The Construction and Development of Teacher Professional Learning Community: Based on Network Co-teaching Between Public School Teachers and Migrant School Teachers

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The Online Education Assistance Project (OEAP) is an online collaborative teaching project. This research took the OEAP as a case and used qualitative research methods to analyze the conditions of the OEAP as a professional learning community (PLC), the important factors affecting the development and construction of the OEAP, and the significance of developing and building a PLC. It was found that teachers' individual factors, working environment and students' academic conditions were all important factors affecting the sustainable development and construction of PLC. In addition, the development and construction of PLC based on the OEAP not only promoted student learning, teacher professional development and school construction, but also provided reference for promoting the sharing of high-quality educational resources and regional education balance.

Keywords: teacher professional learning community; collaborative teaching; Online Education Assistance Project; teacher professional development

Introduction

As the reform of basic education pays more and more attention to professional development of teachers and continuous improvement of schools, professional learning

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communities (PLCs) as a reform model have become an important issue and hot topic in Western education research in the past three decades (Cheng & Pan, 2019). PLCs refer to collaborative activities which foster "teachers critically interrogating their practice in ongoing, reflective and collaborative ways" (Stoll & Louis, 2007) to encourage students to learn. In the domestic and foreign research on PLCs, scholars mainly conducted in-depth discussions on the characteristics, development and functions of PLCs (Borko, 2004; DuFour, 2004; Gallagher, Griffin, Parker, Kitchen, & Figg, 2011; Stoll, Bolam, McMahon, Wallace, & Thomas, 2006; Vescio, Ross, & Adams, 2008). Nowadays, PLCs have gained momentum as a model of teacher education. More and more researchers regard PLC as an effective means to promote professional development of teachers, as well as the key to school reform and education quality improvement (Fu, 2020).

As mentioned earlier, most of the practical research on teacher PLC explored the influence of PLCs on teacher professional development and its relationship with school improvement (Allen, 2013; Hairon & Dimmock, 2012; Hu, 2013). Although there were many cases involving distance co-teaching in domestic and foreign studies (Chan, Lam, & Li, 2012; Øgaard, 2018), these studies tended to describe the learning of students rather than the development of teachers (Q. Zhang, 2017; Zhou, Zhu, Liu, Zhu, & Yuan, 2015). There is almost no literature concerning the process and significance of forming a teacher PLC through network co-teaching among complex subjects. Therefore, it is necessary to explore the process and significance of public school teachers and migrant school teachers in the Chinese context to form a teacher PLC through online cooperative teaching. Perhaps online co-teaching will become a new form of promoting regional education balance and teacher professional development (Liang, 2017; Zheng, 2008).

This is a case study from the Chinese mainland, mainly exploring the process and significance of forming a teacher PLC through network co-teaching between public primary schools and migrant primary schools under the current background of China. The Online Education Assistance Project (OEAP) is a distance co-teaching plan proposed by the Suzhou government. The case study has been conducted in five migrant primary schools and one public primary school from September 2019 August 2020.[1] In order to better study the process and influence of public school teachers and migrant school teachers to build teacher PLC, the researchers tried to conduct in-depth case study analysis of the OEAP through qualitative research methods such as observation, interview, and physical analysis. More specifically, the study aimed to answer the following questions:

1. Can the OEAP be explained from the perspective of PLC concepts?
2. In the OEAP, what are the important factors affecting the construction and development of teacher PLC?
3. What is the significance of constructing and developing the OEAP?

Online Education Assistance Project

As the rapid growth of industrialization and urbanization in China, challenges arise for many cities to offer educational services to migrant families. According to the Ministry of Education of China (2019), approximately 80% of migrant students were admitted to public schools, while the remaining 20% were attending migrant schools, most of them being rural-to-urban migrant children. Chen and Feng (2013) found that students in migrant schools performed significantly worse in both Chinese and Mathematics than their counterparts in public schools. Suzhou is one of the largest migrant-receiving cities in China. In order to further promote fairness in education, the sharing of high-quality educational resources, the deepening and re-practice of the function of sharing high-quality resources in Suzhou Online Education Center, and to realize the same-city treatment for primary and middle school students, a network assistance project called Online Education Assistance Project was launched by the local government in Suzhou. The project started piloting online education assistance in Suzhou in September 2019.

In this project, one public school was selected to be responsible for docking with five migrant schools, and a fifth-grade Chinese language and Mathematics live-stream pilot classroom was launched. The network course adopts the "distance teachers + on-site teachers" dual-teacher teaching mode, meaning that an experienced public teacher and five migrant assistant teachers form a dual-teacher teaching team. Using the "dual-teacher" teaching team model of "on-site teaching + distance teaching," live-stream pilot classrooms of Chinese and Mathematics were set up, with one class for each subject per day. Teachers who originally taught the six classes in Chinese and Mathematics formed a teaching team; that is, all the teachers would keep the same teaching pace and deliver instruction collaboratively in different ways for students in these six classes. Chinese and Mathematics were chosen because the achievement gap of the two subjects between students of the public school and migrant schools was narrower than that in English among these three core subjects. Before starting the class, the dual-teacher teaching team carried out a network collective lesson preparation based on the teaching materials and different students,

clarifying the teaching links and the division of labor between public school teachers and migrant school teachers. In the class, distance teachers are responsible for explaining the key content and controlling the overall progress of the classroom; on-site teachers are responsible for organizing students for answering questions, group discussions and hands-on operations. After the class, on-site teachers are responsible for summarizing and giving feedback on the students' classroom performance and homework, and the dual-teacher teaching team discusses the next teaching plan together.

