987, 1999, 2001).



restrictions for the subject's goal-directed actions towards the object, resulting in an outcome that comprises the factors "rules," "community," and "division of labour."

Rules include norms and conventions that direct the actions in the activity system. The factor of "community" refers to all people who share the same goals. Division of labour implies that the work or the goal-directed action is divided between, and conducted by, people belonging to the community. The concept of "division of labour" makes it possible to distinguish between collective activity and individual action (Cole, 1996; Engeström, 1987, 2001; Engeström & Miettinen, 1999). As a unit of analysis, the activity system makes the system view and the subject's view complementary factors. The factors in the activity system are in mutual relation to each other, continuously changing because of human actions and interplay. Having reviewed the theoretical framework of this review, we now turn to the findings of the current research.

4. Findings on teachers' professional development in school

4.1. Leadership for teachers' professional development

In order to answer the twofold research question of what characterizes teachers' professional development in school, and how it influences school improvement, I developed five categories. The first category is leadership for teachers' professional development. In their survey study of 1,259 teachers in 41 primary and secondary schools in China, Liu, Hallinger, and Feng (2016) found a positive association between learning-centred leadership and teacher professional development; teacher trust is a significant mediator in this relationship. The research underscores the importance of principals building trust to establish productive learning environments for their teachers. A survey study from Thailand including 1011 teachers, 60 principals, and 60 primary schools confirmed that leadership effects moved through trust to agency to teacher professional development, with trust serving as the mediating factor (Piyaman, Hallinger, & Viseshsiri, 2017).

In a quantitative study conducted in Hong Kong in 10 primary schools, Pang, Wang, and Leung (2016) found that leadership was essential for teachers' learning and professional development. In this study, leadership for teachers' learning meant that principals continuously encouraged teachers' self-improvement and collective inquiry, provided ample staff training and development opportunities, and fostered teacher learning by providing professional support. These factors were also prevalent in Haiyan, Walker, and Xiaowei's (2017) findings from an in-depth qualitative study of an award-winning primary school with 300 teachers and 4,500 pupils in Shanghai. At this school, the leaders organized all of the teachers in "teacher research groups" (TRG) that planned their teaching together, observed each other's classes, and reflected collaboratively afterwards. Expert teachers led these groups with fixed timeslots weekly or bi-weekly. The leaders wanted the

teachers in the TRGs to develop a habit of collecting and utilizing data, a practice the teachers experienced as part of their work, not a research activity outside of their ordinary work. The leaders also had expectations as to how teachers should prepare and follow up on their observations and reflections. The leaders led by example by sharing their own learning while maintaining innovative attitudes.

A survey study including 234 teachers in six middle schools in Portugal showed that teachers had the highest interest in collaboration when they perceived professional development support and encouragement from their leaders (Silva, Amante, & Morgado, 2017). Teachers' need for support in continuous development also pervaded a qualitative study conducted in five primary schools in Ireland (King & Stevenson, 2017). The study presented a bottom-up approach supported from above; the school principals trusted the teachers. The teachers in this study received time to plan and reflect together, and the teachers cultivated an openness to working together and team teaching. Demonstrating a modern form of leadership, the principals were described as courageous and willing to take a risk in an education system characterized by standardization, accountability, and performativity.

Cravens, Drake, Goldring, and Shuermann (2017) conducted survey studies in a Southern state in the US, focusing on 18 elementary, middle, and high schools. Focusing on teacher peer excellence groups (TPEGs) in six districts the first year, the study expanded to nine schools the second year. The TPEG model includes teams of teachers organized by subject matter or grade levels participating in iterative cycles of collaborative teacher lesson planning, peer observations, peer feedback, and lesson revisions. The TPEG process is led and owned by the teachers and receives support from principals. The results show that principal leadership stands out as a key condition for teachers to feel more comfortable with de-privatized practice, actually taking their teaching public. The study underscores the importance of principals who provide flexibility and support for their teacher leaders. The teachers expressed a strong connection between participation in communities of practice and improved classroom teaching, but this connection was strongest for teachers at the elementary level.

The research literature also focuses on teachers as leaders of teachers' professional development. A mixed-method study conducted by Adolfsson and Alvunger (2017) in compulsory schools in Sweden showed the significance of an established method in the schools with expert teachers visualizing common goals, developing teachers' subject matter knowledge, increasing their knowledge of the curriculum, and participating in instructional and pedagogical discussions. Sixty-six percent of the 160 teachers claimed that pedagogical discussions had become an established method whereas just 16.5% believed that peer observation had become a strategy to improve research practice. The researchers conclude that the long-term effects remain unclear when it comes to this new function and position in Swedish schools.

In her observation study, Salleh (2016) found a challenge in developing common goals for teacher leaders in three groups of professional learning teams of mathematics teachers in Singapore primary schools. The teacher leaders of these three teams also had difficulties leading learning in their respective teams. The researcher concluded that the teacher leaders' lack of familiarity with strategies to build a sense of collective purpose and learning had hindered the transfer of group learning to classroom teaching practice. Important factors for learning in teacher teams include building the community and working on collegiality, bonding, and trust; however, the teacher leaders gave little attention to these factors, according to Salleh (2016).

