

The role of brokers in establishing and sustaining a professional development school as an evolving activity system (version110613)

Sub-theme 50: Activity Theory and Organizations

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Introduction

In many countries educational partners have the ambition to realize professional development schools. Two decades of pursuing the ideal of professional development schools (PDSs) have revealed huge challenges and complexities that are involved in their realization. We theorize PDSs as dynamically evolving activity systems (Engeström, 1987) and as continuing endeavors of crossing institutionally and epistemologically formed boundaries between schools, teacher education, professionalization and research. The aim of this paper is to explore the role that brokers play as boundary crossing professionals in PDSs, the challenges these brokers encounter and how they learn to deal with those challenges. Two case studies concerning the development of one and the same PDS will show how a chain of boundary crossing professionals is at work and how this initially promotes the learning and development of the PDS but in the end might prevent the growth and sustainability of such an educational network. We suggest that the ultimate challenge for a broker might be the ability to step away, to secure the filamentous growth of the PDS as a 'mycorrhizae'¹.

By integrating formal teacher education, teaching in practice, and collaborative teacher research in schools, educational partnerships are built, aimed at continuous renewal and progress in the teaching profession. These PDS partnerships simultaneously involve the professional development of student teachers, teacher educators, and experienced teachers. Consequently the teaching profession is meant to

¹ A metaphor introduced by Engeström (2008) to picture the multi-directional and heterogeneous, symbiotic, mutual, beneficial and exploitative base for knotworking professionals.

better serve students' learning (Neapolitan & Tunks, 2009). Ideally, inquiry serves as the catalyst for developing the PDS organization (Neapolitan & Tunks, 2009). It has become clear that PDS partnerships are not easily established and sustained. A PDS can be understood as shared activity system. The participating individuals and their institutions recognize and negotiate its use across institutional and inter- and intrapersonal boundaries. With this perspective in mind we discuss the development of a Dutch PDS partnership followed for five years (Bruining & Van den Eijnden, 2011). We examine what has been at stake in this partnership looking through the lens of boundary crossing theory. We examine organizational development looking at learning mechanisms and we zoom in on the role of brokers as key actors in the partnership.

In school year 2010/2011 Bruining & Van den Eijnden (2011) did five case studies looking at the different primary schools in a PDS network. They wanted to know how the schools developed PDSs and what measures would be needed to sustain the network. The activity system model (Engeström, 1987) was used as a heuristic device to analyze the different cases. Documents were collected, on three occasions in the school year PDS activities were videotaped and ongoing reflective conversations with the participants were conducted. A cross case analysis showed that in the different primary schools inertia and frictions occurred in one or more of the four sub-processes that Engeström (1987) distinguishes in activity systems. They concluded that to develop and sustain the different primary schools as PDSs, institutional, interpersonal and intrapersonal learning and boundary crossing activities were recommendable, but they also saw that there was a flaw in their study. Schools and not the different levels in the network were analyzed. Therefore they decided to return to the data. This lead to two new case studies (Akkerman, Bruining & Van den Eijnden, 2012/2013). Literature on boundary crossing is specifically devoted to analyzing situations in which there are diverse stakeholders and social and cultural differences at play in processes of organizational change and collaboration. Drawing on an emerging strand of boundary crossing theory (Akkerman & Bakker, 2011) these two case studies identify and put the spotlight on the people who are most confronted with and active in bridging diverse stakeholders: *the brokers*.

Study 1 (Akkerman et al, 2013) shows how PDS partnerships can be seen as an endeavor of boundary crossing that can generate learning processes at the organizational level, interpersonal level and intrapersonal levels simultaneously. This study shows how groups were created at different levels of hierarchy in the involved organizations, revealing what can be referred to as a chain of brokers establishing connections both horizontally across, and vertically within the involved organizations. The centrality of the brokers makes that they face boundary crossing processes on different levels. Study 2² (Akkerman et al, 2012) zooms in on the brokers as central figures who individually ‘embody’ boundaries and analyses what has been at stake in this partnership by narrating the perspectives of a chain of brokers. The ownership the brokers develop may lead to boundary crossing actions as well as to territory drift. In the beginning it may promote the development of cross organizational networks, but in the end it may hinder it.

In the following sections we present PDSs as an organizational challenge, we discuss boundary crossing theory, we present relevant findings from our case studies and we reflect on the role of brokers and the learning mechanisms they are engaged in, whilst building joint professional spaces across different organizations.

Professional Development Schools, an organizational challenge

Two decades of pursuing high ambitions and ideals in establishing professional development schools have also identified huge challenges and complexities that are involved in their realization. A PDS partnership is a collaborative relationship between one or more colleges and a school and/or district designed to renew school and teacher education programs (Teitel, 1999). The central ambitions and ideals of PDSs, as well as their relevance for all parties involved, have been clear since their introduction by the Holmes Group in the mid-1980s (Holmes Group, 1990). By integrating formal teacher education, teaching in practice, and collaborative teacher research in schools, an educational partnership can be created which aims at continuous renewal and progress in the teaching profession. Such a partnership simultaneously involves the professional development of student teachers, teacher educators, and experienced teachers. Consequently, the teaching profession is meant

² Case study 2 was done prior to case study 1. In the future we want to re-examine the data of case study 2 and fine tune it in the context of case study 1.

to better serve students' learning (Neapolitan & Tunks, 2009). Ideally, inquiry serves as the catalyst for developing the PDS organization (Neapolitan & Tunks, 2009). Despite the ambitions of the PDS models, many challenges have been reported in the literature. Scholars have referred to the possible lack of organizational conditions, such as limited time, difficulties in finding resources and lack of experience amongst participants in terms of establishing new collaborations (e.g., Darling-Hammond, 2005). Scholars have also pointed to the more fundamental social and cultural dimension of establishing PDS partnerships. Inter-organizational partnerships require the bringing together of different parties and, accordingly, alignment of different ideas and perspectives, ways of talking and doing, as well as the establishment of mutual trust and respect (Darling-Hammond, 2005; Stein & Coburn, 2008). On the basis of reviewing 250 PDS studies, Breault and Breault (2010) conclude that PDS partnerships require organizational change that includes resources, relationships and culture. Realizing change in PDS partnerships seems more challenging than realizing change in a single organization because of the diverse stakeholders involved. Breault and Breault (2010) suggest that educational research on partnerships needs to draw on organizational theory as a resource for understanding and studying partnerships. In line with these authors, we argue that such a theoretical frame is vital if we are to address what is at the core of the challenges that PDS partners encounter and to draw lessons not only for establishing but also for sustaining PDS partnerships over time. In the Netherlands initiatives for cooperation between teacher education institutes and schools were aimed at defining shared educational programs and arranging internships. In 2005, these initiatives were extended by financing the creation of so-called *academic* professional development schools. An academic PDS is a school that combines a training function with a component consisting of highly practice-oriented research and innovation. As described by Snoek and Moens (2011), the academic PDS schools have much in common with the concept of the PDS (Darling-Hammond, 2005; Holmes Group, 1990) and the research-engaged school (Handscomb & MacBeath 2003; Sharp, Eames, Sanders, & Tomlinson, 2005). Academic primary schools are more specialist and experienced development schools that explicitly pertain to educational innovation and the professionalization of student teachers and experienced teachers at work, the conducting of research within schools acting as the catalyst. These academic schools typically aim at applied research, with the aim of solving problems encountered in educational practice and the ultimate goal is to

