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ORIGINAL PAPER

Effectiveness of professional development for teachers in French- and English-medium public elementary schools in Quebec, Canada: A first descriptive survey

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Abstract

Participating in effective professional development (PD) is beneficial in many ways for teachers themselves, but also for improving school systems. "Effective" PD differs from "traditional" PD in that it employs elements known to support changes in teaching practices and in student learning. Characteristics of effective PD include collective participation, sustained duration, active learning and specific content focus, all within a coherent development process. Based on these effectiveness characteristics, the authors of this article conducted a survey to assess the PD provided to Quebec elementary (primary) school teachers ($N = 708$) and to identify the content, the learning modes emphasised, the reasons why teachers participated, the perceived benefits, the impacts of participation, as well as the incentives for and potential barriers to participation. Overall, they found that teachers rarely participate in PD unless it has first been specifically offered to them. Although Quebec teachers have access to a relatively wide range of PD activities (e.g., in-school or out-of-school workshops, conferences, teacher networks, professional learning communities, university courses), there is still a need for improvement in terms of the inclusion of effectiveness characteristics in PD activities. The authors conclude their article with avenues for further research and recommendations to increase the effectiveness of teacher PD.

Keywords Effective professional development · Teachers' professional learning · Survey research · In-service teacher education · Teacher change

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Résumé
Enquête descriptive sur l'efficacité des activités de développement professionnel auxquelles participent les enseignants des écoles primaires publiques francophones et anglophones du Québec (Canada) – La participation des enseignants à des activités de développement professionnel (DP) efficaces comporte plusieurs bénéfices, notamment au regard de l'amélioration des systèmes éducatifs. Ces activités de DP « efficaces » se distinguent des activités « traditionnelles » puisqu'elles réunissent des caractéristiques qui seraient reconnues pour soutenir la transformation des pratiques enseignantes et l'apprentissage des élèves. Ces caractéristiques renvoient aux activités de DP qui sont collaboratives, étendues dans le temps, qui misent sur l'apprentissage actif, qui sont centrées sur un contenu précis et qui font partie d'un processus de développement cohérent. S'appuyant sur lesdites caractéristiques d'efficacité, les autrices du présent article ont réalisé une étude permettant de décrire l'offre d'activités de DP proposée aux enseignants québécois ($n = 708$) et de cibler les contenus abordés lors de ces activités, les modes d'apprentissage privilégiés, les raisons menant les enseignants à participer aux activités, les bénéfices et les effets perçus de leur participation, ainsi que les incitatifs reçus et les raisons qui peuvent freiner leur participation. Globalement, elles ont constaté que les enseignants québécois participent rarement aux activités qui ne leur ont pas d'abord été offertes. De plus, si les enseignants québécois ont accès à une offre d'activités relativement variée (ateliers tenus à l'école ou à l'extérieur de l'école, conférences, réseaux d'enseignants, communautés d'apprentissage professionnel, cours universitaires, etc.), la prise en compte des caractéristiques d'efficacité pourrait être améliorée. Les autrices concluent leur article en dégageant de nouvelles perspectives de recherche et proposent diverses recommandations visant à accroitre l'efficacité du DP des enseignants.

Introduction

Today, teachers are widely acknowledged as playing a major and predominant role in student success at school (OECD 2014) – an impact confirmed by many studies (Alton-Lee 2003; Darling-Hammond et al. 2017; Desimone 2009; Elmore 2002; Hargreaves and Fullan 2012; Hattie 2009, 2013; Timperley 2011a). At the same time, the job of a teacher has grown increasingly complex in recent years; societal expectations for children's education have grown, and the skills and knowledge that students need to thrive in society are constantly evolving (Darling-Hammond et al. 2017; OECD 2014).

All these changes have significant consequences for teachers in terms of having to address new challenges. According to Maurice Tardif (2013), the media regularly focus on difficulties teachers experience in the classroom, including the integration of students with special needs into regular classes, child poverty, rocky relationships with some parents, educating students from diverse cultural and linguistic backgrounds with minimal shared experiences, and rising violence against and disrespect for teachers in schools. Added to this is the helplessness teachers feel when faced with increasing numbers of failing students (ibid.).

Numerous researchers now acknowledge the importance of teacher commitment to a career-long PD process in order to tackle these difficulties and improve school effectiveness (Darling-Hammond et al. 2017; Desimone 2009; Desimone and Garet 2015; Opfer and Pedder 2011; Timperley 2011a). Engaging teachers and school teams in a continuous PD process is now considered a useful way of not only supporting teachers' personal development and professional autonomy (CSÉ 2014; Day 1999; Langdeau 2004) and changes in teaching practices (CSÉ 2014; McCormick et al. 2008; Ono and Ferreira 2010; Supovitz and Turner 2000), but also student learning (McCormick et al. 2008; Opfer and Pedder 2011).

Nevertheless, not all PD practices are equally effective. Since the early 1990s, various studies have demonstrated that many PD activities hardly translate into changes in terms of teacher practices. One reason for this is that, traditionally, many PD activities offered to teachers are in the form of workshops, seminars, conferences or courses (CSÉ 2014; Fullan and Hargreaves, 1996; Sellen 2016; Villegas-Reimers 2003). Many researchers have criticised such PD as too brief, isolated, fragmented, incoherent and/or decontextualised, and therefore less likely to improve teaching practices (Fullan and Hargreaves 1996; OECD 2005; Ono and Ferreira 2010; Villegas-Reimers 2003). Many PD activities also focus on having teachers develop a repertoire of alternative practices (Little 1993) rather than having them engage in a genuinely reflective process (Korthagen 2017; Little 1993).