Cravens and Wang (2017) conducted a qualitative study in an elementary and a middle school in Shanghai regarding the influence of expert teachers on teachers' professional development. Two expert teachers each led their own teaching-study group at their schools. Their teaching was videotaped and observed by the teachers in the teaching-study groups. After the observation, the expert teacher facilitated the comparison, reflection, and strategy identification. This study

concluded that the expert teachers helped regular teachers to identify areas of their teaching in need of improvement. Meanwhile, the expert teachers served as role models for the teachers' professional growth. The regular teachers also gained more confidence and learned to put their understandings into words. According to the expert teachers, it was a limitation that only practitioners could take part in these teaching-study groups. The researchers argued that university professors and schools should form relationships to aid professional development at the school or even group level.

4.2. Outside resource persons and schools collaborating for teachers' professional development

Having reviewed the category of leadership for teachers' professional development, we now turn to the topic of outside resource persons and schools collaborating for teachers' professional development. Grau, Calcagni, Preiss, and Ortiz (2017) conducted a case study in Chile including two partnerships between universities and teachers in primary and lower secondary schools. Thirteen mathematics and Spanish teachers took part in one partnership lasting for 3 years. In the other partnership lasting for 5 months, 15 mathematics and Spanish teachers took part. The participants were unaccustomed to observing colleagues' classrooms, videotaping and observing their own practicing, and developing communities to discuss different aspects of teaching. They also were not used to discussing their practices with colleagues, let alone university researchers. The study found that the partnerships influenced teachers' reflections on their own practices, leading the researchers to conclude that such partnerships can be a fruitful way of promoting teachers' re-engagement with their teaching. The reflections focused on the teachers' practices, and they therefore developed ownership of the research findings as well.

A qualitative study conducted in Sweden by Olin and Ingerman (2016) focused on a collaboration between a team of two science teachers from a lower secondary school and a team of four researchers. The collaboration process had duration of three semesters, and collaborative meetings occurred weekly for about 75 min. The study indicates that the teachers wanted to obtain useful tools immediately for their practices. At the same time, other tools, as didactic models, became useful for teachers in the long run. The article comments that future researchers should be careful about the content they introduce in the initial phase because it takes time to establish trust between the parties involved. The study ultimately found the following steps necessary for collaboration: identification of shared and flexible content, free time for meetings, and a reflective meeting style. The researchers also noted that the collaboration was constrained by a low degree of connection to teaching activities as well as cultural differences in schools and universities in terms of meeting expectations and outcomes.

In a qualitative study conducted by Wood et al. (2017), external resource people from the university facilitated meetings for teachers in primary and lower secondary schools in Brunei Darussalam. There were three cohorts of five subject-based groups involving 150 teachers meeting regularly for 4–6 months. The teachers were engaged in cycles of evidenced-informed action research and supported by a facilitator and a research assistant. The study indicates that the conditions for teacher learning include the collection and analysis of data related to pupils' learning outcomes, the teachers' prior teaching experiences, and pivotal interventions by group members and facilitators. The study notes that the facilitator played an important role in sustaining the process while empowering the group to take part in its own decisions.

Lyna, Hung, and Chong (2016) conducted a qualitative study of teachers in primary and secondary schools in Singapore. The researchers partnered with a university researcher supported by a cluster of superintendents and school leaders in order to develop teachers, particularly in terms of classroom assessment. The teachers collaborated across five schools, including four to nine teachers from each school for a year. Two of these partnerships were studied during the 2-year research project. The teachers were expected to conduct action research in their own classrooms guided by a university researcher. The teachers from the various schools met during a lunch

meeting. They also were involved in 63-h consultancy sessions throughout the year, as well as a learning symposium at the end of the project where they presented their classroom action research. The study indicates that teachers became familiar with alternative assessment measurements in the classroom, and they acquired action research skills at the classroom level due to the guidance of a university researcher and support from superintendents and school leaders. Furthermore, the teachers took ownership of their own learning, and they led their peers through alternative assessment practices and action research.

In a qualitative case study conducted by Ermeling and Yarbo (2016) in one middle school and one high school in the US for 12 months, 10 experienced teachers took part in professional development in two teams. The teachers represented a range of subjects, including math, science, English, social studies, and technology education. In their data, the researchers found at least one pivotal episode that demonstrated clear evidence of “outside content experts” (OCE) from a secondary school influencing the teachers’ instructional plans. The researchers found that the OCEs used three key patterns to help the teachers rethink their instructional plans. First, they demonstrated a flexible mind set and adapted their expertise to the local needs. Second, they applied their expertise through diligent follow-up work between meetings using e-mail. Finally, both OCEs patiently guided their respective teams to new insights and judiciously applied pressure to expand their horizons of instructional possibilities. They introduced their ideas as options to consider, rather than asserting opinions or overtly leveraging their authority as an outside expert or researcher.

