



Review

Teacher professional development in *Teaching and Teacher Education* over ten years[☆]

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A B S T R A C T

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A review of publications in *Teaching and Teacher Education* over ten years (2000–2010) on teacher professional development is the subject of the paper. The first part synthesises production referred to learning, facilitation and collaboration, factors influencing professional development, effectiveness of professional development and issues around the themes. The second part, selects from the production nine articles for closer examination. The paper concludes by noting how the production brings out the complexities of teacher professional learning and how research and development have taken cognisance of these factors and provided food for optimism about their effects, although not yet about their sustainability in time.

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1. Introduction

The professional development of teachers is studied and presented in the relevant literature in many different ways. But always at the core of such endeavours is the understanding that professional development is about teachers learning, learning how to learn, and transforming their knowledge into practice for the benefit of their students' growth. Teacher professional learning is a complex process, which requires cognitive and emotional involvement of teachers individually and collectively, the capacity and willingness to examine where each one stands in terms of convictions and beliefs and the perusal and enactment of appropriate alternatives for improvement or change. All this occurs in particular educational policy environments or school cultures, some of which are more appropriate and conducive to learning than others. The instruments used to trigger development also depend on the objectives and needs of teachers as well as of their students. Thus formal structures such as courses and workshops may serve some purposes, while involvement in the production of curricula, the discussion of assessment data or the sharing of strategies may serve other purposes. Not every form of professional development, even those with the greatest evidence of positive impact, is of itself relevant to all teachers. There is thus a constant need to study, experiment, discuss and reflect in dealing with teacher professional development on the interacting links and

influences of the history and traditions of groups of teachers, the educational needs of their student populations, the expectations of their education systems, teachers' working conditions and the opportunities to learn that are open to them.

During the past ten years a large number of articles published in *Teaching and Teacher Education* have reported on research and interventions designed for teachers, with teachers and by teachers aimed at their professional learning, with an eye on their impact on teacher and student changes. They cover different geographical regions and different research and development procedures. The first part of this article provides a bird's eye view of the content of these pieces, thematically organised in terms of their main emphases. The second part reviews more closely nine articles selected as being particularly illustrative of the thematic areas, and also representative of different geographic locations and contextual particularities.

2. Thematic emphases over ten years (2000–2010)

The Scopus search machine (<http://www.scopus.com.scopesprx.elsevier.com/home.url>) was used to retrieve a list of articles that included "teacher professional development" in their key words, to select 111 relevant ones and, by examining their abstracts or the entire article, to produce the classification presented below in Table 1. While it might be artificial to classify journal articles according to a single thematic emphasis as usually they have more than one central focus, to do so seemed a sensible way of providing a synthetic overview of what was published over the period. In the rest of this first section then I briefly review the production under each one of the thematic areas.

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Table 1
Professional development articles published in *Teaching and Teacher Education* (2000–2010).

| Thematic area | No. of articles | Geographical location |
|---|-----------------|--|
| Professional learning (general) | 9 | Canada (1), England (2), The Netherlands (2), S. Africa (1), USA (3) |
| - Reflection processes | 11 | Australia (1), Canada (1), England (1), Portugal (1), The Netherlands (1), USA (6) |
| - Tools as learning instruments | 10 | Australia (1), Spain (1), Taiwan (1), USA (7) |
| - Beginning teachers learning | 13 | Australia (1), Belgium (1), Canada (1), England (2), Hong Kong (1), Ireland (1), Norway (1) Scotland (1), The Netherlands (1), USA (3) |
| Mediations | | |
| - School–university partnership | 11 | Canada (2), Greece (1), USA (8) |
| - Teacher co-learning | 13 | Canada (2), Hong Kong (1), Singapore (1), The Netherlands (2), USA (7) |
| - Workplace learning | 3 | Japan (1), The Netherlands (1), USA (1) |
| Conditions and factors | | |
| - Macro conditions | 10 | South Africa (1), USA (9) |
| - School cultures | 6 | Canada (1), England (2), USA (3) |
| Effectiveness of professional development | | |
| - Cognitions, beliefs and practices | 10 | Italy (1), New Zealand (1), Portugal (1), The Netherlands (2), USA (5) |
| - Student learning & teacher satisfaction | 7 | Belgium (1), Canada (1), Israel (1), Switzerland (1), USA (3) |
| Specific areas and issues | 8 | Australia (1), Canada (1), Ireland (1), The Netherlands (1), USA (4) |
| Total articles | 111 | |

Source: <http://www.scopus.com/scopesprx.elsevier.com/home.url>.

2.1. Professional learning

These articles deal in general with how teachers learn and change by developing theory or applying theory to the discussion of teacher change (Clarke & Hollingsworth, 2002; Korthagen, 2004, 2010; Penlington, 2008; Snow-Gerono, 2008). They examine the personal processes that are involved in the various formats used for teacher learning, how teacher learning is researched and propose or discuss models of teacher professional learning (Castle, 2006; James & McCormick, 2009; Mushayikwa & Lubben, 2009; Olson & Craig, 2001). The main emphasis of these studies is to understand the processes whereby teachers change. While some are centred on conceptual analysis, others describe the approach with both qualitative and quantitative research examples.

Within this broad area of professional learning, there are three specific groups that stand out in terms of the number of articles they contain. Articles that deal with reflection and narratives form one group. A second one centres on the role of different tools in professional learning, especially technological ones and a considerable number focus on beginning teacher learning.