The current state of PD for Quebec teachers

In Canada, education is a provincial responsibility. Stakeholders involved in the provincial educational system of Quebec recognise the importance of ensuring that teachers reach and maintain a high level of professional skills. In 2020, the Quebec Ministry of Education amended the Education Act (NAQ 2020) to add new continuing education requirements for elementary (primary) and secondary school teachers. Even though participation in PD is encouraged, there were no data available prior to our survey to create a portrait of the PD activities that teachers in Quebec's French- and English-medium elementary schools participated in (see also CSÉ 2014). The survey we conducted enabled us to describe PD activities and their relative occurrence in order to examine whether the most common PD activities are in agreement with the characteristics recognised in the literature as promoting effective PD (Desimone 2009).

Conceptual framework

Over the past 30 years, a certain consensus has emerged in the scientific community regarding the main characteristics of effective PD, which have proven to support changes in teacher practices in order to improve student learning (Garet et al. 2001, Desimone et al. 2002, Elmore 2002, Villegas-Reimers 2003, Desimone 2009, Opfer and Pedder 2011, Timperley 2011a, CSÉ 2014, Desimone and

Table 1 Summary of the effectiveness characteristics of teachers' professional development based on the work of Desimone (2009)

Effectiveness characteristic	Description
Content focus	Activities with a specific content focus, such as those that simultaneously teach the educational content and explore pedagogical practices that enable students to learn that content, are conducive to effective professional development
Active learning	Teachers engage in a process of inquiry into their own practices, reflect on their beliefs and experiences, and analyse and experiment the new strategies they have learned. Ideally, teachers are able to connect what they learn to their everyday work with students in the classroom (e.g., evaluating their students' work, analysing videos of their practice, observing and analysing their colleagues' practices, coaching or mentoring, leading discussions with colleagues, writing articles)
Collective participation	PD activities that encourage collective participation by teachers of the same school, subject, or year level are more likely to lead to changes in classroom teaching practices. These activities support the development of a shared framework of knowledge, which in turn enables improved understanding of a variety of teaching issues. Collective participation is more effective when provided with different forms of support such as mentoring, coaching, and peer observation
Duration	The general consensus is that a minimum of 20 hours should be spent on PD over the course of at least one semester. It is important to keep in mind that experimentation and implementing new classroom practices takes time, that time is valuable, and that teachers are entitled to it
Coherence	It is crucial that teachers perceive PD as part of a coherent development program that takes into account their personal framework (values, interests, knowledge, motivations, beliefs, experiences) and learning needs, the needs of their students and the school's priorities

Garet 2015, Darling-Hammond et al. 2017). These characteristics, grouped into five categories by Laura Desimone (2009), are as follows (for more detail, see Table 1):

- PD is centred on specific educational content and on how students learn that content.
- PD focuses on active learning by teachers.
- PD is coherent.
- PD is of sufficient duration.
- PD is collaborative.

Nonetheless, it is worth noting the contrasting results of a few other large-scale experimental studies (Garet et al. 2008, 2011) on PD activities that have incorporated these five main characteristics. These studies highlighted the difficulty of translating these five general characteristics into effective PD activities, and consequently noted that further studies to explore this difficulty were necessary (Desimone and Garet 2015). For their part, Sam Sims and Harry Fletcher-Wood (2021) argue that the consensus on these five characteristics is likely to be

inaccurate because the reviews on which it is based are methodologically flawed due to the use of inappropriate exclusion criteria and the dependency on an invalid inference method. Consequently, refining our understanding of the professional learning mechanisms that lead to real improvements in student learning outcomes is highly relevant.

However, for our own survey, we have drawn on these five categories defined by Desimone (2009) and then refined by Desimone and Garet (2015) because they are consistent with a large number of other research studies on teachers' effective PD (Darling-Hammond et al. 2017; Desimone and Garet 2015; Elmore 2002; Garet et al. 2001; Timperley 2008; Villegas-Reimers 2003). Furthermore, we developed the survey tools we used in our study using questionnaires based on these characteristics.

Methodological approach

Recruitment

We used a variety of strategies to recruit as many participants as possible. First of all, we concluded two agreements with teachers' unions, one with the *Fédération des syndicats de l'enseignement* (FSE CSQ) and one with the *Association provinciale des enseignantes et des enseignants du Québec*/Quebec Provincial Association of Teachers (APEQ-QPAT). Under these agreements, each of these two provincial teachers' unions sent our recruitment e-mail to their affiliated unions, and those unions were then free to choose whether or not to share it with their members. We also invited teachers to participate on multiple occasions using the following social media: Facebook, Twitter and LinkedIn. Our recruiting process was approved by the Laval University Ethics Committee and took place between 25 November 2019 and 31 January 2020. Our sampling was non-probabilistic, as participants voluntarily chose to respond to the questionnaire.