Within the frame of a 4-year qualitative study of four large urban school districts in the US, Andrews-Larsen, Wilson, and Larbi-Cherif (2017) decided to focus on two math teacher teams from two middle schools. Specifically, they sought to understand how external facilitators supported the teacher teams because they exhibited growth in instructional quality. The teachers had daily common planning time by grade level, with a facilitator coming in to work with the teachers in grade-level groups one to two times per month. The researchers found that lesson co-planning sessions held great potential for supporting teachers’ professional learning. When supporting the teachers, the facilitators used the following techniques: solicitation of detailed representations of teachers’ classrooms and practices, orientation towards pupils as sense-makers, and pressing teachers to articulate rationales for instructional decisions, as tied to student learning goals.

González, Deal, and Skultety (2016) focused on facilitators’ language in a qualitative study at a US high school. The facilitators, who were also the researchers, worked together with five mathematic teachers in a group. The teachers participated in a 2-year professional development intervention. The main sources for the study were videos from the teachers’ classrooms and audio recordings of the study group sessions from the first year, including 10 monthly 3-h sessions. The study shows that the facilitators used clarifying, pressing, and explanation moves to sustain a stance of inquiry. When the facilitator shared insights based on her own experiences as a teacher, the explanation move seemed to accomplish co-membership between the researchers and teachers. These moves indicate that the facilitators did not take a neutral stance. The study shows that the facilitators’ moves supported teachers’ learning and classroom teaching, concluding that facilitators are important catalysts for promoting teacher learning in professional development with study groups.

Tan and Caleon (2016) conducted a case study of a teacher team including four biology teachers from grades 9 to 10 in Singapore. This study focused on the problem-finding phase in development work. According to the researchers, little is known about how teachers “jumpstart” their collaborative processes (p. 128). The researchers in this case were also the facilitators for the teachers under study. School leaders provided the teachers an hour per week to engage in professional development activities. The study extended over a period of 22 weeks. During the first meeting, the researchers gave the teachers an overview of the learning study and an introduction to the notion of a learning object. During the next meeting, the researchers introduced variation theory to serve

as a resource for the teachers. The researcher also provided examples of how variation theory has been applied to help teachers craft learning objects in their professional development. The researchers went on to present research literature that could assist the teachers in determining critical aspects of the learning object. Rather than discussing the learning object, subsequent sessions had the teachers engaged with discussion around the curricular flow, because it helped them to crystallize their focus. The study shows that it is important for researchers/facilitators to be sensitive to teachers and to be open to emergences in learning when defining the problem to be worked on.

In a 3-year intervention study conducted in Cyprus, Kyriakides, Christoforidou, Panayiotou, and Creemers (2017) the findings emphasized that teachers' professional development needed to be differentiated to meet their individual needs. Altogether, 106 in-service teachers in primary schools took part, with the teachers being allocated into groups, each consisting of teachers working with students in the same developmental stage. The research team supported the teachers with literature and research findings related to the skill under development. During monthly sessions between the teachers and the research team, dialogue and reflection led to the development of action plans. The teachers also set goals and created activities to reach these goals. The teachers were expected and encouraged to cooperate and to revise and improve their action plans. The results indicate that not all teachers moved from one developmental stage to another during the first year; however, participation over the 3 years had a major influence on their teaching.

Smith and Lindsay (2016) conducted a study of two in-service projects carried out in primary schools in Australia to support teachers' professional development, again showing the importance of teachers articulating their own learning needs. The study also underscored the significance of learning conditions in teachers' professional development. Smith and Lindsay emphasize that providers of external support should scrutinize the school's current practices before providing learning opportunities for the teachers. In an article based on a qualitative study focusing on collaboration between teacher educators and teachers in three lower secondary schools in Norway, Postholm (2016) found that both structure and culture can lay the foundation for professional development, thus leading to school development.

4.3. Teacher collaboration

Having discussed the role of outside resource persons, this section turns to the subject of teacher collaboration in order to answer the research question. In a qualitative study of six primary school teachers in Australia, Ambler (2016) found that classrooms and schools provide teachers with opportunities for learning. The study shows that teachers need to be able to talk and thus put words to their daily work; in short, they need to work with others during school days to learn from their everyday practices. In practice, however, this goal proves difficult. For instance, Horn, Garner, Kane, and Brasel (2017) conducted a qualitative study of 77 meetings of teacher teams in middle schools in the US, finding that teachers rarely accomplished collective interpretations for future work. Rather, most communication focused on logistics and pace as well as topics to be taught. This finding held true even though the researchers included best-case workgroups through purposive sampling.