2.1.1. Reflection processes

The assumption in articles dealing with teacher reflection is that analysis of needs, problems, change processes, feelings of efficacy, beliefs are all factors that contribute to teacher professional development, be it through enhanced cognitions or new or improved practices. Reflection is discussed and used in research in several ways. The studies in this decade centre primarily on reflection as an instrument for change and on the various ways in which reflection can be developed. A group explicitly considers the contribution to reflection of narrative methods such as storytelling (for example, about Professional Development School experiences) and the construction of stories within professional development activities (Breault, 2010; Day & Leitch, 2001; Doecke, Brown, & Loughran, 2000; Jenlink & Kinnuncan-Welsch, 2001; Shank, 2006). Narrative accounts serve also to unveil the role of emotions in change. Other articles consider the importance for reflection of involvement in research, and more practically the opportunity offered by self-assessment tools or reflective school

portfolios as triggers for change (Burbank & Kauchak, 2003; Craig, 2003; Reis-Jorge, 2007; Romano, 2006; Ross & Bruce, 2007; Runhaar, Sanders, & Yang, 2010).

2.1.2. Tools as learning instruments

Several articles deal with uses of technology in professional development. For example discourse and content analysis serve to study teacher discussions of videos in video clubs, online forums, online video case discussions, as well as the use of classroom video for teaching and learning (Borko, Jacobs, Eiteljorg, & Pittman, 2008; De la Torre Cruz & Casanova Arias, 2007; Hou, Sung, & Chang, 2009; Koc, Peker, & Osmanoglu, 2009; Kucan, Palincsar, Khasnabis, & Chang, 2009; Prestridge, 2010; Sherin & Han, 2004; Van Es & Sherin, 2008; Warren Little, 2002). One article in particular proposes a “model-hypertextual function to consider teachers’ thinking, practice, and development in the use of technology” (Schussler, Poole, Whitlock, & Evertson, 2007).

2.1.3. Beginning teachers

Beginning to teach is now well recognised around the world as a particular and complex stage of teacher learning (OECD, 2005). Thus, a large number of papers examine various aspects related to mentoring, induction as well as comparisons between novice and experienced teachers. An extensive review of international literature on mentoring (Hobson, Ashby, Malderez, & Tomlinson, 2009) looks at the process in terms of benefits, costs, needs and suggestions for policy-makers. Mentoring takes an important place both in terms of what mentors bring to the induction process, their identity formation during the process, training of mentor teachers, how they contribute or not to identity formation of beginning teachers, problems associated with the mentoring process, what are best practices, and the use of tools such as electronic journals (Devos, 2010; Harrison, Dymoke, & Pell, 2006; Hennissen, Crasborn, Brouwer, Korthagen, & Bergen, 2010; Killeavy & Moloney, 2010; Kwan & López-Real, 2010; Sundli, 2007). Conditions associated with the support and mentoring needed to retain beginning teachers in the profession and assist them with their teaching difficulties were studied by Fantilli and McDougall (2009), Mitchell and Logue (2009), and Oberski and McNally (2007). Professional

judgment and concerns, including those related to school socialisation of beginning teachers, are studied both longitudinally and with mixed methods (Johnson, Reiman, & Richard, 2007; Kelchtermans & Ballet, 2002; Watzke, 2006).

2.2. Mediations through facilitation and collaboration

I understand mediations to be structured or semi-structured processes (such as partnerships, collaborative networks) or informal contexts (such as the workplace interactions) that facilitate learning and stimulate teachers to alter or reinforce teaching and educational practices. In most, but not all of these instances, people such as external researchers or peers play key roles. I have grouped the contributions in this area in three main ones: school–university partnerships, teacher co-learning and workplace learning.

2.2.1. School–university partnerships

These articles examine how school–university (or teacher–researcher) partnerships bridge the gap between their different perspectives of professional development or highlight the importance of such a space as an area for joint work or joint contributions (Bartholomew & Sandholtz, 2009; Gravani, 2008). The articles report long-standing mixed methods studies on multi-site school partnerships assisted by university professors, improvement of science teaching through links between a university science centre and schools, and discuss both the valuable opportunities as well as complexities in these links (Buczynski & Hansen, 2010; Butler, Lauscher, Jarvis-Selinger, & Beckingham, 2004; Erickson, Minnes Brandes, Mitchell, & Mitchell, 2005; Hudson-Ross, 2001; Jewett & Goldstein, 2008; LePage, Boudreau, Maier, Robinson, & Cox, 2001; McCotter, 2001; Sandholtz, 2002; Sztajn, Hackenberg, White, & Allexsaht-Snyder, 2007).

2.2.2. Teacher co-learning

The importance of understanding how teachers work together and share practices with learning purposes is reflected in articles that look at teacher networks and teams, communities of practice and communities of learning, as well as peer coaching. Two studies illustrate the use of different research procedures such as surveys and ethnography to study conditions for the success of networks as well as effects of networks on teacher meanings, identity and agency (Hofman & Dijkstra, 2010; Niesz, 2010). Lesson study, the Japanese experience of teacher co-learning through mutual collaboration and feedback, is examined in three studies that link its effects to improvement of instruction, efficacy and collaboration and that review conditions that impact on its effectiveness (Fernández, Cannon, & Choksi, 2003; Lee, 2008; Puchner & Taylor, 2006). The productivity of teamwork focussed on data collection and problem solving, case studies on communities of practice, peer-coaching trajectory and co-construction of situated assessments are the subject of another group of articles (Baillon & Damico, 2008; Gregory, 2010; Huffman & Kalnin, 2003; Schnellert, Butler, & Higginson, 2008; Zwart, Wubbels, Bolhuis, & Bergen, 2008). Finally three studies (Clausen, Aquino, & Wideman, 2009; Crockett, 2002; Rueda & Monz, 2002) consider the effects of teacher inquiry groups on changes in beliefs and practices, collaboration in mixed-culture situations of teachers and assistant teachers as well as the early development of a learning community.