improve educational practice itself. Snoek and Moens (2011, p. 820) described the challenges faced by these partnerships as follows: 'When the pilots were first launched, no concrete guidelines were given on how the concept of the academic training school should be put into practice, which meant that the schools were free to flesh this out for themselves. Since research was a new activity for most schools, schools needed to provide answers to such questions as: what is the purpose of the research to be conducted in the school? Who will conduct the research in the school? What is the relationship between training, research, innovation and professional development? What will be the consequences for the culture and structure of the school and for the qualities that teachers require?'

Boundary Crossing Theory

PDS partnerships can be conceptualized as a large-scale effort of crossing boundaries between different types of professionals as well as between various institutions, each reflecting their own culture and history. Literature on boundary crossing is specifically devoted to analyzing situations in which diverse stakeholders and social and cultural differences are at play in processes of organizational change and collaboration. On the basis of a review of 181 studies on boundary crossing, boundaries have been defined by Akkerman and Bakker (2011, p.133) as *sociocultural differences between practices leading to discontinuities in action or interaction*. Educational scholars have stressed that boundaries are at play in many working and learning processes (e.g., Engeström, Engeström, & Kärkkäinen, 1995; Wenger, 1998). For example, students may be confronted with conflicting perspectives on subject matter and assignments in school (East, 2009; Zitter, Kinkhorst, Simons, & ten Cate, 2009), encounter irreconcilable differences between family, peers and school (Phelan, Davidson & Cao, 1991), or encounter different cultural traditions when moving between school and work (Tuomi-Gröhn & Engeström, 2003). Specifically, in dual teacher education programs, student teachers often encounter boundaries between the teacher education program and the schools in which they work (Alsup, 2006; Andersson & Andersson, 2008; Finlay, 2008; Gorodetsky & Barak, 2008). Professionals may face boundaries between different practices, particularly when working in or with other groups, disciplines or institutions (e.g., Broekkamp & van Hout-Wolters, 2007; Kerosuo, 2008). Several studies showed how teachers can face boundaries within their own team (Venkat & Adler, 2008) and

when working with other teacher teams (Cobb, McClain, de Silva Lamberg, & Dean, 2003). Akkerman, Bronkhorst and Zitter (2013) showed the specific boundaries that can be encountered in projects where scientific research and educational design and change are combined, and argued how each of these practices is historically embedded in different epistemic cultures, adhering to different ways of thinking and doing and different quality criteria.

Boundaries, though carrying a negative connotation of limitation, are not to be perceived as problematic only. Boundaries can trigger boundary crossing; that is, they can trigger *efforts*, of individuals or groups and larger systems, *to (re)establish continuity in actions and interactions across practices*. For example, Kerosuo (2008) has shown how medical specialists, after being confronted with patients' stories about the different diagnoses they received from different types of specialists, started to find ways to communicate better with one another in order to address the patient as one professional body. In line with this, several learning theories claim that boundaries are resources for learning as they compel people to reconsider their previous assumptions. As Wenger (1998) states in his situated learning theory, boundary crossing of some community members prevents communities of practice becoming too stale. In the third generation of cultural historical activity theory on expansive learning (Engeström, 2001; Roth & Lee, 2007), it is stressed how collaboration between different activity systems can lead to meaning making and transformation of the intersecting practices.

Reviewing all literature on boundary crossing until 2011, Akkerman and Bakker (2011) found in particular four learning mechanisms that can take place in situations of boundary crossing. First, boundary crossing can lead to a process of mutual *identification*, whereby the intersecting cultures are (re)defined in the light of one another. In this process, people are concerned with (re)defining the way in which the intersecting cultures are different from one another and how they can legitimately co-exist. Second, a process of *coordination* of both practices can take place in the sense that means and procedures are sought, allowing diverse practices to cooperate efficiently in distributed work. In these cases, dialogue is established only as far as necessary to maintain the flow of work. Third, boundary crossing can lead to a *reflection process*, which is about mutually defining the different perspectives that each intersecting culture can bring, and openness to take up others' perspectives to look at one's own practice. Fourth, in a more profound way, boundary crossing can

lead to a *transformation* process, whereby, often in response to a confrontation with a certain question or problem, a shared problem space is defined, on the basis of which the intersecting cultures are integrated by hybridization of perspectives and sometimes also activities. In contrast with the other three processes, transformation indicates changes in practices or even the creation of a new in-between practice.

Drawing on Akkerman & Bakker (2011) we looked at PDS partnerships as attempts at boundary crossing that constitute both challenges and opportunities for learning processes. The learning mechanisms might explain what is evoked by boundary crossing as locally produced forms of learning. Learning is understood broadly as developing new ways of doing or new ways of making sense of doing. As noted by Akkerman and Bakker (2011), the four learning mechanisms are not to be seen as chronological or hierarchical *per se* (Akkerman, Admiraal, & Simons, 2012). What learning mechanism is to be conceived as most ideal remains to be a matter of situation, time and perspective?

The Role of Brokers

Studying boundary crossing is a multifaceted empirical undertaking, as one inherently needs to extend the unit of analysis beyond a single domain, profession, and/or institution. What needs to be at the center of analysis is the dialogical work between intersecting practices and what is at stake in this. Boundary crossing and its learning potential are often analyzed systemically, that is, in terms of the developments which take place at institutional and interpersonal levels (Akkerman & Bakker, 2011).

Brokers ‘face the challenge of negotiating and combining ingredients from different contexts to achieve hybrid situations’ (Engeström et al., 1995, p. 319). This stands out most clearly in cases with only one or a few persons doing the crossing. In social network theory, brokers have been found to be significant in terms of establishing what Granovetter (1973) called weak ties between otherwise loosely connected systems. In terms of our definition of boundary crossing, brokers can therefore be seen as potentially significant in realizing continuity in actions and interactions at interpersonal and institutional level.

