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Understanding Teacher Learning Through "Boundary Crossing" in the Greater Bay Area: Voices From Hong Kong and Guangzhou

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Abstract

Alongside the growing demand for educational reform, calls for commitment to teacher learning have increased exponentially in the last decade. Yet, little is known about the effects teacher learning across different educational systems (what we will also call "cross-system teacher learning practices") have on the work itself, or how the learning these teachers experience across schools is reflected in their engagement in practices and activities when they return to their original schools and classrooms. Through the lens of activity theory, this study aims to ascertain the experiences of groups of teachers in mainland China and Hong Kong who participate in cross-system teacher learning activities. A qualitative multi-case study was adopted where three schools were sampled in both Guangzhou and Hong Kong. Six principals and 12 teachers participated in the study. Interviews were collected and qualitatively analysed to categorise the major processes and effects of cross-system teacher learning and capture the nature of cross-system teacher learning in China. The study showed that: (a) education departments "set the tone" for teacher education across different educational systems; (b) teaching methods and "the other side" of educational development serve as boundary objects; (c) principals function as boundary brokers; and (d) different types of learning activities regulate teacher learning. Four recurrent themes emerged related to the impact of cross-system teacher education: (a) awareness and understanding; (b) increased collective efficacy; (c) decision-making and problem-solving; and (d) teaching knowledge and skills. It is argued that equity and sustainability were central issues that teachers faced during the study. Relational trust contributed to teachers' collaboration across different educational systems and community-building. In the end of this article, suggestions to support cross-system teacher learning are made and implications for future research are proposed.

Keywords

activity theory; boundary crossing; educational systems; Hong Kong; mainland China; teacher learning

1. Introduction

Education systems worldwide are undergoing reform and change (Day & Gu, 2018; Lieberman & Grolnick, 1998), and it is widely acknowledged that teachers play a key role in implementing educational change (Fullan, 2014; Lieberman & Pointer Mace, 2008). Alongside calls for reform, calls for commitment to teacher learning have increased exponentially in the last few decades (see, e.g., Darling-Hammond & Richardson, 2009; Hayes et al., 2024; Wilson & Berne, 1999). However, teacher learning is a complex process influenced by multiple contexts, as teachers often participate in school-based learning communities as well as in cross-school learning communities in order to develop professionally. "School-based teacher learning" refers to teachers who acquire new practices ("learn") through the observation of their teaching peers, proactive action research, and "lesson study," a teaching improvement process that includes, for instance, teachers meeting to discuss learning goals, or planning a classroom lesson; "out-of-school teacher learning" includes learning in-school–university partnerships, teachers' training at the district and provincial levels, and possible school visits and exchanges (Darling-Hammond et al., 2009).

Teachers need time to go across contextual boundaries, in addition to daily professional learning within schools, to look for successful experiences (Burtch & Gordon, 2021). When teachers engage in different learning communities, crossing boundaries in multiple spheres, their learning is fostered. Indeed, the boundary crossing of teacher learning, including teachers' participation in courses and activities beyond school and beyond the system, enhances the scope of teacher learning opportunities. Although studies on boundary crossing emphasise that boundaries carry learning potential, they do not explain the specific mechanisms through which this potential is realised (Akkerman & Bakker, 2011). Little is currently known about how cross-system teacher learning drives teacher improvement, or how the learning these teachers experience in cross-system settings is reflected in their engagement in the practices and activities of schools and classrooms when they return.

China is no exception; Chinese teachers typically engage in subject-based teacher learning within schools. Additionally, these teachers are involved in professional activities beyond schools and the education system, such as school visits and exchanges in the Greater Bay Area (GBA).

At the policy level, attempts have been made to build cooperative relationships and shared understanding between teachers in different contexts. In 2019, the Chinese government promulgated the *Outline of the Development Plan of the Guangdong, Hong Kong and Macao Greater Bay Area*, a document that fosters sustainable collaboration and communication in the GBA. Teachers' participation in learning activities in the GBA allows them to engage at the intersection of their collective professional boundaries and enhance their professional connections. Indeed, Guangdong, Hong Kong, and Macao have historical collaborations in the field of teacher learning. By examining the development trajectory of Guangdong's interaction with Hong Kong and Macao, it is evident that the cooperation in teacher learning among these regions has undergone a process of experimentation and exploration, comprehensive development, as well as deepening and expansion, since the country's reform and opening up (Ma, 2014; Shi, 2021).

However, there is limited research on how cross-system teacher learning contributes to teacher improvement, and the process remains underexplored. Therefore, this study aims to ascertain specific practices of groups of in-service mainland Chinese teachers and groups of Hong Kong teachers who engage

in professional development activities in the GBA, a multilateral planning and ongoing development space, with a particular focus on Hong Kong and Guangzhou.