2.2.3. Workplace learning

To some extent this is an “umbrella” term for professional development that takes place formally or informally in schools and that is not assisted by outside facilitators. Some articles that look at teachers learning in school contexts draw on situated learning

theory and consider this learning to be both individual and collaborative as well as facilitated or not by a range of factors including, as we shall see below, different school cultures and traditions (Kwakman, 2003; Mawhinney, 2010; Sato & Kleinsasser, 2004).

2.3. Conditions and factors influencing professional development (learning and change)

While several of the articles reviewed deal with factors that affect the quality, possibilities and success of teacher professional learning, there are some that focus more closely on macro societal conditions and the micro-contexts provided by school cultures.

2.3.1. Macro conditions

Included under this concept are the nature and operation of educational systems, policy environments and reforms, teacher working conditions as well as historic factors that determine what is accepted or not as suitable forms for professional development. For example, a historical approach and a particular theoretical model for analysing policy implementation (McIntyre & Kyle, 2006) is used to explain why an attempt to establish an ungraded primary school system in a particular USA state education system was not sustainable over time and the effect on this failure of pressures from the community, politics and the media. With the exception of those who had better professional development, school support and whose beliefs were aligned with those of the reform, teachers reverted to old practices. An opposite example is provided in an ethnographic case-book study about seven South African unqualified teachers (Henning, 2000) who in the last years of the Apartheid struggled against the odds to form a teachers' community. In 1991 they sought assistance to develop professionally from an all-white university. The willingness and commitment of partners on both sides, allowed for the successful development of a programme that combined contact education, distance education, school-based training and the systematic assessment of prior learning. All of which made the teachers' journey to greater professionalism a successful one. While policy reform environments may be supportive of teacher development as narrated in another case (Borko, Elliot, & Uchiyama, 2002), and as evidenced in the learning interaction of teachers participating in the National Board Certification in USA (Coskie & Place, 2008; Park, Steve Oliver, Setar Johnson, Graham, & Oppong, 2007), a more critical stance is taken about the effects on teacher development of standards-based reforms and accountability environments, high-stakes assessment, the narrowing of professional development “outcomes” to teacher test scores and the increased control and regulation over how professional development operates (Boardman & Woodruff, 2004; Cochrane-Smith, 2001; Delandshere & Arens, 2001; Sandholtz & Scribner, 2006; Skerrett, 2010).

2.3.2. School cultures

Different studies refer to school culture as an indicator of the school's ethos and social environment (traditions, beliefs). The concept covers the operation of the administrative and organisational structures, and how these interact to facilitate or constrict teacher workplace learning. Comparative studies of schools in different geographical locations and their opportunities for teacher learning serve to illustrate how beliefs, traditions, types of institutional arrangements affect the extent of teachers' informal engagement in pedagogic exchanges (Jurasaitė-Harbiton & Rex, 2010; Melville & Wallace, 2007; Muijs & Harris, 2006; Sato & Kleinsasser, 2004; Snow-Geron, 2005). Professional development that incorporates all-school inquiry can either be hindered by the school's organisational context or on the contrary, under certain

conditions, can contribute towards commitment to learning goals and collaboration in school (King, 2002). Subject departments as forms of school organisation have positive effects on teacher professional growth and active pedagogic leadership provided they operate as communities that seek to have influence on the whole school environment (Knight, 2002; Melville & Wallace, 2007).

2.4. Effectiveness of professional development

While most of the studies reviewed consider some form of impact of professional development on teachers' knowledge and practice, including effects on pupils, some set out explicitly to explore the effectiveness of programmes on personal changes of teachers cognitions, beliefs and practice as well as pupil change and teacher satisfaction.

2.4.1. Teacher changes in cognition, beliefs and practice

Changes in cognition took several forms in the studies reviewed. Different modalities of professional development improved curricular knowledge and understanding in areas as diverse as reading comprehension and science, as well as fostering of student motivation (Cherubini, Zambelli, & Boscolo, 2002; Ermeling, 2010; Frey & Fisher, 2009; Levine & Marcus, 2010; Morais, Neves, & Alfonso, 2005; Seymour & Osana, 2003). Improvement in teacher knowledge was partially detected in a study of the effect of Action Research on three areas of teacher cognition: ideological (norms, values), empirical (connection between phenomena) and technical (methods). Only technical knowledge was improved (Ponte, Ax, Beijaard, & Wubbels, 2004). Partial results were also produced on teachers' conceptions and practices regarding student self-regulated learning (Hoekstra, Brekelmans, Beijaard, & Korthagen, 2009). Changes in teacher beliefs or expectations of student achievement in low-income communities, was an outcome sustained over two years of professional development (Timperley & Phillips, 2003). The effects of a yearlong experience in developing literacy instruction skills resulted in high and low implementers. Differences between them were explained in terms of their levels of general, personal and collective efficacy (Cantrell & Callaway, 2008).