Literature Review

The Development of Co-teaching

Co-teaching, commonly regarded as collaborative teaching between special education and general education teachers for students with special needs to be educated in a common classroom of mainstream schools, has become a prevalent instructional approach as a practice of inclusive education (Cook & Friend, 1995). Co-teaching can be applied to any pair of educators (Rytivaara, 2012). Broadly defined, co-teaching means that two professionals share responsibilities for all students in a common classroom, including three components: co-planning, co-instructing, and co-assessing (Conderman, Bresnahan, & Pedersen, 2009). To date, co-teaching should be introduced as a mainstreaming strategy to meet the needs of students from diverse social and cultural backgrounds (Bauwens, Hourcade, & Friend, 1989).

However, different from inclusive co-teaching models, distance co-teaching was added with new element of "distanced" (Chan et al., 2012). It means that distance teachers and on-site teachers deliver instruction geographically separately for the same group of students with various ways. Distance teaching can create more possibilities and flexibilities for co-instructing in the class to meet the needs of students better. Øgaard (2018) reported there was a full-time supply teacher in the classroom collaborating with the distance teacher, whose main function was to turn on the smartboard and computers and hand out materials, except to support the teaching in any other way. Zhou et al. (2015) found that the teachers' network cooperative teaching had obvious effects in improving the academic achievement and learning attitude of students in rural areas. Liang (2017) and Q. Zhang (2017) considered it as a new effective training mode for rural teachers, which provided high-quality resources of cities and supported professional development of them. Besides,

Chan et al. (2012) reported a phenomenon of peer learning among students from different schools during distance co-teaching.

Professional Learning Community

Definition of PLC

The concept of "professional community" first appeared in the literature in the early 1990s (McLaughlin & Talbert, 2006), and originated with organizational theory literature. Under the context of education, these processes are illustrated by a set of social relations that create a culture of shared responsibility for student learning, improve teachers' understanding of key pedagogical elements, and promote the implementation of effective practices (Louis, Marks, & Kruse, 1996).

Teacher PLCs can be defined as environments in which teachers interact and collaborate regularly around issues of teaching and learning and engage in the production and consumption of knowledge about improved practices for student learning (Cochran-Smith & Lytle, 1999; Vescio et al., 2008). With collaboration as its core element, PLC is a loose concept with different meanings under different contexts and to different researchers (Lomos, Hofman, & Bosker, 2011). Hord (1997) initiated the term of PLC and defined it as "teachers in a school and its administrators continuously seek and share learning, and act on their learning" with an aim of "enhancing their effectiveness for the students' benefit" (p. 1). Within a PLC, the relationship between teachers and other school professionals is a key element affecting student learning. This community-based environment reduces the isolation of teachers by promoting productive interactions when solving classroom difficulties. By working together, the personnel will increase their commitment to the school's goals and mission. PLCs thereby enrich their understanding of teaching and learning concepts and ensure that the varied academic disciplines are closely intertwined. Teachers working in this type of environment are committed to continuous professional development and take the promotion of student learning as their main mission. (DuFour & Eaker, 1998; Hord, 1997; Hord & Sommers, 2008).

Characteristics of PLC

In a nutshell, an effective PLC demands at least a minimal level of: (a) shared values and norms, (b) collaboration, (c) focusing on student learning, (d) reflective dialogue, and

(e) norms of making practice public (DuFour, DuFour, Eaker, & Many, 2006; Fullan, 2007; Louis et al., 1996; McLaughlin & Talbert, 2006; Stoll et al., 2006).

In fact, there are obvious differences in the PLC conceptual models proposed by different researchers. According to Louis et al. (1996), the core elements of PLC mainly included: shared norms and values; collective focus on student learning; collaboration; derivatized practice; reflective dialogue. Hord (1997), the initiator of PLC, proposed five core characteristics of it: supportive and shared leadership; team creativity; shared value and vision; supportive conditions; shared personal practice. DuFour and Eaker (1998) divided PLC into six dimensions: shared mission, vision and values; collective inquiry; collaborative teams; action orientation and experimentation; continuous improvement; results orientation. Thompson, Gregg, and Niska (2004) believed that PLC is a learning organization, including: systematic thinking; personal mastery; mental models; shared vision; team learning; relationships/trust; data-informed decision making; risk taking. Stoll et al. (2006) explained the characteristics of PLC from the perspective of a community of practice, including: shared values and vision; collective responsibility; reflective professional inquiry; collaboration; group as well as individual learning being promoted; mutual trust, respect, and support among staff members; inclusive membership; openness, networks, and partnerships. Hipp and Huffman (2010) summarized the characteristics of PLC on the basis of comprehensive previous research into five dimensions: shared and supportive leadership; shared values and vision; collective learning and application; shared personal practice; supportive conditions. To sum up, PLCs are characterized by both teachers' collaborative work such as shared values and vision, collective inquiry, shared practice, shared responsibility, and schools' supportive conditions in terms of leadership, structure, relationship, and external resources (J. Zhang & Sun, 2018).