Population and sampling

To be included in the study, participants needed to be part of the target population: teachers in French- or English-medium public elementary schools in Quebec. We defined this population as any staff member (permanent, non-permanent or adjunct), teaching in classes called "regular" or "special", from kindergarten to Grade 6,[1] in any of Quebec's 72 school boards. According to the most recent available data, there were 61,998 teachers in this target population (MÉES 2020). Out of this population, 1,707 teachers responded to the questionnaire; of whom 713 filled it out completely, and 994 partially. Only fully complete questionnaires were used for the purposes of this study, and we had to discard five of the 713 completed questionnaires. Three of

[1] Children in Quebec join kindergarten/preschool, which is voluntary, at age 4 or 5. They enter elementary (primary) school (Grades 1–6) at age 6, progressing to secondary school (Levels I–V) at age 12. School attendance is free and compulsory from age 6 to 16.

the five had opened the questionnaire, but then not consented to filling it in, and the other two had provided impossible data on seniority.[2]

While the remaining respondents ($N = 708$) might not be a representative sample of the broader teacher population, we conducted our analysis using weighted data obtained from post-stratification, a strategy allowing us to correct for disparity between the sample and the population. We were able to weight the results using selected population characteristics (gender, teacher's job status and teacher's school board affiliation) based on information provided to us by Quebec's Ministry of Education and Higher Education (MÉES 2020). This approach allowed us to correct for the probability of inclusion and non-response with regard to the above variables, and thus to extrapolate our survey's results to the wider population of teachers in French- and English-medium elementary schools in Quebec (Fortin and Gagnon 2016; Gelman 2007; Lumley 2010).

Data collection and instrument

The data collected in this survey were collated using LimeSurvey and hosted on the secure site belonging to the *Centre de recherche et d'intervention sur la réussite scolaire* [Centre for research and intervention on school success] (CRIRES).[3] The English questionnaire we used for our study is an adapted version[4] of the questionnaire that was developed, tested and validated by Darleen Opfer and Dave Pedder (2008) as part of a national survey on teachers' PD in England.[5] That questionnaire has also been used in other large-scale national surveys (see Pedder et al. 2010). Our adapted version comprised five sections (A–E), with a total of 29 questions:

Section A; Professional learning practices (Question A1);
Section B: Continuing professional development activities (Questions B2–B5);
Section C: The professional development activity on which you spent the most time during the previous 12 months (Questions C6–C15);
Section D: Support and barriers to professional development activities (Questions D16–D17); and
Section E: Teacher background (Questions E18–E29).

To cater for our participants from French-medium schools, we translated the English questionnaire into French because no such tool existed in French. In October 2019, the French version translated by the first author of this article underwent selected

[2] The questionnaires of respondents no. 421 and no 597 were discarded as their stated years of seniority were 135 years and 188 years respectively.

[3] The two versions of the questionnaire are available at https://sites.google.com/view/dp-enseignement/questionnaires

[4] The adaptation of the questionnaire involved the removal of questions that measured the value that teachers place on certain PD practices and various kinds of institutional support, as these topics were not relevant to the objectives of this study.

[5] Authorisation to use this questionnaire and to translate it into French was formally granted by e-mail communication with one of the study's primary investigators, David Pedder.

steps of the cross-cultural validation process proposed by Joseph Flaherty et al. (1988, reviewed in Fortin and Gagnon 2016), in order to ensure that it matched the English original as closely as possible, including validity. First, the two co-authors of this article were given the original and translated instruments to assess how closely they corresponded to each other. Next, four teachers were asked to respond to the French and English versions of the questionnaire. They were selected based on two main criteria: they were bilingual, and they taught in a public elementary school in Quebec. We also ensured that the teachers selected represented a variety of relevant characteristics (for example, rural and urban settings, regular and specialist, different genders). We compared the responses between the French and English versions to make sure that the responses collected would be substantially equivalent. No formal assessment of validity was conducted, as the original instrument had already been tested and validated by Opfer and Pedder (2008).

We added one question (C8) and one section (D "Support and barriers") containing two questions (D16 and D17) to the Opfer and Pedder (2008) questionnaire. These questions were drawn from the questionnaires written in English and French that were used in the Teaching and Learning International Survey (TALIS 2018). The validity and correspondence of these two questionnaires have been confirmed by a committee of education and PD specialists (Ainley and Carstens 2018). Adding Question C8 enabled us to identify the precise effectiveness characteristics of the activity to which teachers dedicated the most time. Section D was designed to address two objectives of this study: identifying support offered to teachers for participating in PD and identifying barriers to participation.

Method – weighted summary descriptive analysis

In order to describe the PD activities that teachers in French- and English-medium elementary schools in Quebec participate in, we conducted weighted summary descriptive analyses using the software R, version 3.6.3 (R Core Team 2017). This was done for every question that referred to professional learning practices used (A1), participation in PD activities (B2, B2A, C1 to C15), and incentives and barriers to teacher participation in PD (D16, D17). We present the results as average scores (proportions and percentage) and range, with a confidence interval (CI) of 95%, obtained from weighted analyses carried out using R's "survey" package. We specified the study design with the "svydesign" function from that package and weighted the data using the post-stratification method with the "rake" function. Post-stratification adjusts the sampling so that the joint distribution of a set of post-stratifying variables matches the known population joint distribution, in order to ensure that the estimates based on the survey's findings are aligned with demographic estimates. It is worth noting that two school boards (SBs) were erroneously omitted when the questionnaire was developed, one in the Montréal region (Marguerite Bourgeoys SB) and the other in the Montérégie region (Grandes Seigneuries SB). Consequently, all respondents working in these two school boards were categorised as "Other" for the purposes of post-stratification weighting.