Besides their potential significance in boundary crossing, the experiences of people who act as brokers plainly illustrate the discontinuities they face and how these are managed. Double participation, both in the teacher education program and in the school, might seem like ‘juggling’ for student teacher because the can face different

pedagogical values (Alsup, 2006). A study by Fisher and Atkinson-Grosjean (2002) shows how managers of commercial institutes are situated between industry and university. On the one hand, they have to build bridges between both worlds. At the same time, they are held accountable in each world and must endure criticism.. Focusing on identity formation of apprentices in trade vocation, Tanggaard (2007) characterizes their position at the boundary as that of marginal strangers ‘who sort of belong and sort of don’t’ (p. 460). Akkerman and Bakker (2011) summarize the ambiguous position of brokers as being simultaneously in a both/and and neither/nor situation. On the one hand, they observe the boundary by addressing and articulating meanings and perspectives of various intersecting practices. At the same time, these people move beyond the boundary in that they have an unspecified quality of their own (neither/nor). In terms of identity, this ambiguous position calls for theories that acknowledge the multiplicity of identity on the one hand and the continuous striving of human beings to act as one on the other (Akkerman & Meijer, 2011). Though brokers run the risk of not being accepted (e.g., Edwards, Lunt, & Stamou, 2010), Jones (2010) found in a historical analysis of boundary-crossing architects that people can receive appreciation for their innovative role in changing established professional practices in the longer term. As important actors in innovations, however, they have to be able to take an ambiguous position. What does it take for people to maintain such a position? Landa (2008) notes that brokering generally calls for ‘personal fortitude’. More specifically, it requires people to have dialogues with the actors of different practices, but also self-dialogue between the different perspectives they are able to take on (Akkerman, Admiraal, Simons, & Niessen, 2006). Brokering may be seen as a quality that some people have developed, eg. boundary-crossing leadership style (Morse, 2010), boundary-crossing competence (Walker & Nocon, 2007), and boundary skills (Fortuin & Bush, 2010).

Two Case Studies

The case studies we discuss here concern the first five years of a Dutch academic PDS partnership of five primary schools (part of two larger school boards) and a teachers’ college that participated in the partnership, with its teacher education department and its research group. The partnership focused on building, developing and sustaining a collective research practice to improve school teaching, teacher education, and research programs at the same time. We analyze how the PDS partnership was

established in five years, and which successive learning mechanisms occurred. We try to typify the partnership activity that was directed towards establishing continuity in actions and interactions across the organizations and organizational units involved. Specifically in terms of the learning mechanisms evoked at different levels (study 1) and looking at the challenges faced by the brokers (study 2).

Case study 1: A chain of brokers learning to become a PDS

The research question in the first case study is: *Which successive learning mechanisms are evoked in the start-up of a Dutch academic PDS partnership at institutional, interpersonal and intrapersonal level?*

The first author was involved in the partnership for the last two years, replacing the initial Professor of Applied Sciences in the teachers' college. He was responsible for facilitating the partnership by means of action research. This study relies on all partnership data gathered during the first five years of the partnership. These include working papers, covenants, strategic documents, task and role descriptions of different stakeholders in the PDS partnership, brochures, evaluation reports, conference posters, PowerPoint presentations, research reports; case study reports per school, reports of all meetings; video recordings of two meetings; video recordings of seventeen meetings; email communication in between meetings and interviews with brokers. To answer the research question, we conducted content analysis of all observed meetings and collected documents and email communication. Content analyses of the data was conducted by the second author. The results of each step of analysis were checked, leading on several occasions to revisits of the data and to elaborations of the resulting findings. A final narrative was produced with reference to different data sources. This content analysis was aimed at:

1. Identification of: (a) activity aimed at establishing new connections within and across organizations and organizational units,(b) new interpersonal relations between individuals, and (c) new positions of actors established in light of the partnership. This step resulted in an overview figure of three new groups crossing the organizations at different levels of the hierarchy (Figure 1).
2. Identification of prominent challenges related to establishing and sustaining the partnership. This step revealed one main and recurrent challenge (i.e. 'involvement')
3. Creating a thick description of what was done and discussed in and outside the

three groups throughout the five years, with more specific transcriptions of verbal (and partly non-verbal) behaviour during: (a) interactions (in meetings, email communication and documents) referring to the main concern of ‘involvement’, and (b) linkages between the three groups, that is, the way in which the interactions within one group were brought into or became the object of discussion in another group.

4. Marking signs of the four different learning mechanisms at different levels.

To indicate what the boundary crossing entailed we zoomed in on what the three main groups were doing and discussing, and how the groups addressed what came to be the biggest recurrent concern: ensuring that all teachers and teacher educators became involved in the PDS concept. This revealed learning mechanisms at an institutional, interpersonal and, to a lesser extent, intrapersonal level.

5. Result 1 and 3b. These results revealed how several brokers were central in the partnership. Open coding of interviews with these brokers resulted in five consistent themes.

We first give an overview of the new project groups that were established for the PDS partnership across and within organizations, revealing a characterization of boundary crossing and brokers at different layers of hierarchy in the partnership. Finally we focus on the reflections of the brokers on the PDS partnership and their own role in it.

To realize the PDS partnership three collaborative groups between and within the involved organizations were created during the first two years and remain at the time of writing. Figure 1 gives an overview of how these groups bring together the teachers’ college and the schools through different constellations of actors. To begin with, this visualization implies boundary-crossing efforts in the form of three project groups involving actors positioned on different layers of hierarchy within the schools and the teachers’ college. Given the hierarchical positions of the groups, one would expect these project groups to have different foci in terms of realizing the PDS concept. Interestingly, the groups potentially reflect all three levels of boundary crossing: the aims of the groups are to establish, at an institutional level, continuity across the involved organizations and organizational units; the groups themselves reflect new configurations of people requiring the establishment of interpersonal relations; and, individually, the group members may be affected at an intrapersonal level or cause intrapersonal mechanisms for others in the organizations.