The significance of PLC

Early research on effects of PLCs tended to focus on creating workplace conditions conducive to teacher learning and overall school improvement (Bryk & Schneider, 2004; Louis et al., 1996). More recent researches found that PLCs produce positive outcomes for both teachers and students. PLCs aim to promote and sustain the learning of all teachers in the school community through collaboration with the shared purpose of improving student learning (Stoll et al., 2006). PLCs have strengthened the connections between professional learning and the immediate needs of teachers (Berry, Johnson, & Montgomery, 2005; Bolam, McMahon, Stoll, Thomas, & Wallace, 2005). A review of outcomes based on a small

number of empirical studies demonstrates that "well-developed" PLCs can lead to the improvement of teacher culture and practices (Vescio et al., 2008; Wenner & Campbell, 2017).

There is growing support for the fostering of PLCs in the current policy environment (Hargreaves, 2000). In the research field of teacher professional practices, scholars have noted the variation in the degree to which educational systems support teacher collaboration and the development of PLCs (Feldman, 2004; Wang & Paine, 2003). In Japan, for example, "lesson study" is an established practice that began in the early 1900s (Fernandez, 2002). Building and developing PLCs have been an important strategy to promote school reform and teacher development in many countries such as the U.S., Australia, and Singapore (Allen, 2013; Hairon & Dimmock, 2012). Other scholars have found that participation in PLCs has an impact on school professional culture and leads to increased involvement, ownership, innovation, and leadership among teachers (Andrews & Lewis, 2002; Berry et al., 2005).

Teacher Professional Development

The term "teacher professional development" has generally referred to the formal learning opportunities for teachers. It is pre-planned and designed in some way to improve the knowledge, skill, and dispositions of teachers (Bellanca, 2009). Many educational scholars have argued that when teachers acquire a deep understanding of the content knowledge and skills through effective and on-going professional development, teaching practices and student learning will be improved (Corcoran, 1995).

In terms of teacher professional development, teacher professional learning is at its core (Allen, 2013). Hoyle and John (1995) defined teacher professional learning (TPL) as the process by which teachers acquire knowledge, skills and value to improve the services they provide to students. TPL affects teacher professional development concepts, the development of teacher professional development standards, and school improvement and educational change (Stoll et al., 2006). Owing to the importance of professional learning for teachers, many teachers believe that "professional learning" can better reflect the essence of teacher development and have begun to consciously use the narrower concept of "professional learning" to refer to professional development (Timperley & Alton-Lee, 2008). Teachers' reflective thinking and engagement in a supportive community with shared visions, knowledge and commitment can be seen as central to the learning process.

Methodology

The choice of research method mainly depends on whether the research question and the nature of the research method match. The qualitative research method is a form of inquiry with the core concepts of "holistic view" and "contextuality." It focuses on the wholeness of society and the interaction between "people, things and situations" in research phenomena (Patton, 1990). This research focuses on the construction and development of teacher PLC from the perspective of network co-teaching. Overall, this research has strong contextuality, integrity and relationship, so it is suitable for qualitative research methods. At the same time, this research is based on a network co-teaching project between public school teachers and migrant school teachers. Therefore, the case study approach is applicable to this research (Yin, 2014).

Participants

In this study, one public school and five migrant schools participated in the OEAP, with two public school teachers and ten migrant school teachers. They respectively undertook the teaching tasks of Chinese and Mathematics. Participants from the public school were well-experienced teachers and had the titles of senior teacher professional. Lisa (pseudonym) was a mathematics teacher in the public school and had twenty-three years of teaching experience. As the leader of the mathematics subject of elementary schools in local area, she started participating in the OEAP in September 2019. She taught only one class of students in this school to support simultaneous live broadcast, with a total of three hundred students in six classes. All teachers participating in this project from migrant schools have the formal teacher credentials, with average five to ten years of teaching experience. For example, Lucy (pseudonym) was a mathematics teacher in a migrant school and had seven years of teaching experience. They were chosen because they were relatively young to adapt to new things.

In this study, we called teachers in the public school "distance teachers" while teachers in migrant schools "on-site teachers." In order to protect the privacy of the interviewees, the real names of all interviewees were not disclosed.

Data collection

The fieldwork started in September 2019 and ended in August 2020. It spanned two semesters and lasted nearly 12 months. At the beginning of the survey, we first observed the

co-teaching classrooms in the public school and migrant schools. After each observation, we recorded the classroom situation and the actions of distance teachers and on-site teachers. Besides, we also collected each school's application form for participation in this project and its education policies about the project. In the meantime, we conducted semi-structured individual interviews and focus group interviews of on-site teachers in the migrant schools and distance teachers in the public school. Each interview lasted about 30 to 90 minutes.