Analysis was carried out on the sampling as follows. The "full" sample ($N = 708$) was used for the responses to Question A1 (regarding the professional learning practices that teachers use) and to Questions B2 and B2A (regarding teachers' participation in PD activities and opportunity for participation). The full sample was also used for Section E, containing questions on respondents' sociodemographic characteristics (E18–29), and Question D17 (regarding some potential barriers to teachers participating in PD). A "reduced" sampling ($n = 519$) of teachers who indicated in question B2A that they had participated in PD within the previous 12 months was used for analysis of responses to Question D16 (regarding incentives to participate) and Section C (gathering more in-depth information on the characteristics of the PD activity that teachers spent the most time on during the previous 12 months). The remaining respondents ($n = 189$) had indicated that they had not participated in PD activities (see Table 2), and hence were automatically directed to the question about the barriers to their participation (Question D17).

It is worth noting that due to our choice of questionnaires for this survey, we only had access to teachers' statements about their behaviour, rather than access to their effective behaviour (Bressoux 2001, reviewed in de Dupin de Saint-André et al. 2013). This may have led to bias in the responses provided and, consequently, in our interpretation.

Results

Our results indicate that teachers' professional learning practices are varied, are both individual and collaborative, and employ reflective activities, questioning and in-class experimentation (see Figure 1).[6] Professional learning practices teachers appear less likely to use include reading research reports as a source of useful ideas for improving their practices, modifying their practices in the light of published research evidence, and relating what works in their own practice to research findings(see Figure 1).

Opportunity for, participation in, and organisation of PD activities

With respect to teachers' participation and opportunity to participate in various PD activities over a 12-month period, our findings indicate that the available activities are relatively varied, with an overall emphasis on conferences or presentations, workshops or seminars focused on a specific topic, in or out of school, and, to a lesser degree, in teacher networks (see Figure 2). Our findings also show that teachers rarely participate in activities that are not first offered to them (see Figure 3).

[6] Since their inclusion here would have exceeded acceptable article length, we have hyperlinked Figures 1–15 to their external platform location at https://sites.google.com/view/dp-enseignement/projets-de-recherche/portrait-des-activit%C3%A9s-de-dp/figures-english

Table 2 Questionnaire respondents ($n = 189$) who answered 'No' to Question B2A (did not participate in PD activities in the past 12 months), by response to Question B2 (did or did not participate in the types of PD activities listed)

PD activity	Participated in the PD activity listed (Question B2)	
	Yes*	No*
In-school workshops or seminars, focused on a specific topic, provided by or within your school ($n = 151$)	58.94% ($n = 89$)	41.06% ($n = 62$)
Non-university accredited courses, leading to a diploma or certificate ($n = 138$)	7.25% ($n = 10$)	92.75% ($n = 128$)
University courses, leading to a diploma, certificate or advanced degree ($n = 141$)	14.89% ($n = 21$)	85.11% ($n = 120$)
Out-of-school workshops or seminars, focused on a specific topic ($n = 157$)	52.23% ($n = 82$)	47.77% ($n = 75$)
Teacher networks or collaborative, connecting teachers within or outside your school ($n = 145$)	43.45% ($n = 63$)	56.55% ($n = 82$)
Conferences or presentations organized by your union, a professional organization, your school board, the Ministry of Education and Higher Education, etc. (n = 154)	52.60% ($n = 81$)	47.40% ($n = 73$)
Mentoring, coaching, lead teaching or observation of peers, in a one-on-one situation, usually in the classroom ($n = 140$)	33.57% ($n = 47$)	66.43% ($n = 93$)
Committee or task forces, focusing on curriculum, instruction, or assessment ($n = 145$)	31.03% ($n = 45$)	68.97% ($n = 100$)
Professional learning community of teachers or research groups, meeting regularly, face-to-face, to further knowledge and practice (n = 140)	33.57% ($n = 47$)	66.43% ($n = 93$)
Independent study, in which you systematically examine your own practice ($n = 139$)	38.13% ($n = 53$)	61.87% ($n = 86$)

*The total number of respondents is different for each question, as respondents had the option of answering or not answering each of the questions

A wide variety of people were involved in organising and/or leading the activities on which the teachers spent the most time. Educational advisors[7] lead this list by a large margin (see Figure 4). Members of the administration team come in a distant second, followed by university researchers or professors.

PD activity on which the respondents spent the most time during the previous 12 months

Of the activities on which the teachers had spent the most time during the last 12 months prior to responding to our survey, four activities emerged as the most common (see Figure 5): participation in a university course (18.5%), in a professional learning community (17.3%), and in an out-of-school (18.5%) or in-school (16.3%) workshop or seminar focused on a specific topic. This diversity in the types of activities that teachers engaged in probably explains the great variability in the reported activity duration (see Figure 6).

The primary reasons that prompted teachers to participate in the activity on which they spent the most time in the previous 12 months were personal rather than collective (see Figure 7). Our findings suggest that, on average, teachers were not strongly motivated to participate in a PD activity by the fact that the school required their participation (see Figure 7). We also note that the reason which played the smallest role in prompting teachers to participate in PD was that the teacher and the school principal had together identified an activity as relating to the teacher's PD needs (see Figure 7).