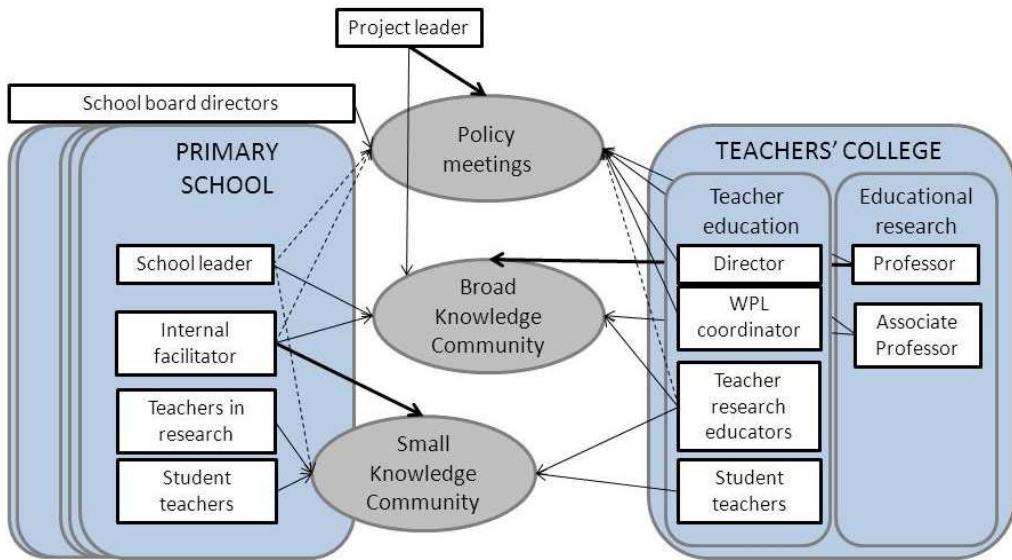


Figure 1. *Visualization of partnership organizations, boundary-crossing activity and types of actors*

Note. Blue boxes indicate the organizations involved in the academic PDS partnership. Gray ovals indicate the boundary-crossing groups, with the two upper ones crossing all five schools and the teachers' college, and the lower group crossing the teachers' college and each of the separate schools. White boxes indicate the types of actors participating in integrative activity. The arrows indicate participation of the actors in the groups, with thick arrows indicating a lead position, and dotted lines indicating 50% of participation in the group.

A second observation from the visualization concerns the many types of actors involved. Some actors seem to have been more central given that they prepare and lead the PDS related groups, (the project leader, the professor and the internal facilitators). In addition, one can see several actors who have been participating in not one but two groups, thereby potentially linking the different types of activity vertically. These actors comprise the project leader, the professor from the college, the internal facilitators, and the teacher research educators. The student teacher is another notable actor, being the only one simultaneously participating in both the teachers' college (within the teacher education program) and the school (working as a teacher and conducting research).

The **policy meetings** were created as a grouping at the highest level of hierarchy, crossing the boards of all of the involved organizations and aimed at the strategic policy and looking after the academic PDS partnership financially. The group has been meeting about four times a year and its participants comprise: the project leader Vivian, who chairs the group and prepares the meetings, school board members

representing two school boards of which the five primary schools are part, the director and workplace learning coordinator from the teachers' education department, and the professor and associate professor from the teachers' college research group. This group is held accountable by the Ministry of Education for establishing the stipulated PDS partnership. The group has been extended over the years, with all actors participating in the broad knowledge community during the fifth year (see dotted lines in Figure 1). The policy meetings represented the first steps towards establishing the PDS project by creating the infrastructure of the partnership. This included converting intentions into working agreements regarding the designation of academic primary schools, the deployment of staff of the primary schools and the teachers' college in the education and research programs, the education and training of teachers and teacher educators for their work in the academic primary schools, the programmatic planning of a line of research in the curriculum and the attraction and selection of students. As regards the further establishment of the partnership itself, one broad knowledge community (BKC) was created as well as a small knowledge community (SKC) in every school, and a rough sketch of the tasks and roles of involved actors was made. The orientation of the policy meetings can be interpreted primarily as efforts at *coordination* on an institutional level.

The **broad knowledge community** (BKC), is a grouping at the upper organizational level of the schools and teachers' college, initially aimed at PDS policy-making and implementation within the schools. The group has been led by the professor of the teachers' college, and includes the school directors and internal facilitators of the schools, the project leader, the associate professor and the three teacher research educators. In the first two years, the BKC mostly functioned as an extension of the policy meetings, focusing on what the BKC group in the third year retrospectively formulated as: (1) creating an infrastructure of communication within the network, (2) developing a curriculum for the academic teacher education program that included shifting learning processes of student teachers more to schools with local supervision, and (3) determining a method for doing research systematically in subsequent steps to be used in research activities by all schools, i.e. according to a model referred to as 'the collective practice-based research model.' Similarly to the policy meetings, this BKC activity initially reflects a focus on *coordination* at institutional level. In the third year of the PDS partnership, the BKC started to talk more about the content and structure of research activities that were taking place within the schools. It was during

this year that school A was established and joined the partnership, participating as an academic primary school from the start.

In each of the five schools, a so-called **small knowledge community** (SKC) was created in order to plan, discuss and share the research to be conducted within the schools by both student teachers and school teachers. As this activity was directly aimed at integrating educational research, teacher education, and schooling, one could argue that the SKCs were key in the PDS concept. The group was typically led by the internal facilitator of the school, and participants were the teacher research educator associated with the specific school, the student teachers and the school teachers involved in the research within the respective school. The functioning of the SKC became object of many discussions in the BKC.

Five actors were identified as **the chain of brokers** related to school A. The narratives about the three groups indicate how these actors were very central not only in terms of their formally recognized positions and chairing of group meetings, but also their many one-to-one conversations to prepare for the meetings, and their efforts to take information from one group to another. Interviews were conducted with Vivian, the project leader; Adèle, the school leader of school A; Zita, the internal facilitator of school A; Ruby, the teacher research educator connected with school A; and Leonore, the student teacher who spent her internship in school A in the fourth year. The interviews addressed the brokers' perceptions of the PDS partnership and what they considered to be their own role in it. Five themes were similar in the five interviews and relevant for understanding boundary crossing at the intrapersonal level. First, all brokers referred to the partnership and their own position in it as having been challenging. Leonore described that she found it challenging to connect with other teachers in doing research and also to connect her research activities with her own concerns in the classroom as a new teacher. Zita described how her position as internal facilitator had been challenging as she had to work on alignment both within the SKC in the school and in the BKC across schools. Adèle pointed to the process of searching and the frustrations along the way: '... you sometimes want to throw your laptop out of the window.' She also referred to a recurrent dilemma she encountered with respect to participating in the BKC and being a school leader: 'The thing is that in those moments one often faces a dilemma. That my presence is very much needed at school and I know that I can contribute there, while I have the feeling that I am wasting my time here [in the meetings of the BKC]. You can spend your energy only