2.4.2. Student learning

The effectiveness of communities of learning on the improvement of teaching practice and student achievement was supported by a review of 11 studies dealing with the subject (Vescio, Ross, & Adams, 2008). Three articles (Fishman, Marx, Best, & Tal, 2003; Lovett et al., 2008; Vogt & Rogalla, 2009) report on the effects of professional development on student reading outcomes in one case, science learning in the second, and in the third one, on generally improved student outcomes as teachers learned to adapt teaching to individual student needs. Comparison of two types of professional development related to reading comprehension instruction (a year-round intensive coaching and a short 13-h course) had similar positive effects on student learning and self-efficacy perceptions, but with increased workload for teachers in the restricted course (Van Keer & Verhaeghe, 2005).

Teacher satisfaction increased in relation to professional development activities considered to be "close to home" and to their needs and expectations, and when they contributed to the improvement of curricular understanding and increased self-efficacy (Lovett et al., 2008; Nielsen, Barry, & Staab, 2008; Nir & Bogler, 2008).

2.5. Specific areas and issues

A couple of articles consider both conceptually and empirically how teachers deal with aggressive behaviour or abused children

and the degree to which they have been prepared appropriately (Alvarez, 2007; Walsh & Farrell, 2008). A few articles look at diverse forms of professional development activities with an eye on dilemmas, conflicts and limiting circumstances that for different reasons affect their effectiveness (Glazier, 2009; Hibbert, Heydon, & Rich, 2008; O'Sullivan, 2002; Tillema & Kremer-Hayon, 2002; Yamagata-Lynch, 2003; Yamagata-Lynch & Haudenschild, 2009). These articles highlight, for example, the dilemmas that facilitators and teacher participants have promoting self-regulated learning, the equivocal goal of preparing "expert teachers" to become trainers of others, teacher tensions during activities due to competing responsibilities and pressures on their work lives arising from external expectations, the disturbing role of a "cultural expert" within a professional development group, and possible misalignment between motives or background of teacher participants in professional development and those of the responsible entities. Professional development geared to new curriculum implementation both assists the sharing of new knowledge with other teachers, but is also limited in terms of new pressures on their work lives by expectations of the program and the school district.

3. Teacher professional development in selected articles

In this section, I discuss a group of nine articles published over the ten year period that cover a number of the themes outlined in the first section. I have selected these particular papers not only because of their thematic approach but also because they study teachers in different geographical and cultural contexts, thus honouring the international character of *Teaching and Teacher Education*. These papers represent ways of approaching teacher professional development along the following main thematic areas:

- a) The learning of practicing teachers: how they learn, what they bring to their learning efforts and how these efforts are reflected in changes in cognition, beliefs, and practices.
- b) The embedded or situated nature of teacher professional learning and development: within the school environment and its culture, and in relation to how educational systems and policies affect their work lives.
- c) The role of mediations in the quality of their learning: external facilitation of learning processes provided for example by school–university/researchers collaboration or by other teachers as collaborators, informal and teacher formal networking, and the use of specific teaching tools as sources for self-analysis and change.

The main characteristics of the selected papers are presented in Table 2 below:

3.1. How teachers learn to learn? The possibilities and limitations of teacher professional development (O'Sullivan, 2002; Ross & Bruce, 2007)

The reason why I selected O'Sullivan's (2002) article to illustrate how teachers learn to learn is because of the extreme care with which the author unveils an experience with unqualified and under-qualified teachers. The participants were teaching English in 31 primary schools at lower and upper primary level. The setting was Namibia in the early years after its independence and at the end of the Apartheid regime. Only 24% of the 99 teachers had some form of qualification. The originality of the experience was that not only did the author design and implement the professional development activity but also researched its process. Appropriately, she chose an Action Research model based on Elliot's (1991) cycles of

Table 2
Main features of selected articles.

| Authors | Topic | Type of article | Subjects studied | Location |
|-------------------------------------|---|--|--|-----------------|
| James and McCormick (2009) | Teachers learning how to learn | Research based (quantitative & qualitative) | Teachers in secondary, primary & infant schools | England |
| Jenlink and Kinnuncan-Welsch (2001) | Teacher development facilitators' learning | Research based (qualitative, case stories) | Design team, facilitators and teachers in study groups | USA |
| Jurasaitė-Harbisson and Rex (2010) | School cultures and teacher learning | Research based (ethnographic study) | Teachers | Lithuania & USA |
| Sato and Kleinsasser (2004) | School cultures and teacher beliefs, practices & interactions | Research based (interviews, observations, documents) | Teachers | Japan |
| LePage et al. (2001) | Professor/teacher relationships in graduate programme | Research based (dialogic inquiry, interviews & short-answer surveys) | Teachers and university faculty | USA |
| O'Sullivan (2002) | Teacher learning in action research cycles | Research based (action research cycles, observation) | Unqualified and under-qualified practicing teachers | Namibia |
| Ross and Bruce (2007) | Teacher self-assessment as a source of change | Research based (qualitative case study) | Teachers | Canada |
| Schnellert et al. (2008) | Collaborative learning from use of situated assessment tools | Research based (qualitative data in cycles of collaboration) | Teachers and researchers | Canada |
| Vescio et al. (2008) | Impact of teacher learning communities | Research review | Research reports | USA & England |

Source: <http://www.scopus.com.scopesprx.elsevier.com/home.url>.

hypothesis, planning, action, monitoring and reflection, and the article centres on how these cycles were carried out during four circuits of workshops and follow-up activities in classrooms (June 1995 to June 1997). The article centres on the effort to develop reflective skills in the participants.