Presence of effectiveness characteristics

Multiple effectiveness characteristics are present in the activities on which the teachers spent the most time (see Figure 8). For example, a very high proportion of the teachers reported that their activity provided opportunities to practise or apply new ideas and knowledge in their own classrooms, that it had a coherent structure, that it adapted to their personal development needs, that it built on their prior knowledge, and that it provided opportunities for active and collaborative learning. Fewer teachers, however, reported having participated in an activity that took place at their school or involved most of their colleagues (see Figure 8).

The majority of the teachers reported that the activity on which they spent the most time in the previous 12 months was focused on content needed to teach their subjects (see Figure 8). More specifically, the activity gave the greatest emphasis to teaching and learning methods, with catering to the needs of different pupil groups in second place (see Figure 9). Specific content related to literacy or the curriculum was given some emphasis, while numeracy was given the least emphasis of all (see

[7] In Quebec, educational advisors advise both administrators and teachers at a school regarding the educational programme, course organisation, and options for instructional methods and learning materials.

Figure 9). We also note that the teachers reported that the activity in question put relatively little emphasis on learning to learn (see Figure 9).

In terms of teaching methods, although a very high proportion of the teachers reported that the activity on which they spent the most time used active learning (see Figure 8), what they reported doing as part of those activities was nonetheless mainly associated with passive learning modes (see Figure 10). For example, the teachers reported having participated in small-group or whole-group discussions or listening to a lecture or presentation, rather than actions such as engaging in extended problem-solving, reviewing or assessing student work or developing or reviewing materials (see Figure 10). Few teachers indicated that they had had the opportunity to play a more central role in the activity, such as leading a small group or whole-group discussion, giving a lecture or presentation, or conducting a demonstration lesson, unit or skill (see Figure 10).

It is worth noting that after participating in the PD activity on which they spent the most time, just over half of the teachers reported having developed a plan to integrate what they learned into their classroom practice (see Figure 11). In terms of sharing and disseminating knowledge, many of the teachers reported discussing what they learned with other teachers in their school, irrespective of whether or not those others had attended the activity (see Figure 11). Furthermore, approximately a quarter of them said that they had evaluated what they learned from the activity with another education professional (see Figure 11).

Perceived benefits and impacts of participating in the activity

The teachers reported having gained both individual and collective benefits from participating in the activity on which they spent the most time (see Figure 12). Approximately 10% of the teachers stated that the activity had provided no benefits and that they felt it had been a waste of time (see Figure 12).

The perceived impacts of participating in the activity were, on average, moderate (see Figure 13). We found that the reported impacts were primarily on the teachers themselves; the respondents reported feeling impacts on their beliefs, knowledge and practices (see Figure 13). They also reported lesser impacts on their pupils and classes (see Figure 13). In general, however, there was little perceived impact on the organisation or structures of the school (see Figure 13).

Support for and barriers to participation in PD activities

Teachers had little access to various support measures to allow them to participate in PD activities over the previous 12 months (see Figure 14). The main incentive they received was release from teaching duties in order to participate in PD during working hours (see Figure 14). Next came payment for or provision of materials needed for the activities and the reimbursement or payment of costs (see Figure 14). What we might term payroll measures were the least common (see Figure 14).

The most commonly reported of the questionnaire's potential barriers to teacher participation in PD activities was a lack of substitute staff (see Figure 15).

Also common were a prohibitively busy work schedule, the cost of participation and a lack of employer support (see Figure 15). While there was a wide range of responses, the teachers who responded to our survey did not appear to feel that a lack of incentives, a shortage of relevant PD offered, or the fact that they did not fulfil the requirements (e.g., qualifications, experience, seniority) were barriers to their participation (see Figure 15).

Discussion

Professional learning practices: support for developing a learning attitude

Our study found that teachers' professional learning practices are varied, are both individual and collaborative, and employ reflective activities, questioning and in-class experimentation. In the literature on adult learning theories, such practices are recognised to be conducive to transforming teaching (Darling-Hammond et al. 2017; Korthagen 2017; Opfer and Pedder 2011). Our survey also highlighted that teachers seem least inclined to use professional learning practices that entail reading published research findings as a source of useful ideas for improving or modifying their practices or relating what works in their own practice to research findings. These findings corroborate those of Pedder and Opfer (2013), lending support to the notion that some kinds of "roadblocks" are inhibiting teachers from putting research findings into practice.

This may be surprising, given that today's teachers have easy access to online sources of information about educational research findings and to activities that present those findings. Furthermore, Quebec teachers draw heavily on the Internet as a resource; among our participants, this was the top reported professional learning practice. As noted in other studies (Bérubé 2010; CSÉ 2006; Lysenko et al. 2014), a pressing need remains for educational researchers to redouble their efforts regarding knowledge mobilisation and dissemination in order to enable teachers to put research findings into practice more effectively.

Similarly, we observe that, according to the teachers' responses to our survey, the activity on which they spent the most time during the period in question tended not to focus on learning to learn. Because developing a learning attitude is seen today as an essential characteristic for translating research findings into practice as well as a condition for effective PD (Darling-Hammond et al. 2017; Joyce and Showers 2002, 2003), it would seem appropriate that it be incorporated into the training activities offered to teachers. Such activities could put more emphasis on engaging teachers in a process of inquiry into their own learning practices (Timperley 2011b), to enable them to take control of their own professional development as educators.