once. At those moments I say what I think is needed to go forward and try to be constructive'. On a more general level, Vivian spoke about her vision of this kind of educational innovation, and said it inherently required bringing together different actors and going through struggles and difficult phases which even included people being angry and crying about the ongoing changes. Though facing difficulties themselves as well, both Vivian and Ruby referred to the position of the internal facilitator as being one of the most difficult. Internal facilitators are right in the middle of the whole shift towards an academic culture, while not necessarily having an academic background themselves. Second, brokers more or less directly talked about themselves as now owning the concept and wanting to continue working in or with schools that had an academic PDS nature. They described how they had become deeply interested and how much can be gained by working in schools with an academic culture. More explicitly, Leonore and Zita referred to how much they had learned from doing research themselves. In terms of learning mechanisms evoked by boundary crossing these comments indicate how a *transformation* process has been initiated at an intrapersonal level. At the same time, in line with what some brokers said in the meetings, Adèle, Ruby, Zita and Leonore all said they had been questioning their own research skills and whether they had what it takes to conduct or supervise research activities. These doubts can be interpreted as a *reflection* process at an intrapersonal level resulting from the boundary-crossing activity. Third, in line with what we identified as a recurrent issue in the observations, documents and emails, all five brokers pointed to 'involvement' as the biggest challenge in establishing but also sustaining the academic PDS partnership. Most prominent was the issue of how to involve other teachers in the school, not only in doing research but in applying it within their daily work. Both Zita and Leonore emphasized the importance of focusing on topics in line with the primary processes of teaching and learning. Vivian, Adèle and Ruby noted that teacher educators should also become more involved with research activities in school. Fourth, the brokers referred to their own deliberate actions to improve involvement of others. They did so in similar ways. Adèle described how she delegated the role of internal facilitator to Zita, who was one of the school teachers involved in research. One reason for this was to increase ownership amongst the team of school teachers. Similarly, Ruby described how she always prepared for the meetings with Zita, but deliberately gave the floor to Zita and student teachers during the meetings. In turn, Zita described how she gradually gave

more responsibility to the student teachers in terms of chairing parts of the SKC meetings. Finally, Leonore described how she got teachers more involved by explicitly asking for feedback and expressing their concerns in the evaluation. These actions of handing over responsibility illustrate how a chain of brokers was created and maintained. Fifth, in relation to this, the brokers referred to their own centrality in the partnership. They all considered the changes so far to be positive, yet in order to sustain the partnership they had to find a way to get other teachers and teacher educators more involved. What seems to be an implicit dilemma is that they do not seem to know how to achieve this without themselves taking action, thereby reinforcing their own centrality rather than giving floor to others. This dilemma is explicitly summarized by Leonore and Ruby. Ruby argues that if it were not for the student teachers, research would probably not take place. In line with this Leonore admits that she has been so active in the SKC that 'it is difficult to withdraw from it' and she also feels that she is 'the one who keeps it alive.'

After the rise of PDS partnerships in many countries, it has become clear that establishing and sustaining these partnerships is a serious challenge. The aim of case study 1 was to understand this challenge. A boundary-crossing perspective acknowledges teacher education, schooling and academic research as reflecting different epistemologically and institutionally grown practices. Our research question was: *Which successive learning mechanisms are evoked in the start-up of an academic PDS partnership at institutional, interpersonal and intrapersonal level?* The case study shows different learning mechanisms in different phases and at different levels. The first three years mainly showed signs of a *coordination* mechanism, taking place at all three levels. At the institutional level, the first step was building an infrastructure. This infrastructure entailed initiating policy meetings, the broad knowledge community (BKC) across schools and a small knowledge community (SKC) within each school, including actors with specific roles. Furthermore, one research model was chosen for use in all research. The policy meetings led to the first steps, the BKC further realized the infrastructure, and the BKC and SKC then started to realize the stated ambitions on the basis of that infrastructure. Given the different hierarchical positions of these groups (see Figure 1), this order reflects a top-down approach. Top-down approaches are very common in organizational change practices, as managers do not tend to allow for much

uncertainty and often approach change technically and as a project-based matter (Boonstra, 2004). At an interpersonal level, there was a similar initial focus on coordination. The three groups were initially most concerned with 'having meetings together' as a new configuration of people who needed to share plans and give updates on on-going activity. In line with this, one can see at an intrapersonal level how the central actors were initially oriented to preparing the meetings of these groups and making sure all information was shared. After this first period of coordination, the narrative reveals an *identification* mechanism within the SKCs in the five schools. School teachers noted that they did not perceive the research activities as relevant for their daily work. By stressing this discontinuity, they implied a boundary between research practice and schooling practice. It is noteworthy that the SKCs ensured continuity between teacher education and research by focusing on the student teachers as primary researchers and giving them a prominent role in the meetings. This, however, seemed to reinforce the lack of involvement of the school teachers in doing research. More generally, this suggests that establishing continuity in one direction can lead to discontinuity (reinforcing a boundary) in another direction. The identification within the SKC evoked *reflection* from the third year onwards and signs of *transformation* during the last 18 months of the project, at least on an interpersonal and intrapersonal level. The SKC started to reflect in its evaluations on how to become more involved as teachers in research activity. In parallel with this, the involvement of school teachers was discussed in the BKC as a recurrent issue in the schools. The BKC started to collaboratively question what 'academic' means in an academic PDS partnership. These discussions changed members' understanding of research. Rather than being about 'participating in the required technical steps of the research model' or 'joining the SKC meetings,' research was redefined as being about 'an academic attitude,' about establishing 'a research culture,' and about 'owning' the academic PDS 'as concept.' This shifting perspective led the BKC group to define a research agenda themselves to explore how this could be established. Besides leading to a transformed understanding of research, these reflective processes gave rise to strong relations between the various actors in the BKC. This was visible on several occasions where they acted together. Parallel to these learning mechanisms at an interpersonal level, reflection and transformation were notable at an intrapersonal level. Reflection can be seen in the way brokers started to openly question their own skills in conducting or supervising research. Despite doubting their own research

skills, they also started to refer to themselves as transformed people. Referring in meetings to others not owning the concept of academic PDS, the brokers implied they came to own the concept themselves. In line with this, they indicated that they strongly favored working in an academic PDS rather than a regular school, despite the frustrations and doubts they had encountered along the way. Another sign of transformation can be seen in their reluctance to take a more distant position in the partnership activity. Whereas they seemed to perceive their own centrality as preventing others becoming more involved, they were also afraid that completely stepping down would mean the end of the academic PDS activity that they had managed to establish. Altogether, the pattern of learning mechanisms at different levels can be summarized as in Table 1. This pattern shows how, after an initial top-down approach, bottom-up initiatives emerged, starting with identification of a boundary in the SKC that evoked, in the BKC and for the brokers individually, reflection and a transformed perception of what the partnership was about. A significant catalyst in this context was the chain of brokers. This chain of brokers not only worked hard to establish horizontal connections and continuity across organizations, but also realized vertical connections within their organizations, making sure that the way in which the academic PDS activity was experienced as separate from daily schooling was discussed by directors in the policy meetings. The importance of a chain of brokers at work as we have seen in this case is in line with the value of having webs of people spanning organizational groupings and infrastructures, as stressed by several scholars (e.g., Boonstra, 2004; Granovetter, 1973; Stein & Coburn, 2008).