Communication was also the focus of a qualitative study conducted by Vrikki, Warwick, Vermunt, Mercer, and Halem (2017) in England. Primary and secondary school teachers took part in a lesson study (LS) project for a total of 30 teachers groups (27 from primary school and three from secondary schools). There were three teachers in most groups, most of whom participated for three to seven months. The intention of the study was to understand how dialogues between teachers could enhance their learning. The researchers focused on three dimensions—dialogic moves, scope of discussion, and learning processes—by analysing videos in which teachers reflected on the observed teaching in groups. Dialogic moves included requests for information, opinions and clarifications, building on ideas, and providing evidence or reasoning. The study demonstrates that dialogic moves building on each other's ideas influenced the teachers'

individual descriptive learning processes (DLP), meaning that the teachers focused on concrete cases at the practical level. No dialogic moves were found to be significant with regards to interpretive learning processes (ILP), meaning that the teachers connected concrete practice to theory. However, the researchers conclude that building on the groups' shared contributions and making strong individual contributions to reason strongly impacted teachers' descriptive learning processes. Furthermore, the study shows that supportive moves are vital to learning processes.

In a mixed-methods study, Popp and Goldman (2016) focused on language use while comparing meetings about assessment and classroom instruction. Altogether, nine meetings were chosen for analysis from 67 observed meetings. The researchers specifically focused on three meetings from an elementary school comprised of six language arts teachers. The researchers used Crespo's (2006) categories of expository and exploratory talk. Expository talk is descriptive whereas exploratory talk involves the collective examination of ideas leading to knowledge building. This collective examination occurs through questioning, proposing ideas, elaborating on proposals, negotiating, and explaining thinking. The researchers found that the focal point of meetings played a role in language use, with significantly more knowledge building occurring in meetings that focused on assessment systems.

Mohan, Chand, and Lingam (2017) conducted a qualitative study in two Fijian secondary schools including 30 teachers. Their study shows that professional development situated in school is necessary to change teaching practices. Furthermore, the findings highlight that professional development needs differ slightly in rural and urban teachers, mostly because of the pupils' needs. Their major finding was that the opportunity for teachers to collaborate to share ideas forms a strong foundation for professional development. A qualitative case study conducted by Cheng and Wu (2016) in a secondary school in Shanghai focused on three particular English teachers. This study demonstrated that collaboration—including observations and discussions—enhanced the teachers learning when it came to basic lesson plan elements and steps in classroom activities. In the research, teachers reflected more thoroughly and became more willing to offer comments and share ideas with each other. The study also shows that individuals are the driving force in community development and social affordances, which in turn enable the further development of individuals in the community.

In 12 Irish secondary schools, researchers conducted a qualitative study of a teacher collaboration continued from an experimental study (Girvan, Conneely, & Tangney, 2016). First, the teachers who volunteered to participate observed their own pupils being taught by the university staff or researchers. Next, the teachers themselves used the observed teaching as a model. After both of these teaching rounds, the teachers reflected together with the researchers taking part. Throughout the year, the teachers from the same school could teach, observe, and reflect together. The study's findings indicate that the teachers benefited from collaboration with teachers from different departments in terms of their development; their classrooms also became more learner-centred than before. The study also demonstrated that experienced teachers could lead professional development activities, meaning that the model could work without researchers.

According to Sung, Lee, and Choi (2016), the dominant paradigm in South Korean classrooms has been teaching and learning in order to achieve high test scores (PISA—Program for International Student Assessment). In 2009, a new policy was introduced to move the schools away from traditional teaching to a more student-centred and democratic approach. The program, called Hyukskin School (HS), had been introduced in 6.9% of all schools by 2015. Focusing on a middle school through a qualitative study, the researchers studied community building, whole-school observations, and reflections. Participants engaged in a whole-school observation of a lesson nearly every week, which was possible because administrators adjusted the timetable in such a way that one class continued after the others finished. This adjustment gave teachers the ability to observe others at the same grade level, also making them more aware of their own teaching. The researchers found that a shared mission is essential for school change but difficult to

achieve because of the test-driven teaching tradition; nonetheless, collective learning and democratic teaching can lead to school change. The difficulty of change was also a theme in Hardy and Edwards-Groves' (2016) qualitative case study of nine teachers in a primary school in Australia. These researchers found that teachers' professional development is influenced by particular events at an earlier phase of their careers, not only present-day, site-specific, and whole school learning. In essence, they found an inextricable connectedness between teachers' earlier collaborative professional learning experiences and later learning practices.

In a primary school in Zambia, Hennessy, Hasler, and Hofman (2016) conducted a qualitative study on 12 teachers using videos as a tool to develop their practice. The teachers met with each other for 1 h every week. Recorded by the researchers who were teacher educators, the videos showed real lessons taught. Guided by the researchers' questions, the teachers discussed the videos and worked on new lessons planned on the basis of these discussions. Finally, they discussed their own observed lessons afterwards. The researchers found that this activity helped the teachers to develop their teaching from lecturing monologues to more active learning for the pupils over the duration of the year. However, the researchers also pointed out discrepancies in progress between the teachers, who also noted that they needed more time to integrate this activity into their busy working lives.