2. Hong Kong: Mainland Connection in the Context of the GBA Under the "One Country, Two Systems" Ideal

Hong Kong remained a British colony for over 150 years until June 1997, when it returned to mainland China as the Hong Kong Special Administrative Region. Under the "One Country, Two Systems" policy stipulated by the Basic Law, this former British colony retained a high degree of autonomy in all matters except foreign affairs and defence. Despite this, the influence of the British colonial period continues to shape Hong Kong, as evidenced by the retention of the education system established by the colonial government and the high priority placed on English. While Chinese education is rooted in the influence of Confucius (Bush & Qian, 2000), Hong Kong has been influenced by a hybrid of Western and Confucian cultures (Walker & Qian, 2017). Schools in mainland China are primarily classified as public schools operated directly by the government, self-financed private schools, or international schools. In Hong Kong, the school system comprises public schools directly operated by the government, or schools fully funded by the government and managed through incorporated management committees or school management committees. Additionally, there are direct subsidy schools that can charge tuition fees and receive government funding based on student enrollment, as well as self-financed private schools and international schools.

Since Hong Kong's return to China, educational exchanges and cooperation between the mainland and Hong Kong have continuously increased. In early 2019, the State Council issued the *Outline Development Plan for the Guangdong–Hong Kong–Macao Greater Bay Area* to encourage primary and secondary schools in Guangdong and Hong Kong to establish partnerships and promote the qualification of Hong Kong primary and secondary school teachers, allowing them to teach in Guangdong (State Council of the People's Republic of China, 2019).

The Guangdong–Hong Kong–Macao GBA refers to an integrated cross-system region encompassing the two special administrative regions of Hong Kong and Macao and nine cities in Guangdong Province, including Guangzhou. The GBA spans a total area of 56,500 square kilometres and has a resident population exceeding 86.90 million (Government of Macao Special Administrative Region Statistics and Census Service, 2023).

Given its geographical location and economic significance within China's socioeconomic landscape, the central government launched the GBA development strategy—China's first bay area regional development strategy, elevated to the national level. The GBA development represents both a new endeavour to foster a new pattern of comprehensive opening-up in the new era and a fresh practice in advancing the "One Country, Two Systems" cause. The development of the GBA also facilitates the establishment of school partnerships among primary and secondary schools in Guangdong, Hong Kong, and Macao, while accelerating cross-system teacher mobility (Qian et al., 2025).

The research to date on teacher learning provides useful theoretical angles to examine cross-system teacher learning (e.g., Lieberman, 2000), yet cross-system teacher learning presents unique features that cannot be fully understood with existing teacher learning frameworks. In other words, although job-embedded professional learning demonstrates significant potential at the school and district levels, little is known about how to scale this model more broadly. Teacher learning between Hong Kong and Guangzhou involves

crossing a hard boundary—namely, the difference between their school systems (Cheung & Hui, 2003). Historical ties (sharing the same roots) have bridged these two systems. The GBA, a nationally prioritised zone, cultivates a more integrative and collaborative educational environment, which provides an informative case for this study. The current study extends the literature on teacher mobility and cross-system collaboration, demonstrating how teachers contribute to and benefit from the GBA space.

3. Teacher Learning in the Chinese Context

Teacher learning, which is the same as teacher professional development (Avalos, 2011), encompasses work-integrated formal and informal learning. In the present study, teacher learning refers to collegial exchange of work-related subject and pedagogical knowledge and skills aimed at improving teaching and learning (de Vries et al., 2013; Kyndt et al., 2016; Meirink et al., 2007). The ongoing educational reform accentuates the importance of teacher learning. In China, such development has a long tradition embedded in the workplace practice of schools (Qian & Walker, 2021). A teaching-research group, as a teacher learning community, exists in each school. School-wide teacher development activities are routinised through teaching-research groups, under which lesson preparation groups operate as the smallest formal teaching learning community in schools (Tsui & Wong, 2009). Apart from these two teacher learning communities, teachers are also developed through the apprenticeship model, in which the old guide the young. This mentor–novice scheme supports young and inexperienced teachers at the beginning of their careers to get on the right track quickly.

In addition to school-based teacher learning opportunities, there are a number of out-of-school teacher learning opportunities available. These include master teacher studios, teacher training, and collective lesson study at the district and provincial levels, as well as school visits and exchanges. The Chinese government has made efforts to strengthen teaching quality by implementing effective systems to support teacher learning. Over the years, teacher learning has been institutionalised based on the official and unique setting of the teaching-research system. Given clear structural support, teacher learning in China becomes embedded in daily practice and very much relies on the interactions with colleagues within and across schools and with inputs from experts and professional associations, such as master teacher studios.