This case also shows the threat to long-term sustainment of having chain brokers at work. It is mainly the brokers who transformed individually and as a group, collectively owning and embodying the concept that was originally targeted at the institutional level. For the partnership to realize transformation at the institutional level, the chain of brokers appeared to stand in the way of others becoming more involved. The difficulty of stepping down, and the perception that they keep the partnership alive, suggests that the *function* of brokers remains very important, meaning that it is good to have people with primary concerns related to the academic PDS partnership. A chain of brokers learning to be a PDS might invite other people in the organizations to take on the broker positions after a time.

	Institutional	Interpersonal	Intrapersonal
Identification		2 (SKC)	
Coordination	1	1 (Policy meetings, BKC and SKC)	1 (broker)
Reflection		3 (SKC and BKC)	3 (brokers)
Transformation	(only externally)	4 (BKC)	4 (brokers)

Note. The number in the cell refers to the chronology of this process at the respective level. Text in brackets indicates to which group (interpersonal level) or type of actor (intrapersonal level) the process applied.

Table 1. *Successive learning mechanisms at multiple levels in a Dutch academic PDS partnership*

Case study 2: The life of brokers in a PDS

In our first case study, we found that five types of brokers played a central role in establishing continuity in actions and interactions both vertically within organizations and horizontally across organizations. In our second case study we focused on these five types of brokers who individually ‘embody’ boundaries and we analyzed what has been at stake in this partnership by narrating the perspectives of a chain of brokers. We expected that their perspective would allow us to identify and discuss constitutive elements for establishing and sustaining a PDS partnership. Considering their perspective on the work that they do: What is their personal and professional background in relation to their current position? What boundary-crossing actions in the PDS partnership do they report? What do they consider to be the challenges and achievements in establishing and sustaining the PDS partnership?

We conducted interviews with five of these brokers in order to include their self-perceived role to complement our observations. In order to examine the positions and perspectives of the brokers in more detail. We used a method to explore lived experiences through biographical narrative interviews (Wengraf, 2011). We asked the interviewees to talk about their career, about their experiences as a member of the PDS partnership and about the development of the PDS partnership. The interviews were recorded on tape and were transcribed verbatim. Transcriptions of the interviews were presented to the interviewees for correction and validation. To answer the three research questions, we conducted content analysis of the interviews, respectively selecting all quotes relating to the history they narrate as preceding this particular

position in the PDS partnership, all quotes referring to linkages they created or acted upon between one group of people and another, and all quotes referring to their evaluation of the challenges and achievements in and of the PDS partnership. The content analysis was conducted separately by three researchers, and discussed until full agreement was reached about the selected quotes.

The results show that:

1. The group of brokers can be conceived as **a chain**, representing different hierarchical positions related to the PDS activities around one school in particular. Each broker interacts most with the brokers who are one step higher and lower in the PDS hierarchy than one's own position.
2. All brokers describe **a deep interest in education**, but also an explicit interest in academic schools as opposed to other schools because of the educational innovation these schools aim for. Student teacher Leonore deliberately chose to work in an academic training school as she considered this 'a unique experience'. Teacher Zita immediately took the opportunity to work as an internal facilitator in the academic primary school as she knew this was 'the perfect place for her'. School director, Adèle, described her long-term interest in innovative schools. Similarly, Ruby had been concerned with educational innovation during her career as teacher educator and her intentions to contribute to school development by means of research led her to participate more actively in the PDS partnership. The project leader Vivian, described how she perceived the collaboration with the other schools and the teacher college as the basis for educational innovation. She stressed how she always liked to collaborate with other parties, particularly when they were not in the same field or professional position. The explicit motivation of the brokers for educational innovation explains their active role in pursuing the PDS concept.
3. Each of the brokers has been a **pioneer in other situations**, including professional positions. For example, Leonore had been active for several years in the student committee of the teacher training college. Zita, initially a school teacher, wanted more and worked as educational researcher and trainer, had her own advisory company besides her teaching profession for several years, and started a master's program in special needs education. Adèle described how she enjoyed meeting people from very different fields during her master's. She emphasized her enthusiasm for the pioneer group in which she worked earlier at another school, allowing her 'to push your boundaries and think out of the box'. She related this to her parents, 'who always

emphasized how change begins with oneself and with having a vision . . . and guts'. Ruby, initially and currently a teacher educator, followed a master's in educational sciences and worked for several years as an educational advisor. Vivian worked as a school director and as an educational policy maker before her current role as project leader of the PDS partnership. During her current position, she started with a master's in educational sciences. Most also referred to pioneering in life more generally, referring to the way they liked challenges and doing something new. Their life stories seem to support this, indicating, for example, how they travelled around the world, participated in committees, followed education also during already established professional careers (e.g., Adèle finished a master's in culture, organization and management; Vivian got herself an entrepreneur's diploma; Ruby followed theatre education).

4. All the brokers describe **boundary crossing actions**. Leonore tells how she initially started conducting her research with a rather theoretical theme related to the role of core concepts in education and multiple intelligences. She experienced that this topic did not connect to the needs of the teachers in school. For this reason, she asked teachers about their concerns and they collaboratively decided to change the research topic to the pedagogical climate. She denoted how she, supported by two other student teachers, took the lead in the small knowledge circle. They were the ones who initiated and coordinated the meetings and offered the input regarding the research that she and her peers conducted in the school. The school teachers in the small knowledge circle provided useful feedback. According to Leonore, Zita, the internal facilitator was involved in preparing the meetings, but with some more distance towards the content of the research. Whereas Leonore stressed her role in coordinating the meetings and aligning the different concerns by means of the research topic and content, Zita perceived her role as stimulating all school teachers to be active and reflective in the group. She tried to 'more or less force the teachers to slow down and reflect'. She argues that teachers are pragmatic people, who often come up with solutions very quickly. She stimulated active participation by involving the school teachers in preparing data collection during the meetings: 'Last year I learned to involve colleagues in the research that was conducted by giving them an active role in the knowledge meetings, preparing interviews, and creating observation instruments and such'. Adèle's stories reveal her efforts in bridging people in her position as school director. She recently offered a job to one of the student teachers to stay within