What we get is a detailed account of the teachers interaction with the process and of how the author, slowly and painfully, interprets and reacts to what initially are hardly discernible signs of interest and involvement, by creatively applying the Action Research steps: retracing steps, redirecting and refocusing during workshops and in follow-up stages of the training circuits. As products of Apartheid education the participant teachers had been exposed for the most part of their education to structured directive teaching and rote learning. They had no prior experience of brainstorming, of volunteering ideas, and of sharing of views. Thus the “reflection” step in the first Action Research cycle proved difficult and ineffective. Rather than giving up and considering the method to be a failure, the author as facilitator resorted to refocusing the next three circuits of the process. This was done through posing and seeking to respond to three questions: (a) to what extent can reflective skills be developed (b) how can they be developed and (c) how appropriate is the “western” model of reflective training to the Namibian context. The core of the remaining Action Research cycles consisted in examining what reflective skills were possible and how they could be developed. By being attentive to signs of change the author observed that through practice and reinforcement in question-asking as well as through group and pair discussions the teachers increased their confidence and participation. She also noticed that teacher reactions to unstructured lesson observations and videos were passive and so decided to provide them with a semi-structured observation form containing factual and reflective questions. This approach was successful in increasing teacher reflective analysis and involvement. Leading teachers critically to examine their own practice was more complicated, but again it was aided by prompts based on presenting examples of carelessly prepared materials so that teachers, in their student role, could notice the problem. In other words, she concluded, reflective learning as conceptualised in western literature required adaptation if it was to be effective in the kind of situations described. She defined the adaptation as “structured reflection”. This made it possible for her to respond affirmatively to the question about teachers being able to move along the reflective path. They could do so. But the pace was slower. In the timeframe of the experience these teachers had reached a “basic”

stage of reflection, which was below Zeichner's (cited O'Sullivan, 2002) first stage of “technical rationality”. They could see problems in their practice but not yet devise solutions for them. Had the programme been extended, these teachers would probably have reached the stage of “technical rationality”. Kenneth Zeichner (Zeichner & Dahlström, 1999) who also contributed to teacher education in Namibia through a Bachelor of Education Initial Teacher Preparation Programme based on reflective learning might have a different opinion regarding O'Sullivan's conclusions. Nevertheless, the authors' experience and approach as narrated in this article provides substance to well-developed theories and approaches to teacher development that alert us to the importance and strength of prior beliefs and cultural values as factors that may affect its results and impact. The honest account of the author also highlights the importance of monitoring progress in learning and refocusing teaching when necessary as a key condition in any learning process. These procedures did allow for observed improvements of teaching in the participants classrooms.

The second article (Ross & Bruce, 2007) included in this section is also about the subjective reflective elements in teacher learning as facilitated through a structured process of self-assessment and includes research carried out in Ontario, Canada. It starts by proposing a model of teacher change centred on teacher self-assessment, which is embedded within the framework of social cognition theory. Self-assessment is seen as integrating three processes: (a) self-observation of aspects of instruction considered relevant to success; (b) self-judgments about meeting or not proposed goals; and (c) self-reactions or interpretations of the extent to which goals have been attained and degree of satisfaction about the process. Self-assessment influences self-efficacy beliefs and in turn affects future decisions about teaching. The model also includes the influence of peers who may assist in drawing attention to specific elements of practice (in cases of co-observation), and provide feedback that supports or competes with the teacher's self-assessment, depending on how credible the peer teacher is considered to be. Finally, the model includes the participation of external agents in the process of teacher change. With all these elements at hand, the article narrates the results of work with seven teachers involved in an in-service programme designed to implement standards-based teaching in mathematics. Standards-based teaching in mathematics is described as being at the opposite end of “traditional” mathematics teaching based on rules and procedures. The key feature of the study was a self-assessment tool constructed by the authors, which included 10 characteristics of

standards-based mathematics teaching and a rubric with four levels of implementation based on fidelity to the standards.

Based on the model, the intervention consisted of a cycle beginning with the use of the self-assessment tool and rubrics by the teachers, followed by exposure to peer observation skills and information about teaching mathematics using the standards, peer observation of teaching and joint setting of teaching goals, analysis of the observation data and further input on standards' teaching skills, classroom experimentation during four weeks, peer observation, and further work on teaching skills. The article discusses results of the whole process on the basis of the example of one teacher and the usefulness of the self-assessment tool. It concludes that the tool reinforced the value of existing practices and strengthened beliefs about competence, but also provided information for improvement. It provided a common language for observation and discussion with peers and researchers. However, there were also problems with the assessment tool as noted by the case teacher: rigid in some parts, the actual teacher practices overlapped the categories, and changes suggested in the rubrics were too big to be accomplished in the period of time available (four weeks). The initial change model was modified as a result of the experiment, to include effects on student achievement and the contribution of peers and researchers to the development of innovative instruction.

Awareness of shortfalls was provided by what the authors call "negative data", or data that worked in the opposite direction of what was expected, indicating for example, that teaching had become more and not less directive. And, in a similar way to what happened in the Namibian case, these shortfalls were explained on the basis of existing beliefs and the extent to which teachers recognised or not the need for change and therefore attempted to change their teaching practice. If there is a gap between beliefs and suggested practices, change will only occur if the gap is recognised: "teachers who underrate their performance or have low self-efficacy are less likely to implement data" (Ross & Bruce, 2007, p. 155). The article also refers to other contextual elements that support change in the expected direction such as a history of successful mathematics teaching and support from school administrators.