In recent years, China has reconstructed regional development planning in the form of city clusters, which has become an effective means of integrating and developing various fields within regions. At the same time, the governments of the two special administrative regions of Hong Kong and Macao have specifically emphasised in their policy addresses that they will continue to strengthen co-operation with the mainland provinces and actively act as facilitators of regional development. Both the central government and various local governments have innovated China's regional development model with great theoretical wisdom and great theoretical courage. Cross-border collaboration in teacher learning is an important means of enhancing the level of education development in the GBA, innovating modes of teacher learning, and building an exemplary brand of regional cooperation in China. In the past decades, some research has shown the potential influence of cross-system teacher learning on teacher development and identified a list of forms of cross-system teacher learning in the GBA, such as education forums, peer observation and exchange, research projects, and teaching competitions (Tang & Zhou, 2019). This study examines how teachers learn together when they engage in cross-system learning activities. Through the lens of activity theory, the authors explored the processes and effects of cross-system teacher learning in the GBA. Our aims were:

1. To identify the patterns of cross-system teacher learning in China.
2. To analyse different perspectives on the impact of cross-system learning in teacher development.

Two interrelated research questions have been formulated:

1. What mechanisms constitute teacher learning of boundary crossing?
2. How do school leaders and teachers perceive the impact of cross-system teacher learning in the GBA?

4. Theoretical Framework: Teacher Learning Through Boundary Crossing and "The Third Space"

Extensive evidence shows that teachers approach their long-standing practices and assumptions with a fresh perspective through boundary crossing. Boundaries often carry learning potential and can be opportunities for deep learning (Opfer & Pedder, 2011; Wenger, 1998). Akkerman and Bakker (2011) identified four mechanisms of learning that take place during boundary crossing: identification, coordination, reflection, and transformation. Two well-known theories that can be found in studying the boundary crossing behaviours and processes are activity theory (Engeström et al., 1995) and communities of practice (Wenger, 1998). Both theories emphasise the importance of boundaries and how they can facilitate learning.

Engeström's activity theory is well-suited for investigating cross-system teacher learning in the GBA because it focuses on analysing both individual systems and the intersecting or boundary spaces. This aligns closely with the concept of "the third space" (Bhabha, 1994; Gutiérrez et al., 1999), referred to as the "boundary zone" by activity theorists, which can be seen when two activity systems interact (Akkerman & Bakker, 2011). Professional partnership develops a "third space" where knowledge communities meet (Bloomfield & Nguyen, 2015; Daza et al., 2021). These concepts highlight the importance of recognising and leveraging the potential of these boundary spaces for learning and collaboration. The two interacting activity systems, as a minimal model for activity theory (see Figure 1), provide the specific dimensions of the exploration of the process and effects of the cross-system teacher learning. This allows for a comprehensive understanding of how teachers learn and interact across different educational systems in the GBA.

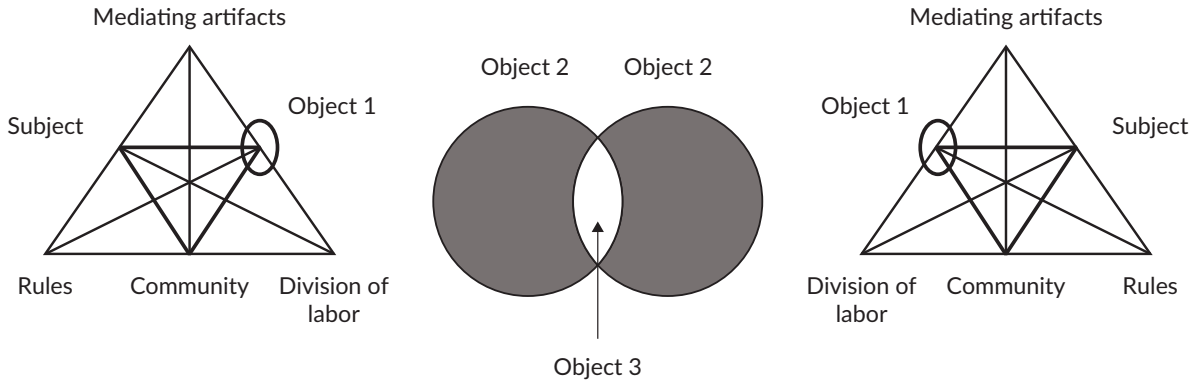

Figure 1. Two interacting activity systems as a minimal model for activity theory (Engeström, 2001).

The conceptual framework drawn upon in this study, referred to as the third generation, shows social influences and interdependence in a complex web of activity. It is comprised of six interrelated components,

including the object, division of labour, community, rules, subject, and mediating artefacts. These analytical dimensions facilitate the comprehensive understanding of the major processes and impacts of teacher learning activities when they move across different communities of practice (Wenger, 1998) or activity systems (Engeström et al., 1995).