the school. She emphasized the importance of the continuation of research activities between student teachers in subsequent years. She deliberately attracted one of the school teachers to fulfil the role of internal facilitation instead of continuing doing this herself. Initially, school directors were meant to facilitate the teacher education and research activities in the school, but with 'one of the team members' having this role 'the team is much more involved'. She had clear ideas about how to sustain the PDS partnership in the future and she maintained contact with the teacher college to discuss her ideas. Ruby fulfilled a broker position at the teacher college. Besides educating and coaching student teachers, she participated in the knowledge circle of school A. She described her frequent contact with Zita as follows: 'Together with Zita I search for ways of working to involve as many teachers as possible in our research program. We invite the teachers to be more critical. My focus lies on the preparation, asking Zita questions in advance. In the team meetings I take a more distant and observing stance. I enjoy seeing how Zita develops in her role and how, especially last year, the student teachers had a central and pioneering role in the group'. This indicates how Ruby, in supporting Zita, is active in preparing the meetings and stimulating other school teachers, yet takes some distance during the meetings. Her observation that student teachers had a central position in the group is in line with what Leonore experienced, though Leonore may not be aware that Ruby was deliberately more distant in the group. The project leader, Vivian, described how she initially, in her former position as school director, was involved in trying to get the funding for her school to participate in the partnership. By means of writing educational policy texts she had to convince policy makers to invest in their school. But she also had to convince teachers within the school of the value of bringing in young student teachers who start doing research in *their* schooling practice. She referred to incidents of employees coming to her room being angry and crying about the ongoing changes. Through the meetings of the broader knowledge circle in the PDS partnership, she learned to listen to and understand the internal facilitators in the different schools who, according to her, were faced with the challenge of facilitating the educational research of the student teachers without elaborate expertise in doing research. Though not referring to specific boundary-crossing actions, Vivian told about her vision of this kind of educational innovation, and the way these, according to her, inherently require bringing together different actors and going through

struggles and difficult phases. She emphasized how people can be opposing when existing routines are being changed.

Challenges and achievements in establishing and sustaining the PDS partnership

The interviews testify how each of the brokers brings a complementary perspective to the challenges and achievement in and of the PDS partnership.

Leonore found it challenging to work on conceptual questions in research that were not always related to her own concerns as a beginning teacher. During the first half year she realized the extra efforts it took to work in this kind of academic training school. During the first period she had doubts about her abilities, questioned whether it was the right place for her to work, but at the same time started to wonder whether the academic training school was a viable concept. She became more positive about the PDS concept and her contribution to it when she started to connect research more closely to the concerns faced by herself and by the other teachers. Additionally, taking a more active role allowed her to take more control and to develop her own ideas about teaching and research. She also perceived herself as ‘the one who keeps it alive’.

Zita was positive about the way their school had developed in light of the PDS partnership, though she perceived what had been achieved was just a first step in the right direction. She explained that the participation of teachers in the meetings had increased since the beginning and that one work group of teachers had started to conduct follow-up research. She described how she was amazed about the current status, given that the PDS concept was ‘messy at first’, whereas now there was ‘more structure and balance in what is being done in the partnership’. Personally, she had become aware of how much can be gained by doing research. Being an expert on visual thinking she always noticed many things about kids, yet she could not always explicate what it was. By the research that was conducted, she learned to explicate more and to relate observations to scientific insights about learning difficulties. She also realized that research is all about formulating very precisely what your question is and then considering the appropriate instruments to answer this question. It was very valuable for her to learn by the feedback she received in the partnership meetings, especially when it concerned involving other teachers more in the research that was being conducted. Still, she felt inadequate when it came to doing research, despite her finishing a master’s. Zita believed that a person can adequately supervise

student teachers only when one has conducted research him or herself on a frequent basis. For the future she hoped that others would engage more in research. On a partnership or network level, she saw opportunities to conduct collaborative research on a larger scale, and she thought it was very valuable to systematically reflect on the PDS partnership itself as well. She emphasized that not everything has to be studied and that the themes that are picked up in research need to relate closely to the concerns of teachers and the primary process of teaching and learning in order for research to have actual effects in education. One condition for such a future is that the school teachers were also facilitated in time, so that they could not only participate in the meetings about research, but also could take part in conducting it.

Adèle was very explicit about the challenges that the school and she in her role as school director encountered. The moment that the school started participating in the partnership was ‘very intense’, also because some of the other schools already started with this initiative two years earlier. Being behind, she also perceived it as a battle. At the same time, she realized the surplus value and the enrichment of working with the PDS concept, despite the extra efforts that it required. Looking back, she thought that they did a good job as a school in deciding that all teachers were to be part of the knowledge circle: ‘If I compare us to other schools in the partnership, I think we do a good job’. After one year of participation, she noticed herself saying that ‘they did it’. For her, it was a crucial step to assign a teacher as internal facilitator rather than taking on this responsibility herself. This allowed more involvement in but also ownership of the concept by the team. She appreciated the school partnership at the same time however, she acknowledged the continuous challenges that they faced in the partnership. She explained that specific moments in which she got irritated were those during which they did not realize the desired intensity and achievements during the meetings, while all participating (school directors, project coordinator) were expensive people. This often led her to personal dilemmas. Adèle was positive about the future, stressing that everyone had to hold on to the initial vision of the PDS concept which, according to her, is about learning teachers who are able to make sure that pupils learn better. She argued that full achievement would require a lot of time: ‘Only after eight years one can evaluate whether we have managed to do it . . . we cannot yet say this’. One important condition for this future realization is that they will draw teacher educators into the school practice, particularly the school mentor of the student teachers who, according to her, can act as additional knowledge broker.

This is currently not the case and she already talked about this with the head of the teacher education department.

Ruby appreciated what is happening in school A, since all teachers were expected to take part in the research activities. Yet she noticed how the teachers struggled with finding time to really take part in conducting research. Currently, the teachers still followed research from a distance. She argued that, if it were not for the student teachers, the research would probably not be continued. The partnership meetings were valuable, according to Ruby, since they were systematically reflecting and analyzing with the research group of the college what was going on within the schools and their knowledge circles. At the same time, she argued that this had not yet led to intervention strategies within the schools, nor allowed her to become more capable in doing research. Both these aspects were her initial aims when starting to participate in the partnership. For sustainment of the PDS partnership she wanted to take a next step together with the students. She referred to the research model that was being used by all schools, but emphasized that the research that relied on this model was still tricky. Her intention was to deepen the theoretical framework of the research that was being conducted and the improvement of valid and reliable instruments. Also she saw how there was something to gain in what were the real issues and reflecting on this with teachers. The reason she said so was that the impact on educational innovation is still limited, which is the final intention of the PDS partnership. She conceived the current status as a critical moment. A condition for sustainment within schools was more involvement of the teachers in research: 'A more central role of teachers in research is desirable in order to really maintain that one has realized a research culture at school'. A condition for sustainment she pointed at on the partnership level was taking a critical attitude towards one another and to explicitly question what was needed to realize the initial ambitions.