3.2. *The situated nature of teacher learning (James & McCormick, 2009; Jurasaitė-Harbison & Rex, 2010; Sato & Kleinsasser, 2004)*

The articles selected to represent this well-recognised condition of teacher professional development, consider primarily what is known as workplace learning or the formal and informal processes that take place and are facilitated by schools. Traditions, administrative arrangements and strength of purpose or mission of a school affect how teachers perceive their work and how they interact professionally among themselves. The term "school culture" has been widely used to express these aspects of school life and is used in the articles reviewed in this section.

Set in Lithuania and the USA, the article by Jurasaitė-Harbison and Rex (2010) narrates a two-year ethnographic study that looks at how teachers in three different types of schools perceive themselves as learners and how their school cultures create opportunities for teachers' professional development. The authors define culture, following Anderson-Levitt (cited in Jurasaitė-Harbison & Rex, p. 268) as "an interactive web of meaning, whose parts are in continuous interaction with each other". Two of the schools studied were secondary schools in Lithuania but one was a former Russian school that continued to provide for the Russian population, while the other was a newer school for Lithuanians. The third one was a mid-western USA elementary school. The article addresses the culture of these schools, how teachers viewed them as contexts for professional growth and the manner in which teachers engaged in

professional interactions among themselves. Data was provided by observations of the schools and interviews with eleven teachers, as well as by videos, photographs and diverse documentation. To assess the extent to which the schools reflected external policies and structures, the authors also collected national educational documents. The article describes the methods of analysis and triangulation used to reach their descriptions, interpretations and conclusions.

Each one of the schools comprised a different microcosm. The Russian school had in the past a position of prestige and a tradition of excellence, but in its current condition as a school for Russian minorities, it was struggling for survival and for a valid place within the Lithuanian educational community. The Lithuanian school in a way represented the new world after independence, and tied its academic and social goals to this world. It was described as an elite school that used novel approaches to teaching, and that had well-trained teachers and democratic relations with the community. The American school was new in a community where parents wanted their children to prepare for university entrance. It was also a school that accepted and promoted the goals of the USA educational policy expressed in the No Child Left Behind (NCLB) document. The school is described as not having the need for a proper mission statement apart from the one embedded in the test-driven policies of NCLB. All three schools also differed in their approach to traditions. While the American school did not have any traditions to uphold, the Russian school sought to revitalise their old traditional events, an effort that was valued by the teachers but that involved hard work and stress on their part. The Lithuanian school banked on traditional events and social customs (i.e. meeting for tea) as opportunities for informal exchange and learning. Physical spaces were appropriate for interchange of teachers and visits to each other's classrooms in the Lithuanian and Russian schools, while this was not the case in the two-story building of the American school. The administrative arrangements for professional development also varied in each school. In the American school it was the central administration that provided a time and place for teachers of the same level to plan and to learn (generally on topics related to NCLB). The principal also provided support for teachers to attend conferences and workshops. But there were no in-school formal professional development activities. This was not the case in both Lithuanian schools where the vice-principals organised and led professional development activities for teachers. As far as informal learning among teachers, this was not supported in the Russian school where the emphasis was on top-down monitoring of quality, while the situation was reversed in the Lithuanian school.

As a result of the different contextual elements described above teachers related very differently to each other depending on the school to which they belonged. Using the concepts coined by Hargreaves (cited in Jurasaitė-Harbison & Rex, 2010) of types of professional interchanges: "tinkering, transferring knowledge, researching practice", the authors describe how these processes operated in each one of the schools. In the American school they were very much absent, being practically reduced to "simple exchange or borrowing of materials and ideas". There were, however, examples of "collective tinkering" expressed as bouncing ideas off with others. Despite the introduction of peer coaching in the school, there was not much evidence of its practice. In the Russian school, some individual tinkering with ideas and trial and error occurred despite the lack of support for informal learning among teachers. Interaction depended on their being someone willing to do so. The Lithuanian school, on the contrary, exemplified a wide range of informal learning and interchange among teachers: experimenting of new ideas, classroom observation of colleagues, interchanges with student teachers. This was assisted by the fact that middle managers organised professional development

activities, provided information on external ones, as well as opportunity for informal learning. However, teachers in this school formed a closed community that made it difficult for a new teacher, who did not abide by the established mores, to remain in the school.

On the basis of their findings, the authors conclude that the most productive conditions for informal workplace learning is a teacher culture that encourages and values collaborative learning.

Moving to a different context, the next selected article examines teachers and teaching in an English high school department in Japan (Sato & Kleinsasser, 2004). The concept of “technical school culture” is taken from Lortie (cited in Sato & Kleinsasser, 2004) and serves to define the culture of the school in terms of beliefs, practices and interactions. Through a yearlong study the authors responded to three main questions centred on: (a) the beliefs, practices and interactions of 19 teachers studied (15 native Japanese), (b) how these beliefs, practices and interactions related to each other, and (c) how the whole technical culture influenced individual teachers’ beliefs, practices and interactions.