5. Methodology

5.1. Case Study

Guided by the research questions centred on the nature of the cross-system teacher learning and detailed perspectives of how teachers learn together when they engage in cross-system learning activities, we chose a qualitative multiple-case approach as the most suitable method for this exploration.

First, case studies are a good fit for answering "how" and "why" questions (Flyvbjerg, 2006; Johnson & Christensen, 2017; Yin, 2014). Data was collected to answer these two types of questions to understand the process and effects of cross-system teacher learning. The nature of the study demonstrates depth rather than breadth, considering the "what" and "how" research questions. Case studies can facilitate an in-depth understanding of the process and effects by revealing the complexity of the situation and its meaning.

Second, case studies emphasise understanding the process over simply measuring outcomes and prioritise exploration rather than seeking to confirm predefined hypotheses (Stake, 2010). This study explores how teachers learn together when they engage in cross-system teacher learning. Case studies enable researchers to investigate the dynamics and complexity of the process. Thus, a qualitative case study is the most appropriate approach for addressing the research questions of this study.

Purposive sampling, which includes information-rich cases for exploration (Patton, 1990), was used to recruit participants. Researchers can learn most from the information-rich cases (Merriam, 1998). Cases for analysis needed to meet the following criteria:

1. The schools involved have sister schools in the GBA, ensuring that there is a connection and collaboration between schools within the region.

2. The teachers participating in the study are actively engaged in cross-system professional learning activities regularly in the GBA, ensuring that the teachers have firsthand experience and involvement in the cross-system learning process.

English, Chinese, and mathematics are the main subjects in mainland schools, while English, Chinese, mathematics, and citizenship and social development are the core subjects in Hong Kong schools. Thus, teachers and school leaders of these subjects were sampled. The research included different types of schools, different core subjects, and different years of teaching experience to maximise the variety. The aim is to sample six schools—three schools in Hong Kong and three schools in mainland China. In total, six schools, 12 teachers (two for each school), and six principals (a principal for each school) participated in the study (see Table 1).

Through the qualitative case research design, we try to untangle the dynamics and complexities of how teachers experience learning through participating in a range of cross-system learning activities in the GBA. Through the lens of activity theory, we investigate how cross-system teacher learning communities can drive teacher professionalism.

Table 1. Participants' information.

School ($n = 6$)	Principals ($n = 6$)		Teachers ($n = 12$)	
	Number and code	Years of leadership	Number and code	Years of teaching experience
School A (public school)	1 (A1)	11 years	2 (A2 & A3)	8 & 12 years
School B (private school)	1 (B1)	26 years	2 (B2 & B3)	9 & 16 years
School C (public school)	1 (C1)	12 years	2 (C2 & C3)	11 & 24 years
School D (public school)	1 (D1)	7 years	2 (D2 & D3)	10 & 30 years
School E (public school)	1 (E1)	15 years	2 (E2 & E3)	6 & 20 years
School F (public school)	1 (F1)	17 years	2 (F2 & F3)	23 & 28 years

5.2. Data Collection and Data Analysis

In the data collection, semi-structured individual interviews were used to collect data to address the research questions. Each interview lasted between 45 and 60 minutes. Hong Kong participants were interviewed in Cantonese, while mainland participants were interviewed in Mandarin. The language of the interview was determined based on the participants' preferences. The interviews were audiotaped with the participants' consent. Participants were asked about the experiences of cross-system teacher learning and how this form of learning influences teachers. We employed the deductive and inductive approaches (hybrid approach) to identify the theme of patterns (Braun & Clarke, 2006) by using NVivo 12.0. These themes were analysed in relation to Engeström's (2001) framework (i.e., the object, division of labour, community, rules, subject, and mediating artefacts). Similar to the findings from both within-case and cross-case analyses, transitioning from individual codes to broader patterns highlighted the similarities and differences that addressed the research questions.

Four recurrent themes emerged: (a) education departments "set the tone" of the cross-system teacher learning; (b) teaching methods and the other side of educational development as boundary objects; (c) principals as boundary brokers; and (d) different types of learning activities serve as a regulation of teacher cross-system learning. The outcome of cross-system teacher learning would finally be defined as the overall impact of cross-system teacher learning (Goodnough, 2016). Four recurrent domains emerged in relation to the impact of this teacher learning practice: (a) awareness and understanding; (b) increased collective efficacy; (c) decision-making and problem-solving; and (d) teaching knowledge and skills.

6. Findings

Drawing upon activity theory, this study explored the processes and effects of cross-system teacher learning in the GBA.