Available PD activities: a crucial factor in teacher participation

Although the selection of PD activities that teachers have access to during the year is relatively varied, it is centred primarily on conferences or presentations and workshops or seminars focused on a specific topic and organised either in school or out of school. Such activities are categorised as "traditional" by many researchers (CSÉ 2014; Fullan and Hargreaves 1996; Opfer and Pedder 2010; Sellen 2016; Villegas-Reimers 2003) and only rarely feature the characteristics of effective PD mechanisms (Desimone 2009). On the contrary, they have frequently been criticised as being less conducive to changing teaching practices insofar as they are too brief, isolated, fragmented, incoherent and/or decontextualised (Fullan and Hargreaves 1996; OECD 2005; Ono and Ferreira 2010; Villegas-Reimers 2003). They have also been criticised as focusing too often on developing a repertoire of alternative practices (Little 1993; Pedder et al. 2010) rather than on a more transformative process of real reflection (Korthagen 2017).

Another thing we found is that teachers rarely participate in activities that have not been first made available to them. This finding is deeply revealing and corroborates the observations laid out in the report on a national survey on PD of teachers in England, which found that the availability of PD activities and teachers' participation in them are directly connected (Opfer et al. 2008). When teachers are given the opportunity to participate in PD activities, however, the findings are quite different: the rate of participation is at least 72%, and when it comes to independent study in which the teachers examine their own practice, the rate is as high as 98.6%.

Findings are mixed regarding the effectiveness of PD activities on which the teachers spent the most time

Teacher participation in PD activities is tied to the selection of activities made available to them, and our findings show that the main activities made available to Quebec teachers rarely feature Desimone's (2009) five characteristics of effective PD mechanisms. Opfer and Pedder (2010) have identified that a limited selection of available PD activities featuring these effectiveness characteristics was the main barrier to effective PD. However, it can be difficult to judge the effectiveness of the activities that teachers participate in without a deeper analysis of their content and the learning and evaluation methods used (McCormick et al. 2008). Accordingly, we chose to more closely examine the characteristics of the PD activity on which teachers had spent the most time over the previous 12 months, in order to determine whether that activity incorporated Desimone's (2009) effectiveness criteria for PD mechanisms.

Characteristic 1: PD activities are generally centred on specific educational content and on the way in which students learn that content

First, we should say that a specific content focus may be the characteristic with the greatest influence on the effectiveness of PD mechanisms (Desimone 2009). A high proportion of respondents (70.5%) to our survey reported that the activity on which they spent the most time in the previous 12 months was appropriately focused on content needed to teach their subjects. Specifically, the activities emphasised teaching and learning methods, catering to the needs of different pupil groups, and deepening their subject pedagogical knowledge. A high proportion of the teachers (91.0%) also reported that their activity provided opportunities to practise and apply new ideas and knowledge in the classroom. These findings are significant in that activities with a specific content focus, such as ones that simultaneously teach curricular content and explore pedagogical practices that enable students to learn that content, are conducive to professional learning (Darling-Hammond et al. 2017; Desimone 2009; Elmore 2002; Whitworth and Chiu 2015), in addition to student learning gains (Darling-Hammond et al. 2017).

We also found that, of the subject-specific content that could be included in PD activities, numeracy content appears to be often neglected. This is significant in that, in recent years in Quebec, studies have been conducted on future elementary school teachers' affective relationship to mathematics and in particular to mathematics teaching (reviewed in Theis 2012). These studies have revealed that many future elementary school teachers are anxious about the idea of teaching mathematics and have less confidence in their ability to teach mathematics than other subjects. But what about teachers who are currently working in our elementary schools? Is it possible that they, too, share the same affective relationship with mathematics teaching, and that this might be a factor in teachers' lower rates of participation in activities with a focus on numeracy content? We believe that this would be an interesting avenue to explore.

Characteristic 2: PD activities feature opportunities to engage in passive rather than active learning

Theories of development and adult learning support the idea that active learning enables teachers to engage in a process of inquiry into their own practices and to reflect on their beliefs and experiences. It also enables them to analyse and experiment with new learning strategies during an activity, in order to transform their practices and improve student learning (Darling-Hammond et al. 2017; Desimone 2009; Elmore 2002; Korthagen 2017; Opfer and Pedder 2011; Timperley 2011a; Villegas-Reimers 2003).

In our survey, while teachers reported perceiving impacts on their awareness of teaching and learning issues, on the way they think about teaching and learning, and on their beliefs about pupil learning, we find it difficult to draw firm conclusions on the learning modes emphasised in the activities on which teachers spent the most time. Many (77.2%) reported participating in a PD activity that focused on active learning, but on closer inspection, the exercises they reported doing as part of those

activities can be categorised as rather passive learning. For example, as in the survey conducted by Opfer et al. (2008), the majority of our Quebec teachers reported participating in small-group (75.2%) or whole-group discussions (54.9%) or listening to a conference or presentation (71.3%), and most of these activities took place out of school (59.4%).

Active learning, however, involves engaging in activities that connect to a teacher's everyday work with students in the classroom (Darling-Hammond et al. 2017; Desimone 2009; Elmore 2002; Opfer and Pedder 2011; Timperley 2011a; Villegas-Reimers 2003). In practical terms, active learning provides teachers with professional development that is deeply embedded and highly contextualised, enabling them to study their students' work, to get to know new subject material, and to experiment with new pedagogical practices with their students using authentic artefacts (Darling-Hammond et al. 2017; Desimone 2009; Elmore 2002; Timperley 2011a).