The examination of the general features of the school culture leads the authors to describe it as focused on management and on tasks that were not primarily related to teaching, communication and collaboration. Teaching English was observed to be extremely examination oriented, with teachers sharing the belief that it was important to teach in line with examination demands and to manage the classroom appropriately. Teaching as observed was in fact similar in its patterns. Teacher interactions included collaboration to sustain the established norms and values of their workplace, but not to sound out new ideas or discuss how their teaching was progressing. They described their teaching beliefs and interactions in a similar way to what the researchers had observed in the school and classrooms, supporting the notion that effectively there was a technical culture with the aforesaid characteristics. The prevalence of this general culture led individuals with different personal stands on teaching practices to subsume their beliefs under the general cover of three basic norms or values: examinations-oriented English, keeping pace and managing school tasks and students. Teachers had developed their concept and patterns of teaching by watching their colleagues at school. The effect was to produce a uniform style of teaching. There were no observed differences due to experience. The tendency of the older teachers was to teach English the same way as they always had, using a particular method based on grammar-translation. Professional learning seemed to entail the improvement of teacher fidelity to the established technical culture. To progress in teaching meant to teach according to the textbook and to share handouts. Teachers did not have time to discuss in depth any substantive teaching issue and most did not attend professional development activities. If an individual teacher developed an innovative practice this was not shared with other teachers. In other words, the school did have a shared culture, in which teachers reflected, interpreted and socially constructed English language teaching although “not in the way some scholars want them to do or think they should” (Sato & Kleinsasser, 2004, p. 814).

Beliefs and practices were also the subject of a large study in 40 English primary and secondary schools (James & McCormick, 2009) in the context of a project directed to assisting students in “learning how to learn” (LHTL). The relevant part of the article deals with those teaching practices that the research team generally stimulated and that promoted Assessment for Learning as a tool for teaching how to learn. Using a large data set involving surveys, interviews and observational records, the researchers examined how teachers in the participant schools behaved in their efforts to promote LHTL through work with assessments. They were able to distil three elements in the teaching practices that appeared

conducive to learning how to learn: “making learning explicit, promoting learning autonomy and pursuing a performance orientation in lieu of a learning or mastery orientation”. Teachers differed in the way they worked in relation to these principles, depending on their prior values and beliefs, and on the degree to which they were able to adhere, for example, to the importance of learning autonomy. The study considered the embedded nature of the teachers’ learning processes by paying attention to the educational policy environment in which they taught and to the importance of collaboration and networking among the participating teachers. Thus, teachers who found it difficult to close the gap between believing in teaching to learn through the use of assessment and their own practice were those that felt constrained by a “policy culture that encouraged rushed curriculum coverage, teaching to the test and a tick-box culture” (James & McCormick, 2009, p. 982). Also, while collaboration and networking proved to be a key element in teacher learning, its possibilities depended on the degree to which the schools’ organisational structures and leadership were supportive and enabling. The study thus provided further support for the differing effects on professional development of school and policy environments.

3.3. Mediations (Jenlink & Kinnuncan-Welsch, 2001; LePage et al., 2001; Schnellert et al., 2008; Vescio et al., 2008)

Mediations, in most education processes, are like springboards that provide the impetus for moving from one point to another. An important part of teacher learning is mediated through dialogues, conversations and interactions centred on materials and situations. Teacher professional development often involves horizontal sharing of ideas and experiences, active participation in projects or becoming aware of problems that need solutions. How others mediate teacher learning through these actions and the nature of such interactions is the subject of the next group of articles selected for this review.

The nature of university–school partnerships is discussed theoretically in an article by LePage et al. (2001) and studied empirically during one year through the experience of one professor and five teachers who were part of a “non-traditional” master’s programme offered at a USA University. The purpose of the programme was to enter into partnerships with schools and teachers through enrolling teams of teachers from individual schools. It is described as having a strong philosophical and moral component in the curriculum and an emphasis on confronting issues through analysis and research. In the second year of study, teachers worked as teams with a professor in the development of a research project. The article narrates the work of one such team. The purpose of their study was to explore the complexities of relationships between professors and teachers in a context where reciprocity was valued and teachers’ struggle against confinement to a technician role was underscored and respected by the programme. This was done through several procedures: dialogic inquiry pursued by the team through monthly meetings of which each participant kept a journal, in-depth interviews of ten alumni on the nature of professor–teacher relationships and short-answer surveys that were administered to 80 master’s students at the beginning and end of their studies on the relationship to their professors. The researchers used all the data sources to study the nature of their mediations and deal specifically with issues of authority and hierarchy, role definitions, and contradictions in their different role relations. The process produced changes in hierarchical relations, from greater to lesser feelings of intimidation among the teachers, although a sense of distance still remained due to the professors’ responsibility for assessment. Role definitions were marked by ambiguity. In part teachers equated their role as

teachers of children with the professors' role, but more importantly their roles appeared confused due to what the authors described as the growing 'isomorphism' in teacher and professor definitions within the broader community. For example, teachers increasingly are urged to take on tasks such as research in classrooms that traditionally formed part of academia, while teacher educators are requested to develop skills normally defined as belonging to excellent classroom teachers. This convergence of roles causes difficulties in role definition, especially as the institutions themselves do not change as rapidly in the same direction. On the basis of their findings, the authors suggest changes in how teacher educators see their role and how they value teachers as partners, but also they propose that both sides collaborate in defining roles that do not blur distinctions or maintain traditional boundaries.

While the LePage study addressed role relationships between university professors and teachers, Jenlink and Kinnuncan-Welsch (2001) examined the role of facilitators in teacher development activities, seen from the side of facilitators. The article centres on case stories written by the facilitators of nine study groups of teachers who were part of a professional development activity in the USA. These stories resulted from a project in which three types of teams interacted: a design team of three university academics, a team composed of 12 teacher facilitators plus the design team, and nine study groups of 5–14 teachers. The article centres on narratives written by three of the facilitators on their lived experiences after five months of work with the study groups. The sources from which these narratives were crafted include field notes from participant observation, videotapes, reflective journals, critical moment stories and individual, peer and focus group interviews. The article presents three case stories, as seen in each case through the lenses of a different facilitator: how to get a group started and set the ground rules in one case, or how to handle domineering participants and maintain trust and motivation, in another. The third case story, written after the end of the group work, was the joint facilitators' reflection of what the experience had meant for them: "it has given me the skills and ability to not necessarily delegate more, but let other people take over the role and lead the conversation... it has given me the opportunity to participate versus always being in the leadership role" (Jenlink & Kinnuncan-Welsch, 2001, p. 717). The article ends by highlighting key elements involved in the process of facilitation, issues and outcomes of the process, and its effects on the facilitators' personal professional development: increased confidence, high degree of commitment, heightened responsibility of the self as learner and impact on their personal lives.