6.1. What Mechanisms Constitute Teacher Learning of Boundary Crossing?

6.1.1. Education Departments "Set the Tone" of Cross-System Teacher Learning

Our analysis of the data identified several organisers of cross-system teacher learning, including education departments, sister schools, universities, and school sponsoring bodies. The interviews further highlighted that local and provincial education departments across the GBA play an important role as primary organisers of this collective learning:

> The education departments in Guangzhou, Shenzhen, and Macau typically organise cross-system learning seminars and school visits. Additionally, we have other organisers, such as our school sponsoring body, the Salvation Army. (A1)

> In recent years, the education department has taken on a more proactive and central role. Initially, we took the initiative ourselves, starting with our sister schools. We collaborated with them, with support from the Nanshan district education department in Shenzhen….Universities are frequently involved as well. Researchers from local universities, connected with the Hong Kong Federation of Education Workers and local schools, actively facilitate cross-system learning. (B1)

Our analysis of the data suggests that education departments guided the work of the networked learning community by establishing funds, deploying guidelines and policies, and designing teacher training programmes that incorporate cross-system learning. Another principal gave an example of how the education department supported cross-system teacher learning:

> These cross-boundary exchange activities for our teachers are mainly organised by the Education Bureau. We are a public school with limited funding, so we still rely on the Education Bureau. The Education Bureau provides some subsidies so that teachers can go out more easily. When teachers go out to study, part of the subsidies can be used to hire substitute teachers. In addition, the Education Bureau also has some projects, such as the "Passing on the Torch" National Education Activity Series, to promote exchanges and learning among teachers in the Greater Bay Area. (D1)

In addition to education departments, multiple organisations are involved in creating a multi-tiered system of support with boundary crossing. The interviews revealed partnerships between local, provincial education departments, universities, and other entities to establish a network of support and resources. One principal stated: "Every year, the education department allocates $150,000 to the schools for the sister school exchange programme, covering transportation and accommodation costs." The data suggested government-led initiatives for teacher learning through boundary crossing.

6.1.2. Teaching Methods and Understanding Each Other's Educational Development as Boundary Objects

Participants were asked to indicate what served as a reason for cross-system teacher learning and how other teachers have been involved. The interviewees showed that many innovative teaching methods could be incorporated into the teaching repertoire to enhance classroom effectiveness, and suggested that cross-system learning might be one of the most effective strategies for acquiring these innovative methods:

> They [the mainland Chinese teachers] seem to be more successful than us in terms of teaching. What are we missing? So, I'm actually thinking that it's a motivation for us to engage in cross-system activities. (B3)

> I am eager to bring something precious back to the school, back to Po Leung Kuk, and back to Hong Kong. This is a great opportunity. Teachers from Guangdong disseminated their own excellent education experience and education stories…and in turn, through exchanges and mutual learning with their Hong Kong colleagues, they brought back to Guangdong Hong Kong's distinctive education concepts and practices, which had strongly contributed to the development of Guangdong teachers and the enhancement of the quality of education, and realised the two-way running and mutual achievements of the teachers of Guangdong and Hong Kong. (C3)

One principal further explained:

> As part of the GBA, Hong Kong is increasingly connected to the mainland, prompting us to reflect on our actions. What are they doing? Is there something we can learn from this situation? Over the past decade, the landscape has shifted dramatically. Ten years ago, many teachers from the mainland came to Hong Kong to study and learn from our education system. However, we now recognise that cities in the mainland are advancing more rapidly than Hong Kong. Consequently, we are turning back to engage in idea exchanges with them. (D1)

Teachers engaged in collaborative learning with others outside of their everyday community of practice to improve teaching methods. Additionally, the interviews indicated teachers' interest in what is transpiring in other education systems. A teacher from Guangdong shared her observations:

> The diversified modes of running basic education in Hong Kong, including government, subsidised, direct subsidy scheme, and private schools, can give full play to all kinds of resources devoted to education, and also enable parents and students with different needs to have more choices. Education in Hong Kong focuses on whole-person development. It not only pays attention to the academic performance of students but also attaches importance to the development of students' comprehensive qualities, such as moral character, social skills, and innovative thinking. This concept of holistic parenting is worthy of reference for our schools, and we should pay more attention to the development of students' personalities and the cultivation of multiple intelligences. Currently, our education is still mostly through a single classroom model, and much of the subject knowledge and character education is framed in PowerPoint. (F3)

The recurrent theme is teaching methods and recent educational development in the GBA in the interviews. Moreover, the teachers and principals in this study welcomed one another's experience and expertise and developed a tone where each member of the GBA was perceived as a resource with expertise to share. The teachers also suggested shared belief, stating: "We are *tonggen tongyuan* [meaning: sharing the same roots and the same origin]." The teachers emphasised the sense of national identity and expressed a desire to learn from one another in similar contexts: "I believe that hosting these events creates a synergy for the GBA, resulting in a positive ripple effect that allows more teachers to access quality resources." The data indicated that cross-system learning aimed to promote a space where equity and deeper learning thrive.