During the data collection process, the teachers were formally interviewed for three times. First, we asked the teacher to talk about their teaching experience and basic personal information. Second, teachers were requested to share their co-teaching process and performance of the OEAP. It mainly contains ten questions (see Appendix). For example, what kind of efforts have they put into in this project? What did they learn through this project? How do they learn in the process of this project? What are the key actions or processes of learning? Third, we asked teachers to talk about the impact of participating in the OEAP on the professional development of teachers. Furthermore, researchers became rather well acquainted with the teachers and consequently the narrative ideal of conducting several interviews with the same persons (Riessman, 2008) was fulfilled. The interviews were transcribed verbatim with nearly 80,000 words of transcripts.

Data analysis

The "organization and analysis" of data in qualitative research refers to the systematic and methodical combing of the original data obtained according to the purpose of the research, and then gradually condensing and concentrating it. The ultimate goal is to rationally explain the data (Flick, 2009).

In this study, the textual materials involved mainly included OEAP policy documents, participating teachers' reflection logs, and student academic reports. In the analysis and processing of the text data, we used the file summary table to analyze the text data. In the observation process, we focused on the classrooms where distance teachers and on-site teachers were in class, and paid attention to the performance of teachers and students in the classroom. After each observation, we sorted out the observations in time, carefully recorded the observations and wrote personal reflections. We also conducted timely sorting and analysis of the information obtained from the interview. Firstly, we converted the interview recordings into written materials and recorded our reflections and perceptions during the interview. Secondly, we summed up the concepts and propositions related to PLC

construction and development from the original materials, and established connections between concepts or propositions through methods such as comparison and classification. Finally, we coded and analyzed the interview text (see Table 1). In order to ensure the validity of the data obtained in the research process, we adopted the method of triangulation verification for testing, and timely compared and analyzed the obtained text data, observation results and interview data.

Table 1:   Information of Interviews

Series number	Schools	Persons involved	Length	Comments
DR-[F]-20191009	Migrant school-DR	3	1.5 hours	Two on-site teachers and the principal
DR-[I]-20191120	Migrant school-DR	1	40 mins	A mathematics teacher
HL-[F]-20191127	Migrant school-HL	2	1.2 hours	Two on-site teachers
PJ-[F]-20191210	Public school-PJ	3	1.5 hours	Two distance teachers and the principal
ZN-[I]-20191212	Migrant school-ZN	1	50 mins	A mathematics teacher
HJ-[F]-20191212	Migrant school-HJ	3	1.5 hours	Two on-site teachers and the principal
BY-[I]-20191216	Migrant school-BY	2	50 mins	One on-site teacher and the principal
HL-[I]-20200530	Migrant school-HL	1	1 hour	A Chinese teacher
DR-[I]-20200601	Migrant school-DR	1	50 mins	A Chinese teacher
PJ-[I]-20200604	Public school-PJ	1	30 mins	A mathematics teacher
HJ-[I]-20200605	Migrant school-HJ	1	40 mins	A mathematics teacher
PJ-[I]-20200803	Public school-PJ	1	1.2 hours	A Chinese teacher

Note: The serial number consists of three parts: the first part (e.g., DR) represents the school code; the second part represents the research method, with [F] being focus group interview and [I] being individual interview; the third part (e.g., 20191009) represents the interview date.

Findings

In this section, we present findings of the study by research questions. First, we answer whether the OEAP can be understood from the perspective of PLC. Second, we analyze the main factors affecting the construction and development of teacher PLC in the OEAP. Third, we discuss the significance of building and developing the OEAP.

Explaining the OEAP From the Perspective of PLC Concepts

The essential features of PLCs are defined as connected relationships, shared leadership and visions, and a collective inquiry of practices toward a common goal of improving teaching and student learning. PLC contains five main elements: common values and vision, supported and shared leadership, cooperative learning and application, supportive conditions, and shared personal practice, among which common values and vision are the most important (Hord & Sommers, 2008) (see Figure 2).