In a survey including 2,310 Finnish comprehensive teachers, Soini, Pietarinen, and Pyhältö (2016) found that learning and well-being at work require two elements: teachers must be self-reflective and connected to their own teaching in the classroom as well as co-regulated for learning. In brief, teachers must work and reflect together. Similarly, in a qualitative study conducted in Norway in three lower secondary schools including all teachers and leaders, Postholm and Wæge (2016) found that the learning culture, the teachers' collaboration, and co-regulated learning at work all make a difference to the teachers' job satisfaction and well-being.

4.4. Methods for teachers' professional development

This review now has covered the first three categories, we now turn to the fourth: methods for teachers' professional development. In a summary study of several qualitative studies, Chen (2017) describes how cultural factors in China correspond to the intentions of the lesson study method (LS method) for teachers' professional development. In the study, the researcher includes 100 teachers from 10 schools in China. The findings report that the teachers perceive that they can make mistakes and that the repeated teaching in LS provides an object of focus. The teachers also feel that they are emotionally rewarded when working collaboratively in their teaching groups. The study concludes that practical reasoning in repeated teaching based on useful standards actually improves the quality of lessons—more so than standards codified in theoretical books and official documents. The researcher asserts that the LS method has contributed greatly to the teachers' teaching and professional development.

With a focus on the macro down to the micro level, Hadfield and Jobling (2016) conducted qualitative research within 22 schools in three regions of England, all of which had taken part in LS for at least 2 years. How the teachers experienced the LS work depended on how the regional officers positioned the LS work in terms of the overall school improvement strategy, thus forming the contextual conditions. How the teachers experienced the work also depended both on the lead teachers supporting the teachers and the level of teaching proficiency at the schools. The teachers expressed more professional autonomy if they decided on the goals together with the lead teachers and felt that they created relationships and practices where mutual learning took place rather than participating in a one-sided expert coaching model. The teachers expressed that reflecting while using the LS method helped them to develop a professional dialogue connected to their classroom practices.

Goh and Fang (2017) studied how teachers learn and develop in a qualitative case study of a team composed of 11 primary school teachers in Singapore. The study indicates that each stage of the LS

process engaged teachers' deliberative discourse and assisted them in building a common inquiry stance into the problem of student learning of reading and writing. The inquiry stance established at the beginning stage framed the team's planning and enactment of instruction; it also promoted collective pedagogical reasoning and action. In their joint collaboration processes, the teachers moved from a lesson-based view to a curriculum-based deliberation. The processes challenged their shared assumptions and enabled them to improve and adapt their teaching to the pupils.

In a comparative mixed-method study of two communities of mathematics teachers, Shuilleabhain (2016) found that the teachers (one group of five and one group of seven) made professional improvements through LS work in two post-primary schools in Ireland. These gains occurred despite the fact that the teachers in one school were used to collaborating while those at the other school were not. Their learning became evident through the evolution of their dialogues over successive cycles of lesson study. This study noted that voluntary participation was a necessary prerequisite for professional development.

An observation study conducted by Kullberg et al. (2016) focused on 12 mathematics and science teachers in four lower secondary schools in Sweden. These researchers found that a modified LS method, the learning study method, improved the teachers' teaching practice and thus contributed to their professional development. The learning study builds on variation theory, meaning that learning is enhanced when pupils are presented with different concepts simultaneously. Teachers were observed within 2 years of interval teaching the same topic in the lesson, before and after working with LS. The researchers found that the teachers had improved their teaching practices at the time of the second observation.

A collective qualitative case study conducted by Skott and Møller (2017) at a school in Denmark focused on the teachers' individual learning in LS. With reference to Sfard (2003) and her description of learning as acquisition and learning as participation, they extended this two-sided focus on learning by using a "more purely participationist analysis" (Skott, 2013, p. 5), and the metaphor of figured worlds or "as-if" worlds (Holland, Lachicotte, Skinner, & Cain, 1998). They compared two experienced teachers, Petra and John, with 40 and 15 years of experience, respectively. Petra oriented her participation towards profession and wanted to give good teaching lessons to show that she was an expert in the field whereas John looked upon LS as an exploratory activity. The researchers found that the teachers' initial orientation and meaning-making towards LS profoundly influenced and conditioned their practices; as a result, the two teachers differed significantly in terms of how and what they learned.

Action research (AR), understood as teachers as researchers (McNiff, 2013), was used as a method for five teachers' professional development in a primary school in Newfoundland (Goodnough, 2016). The teachers developed a research question based on their own needs before collecting data in their classrooms. They then analysed and reflected both individually and collectively, an activity they were allotted time to do. The teachers received support from three sources during the reflections and lesson planning: the principal, the author/researcher, and a professional facilitator. Joint reflections occurred 7 days a year. The teachers also read literature related to their research topic. The author and research team supported the school during the development processes for a period of 5 years, and included two AR cycles (data from 2 years) in the qualitative study. The results indicate that the AR process motivated the teachers and made them feel in control over their own learning process. They became more knowledgeable about the content, thus increasing their confidence and comfort in teaching science.