6.1.3. Principals as Boundary Brokers

The brokering role of the principals was highlighted in the study. The data showed that the principals fostered coherence among various activity systems, such as the education bureau and teachers in their schools. In this space, the principals sought connection and agency, as noted by one principal:

> My role is mainly to receive information [in case] there is an event, and I [mobilise] the relevant teachers to attend the topic in question. Based on the fact that it is easier for the school principal to connect when they go, sometimes I also go with the teachers. Moreover, sometimes there are some activities that require the principals to participate and do some sharing. (B1)

The data indicated that the role of a principal is not only to disseminate the information and organise the participation of colleagues, but also to be a participant. They maintained relationships with other schools and supported teachers to cross boundaries by participating in the learning activities. Additionally, the principals interpreted a series of learning activities in which teachers may assume different roles and perform different actions. One teacher responded:

> The principal would encourage us to attend….Depending on the topic, he would find relevant colleagues to attend, and he would talk to us about what he expected of us. (F1)

One principal further explained:

> I send the information to the teachers. Some of our colleagues show interest. For [their] professional development, I let a portion of the teachers develop first and lead other teachers, and then the rest of the teachers develop gradually. I hope everyone has the chance to participate in cross-system learning and extrapolate good practices. (E1)

The data indicated that brokering is one type of practice that principals might engage in as they support teacher professional learning in multiple activity systems. The principals worked with different communities, including education departments, peer schools, and colleagues, to promote teachers' boundary-crossing behaviours. For example, one principal (F1) noted: "Some of the teachers are away on study trips and I will approach their subject groups and then ask for help from the subject groups to sort out the substitutions." Another principal elaborated:

> I have first-hand knowledge of what is happening in [a] school. After receiving the information about the event, I will see which teachers are suitable to participate in the event, and how to arrange it so that the school can benefit more. I will then nominate my colleagues to participate. (C1)

The interviews highlighted the decision-making role of principals as brokers. They leveraged their decisional capital to promote teacher learning. The principals also made sense of internal and external expectations throughout the process. One principal noted:

> In the past, we did not pay so much attention to the "sister school" scheme. The Education Bureau did not care whether you applied or not. But in the past few years, we have seen that the Education

> Bureau has been very active. Some schools that haven't yet applied may reach out to ask if you need assistance in pairing with sister schools. (C1)

The data showed the importance of the role of principals as brokers. At the top level, the principal helped translate the policy and events from the education departments to the schools. At the bottom level, the principals helped teachers communicate with other schools.

6.1.4. Different Types of Learning Activities Serve as Regulation of Teacher Cross-System Learning

The interviews demonstrated multi-level teacher learning in the GBA, involving novice teachers, mid-career teachers, and experienced teachers. In the main, the data demonstrated that there are generally five types of cross-system teacher learning methods: (a) attending conferences and workshops; (b) school visits and classroom observation; (c) collaborative teaching; (d) participating in teacher training programmes; and (e) through access to regional resources.

The majority of the teachers we interviewed had the experience of attending conferences and workshops in the GBA. One principal responded:

> The Guangzhou Education Department and the Macao Education and Youth Development Bureau co-organise conferences and school visits, which we attend, as well as forums organised by the local universities in Hong Kong, which we, and those from schools in Shenzhen and Guangzhou, also attend. (F3)

These teachers spoke of their learning through "hands-on experiences," such as school visits and classroom observation. One teacher mentioned:

> Schools from Hong Kong come over to our school, and the teachers bring their students over, and our teachers teach. Their students are mixed with our students in a class above, and our teachers come and teach. It's a one-day school visit, with lessons in the morning and extra-curricular activities in the afternoon. Then the teachers get to know each other's education system and teaching practices. (D2)

Teachers also indicated that they learnt through collaborative teaching, for example, talking with students and colleagues, sharing materials, and participating in project groups. One principal responded:

> Apart from visits and tours, nowadays, we are increasingly engaging in lesson study, using the same lesson, doing it once in Hong Kong, once in the Bay Area and once in other places, so for teachers, the path of professional development is broader. (C1)

Another teacher added:

> We usually went for a day or two. We went to Hong Kong with lessons, prepared the lessons, made copies of the textbooks for our lessons, and taught their students, mainly in English and Chinese, for one or two lessons. The content of the lessons was mainly suggested by their director of the teaching affairs office and the principal, and after we negotiated with them, we went there with the lessons. It is