Finally, two other studies bring out the importance of teacher co-learning as being itself a mediating factor in the change of practices as well as in the improvement of student learning. One is a review of research on the impact of professional learning communities (Vescio et al., 2008) and the other an account of the effect on reflection and practice of teachers who engage collaboratively in the construction, scoring and interpretation of assessment data (Schnellert et al., 2008). Vescio et al.'s (2008) review covers 11 studies all centred on the impact of professional learning communities. These are described as teachers in schools, with shared values and norms, who work together collaboratively and reflectively on their improvement with a specific focus on student learning. Not all studies reviewed reported important changes in practice, but they did report changes in the school cultures due to four main characteristics: collaboration, a focus on student learning, teacher authority described as the ability of teachers to make decisions within their communities and in school governance, and finally recognition of the importance of teacher continuous learning. As far as improvement of student learning was concerned not all studies examined this outcome, but the eight that

did reported improved student learning and the key contributing factor to this was the learning community's commitment to meeting student learning needs. The article by Schnellert et al. (2008) takes us closer into the learning experience of six teachers in one Canadian school. These teachers worked together with university researchers in the use of two learning tools designed to help develop and measure progress in literacy skills among students, part of a policy target known as Learning through Reading. The relevant part of the broader study was the collaboration of teachers in the use of these instruments, the interpretation of the data they produced, reflection on the meaning of the results and setting of goals, as well as the planning, enacting and reflection on their instructional strategies and the refinement of their teaching over time. All this occurred during what the authors call "data-driven cycles of collaboration". Analysis of the information provided by teacher interviews, field notes from planning meetings and classroom observations as well as classroom artefacts such as lesson plans, graphic organisers, allowed the researchers to conclude that the collaborative reviewing of formative assessment data influenced all teachers' changes in teaching, although to varying degrees. They were also able to conclude that this was not related to years of experience but to the extent to which they had engaged in stages of collaborative and reflective inquiry.

4. Concluding reflections

At the end of this journey through so much that has been studied and written on teacher professional development over a decade, what perhaps more vividly stands out is the extent to which, at least in these publications, we have moved away from the traditional in-service teacher training (INSET) model. What underlies the thematic emphasis of the studies reviewed, their assumptions and inquiry methods, is a recognition that teacher learning and development is a complex process that brings together a host of different elements and is marked by an equally important set of factors. But also, that at the centre of the process, teachers continue to be both the subjects and objects of learning and development.

The particular way in which background contextual factors interact with learning needs varies depending on the traditions, culture mores, policy environments and school conditions of a particular country. The starting point of teachers engaging in professional development in the Namibian study may not be relevant to teachers in Canada or The Netherlands. On the other hand, there is a similitude in the processes whereby teachers move from one stage to the next in different contexts, that appears to be supported in the research reviewed, although with different manifestations. The effort to construct models of teacher development is also a way of searching for unifying threads in the midst of diversity. Cognitive theory and research have helped unveil some of the constant factors such as the role of prior beliefs and perceptions of self-efficacy as individual factors supporting or hindering change, while socio-cultural theory has directed the attention to the external situations that likewise affect change. The good news, resulting from the research reviewed is that diverse formats of professional development have effects of some kind or degree. The not so good news is that we know little about how pervasive these changes are and to what degree they sustain continuous efforts to move ahead. Although it was clear from the successful experiences narrated, that prolonged interventions are more effective than shorter ones, and that combinations of tools for learning and reflective experiences serve the purpose in a better way.

The power of teacher co-learning emerges very strongly from the studies reviewed. The road starts with informal exchanges in

school cultures that facilitate the process, continues in networking and interchanges among schools and situations and is strengthened in formalised experiences such as courses and workshops that introduce peer coaching or support collaboration and joint projects. In whatever way, the lesson learned is that teachers naturally talk to each other, and that such a talk can take on an educational purpose. It also is true that in many places classroom teaching continues to be a solitary activity. Therefore to move from co-learning through talk to co-learning through observation and feedback is necessary as well as effective, as illustrated in experiences such as lesson study.

The traditional “master” role of teacher educators and researchers is revised in a number of the studies reviewed. We read about partnership experiences between university professors and teachers in formal courses where roles and role-playing were investigated in order to further more productive engagements in learning and change. Other partnerships such as those generated by external researchers working with teachers as co-researchers contributed to modify the traditional separation between academia and the professions.

Finally, although the topic was not included in the selected articles, the wider list included a set of articles that highlighted the effects of policy environments centred on standardised examination results and restricted notions of teacher accountability. This is not a minor issue, as these policies have travelled the world and penetrated more strongly in precisely those contexts where teachers, working under difficult conditions, have limited opportunity to renew imaginatively their teaching through collaborative work amongst themselves. In the quest for higher examination scores, they are provided with “outside experts” to teach them how to produce results in the short periods of time demanded by their education systems. The experiences in the articles reviewed run counter to such a model.

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