4.5. Contextual factors influencing teachers' professional development

This review now has covered four categories. The fifth and final category is contextual factors influencing teachers' professional development. Salleh and Tan (2017) conducted a comparative study of basic education in Shanghai and Singapore focusing on teachers' professional learning communities (PLC). In Singapore, each school is conceptualized as a PLC with professional learning

teams consisting of teachers teaching either the same subject or working at the same grade level. In the Singapore model, school leadership is supposed to support the process, and the teachers are expected to work in learning circles including lesson study or action research. In Shanghai, the teachers take part in teaching-research groups or lesson planning groups, formed specifically to plan lessons together, observe and critique one another's lessons, and share teaching resources. The researchers found that the teachers in Shanghai were more positive about the collective working method because of their more collectivist orientation and lighter workload.

In Shanghai, there is also an appraisal system that rewards group effort, thus valuing PLCs highly. The authors conclude that social norms and value influence how PLCs are valued in different educational contexts.

Such values, practices, and contextual factors were also the subject of Feeney's (2016) study into the aspects that support or hinder teachers' professional development in the workplace. The researcher refers to Opfer, Pedder, and Lavicza (2011) who suggest that when teachers' beliefs become important for practice, they manifest themselves as values, which are given high priority in teaching and learning. The mixed-methods case study was conducted at one elementary school with 28 teachers and leaders in the US. The project team included the principal, a teacher representative from each grade level, a regional trainer, and the researcher. They met monthly throughout the year to design a plan in support of school improvement and continuously evaluated the plan's implementation. The findings show that open communication with the principal, shared decision making, learning structures, and autonomy in decision making are factors that support professional development; by contrast, lack of time, accountability pressures, teacher attitudes, lack of communication, and lack of shared vision and values hinder such development. Though research findings rarely informed the teachers' collaborative work, they shared ideas and offered each other reassurance and support, both of which were strong indicators of the school's positive learning climate.

In a qualitative study of five Irish primary schools with 20 teachers taking part in a literacy project, King (2016) considered the systemic factors that support or hinder change implementation and sustainability in schools. King (2016) condensed these factors into the concepts of support, initiative design and impact, and teacher agency. According to King, the factor of support includes the following: principals' support of teachers' voluntary participation; creating the organizational capacity for change by providing time for joint peer observation; planning and reflection; resources; hiring teachers open to collaborative processes; and empowering teachers to create collaborative cultures. The study shows that allowing teachers to volunteer for collaborative practices increased their engagement and made the practice sustainable over time. The researcher noted that many teachers were willing to participate because it was a time-bound initiative over 10 weeks with a specific design and structure; however, the study also indicates that effects seeped into other aspects of teachers' practice on a longer-term basis. Teacher agency influenced the sustainability of the practice, meaning that the teachers adapted their practices to their classroom needs. The findings also indicate that the teachers' openness and willingness to engage with and sustain the practice was significant in its implementation and survival over time.

5. Analyses and discussion

In this section I begin to analyse and discuss the first part of the research question considering teachers' professional development in school. The current review employs the activity system as the unit of analysis for exploring teachers' development in school. I analyse the findings by first examining the connection between the following factors: subject, mediating artifact, and object. The articles illustrate that a team of teachers is generally the acting subject, a team that either teaches the same subject or same grade level. In some studies, the researchers have given the teacher groups names related to their activity, such as "teacher research groups" (Haiyan et al., 2017), "teacher peer excellence groups" (Cravens et al., 2017), and "teaching-study groups" (Cravens & Wang, 2017). All of the teachers at the school took part in the professional development activity in only four studies (Haiyan et al., 2017; Postholm, 2016; Postholm & Wæge, 2016; Sung et al., 2016). It therefore seems

that there might be a disconnect between the work conducted in the various teacher teams and the collective activity at the school, an aspect to which I will return later in the discussion.

Various mediating artifacts are used in teachers' professional development processes. Mediating artifacts can be both ideal (conceptual) and material (Cole, 1996) as well as both technical and psychological (Wertsch, 1985, 1991, 1998). Language and forms of artifacts—such as videos, textbooks, and procedures or methods guiding actions—thus can be looked upon as mediating artifacts in teachers' professional development. This means that one artifact that can enhance learning is the language used in dialogues between teachers, between teachers and their leaders, and between practitioners in school and outside resource persons/teacher leaders.

In three of the studies (Cravens & Wang, 2017; Grau et al., 2017; Hennessy et al., 2016), videos were used as a mediating artifact to enhance reflections between teachers. In one study, the researchers explicitly presented research literature to the teachers (Tan & Caleon, 2016); in another study, the teachers read literature related to their focus area (Goodnough, 2016). One article states that research findings were rarely part of the teachers' collaborative work (Freney, 2016), while another (Chen, 2017) shows that practical reasoning based on useful standards helped the teachers and encouraged the change practice more than standards codified in theoretical books. It appears that teachers fail to use literature often to improve their practice, a practice recommended by Darling-Hammond and Richardson (2009). When the focus of the teachers' joint reflections was their practice, they took on ownership of the research findings (Grau et al., 2017); in such cases, the teachers wanted to discuss topics with a high degree of connection to their teaching activity (Olin & Ingerman, 2016). In one LS project, the teachers used dialogic moves that influenced their individual descriptive learning processes, meaning that they did not connect the theory to their practice (Vrikki et al., 2017).