> not the whole subject group that goes there, and our principal decides which teachers are sent there. We go there at public expense, and the Education Bureau will support us with funding. Additionally, we have a colleague who went to a school in Hong Kong 10 years ago to teach and work on a project for about two or three years. Later, she came back and became the backbone of the school, serving as the director of the teaching affairs office and later as the principal. (E3)

Concerning the teacher training programmes, one principal shared:

> The pilot programme [*Linghang Jihua*] is another important milestone in the education exchange and co-operation between the mainland and Hong Kong, a brand-new attempt in teacher co-operation in the GBA. Initiated by South China Normal University, the programme serves as the first training and exchange base for our teachers, offering one year of continuous and in-depth training, which includes "close guidance," such as shadowing and visiting schools, as well as practical teaching and learning activities. (A1)

In addition to the teacher training programmes, teachers' boundary-crossing learning uses regional resources, such as technology-related advancements in the mainland. One principal noted:

> After recovering from the epidemic, we visited Huawei's office, which feels like a village. We needed to take a bus to get there. Our teachers also visited the Tencent Building in Shenzhen, located in the GBA. It's all about science and technology, urban planning, and learning from the teachers. That's the focus—science, technology, and city development. (D1)

The data suggested that different types of learning activities were supposed to steer teacher cross-system learning. Based on our analysis of the data, teachers learnt through cooperating and interacting with colleagues and students, extra-work contexts, and through teacher training programmes in the GBA.

6.2. What Is the Impact of Cross-System Teacher Learning on Teachers?

The data indicated the impact of teacher learning through boundary crossing in a broad array of domains, namely (a) awareness and understanding, (b) increased collective efficacy, (c) decision-making and problem-solving, and (d) teaching knowledge and skills.

The interviews indicated that teachers developed a strong awareness and understanding of each other's classrooms through their interactions. One teacher responded:

> These activities, particularly lesson observation, have facilitated our reflection and understanding when compared to classrooms in the mainland. I noticed that teaching in the mainland has become more interactive. We focus on how students learn, while the mainland emphasises how teachers teach. Additionally, I observed that they are increasingly meticulous in their lesson preparation and more precise in their teaching points. Often, our students don't learn as much through play, which is a difference. (A3)

One teacher emphasised the increased collective efficacy:

> We welcome one another's experience in an effort to develop a tone where each member of the community is perceived as a resource with expertise to share. We have opportunities to collaborate in the GBA through teaching one another's students, which can support us to enact plans and problem-solve in a different education system. (D2)

Additionally, the data showed that teachers' decisional capital improved. One principal stated:

> I think our teachers, by going out, have opened their eyes and have more options. The concept of education has become richer. They have become more flexible, more suitable for teaching in a wider environment, and have been exposed to issues that they have not been exposed to on the mainland, leading to an improvement in their decision-making abilities. The system and students are also different, which promotes thinking, and it is also helpful for teachers' career development. (E1)

A majority of principals responded that teachers' engagement in the cross-system learning has "raised the expertise of teachers within their schools." The teachers piloted the educational innovation and instructional improvement strategies, as noted by participants:

> I think the first thing is to broaden teachers' horizons. Teachers know that they can do a better job with different resources, so when they know that, they try it out in their schools, introduce these methods, and bring them to Hong Kong for localisation. (B1)

> Hong Kong's student-centred teaching is still worthy of our reference. From this, we can reflect on our own classroom, our lesson preparation, our classroom teaching sessions, and the setting up of teaching activities; that is, we have to think from the perspective of the students. In the process of implementation, we have to pay attention to what students think and make adjustments accordingly, not just follow the instructional design. (D3)

The data showed that cross-system learning provided teachers with opportunities to enact agency and access support. Participants identified the impact on teachers across various domains, including enhanced awareness and understanding of each other's classrooms, increased collective efficacy, improved decision-making and problem-solving abilities, and increased teaching knowledge and skills. The interviews also showed that participants expected a structured and systematic learning system to foster teachers' transformation and professional development.

7. Discussion

Although research on boundary crossing indicates that boundaries hold learning potential, the specific mechanisms through which this occurs are not clearly defined (Akkerman & Bakker, 2011). This qualitative study explores the process and effects of cross-system teacher learning in the GBA from the perspective of Engeström's (2001) activity theory. This theoretical focus helped capture the core dynamics of how teachers learn and interact across different educational systems.

The cross-system teacher learning in this study involves an expanded, more diverse community than a traditional inter-school professional learning community. Brokering was one type of practice that school principals engaged in as they supported teachers being presented in multiple contexts. The brokering role of the school principals highlighted the multi-level influences that are intertwined and influence each other, both within and across systems. It was a multifaceted role as it included "processes of translation, coordination, and alignment between perspectives" (Wenger, 1998, p. 109).