Vivian emphasized the struggle that the whole process had required, but also that this was to be seen as a natural aspect of school innovation. She denoted that schools have to get used to having young people working and doing research in educational practice. After two years, the PDS project started to lead to actual changes in practice. According to her, one central step that made this possible was the introduction of a research model referred to as CPR, an abbreviation for 'collective practice-based research'. This model forced schools to stick to a plan, maintain quality, but also led to involvement of more people than only the student teachers. On the partnership level

Vivian noticed how the policy makers started to draw back somewhat from the PDS initiative and did not talk about it anymore as ‘a project’. She considered this a sign of more ownership by the schools. She was positive about the collaboration between the school leaders of the five schools and the teacher educators who were part of this project. Nonetheless, there were several groups of people who she thought still ‘wrestled’ and showed some ‘shyness’ regarding the research that was conducted in schools. She saw how teachers preferred doing and have to get used to opening up for new insights from the outside, but she was convinced that by experiencing the results they now started to appreciate it. The internal facilitators especially faced the difficulty of having to facilitate and supervise student teachers in doing research without necessarily having research experience or training themselves. Vivian made clear that sustainment of the PDS partnership was a matter of concern as it also required future efforts. She explained how schools easily fall back into previous routines. In describing what was needed, she referred to persistence by the various brokers (referring to the student teachers, the internal facilitators, the teacher educators and the school leaders) in getting everyone on board in the process. She argued that the teachers in the schools as well as the teachers educators should be more involved in the research that was being conducted. Aside from paying attention to this process, she hoped that there would be more attention for the content of the research that was being done, and for the results that new insights and changes in practice can have on pupils.

In this second case study we zoomed in on the brokers as central figures who individually ‘embody’ boundaries. To understand the specific role of brokers, we have analyzed the position and perspective of a chain of five brokers in a PDS partnership. The brokers had two things in common with respect to their personal background. First, they described a deep and early interest in education and in educational innovation more specifically. Hence they were strongly motivated to realize the PDS ambitions that were formulated for the partnership. Second, they all reported earlier instances of broker positions in other life and career situations, and sometimes explicitly denoted the joy they found in new challenges that were related to that. This suggests that their current broker position was not a coincidence as it followed logically from certain experience and motivation for being in this position. It is of interest to study in more detail and on a larger scale the specific ways in which

brokers come to be brokers, determining what (self-)selection and professional trajectories and learning processes have preceded their position and what brokering qualities they have developed through time. Our second research question was what boundary-crossing actions they reported in retrospectively describing the PDS partnership. The actions described by brokers denoted how they conducted explicit 'bridging' work in the sense of connecting or aligning different groups of actors and institutions. On the one end, we can see how the student teacher is able to bridge teacher education, research and educational innovation by means of focusing the research project on the concerns that the teachers share. On the other end, we see how the project leader is able to bridge teacher education, research and educational innovation by writing policy texts, arranging funding, expressing the larger vision, and listening to and acknowledging the frustrations that people have during the change process. In this way, each type of broker seems to contribute to boundary crossing at different levels of formal organization, but all appear relevant and complementary for putting the PDS concept into practice. Our third question was about the way in which brokers evaluated the challenges and achievements in establishing and sustaining the partnership. The reported achievements and challenges can be interpreted in terms of all four learning mechanisms, identification, coordination, reflection and transformation, which all seem to relate to realizing a research culture. First of all, the partnership seems to have led to one type of *identification* process within the partnership. Both Adèle and Ruby explicitly defined school A as different from the other schools in the partnership, based on the fact that, in school A, all teachers, instead of only a few, were involved with the research activities because they were part of the knowledge circle within schools. They perceived this broader participation as important for making research part of the practice within schools. Second, the PDS partnership seems to have led to a *coordination* process when it comes to the research approach and procedure. Several brokers refer to the collective practice-based research model (CPR) as the shared procedure throughout the partnership. Vivian argued that the implementation of this research model had been a critical step towards establishing a research culture. The model seemed to be seen as a form of quality maintenance in research by 'ensuring that' the steps in the research process were 'properly taken'. Interestingly, the CPR model is not perceived by everyone as being the future solution per se. The teacher educator questioned whether the current research could be based on other models, and

related more to theory and reliable instruments. She argued that it is good for sustainability if the partnership is also willing to reconsider and discuss these questions. Third, *reflection* processes can be recognized in the references of all brokers to defining and learning to take on a research perspective. The brokers pointed to various aspects of a research perspective in teaching practice. For example, Leonore and Ruby pointed to the importance of connecting research topics to actual concerns of the teachers and Zita argued that a research approach is all about formulating questions very precisely. Simultaneously, the brokers suggested that taking on a research perspective is not at all achieved completely. As Vivian observed more generally, there is a 'shyness' and inexperience amongst teachers and internal facilitators regarding the conduct of research and the need to focus more on the content of the research and the results for pupils. In line with this, Zita saw how she was still in the process of learning about doing research, which she considered awkward because she was expected to supervise student teachers in their research. Also, Ruby referred to the next step being the organization of more training in research and reflecting together with teachers on how research can improve schooling. Fourth, we also recognize *transformation* processes in the retrospective accounts of the brokers. All brokers suggested that profound changes have occurred in practice and that schools developed a new identity. For example, student Leonore saw contrasts between the academic primary school and a regular school. Whereas teachers in a regular school tend to be focused on their own practices and routines, she felt that the teachers in the academic primary schools kept an eye for different perspectives and that the teacher educator plays an important role in this. Similarly, the PDS coordinator Vivian referred to the change as what began as a project has since become part of the way schools define themselves as an academic primary school. Despite achievements in the transformation of schools, all brokers made clear that the ongoing change must not be taken for granted and that sustainment required continuous efforts. The internal facilitator Zita stated that what has been achieved after all these years was good, but was just a beginning. A consistent point made by the brokers was the need to get more people involved in the PDS process and activities. There was especially a need for more involvement by teachers and by teacher educators who initially were not assigned to do research themselves. Noteworthy is how Leonore did not want to step back from the knowledge circle in

school because she felt that she ‘keeps it alive’. This indicates that an essential step that now needs to be made is that the brokers themselves are able to step down.

To sum up: PDS partnerships seems to have made important achievements but, according to the brokers, continuous work is required to realize all its ambitions. The role of the brokers appears to be central in the achievements of PDSs. Besides reporting about their bridging actions, they also bring forward a passionate and broad overview of the PDS activities. The brokers report in terms of what they observe in the PDS partnership at the institutional, the interpersonal level and the intrapersonal level, with respect to what are their doubts and what they have learned through working with and in between the different PDS partners. As valuable as these brokers appear for the achievements that have been made so far, they consistently refer to the need for more involvement of others in order to realize a research culture throughout the schools and sustain the PDS partnership in the future. Based on this case, we hypothesize that brokers are initially significant actors in bridging diverse stakeholders, yet their centrality needs to be reduced in the longer term in order for others to become more involved in bridging activities. To sustain a PDS partnership, we suspect that it is important that brokers pass their role to others. The ultimate challenge for a broker might be the ability to step away, to secure the filamentous growth of the PDS as a ‘mycorrhizae’.

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