Several studies also have focused on how language actually is used to enhance professional development during teachers' joint reflections. Ambler (2016) states that teachers must be able to put words to their daily practices. As Polanyi (1967) points out, this process can be difficult because knowledge is often tacit. However, Cheng and Wu (2016) found that teacher collaboration, including observation and discussions, led to teachers reflecting more thoroughly; they became more willing to share their ideas with others. This review study further shows that the teachers learned to put their understandings into words (Cravens & Wang, 2017). As such, the collaboration processes can contribute to implicit knowledge becoming more explicit; meanwhile, this knowledge can be brought into reflection processes and contribute to learning.

LS and action research are learning methods that include both data collection in the classroom and reflections; as such, both observation and reflection are based on concrete practice. Lyna et al. (2016) found that teachers acquired the skill to conduct action research at the classroom level and that the teachers took ownership of their own learning. Data material that teachers collected from their classrooms and analysed together therefore became a mediating artifact that created the conditions for learning (Wood et al., 2017). The teachers felt that they also developed professional dialogues connected to their practices when using the LS method (Hadfield & Jobling, 2016). The studies also show that teacher collaboration can contribute to the teachers' job satisfaction and well-being (Postholm & Wæge, 2016; Soini et al., 2016), making them feel emotionally rewarded (Chen, 2017). Partnerships between researchers and teachers also seem to promote teachers' re-engagement with their teaching (Grau et al., 2017).

Outside resource persons used language in various ways to support teachers' professional development. These facilitators solicited information about teachers' classroom practices and rationales for instructional decisions (Andrews-Larson et al., 2017). They also asked for clarifications, pressed and, asked for explanations; they even used their own experiences as examples during these dialogues, building co-membership between researchers and teachers (González et al., 2016). Researchers have found that the meeting foci play a role when it comes to how

language is used (Popp & Goldman, 2016), and that facilitators play an important role in sustaining the process of empowering a teacher group to make its own decisions (Wood et al., 2017). Research also shows that supportive moves are vital for teachers' learning processes (Vrikki et al., 2017), and that offering other teachers reassurance and support are strong indicators of a positive school climate. Research also has shown that teachers can be in the "land of nice" (City, Elmore, Fiarna, & Tietel, 2010) where they simply support each other rather than offering constructive feedback. While school leaders, teachers, and researchers see the potential for learning and development in dialogues, many realize that they could develop their language use in such dialogues to enhance learning (Postholm, 2018).

Cravens and Wang (2017) found that only having teachers collaborating together can be a limitation in teacher groups. The teachers are bounded to their "horizons of observation" (Hutchins, 1996), and they may need outside experts to expand their perspectives; these experts may be local scientists, researchers, or university faculty (Ermeling & Yarbo, 2016). The anthropologist Kluckhohn (1949) has pointed out that the fish is the last one to detect the water. This aphorism also can shed light on teachers' situations in school, as they may not recognize the limits of their horizons. Smith and Lindsay (2016) show the importance of teachers articulating their own learning needs; at the same time, they emphasize that providers or external supporters should scrutinize the school's current practices before providing learning opportunities for teachers. Researchers can collect mirror data (Cole & Engeström, 2007) in schools, so that both insider and outsider perspectives converge in developing an object for the development practice, one that also is based on the teachers' needs. Several studies emphasize that the development work has to meet the teachers' requirements (Goodnough, 2016; Kyriakides et al., 2017; Mohan et al., 2017), and that teachers also can have different motives and objects for their participation (Skott & Møller, 2017). In these studies, teacher participation also has been voluntary (Girvan et al., 2016; King, 2016; Shuilleabhain, 2016) indicating that the teachers were motivated to take part from the outset, not necessarily knowing the content of the work. Timperley, Wilson, Barrar, and Fung (2007) note that participation does not have to be voluntary, but that all teachers should understand the purpose of the development work. As such, time must be allotted to the start-up phase of development work in order to develop an understanding of the object and why one should act upon it (Postholm, 2008).

Logistics and pace tend to be the most frequent topics in teacher communication (Ambler, 2016), indicating that teachers are not conscious of a common goal. Only one of the articles in the review focuses on the problem-finding phase and how teachers "jumpstart" their collaborative processes (Tan & Caleon, 2016, p. 128). This study concludes that researchers have to be sensitive to the teachers when defining the problem. Ultimately, the developmental question for the work is created in a collaboration between outside resource persons and teachers, with the outsiders collecting mirror data (Cole & Engeström, 2007) helping the teachers to expand their horizon of observation and create an object or an overall goal to act on. According to Leontév (1981), "the object is the true motive" (p. 59) for people's actions; in this process, the teachers' motivation can be built into the object, because it is their practice and their needs that serve as the starting point. In one of the presented studies, the teachers developed their research question based on their own needs, allowing them to feel that they were in control of their own learning processes (Goodnough, 2016). Furthermore, the teachers felt that they had more professional autonomy when deciding on goals in tandem with lead teachers (Hadfield & Jobling, 2016). Another study showed the significance of the expert teachers visualizing common goals (Adolfsson & Alvunger, 2017), but the research also indicated that it can be a challenge for teacher leaders to develop common goals in teacher groups (Salleh, 2016). Such findings illuminate the bottom triangles of the activity system constituted by the factors of rules, community, and roles/division of labour on the bottom line.