Figure 2:   OEAP as a PLC
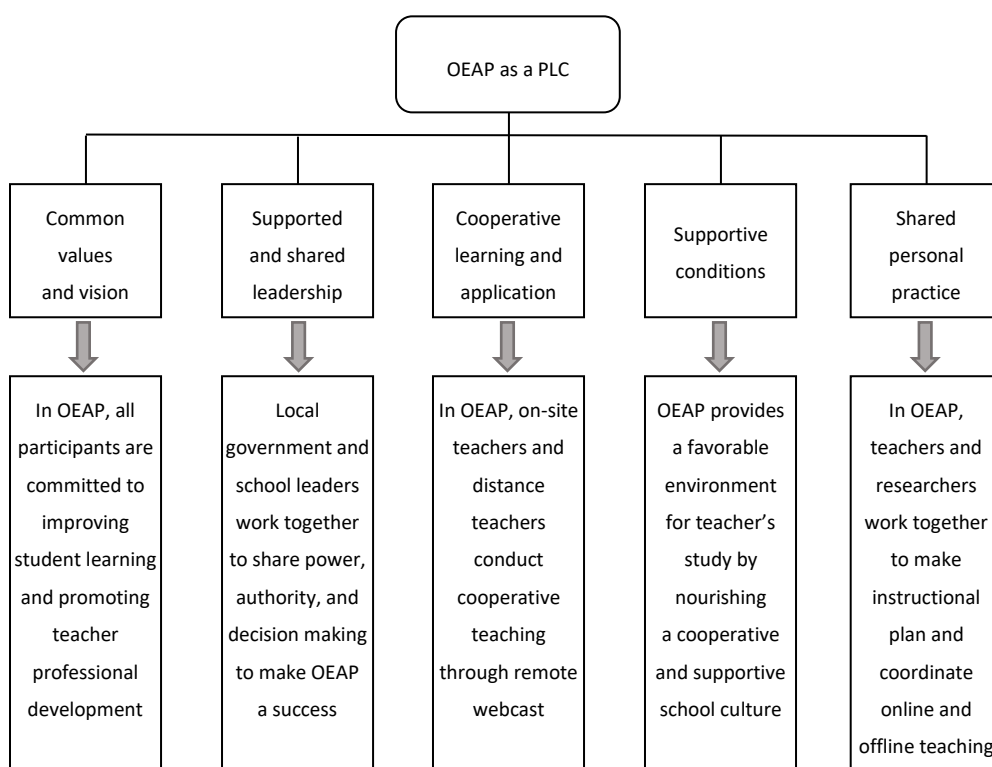
Common values and vision

Members of a PLC have shared values and vision. A spirit of mutual trust and caring exists among teachers. They work interdependently in collaborative teams in an effort to achieve the common goal that is for the improvement of student learning. In the OEAP, all participants were committed to improving student learning and promoting teacher professional development. As a means to promote educational balance and narrow the gap

between public schools and migrant schools, teachers participating in the OEAP were driven by a common vision to actively learn professional skills, enhance their self-cultivation, and provide students with better quality education.

Supported and shared leadership

In PLC, supported and shared leadership refers to the sharing of power, authority and decision making among managers, while promoting and cultivating leadership. In order to ensure the smooth progress of the OEAP, the local government gave great support to the project and established a special online collaborative teaching information platform. In addition, school leaders also actively supported the advancement of the OEAP and provided them with more convenience. In addition, schools participating in the OEAP gave teachers greater learning autonomy. On-site teachers and distance teachers interacted with each other through the Internet at any time, and school principals also provided convenience for teachers' teaching and research. Principals were not only responsible for their own capacity building, but also for teachers' capacity building and supporting teacher professional development.

Cooperative learning and application

This concept of collaborative learning and practices creates a platform of ongoing interaction that gradually forges an inextricable bond in forming a professional identity. In the OEAP, on-site teachers and distance teachers conducted cooperative teaching through remote webcast. Before the class, the dual-teacher teaching team carried out a network collective lesson preparation based on the teaching materials and different students, clarifying the teaching links and division of labor between the two parties. In the class, distance teachers were responsible for explaining the key content and controlling the overall progress of the classroom, while on-site teachers were responsible for organizing students for answering questions, group discussions and hands-on operations. After the class, on-site teachers were responsible for summarizing and giving feedback on the students' classroom performance and homework, and the dual-teacher teaching team discussed the next teaching plan together.

Supportive conditions

PLC provides a favorable environment for teacher's study by nourishing a cooperative and supportive school culture. In the OEAP, online cooperative teaching provided teachers with broader learning and communication opportunities. On-site teachers interacted with distance teachers through online collaborative teaching, and negotiated with other members of the community, which promoted the transformation of teachers' knowledge, skills, meaning, and identity. In addition, the project selected outstanding teachers, and organized a dual-teacher teaching team to discuss teaching plans. In this way, it can be realized that the students covered by the same teacher have the same progress, the same homework, and the same examination.

Shared personal practice

Teacher PLC is a community of teachers and teaching practice, in which teachers can improve their work by learning "tacit knowledge" of their colleagues. In the OEAP, in order to ensure the quality and effectiveness of online distance education and the same pace of online and offline collaborative teaching, the project required teachers and researchers, on-site teachers and distance teachers to develop scientific plans and work together before the class. For the content to be taught, careful preparation and design were carried out from the course standard and the design of the teaching link to achieve the best effect. On-site teachers received support for learning new knowledge and skills. Distance teachers were encouraged to help others learn and provide on-site teachers with needed help and guidance.

We try to understand the formation conditions of the OEAP from the perspective of PLC concept. It turns out that the OEAP meets the basic characteristics of PLC.