By contrast, in our survey, a smaller proportion of respondents reported being engaged in such exercises (e.g., studying students' work (28.8%); engaging in extended problem-solving (12.2%); conducting a demonstration lesson, unit or skill (14.4%); developing or reviewing pedagogical materials (27.6%). Furthermore, the activities on which the teachers spent the most time (university courses, in-school or out-of-school workshops or seminars and professional learning communities) were generally held outside the classroom, i.e., with no pupils present. It therefore seems difficult to conclude that active learning is truly the learning mode emphasised in these activities. Consequently, and to support teachers in selecting effective PD activities, we deem that it might be appropriate to further explore their potential understandings of active learning.

Characteristic 3: coherence and the challenge of addressing individual and collective needs

Teachers must perceive PD as part of a coherent development programme. Coherence applies to various aspects, but refers above all to the notion that PD should take into account teachers' needs, interests, beliefs, motivations, knowledge and experience (Korthagen 2017; Opfer and Pedder 2011). We found it noteworthy that the great majority of respondents reported that the activity on which they spent the most time in the previous 12 months had a coherent structure (85.4%), was adapted to their personal development needs (82.4%) and built on their prior knowledge (81.2%). They also reported that the benefits of participating in that activity included following up on previous professional learning activities (69.7%) and allowing them to meet long-term career goals (74.7%). The activities on which Quebec teachers reported spending the most time appear coherent with their background and some of their personal development needs. But how do the PD activities a teacher selects fit together over a longer period? Are they part of a coherent, personalised professional development plan? It would be interesting to study these questions in more depth, as well as their impact on transforming practices, given that our findings show that teachers did not consider the fact that an activity was part of their professional

development plan to be of top importance when choosing whether or not to participate in it.

Another dimension of the coherence of effective PD is that the objectives and outcomes of PD activities meet the needs, motivations, interests and experiences that both school systems and teachers have clearly articulated and shared (Coldwell and Simkins 2011; Darling-Hammond et al. 2017; Desimone 2009; Korthagen 2017; Opfer and Pedder 2011; Tynjälä 2013; Whitworth and Chiu 2015). Because the teachers appear to select their PD activities primarily based on personal criteria, how can we ensure to meet this crucial dimension of coherence of effective PD? This is a question worth asking. Our findings show that the "collective" reasons that would allow for a certain degree of alignment between the needs of the teacher and those of the school system are of limited significance in a teacher's decision whether or not to participate in a PD activity. For example, the fact that an activity was proposed by the school board and the teacher chose to participate, or that the school or year level/subject team made a collective decision, received relatively low average scores in our survey. Furthermore, the fact that the teacher and their principal had jointly identified an activity that related to the teacher's PD needs was the factor that carried the least weight in a teacher's decision to participate.

Additionally, we found that, although most of the teachers (65.9%) responded that the benefits of participating in the activity included that it addressed immediate school needs and that they had seen some impact in improving school-level practices, they also reported perceiving less impact in terms of changing the organisation or structures of the school. Because only 38.6% of teachers reported that their school leadership had organised and/or led the activity on which they spent the most time, we hypothesise that this low involvement of school leadership in organising and leading PD activities may help explain this finding. As Opfer and Pedder (2010) observe, when identification of learning needs and planning of PD are done in an erratic and non-strategic fashion, this results in ineffective PD for the school or the teachers. Thus, investigating both the level of school leadership involvement in teacher PD and the degree of real alignment that currently exists between the PD needs of teachers and their school systems would provide a solid ground to examine this hypothesis.

The issue of coherence between the needs and interests expressed by teachers and the priorities of their school systems seems to us to be of even greater importance considering the organisational and systemic barriers that can affect teacher participation in PD activities (Buczynski and Hansen 2010; CSÉ 2014; Darling-Hammond et al. 2017; Elmore 2002; McCormick et al. 2008; Opfer et al. 2008; Timperley 2008; Tooley and Connally 2016). For example, our survey found that the primary factor reported by Quebec teachers as a barrier to participation in PD was a lack of substitute staff. Given the current shortage of teachers, it seems vitally important to identify solutions, including incentives, which would allow teachers to continue their PD despite such obstacles. Moreover, while the least commonly reported reason was that some teachers do not feel they meet the requirements to participate in PD activities (e.g., qualifications, experience, seniority), the range of responses does show a wide variability with regard to this perception. This suggests that some

teachers believe that there are access restrictions to participation in PD activities – an unexpected finding that certainly merits further study.

In addition, varying the support measures provided to teachers to encourage them to participate in PD activities could improve coherence. Quebec teachers reported having limited access to varied support measures, and that the main incentive offered was release from teaching duties to allow them to participate in activities during working hours. Given the range of potential options for support (e.g., monetary supplements, recognition of special status, accreditation, changes to payroll structures), it would be interesting to ask Quebec teachers about the main incentives that would meet their needs and therefore enable them to participate in PD activities.