A reason for teachers to continuously participate in cross-system teacher learning was that many innovative teaching methods could be incorporated into their teaching repertoire to enhance classroom effectiveness. Teachers negotiated ingredients from different contexts into instructional-improvement strategies, which corresponds to Engeström et al.'s (1995) term "hybridisation." Teachers moved between schools and the GBA contexts to look for successful practices (Burtch & Gordon, 2021).

Further, another transformation process, gaining new perspectives on one another's education development, was also found in the data. Our analysis of the data indicated that teacher learning through boundary crossing had an impact across a broad array of domains and led to a process of mutual identification, reflection, and transformation. These findings echo the findings of Bloomfield and Nguyen (2015) and Daza et al. (2021), suggesting the potential of the "third space" where knowledge communities meet for professional growth in myriad ways. The transformation process was not a one-time occurrence, but was shaped over an extensive period of time, which resonates with Engeström's (2001) term "historicity."

The GBA as a "third space" makes a unique contribution, emphasising the importance of *tonggen tongyuan* (shared cultural heritage) as well as belonging and attachment in the study of professional identity and development. The finding enriches the understanding of previous studies on how individuals engaged in the joint activities (Engeström, 2001), suggesting that, beyond structural and material conditions, the relational trust and shared cultural heritage contributed to the teacher learning through system boundary crossing. Simultaneously, national interests and policy priorities dictated the nature of the learning networks. Multi-actors, such as the principals acting as boundary brokers, facilitated teachers' spatial practices and teacher learning clusters, and strengthened the partnership synergy. Our analysis of data also indicated that cross-system learning aimed to promote a space where equity and deeper learning thrive, leading to a beneficial ripple effect that enables more teachers to tap into high-quality resources. It is argued that equity and sustainability were central issues facing teachers.

8. Conclusion

This qualitative study examined how teachers learn through boundary crossing when they move between school and GBA contexts. By applying activity theory to these findings, the study showed how the interplay of different elements shaped cross-system teacher learning. The current article extends the literature on teacher mobility and cross-system collaboration, demonstrating how teachers contribute to and benefit from the GBA.

Teachers integrated ingredients from different contexts into instructional-improvement strategies, reflecting Engeström et al.'s (1995) concept of "hybridisation." Teachers navigated between schools across the GBA looking for successful practices (Burtch & Gordon, 2021). Our study identified five main ways teacher learning across different educational systems can take place: (a) conference and workshop attendance;

(b) school visits and classroom observation; (c) via collaborative teaching; (d) by participating in teacher training programmes; and (e) by using regional resources. Teacher learning across different systems showed a positive impact on teachers' enhanced awareness and understanding of each other's classrooms, on the increased collective efficacy, on decision-making, and on teachers' problem-solving abilities and increased teaching knowledge and skills. Relational trust contributed to the cross-system collaboration and networked community building. The innovative aspect of this study lies in the unique application of activity theory to explore cross-system teacher learning within professional experiences.

9. Implication of the Study

This research investigates how teachers learn across different systems and examines the effects of that learning process. The observed mechanisms may serve as a reference for similar regional initiatives worldwide, particularly those considering local differences and cross-system connections. National-level coordination remains important. The study further emphasises that, in promoting cross-system teacher learning, attention should be given to equity and sustainability, promoting cross-cultural knowledge and understanding, and building trustful relationships. The study is helpful and valuable for teachers, policymakers, school leaders, and other educational practitioners in understanding key features of cross-system teacher learning in the GBA and learn from the Chinese experience. The study advances knowledge of teachers' boundary crossing through horizontal and hierarchical forms from the perspective of activity theory. It develops regionally focused knowledge in cross-system teacher learning in a non-Western country, namely China. The study concludes by outlining practical implications for supporting teachers' ongoing development in cross-system settings.

Through the lens of activity theory, the authors explored the processes and effects of cross-system teacher learning in the GBA. The study sampled five public schools and one private school. Considering the differences in resource allocation and school autonomy, future research will include additional private schools to yield a richer and more nuanced understanding. Cross-system teacher learning does not occur in a vacuum; rather, it is highly shaped by multi-level influences. Thus, more clarity is needed to understand the key factors and how they interact with one another to shape the learning process. Additionally, future research should focus on longitudinal studies that track the long-term impacts of cross-system teacher learning on teaching practices and student outcomes. More in situ research is recommended to examine teacher learning to provide cross-societal discourse.

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Conflict of Interests

The authors declare no conflict of interest.

Data Availability

Data is not publicly accessible to protect the respondents' anonymity.

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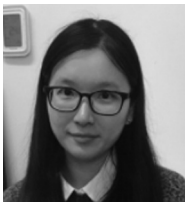

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