The Important Factors Affecting the Construction and Development of Teacher PLC in the OEAP

Many scholars have conducted research on the influencing factors of the development of PLC. The factors affecting the development of PLC can be roughly summarized into two aspects: the teacher and the working environment (Leclerc, Moreau, Dumouchel, & Sallafranque-St-Louis, 2012). Through the follow-up survey of the OEAP, differences in students' academic conditions were also found to be one of the important factors affecting the construction and development of teacher PLC.

Internal factors: Individual teachers

The personal efficacy of teachers is one of the important factors that affect their participation in professional learning activities. Teachers with a good sense of personal efficacy, on the one hand, have enough professional confidence to participate in community activities; they believe that their teaching can help students learn better. On the other hand, personal efficacy affects teachers' tendency to participate in professional learning activities:

> I think participating in the OEAP is a challenge for me, but at the same time it is also a very good opportunity for learning and improvement. I look forward to the exchanges and discussions with distance teachers. (ZN-[I]-20191212)

> Participating in the OEAP has greatly contributed to my personal growth. I cherish this rare learning opportunity, and I have learned a lot of practical teaching skills through communication with distance teachers. In addition, the OEAP has benefited a lot for migrant students. Online teaching broadens their horizons and stimulates their interest in learning. I feel relieved to think of this. (DR-[I]-20200601)

In addition, the teacher's personal motivation and professional attitude have a great influence on the extent to which they invested their effort in PLC. Amos and Benton (1988) showed that teachers' negative attitude towards professional development would reduce the degree of teachers' participation in professional activities, thereby affecting the development of PLC to a certain extent. As one teacher said in an interview:

> In fact, not every teacher participating in the OEAP has a strong willingness to learn and communicate. Some teachers from migrant schools are very responsible, but there are still others who are not very active and are satisfied with completing basic teaching tasks. (DR-[I]-20191120)

External factors: Working environment

In addition to teachers' personal factors, the development and construction of PLC will also be affected by external factors such as the working environment, policy background, and school culture. In order to ensure the smooth progress of the OEAP, the local government has given great support to this project, including providing sufficient preliminary hardware preparation and network maintenance work, and establishing a special online collaborative teaching information platform. The equipment company has dedicated

personnel responsible for site maintenance every day, and also professional and technical personnel for providing technical assistance to distance teachers and on-site teachers.

The school environment is a crucial factor that influences the implementation of a PLC. This includes the school's setting for collaboration (timetables, distribution of staff, resources), support for professional development, climate of confidence among staff members, and mutual support among colleagues (Cibulka, Coursey, Nakayama, Price, & Stewart, 2000). Among them, school leadership is a key factor. In the OEAP, the principal had to assume the role of coordinator and supporter to promote the smooth progress of PLC. One of the principals of a migrant school mentioned in a focus group interview:

> Our school still attaches great importance to the arrangement of teachers. We have equipped the classes participating in the OEAP with a strong team of teachers. The mathematics teacher (part-time head teacher) is our school's teaching expert; the Chinese teacher is our school's teaching director, who has very rich teaching experience. (HJ-[F]-20191212)

The continuous development of PLC relies to a large extent on having a common vision and goal among teachers and school leaders. Whether teachers can abide by common values and visions determines whether the community is truly realized, not just making changes in some superficial forms (Westbury, 2020). Through analyzing relevant education policies of the OEAP, we learned that this project mainly aimed to further promote the process of education informatization, give full play to the role of high-quality educational resources, and provide high-quality and rich resources for teachers and students of migrant schools. During the implementation of the project, all teachers were working toward this common vision.

Important external factors: Differences in student learning

In the OEAP, students of the five migrant schools were from the families of migrant workers. They came from all over the country and had different educational backgrounds. Their parents did not have the ability to coach their studies or provide them with a better learning environment. Some of the students had poor study habits, and even various learning difficulties:

> We are now facing a difficulty; that is, in migrant schools like ours, children come from all over the country, and their learning schedules and habits are also different. Some students

have lost interest in the ordinary learning mode, and now there are more webcast classes. In the course of teaching, the teacher's speech is too fast, which will make some students unable to keep up with the rhythm of the class, and lose interest in learning. According to the current situation in our class, it is no exaggeration to say that at least 5−10 children can no longer learn, and they feel a little bit self-destructive. After all, the academic differences among students in migrant schools are still very large. (DR-[F]-20191009)

In the OEAP, students' learning and growth are the most important, and students are the main body of learning. In the online cooperative teaching class, the learning situation of each class I face is different. Therefore, in the course of preparing lessons, I must fully consider the academic conditions of students in migrant schools. The exchanges and interactions with migrant teachers after class are more focused on students' academic conditions. It can be said that student learning is an issue throughout. (PJ-[I]-20200803)

In order to take into account the differences in the academic conditions of different students, teachers participating in the OEAP needed to devote more energy and time to pay attention to the students' learning situation, adjust the class progress and teaching plan in time, and provide timely help to the backward students. This has increased the difficulty for the improvement and development of PLC.

The Significance of Constructing and Developing OEAP

PLC transforms the elements of teachers, students, and schools as a unified whole, and has many meaningful results in terms of changing teachers' teaching and improving students' academic performance. As a PLC, the OEAP not only improved students' academic performance and promoted the professional development of teachers, but also promoted the balance of regional education in a deeper sense.