In their role as teacher leaders (roles/division of labour), the teachers in one study paid little attention to building a teacher community, instead working on aspects like collegiality, bonding,

and trust. The teacher leaders' lack of familiarity with these aspects also prevented the teachers from building a sense of community and learning to be transferred to the classroom (Salleh, 2016). They did not manage to create a "historically new form of societal activity that was collectively generated" (Engeström, 1987, p. 174). Earlier studies have found that reflection on concrete practice that is jointly observed can lead to changes and improvements in practice (Camburn, 2010; Parise & Spillane., 2010; Zwart, Wubbels, Bergen, & Bolhuis, 2009). However, according to Elmore (2000), it is unlikely that observation and reflection connected to concrete practice will lead to changed and improved practice if the school as an organization does not focus on this developmental practice. According to Elmore (2000), it is the school leaders' task to arrange for the teachers' learning at schools.

Several studies underscore the important role of principals in teachers' professional development (Cravens et al., 2017; Haiyan et al., 2017; King & Stevenson, 2017; Liu et al., 2016; Piyaman et al., 2017; Silva et al., 2017). As such, the importance of building trust and establishing productive learning environments (communities) seems to be a premise for teachers' professional development in school. One study also shows that principals supported the teachers' learning by providing professional support (Pang et al., 2016). According to Timperley et al. (2007), teachers' need new knowledge to reflect on their teaching in alternative ways; therefore, inviting external visitors can be a helpful tool. In addition to supporting the teachers, the principals also have expectations, requiring preparation work and follow-up tasks in connection with joint observations and reflections (Pang et al., 2016); they thus function as "warm demanders" (Evertson & Weinstein, 2006, p. 11). Giving teachers time to collaborate was another way that principals supported teachers' professional development (Goodnough, 2016; King, 2016; King & Stevenson, 2017; Olin & Ingerman, 2016; Tan & Caleon, 2016), but having time allotted to the work in the timetable (rules) does not necessarily lead to development if there is not a culture for learning (King, 2016). It is a prerequisite for teachers to be able to collaborate and use language productively in a trusted and supportive atmosphere. As Forte and Flores (2014) point out, structure and culture must be in interplay if teachers are to learn together.

The second part in the twofold research question for this review study was how teachers' professional development influences school improvement. What is the outcome of teachers' professional development in school? What does this professional development lead to; what is its "outcome"? Only one study commented on school change, saying that collective learning can lead to school change if teachers and leaders have a shared mission (Sung et al., 2016). The LS method gives the teachers an object to focus on because of the repeated teaching (Chen, 2017), but only a few teachers at the school know about this teaching object, not the whole school community. This problem exists despite the fact that the intention is for goals in LS activities to align with school development goals (Lewis et al., 2013). The most prevalent contradiction found in this review study exists between the factors of subject, object, and community. The subject, often a group of teachers, is usually detached from the rest of the school community; in addition, these teachers often do not define an overall goal or object for the professional development. The activity in these groups can therefore become happenings, rather than a forceful expansive learning process including the whole school (Engeström & Sannino, 2010). One article also pointed out that external resource persons, such as researchers, can collect mirror data; meanwhile, insiders and outsiders can develop an object or a developmental question together. In this shared meeting grounds (Engeström & Toiviainen, 2011), researchers can support teachers through dialogue, but they must understand the kind of speech that enhances learning. In the midst of these collaborative learning dialogues, both researchers and teachers can develop their competence in terms of using language as a mediating artifact while dissolving possible contradictions that arise between the acting subjects and language (the mediating artifact) when they act on the object. When joint learning processes occur in the language development, developmental transfer (Engeström & Sannino, 2010) can take place between schools and teachers' education institutions, allowing student teachers to learn how to use language when collaborating, thus preparing them for continuous professional development together with their colleagues.

6. Concluding remarks

This review study has provided an overview of teachers' professional development in school, illustrating that teachers' learning processes need to be developed if they are to lead to school improvements as an outcome. This review indicates that it is insufficient for researchers to simply research the learning processes in school. They also need to conduct formative intervention studies, meaning that the researchers provoke and sustain an expansive transformation process led by and owned by practitioners (Engeström & Sannino, 2010), the leaders and the teachers in *the whole school*, and furthermore, conduct research on these processes. More research is needed to show how outside resource persons, as researchers, can contribute to school development in collaboration with teachers and school leaders at work.

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Note

1. When referring to basic education, I employ the terms *primary* and *secondary school*. However, when referring to studies employing other terms of reference, I have retained the terminology of the original articles.

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