Promoting teacher professional development

Existing research points out that PLC promotes the teaching practice and professional development of teachers (Dunne, Nave, & Lewis, 2000; Roberts & Pruitt, 2003; J. Zhang & Yuan, 2020). In the OEAP, the mechanism of reflection and re-communication has become the main path for the professional development of teacher PLC. On the one hand, the joint teaching between on-site teachers and distance teachers broadened the horizons of teachers from both sides; through dialogue, mutual intervention and collaboration, they could gain

more experience for personal growth. On the other hand, on-site teachers systematically processed the teaching methods and teaching experience they had learned through active reflection, and improved their teaching ability in the process of systematic processing:

> To be honest, participating in this collaborative teaching is beneficial to my future professional development. In this process of collaborative teaching, we have more opportunities to communicate with public teachers. For myself, it is also a process of self-discipline and self-improvement. I improve my teaching ability by learning some of their good teaching methods. (HL-[I]-20200530)

> In fact, the impact of this collaborative teaching on the professional development of teachers is a relatively long-lasting process, which is mainly manifested in the improvement of teaching ability and the increase of individual experience. At the same time, there are also improvements in teaching methods. (HJ-[I]-20200605)

Improving student academic performance

At the same time, many studies have proved that PLC improves students' academic performance (Alvich, 2011; Aylsworth, 2012; Othman, Jamian, Sabil, Said, & Omar, 2020). The OEAP has been underway for nearly a year, during which the schools organized two large-scale examinations. By checking and comparing student transcripts, we found that the Chinese and mathematics scores of public school students and migrant school students have improved to varying degrees. The improvement of mathematics performance is more obvious than that of Chinese:

> Since participating in the OEAP, the progress of the students is actually quite large. Compared with the first test, the average score of this mid-term examination has improved by more than 20 points. (HL-[F]-20191127)

> The final examination grades of the two classes participating in the OEAP were even better. Our school has a custom that after each examination, the better classes will share their experience. At the mid-term education quality analysis meeting, we will organize experience exchanges. These two classes are particularly good, serving as role models to exchange experiences. (BY-[I]-20191216)

> Our students' academic performance has also improved to a certain extent. I think the students' learning status has changed a lot from before, because the current model of

class is that six classes work together to compete for academic performance, and the students' enthusiasm for learning has increased. (PJ-[I]-20200604)

Promoting regional education balance

Compared with PLC in the general sense, the OEAP not only promoted the professional development of teachers and improved students' academic performance, but also built a convenient platform for promoting regional education balance and education equity:

> In a focus group interview with public school teachers, an education department leader said: "On the basis of the regional linkage of educational resources, we must consider how to gradually promote the teaching model of the OEAP to expand the scope of assistance. It would be better that the education bureaus of our counties and cities can undertake this task and organize them nearby, so that simultaneous teaching and research can be further realized, and mutual exchanges will be more convenient." (PJ-[F]-20191210)

The OEAP provided a distance learning platform based on the network co-teaching model. Students in migrant schools experienced better educational resources through the distance learning model. At the same time, teachers in migrant schools in a disadvantaged position could make full use of the teaching resources of the distance learning platform to achieve continuous improvement of their own teaching capabilities. Migrant schools lack advanced teaching equipment and experienced teachers, so that students in migrant schools on the edge of the city cannot have the same high-quality teaching resources as public schools. The implementation of the OEAP could ease this suffering situation. The OEAP was led by the local government, and the teaching equipment and high-quality teaching resources involved were coordinated by the government. This made the project itself with a certain charity attribute, and has become a way to promote the coordinated development of regional education, education equity and education balance.

Discussion and Conclusion

In this research, qualitative research methods were used to analyze the OEAP. From the perspective of PLC, the OEAP met the basic characteristics of PLC, namely common values and vision, supported and shared leadership, cooperative learning and application,

supportive conditions, and shared personal practice. In addition, through interviews with teachers, school leaders, and government personnel participating in the OEAP and analysis of relevant textual data, the factors affecting the development and construction of PLC were the efficacy of individual teachers and the working environment on the one hand, and differences in students' academic conditions on the other. In the OEAP, the construction and development of PLC not only promoted the professional development of teachers and improved students' academic performance, but also to a certain extent promoted inter-regional education equity and education balance. It is worth noting that the OEAP has passed the preliminary pilot assessment and project evaluation, and the next step will be gradually extending the project to the city as a medium- and long-term strategic plan. This fully demonstrates the advantages of building learning community in cyberspace to deepen education equity and promote the coordinated development of regional education. Therefore, continuous follow-up and in-depth research on this project has important practical significance.

First, we try to understand the OEAP from the five perspective of PLC (Hord, 1997): common values and vision, supported and shared leadership, cooperative learning and application, supportive conditions, and shared personal practice. Through data analysis, we found that the common vision of teachers participating in the OEAP was to promote student learning; on-site teachers and distance teachers participated in cooperative teaching through webcast classrooms. In the OEAP, local government and school principals provided support for the smooth development of the project. In addition, on-site teachers and distance teachers cooperated with each other in the process of network cooperative teaching to complete common teaching tasks. At the same time, network and communication technology provided external support for the smooth development of the OEAP. From a theoretical point of view, PLC should be formed voluntarily, but in fact the OEAP was carried out under the organization of government administrative instructions and it is mandatory. Therefore, though we can reflect the OEAP from the five dimensions of PLC, we cannot say that it is an ideal PLC.

Second, when analyzing the development and construction process of PLC, we found the internal factors from the teacher and the external factors from the working environment as two important conditions (Hipp & Huffman, 2010; Leclerc et al., 2012). Stoll et al. (2006) argued that building PLCs was by no means easy: "A number of subtle as well as more overt processes require work, and there are influences, both within and external to schools that can either facilitate or severely inhibit the process" (p. 247). For example, teacher collaboration

on a collective task can be hindered or fostered by differences in teachers' individual mental models (Louis & Marks, 1998). This means that shared values and visions are the most important elements of teacher PLC. The OEAP was dedicated to improving the quality of education and student performance in migrant schools. However, this network cooperative teaching model has become an additional task for teachers in public schools. In the OEAP, the task of public school teachers was to simultaneously broadcast the courses in their class to migrant schools. During the implementation of the project, the local government used the live-broadcast courses of public school teachers as public live-broadcast courses for migrant school teachers to learn, and gave certain rewards to public school teachers who participated in the course assistance. But in fact, requiring public school teachers to carry out webcasting classes has become an extra task, and public school teachers also were unable to prepare targeted lessons based on the characteristics of migrant school students. Therefore, individual teacher factors will become an important factor in the further development of PLC. At the same time, we found that individual differences among students were also an important factor affecting the development and construction of PLC. In PLC, promoting student learning is the common vision of all teachers, and teachers will be affected by differences in students' academic conditions during the teaching process. Promoting teacher professional development is the original intention of PLC construction, and improving student learning is the direction of teacher professional development. Therefore, promoting student learning and building PLC is not contradictory. However, the differences in students' academic conditions will affect the cooperation and learning communication between teachers to a certain extent, and then affect the development and construction of PLC.

Third, the concepts and practices relevant to PLCs appear to be commonly found across countries, systems and school settings. In the OEAP, we found that the influence of PLC was not limited to students and teachers. At the same time, the OEAP based on network cooperative teaching has also promoted the sharing of high-quality educational resources between regions to a certain extent. The OEAP, as an exploration of promoting regional education equity in the form of webcast and on-screen classrooms, reflects a kind of educational care. But in the process of practice, we need to pay more attention to the situation of migrant schools, starting from the development of migrant schools themselves, and enhance teachers' abilities through participation in PLC.

This study is not without limitations. First, the time for the authors to track and investigate the project was relatively short. Therefore, the research on the construction and

development process of PLC based on the OEAP is still not deep enough. In order to explore the problems and significance of the OEAP in the long-term development and construction process, it is necessary to carry out long-term follow-up research on the project schools and individual teachers. In addition, this research only focused on the construction and development process of teacher PLC. In the social learning system, the exploration of teachers' professional identity and its relationship with teacher PLC is worth further exploring.

Notes

1. The OEAP is continuing. The OEAP ran in only six pilot schools from September 2019 to August 2020. Since August 2020, the OEAP has expanded to more than 100 schools in Suzhou. But in this study, our fieldwork for the OEAP was limited to the period from September 2019 to August 2020.

Acknowledgments

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Appendix: Interview Outline

1. In the OEAP, how did you define your identity?
2. Why did you participate in this project?
3. What do you think is the biggest difficulty and resistance you encountered in the OEAP?
4. In order to better participate/adapt to this project, what kind of efforts have you put into it?
5. What is your biggest gain from this project?
6. In the OEAP, what have you mainly learned?
7. Do you think this project is a successful collaborative practice? How do you evaluate the results of the OEAP?
8. In the process of the OEAP, how do you conduct professional learning?
9. In order to better participate in this project, what key actions have you taken?
10. What are the impacts of this project on your future professional development? What are the main manifestations?

教師專業學習社群的建設與發展：
基於公辦學校教師和隨遷子女學校教師網絡合作教學的思考

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摘要

OEAP 是一個在線教育援助項目。本研究以 OEAP 為個案，採用質性研究方法，分析了 OEAP 作為專業學習社群的條件，影響 OEAP 發展和建設的重要因素，以及發展和建設專業學習社群的重要性。研究發現，來自教師個人的內部因素以及工作環境和學生學業條件等外部因素，都在一定程度上影響專業學習社群的持續發展和建設。此外，依託 OEAP 組建的專業學習社群不僅可以促進學生學習、教師專業發展和學校改進，還對促進高質量教育資源共享和區域教育平衡具有一定的參考價值。

關鍵詞：教師專業學習社群；合作教學；在線教育援助項目；教師專業發展

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