Finally, teachers should be able to assess the impacts of their PD activities in order to have a greater understanding of their strengths and PD needs (CSÉ 2014; Darling-Hammond et al. 2017). Quebec teachers participated relatively rarely (22.4%) in a formal post-activity evaluation of what they had learned. Nonetheless, they appeared to discuss what they had learned with their colleagues, irrespective of whether (70.6%) or not (55.8%) those colleagues had also participated in the PD activity, and, to a lesser extent, with school leaders and/or a representative of their union, school board or Quebec's Ministry of Education and Higher Education (32.8%). Because these discussions could result in greater transfer and mobilisation of research findings within a school, examining the nature and impact of these discussions on the transformation of teaching practices in greater depth could be enlightening.

Characteristic 4: considerable variation in the duration of PD activities

Duration on its own cannot guarantee that a PD activity will be effective, but the extremely complex and multifaceted nature of professional learning and changes in teaching practices (Korthagen 2017; Opfer and Pedder 2011) requires that PD be of sufficient duration. Both the period of time over which the activity takes place and the number of hours spent on it, then, must be taken into account (Desimone 2009; Supovitz and Turner 2000). Our survey found that the duration of the activity on which teachers spent the most time varied considerably, from one day or less to one year or more. These results should be viewed with caution in light of the responses to another question, for which a high proportion of the teachers reported that the activity in which they participated took place over an extended period, i.e., several weeks or longer.

In any case, the great variability in the duration of these activities may, of course, be due to the types of activity that the teachers selected. A university course or a professional learning community generally demands considerably more time than a short-term activity such as a workshop, seminar or presentation. The latter, shorter activities are often considered to be less effective for PD (CSÉ 2014; Darling-Hammond et al. 2017; Desimone 2009; Elmore 2002; Whitworth and Chiu 2015). In fact, several studies on the PD activities that led to significant changes in teaching practices and gains in student learning found that they took place over several weeks, multiple months, or even more than one school year (Darling-Hammond et al. 2017). These studies incorporate several of the effectiveness characteristics we have discussed, while recognising that experimentation with and implementation

of new classroom practices takes time, valuable time that teachers must be able to count on (Guskey 2002). If the goal is for teachers to participate in PD activities that are of longer duration and incorporate effectiveness characteristics, then it should be a priority to rework and improve the availability of activities deemed effective.

Characteristic 5: PD activities are collaborative, but that collaboration happens mainly with teachers from other schools

The fifth characteristic that Desimone (2009) identified as useful for effective PD is that of collective participation in learning. The PD activities on which Quebec teachers spent the most time over the previous 12 months did indeed focus on collective participation, with 80.4% of the teachers reporting that the activity provided opportunities for collaborative learning. To be effective, however, collaborative PD activities must meet certain criteria, such as occurring in a trusting environment where risks can be taken (Darling-Hammond et al. 2017; Little 2003). The objective is to create an environment that enables teachers to engage in a reflective process of observation, analysis and investigation of their own practices and those of their colleagues (Darling-Hammond et al. 2017; Elmore 2002; Little 2003; Opfer and Pedder 2011; Timperley 2011b). When multiple teachers and school leaders are involved in this process, collective PD can have a positive effect on practices that extends beyond individual classrooms (Darling-Hammond et al. 2017). Such activities can lead to a shared framework of knowledge among colleagues, which in turn enhances the understanding of a variety of teaching issues (Darling-Hammond et al. 2017).

While 69.7% of the teachers reported having had the opportunity to collaborate with colleagues while participating in PD activities, that collaboration seems to have largely been with colleagues from other schools, as only 32.0% reported that an activity involved most colleagues from their own school. It is rather difficult for us to assess the quality of the trusting environment that participants in these activities were able to establish. Still, the insight remains that the PD activities that emphasise collective participation by teachers of the same school, subject or year-level are more likely to lead to changes in classroom teaching practices (Desimone et al. 2002; Garet et al. 2001) because it breaks the isolation that can prevent teachers from examining their practices (McNicholl and Noone 2007, reviewed in McCormick et al. 2008). Consequently, examining the extent to which teachers who participated in activities with colleagues from their own school might perceive the impact of participation differently from participation with colleagues from other schools would be informative. Additionally, among the reasons that prompted them to participate in the PD activity on which they spent the most time, our respondents gave relatively low importance to the fact that their school or year-level/subject team decided collectively to participate. It seems reasonable, then, to wonder whether the full transformative potential of collective learning is truly being realised in the activities that Quebec teachers are participating in.

Conclusion

The primary objective of this study was to empirically describe the PD activities that teachers in French- and English-medium elementary schools in Quebec participate in, and subsequently to analyse those activities using the effectiveness characteristics recognised in the literature as conductive to changes in teaching practice and student learning (Desimone 2009).

Our analysis yielded mixed results regarding the presence of effectiveness characteristics in the PD activity on which teachers spent the most time over the last 12 months prior to responding to our survey. The range of responses to each question led to highly varied results. Nonetheless, our interpretation of the average scores tends to indicate that in the majority of cases, there is room for improvement in incorporating all effectiveness characteristics. The same is true for the outcomes expected from effective PD: changes to teaching practices and gains in student learning (Darling-Hammond et al. 2017; Desimone 2009; Guskey 2003; McCormick et al. 2008; Opfer and Pedder 2011). Although there was wide variation in the responses, on average the teachers in our study reported perceiving some degree of impact in terms of improved knowledge and skills. The perceived impact with regard to improved pupil performance or learning outcomes was more inconclusive. That said, because PD activities tend to be more effective when they incorporate all the effectiveness characteristics (Darling-Hammond et al. 2017; Desimone 2009), it would be interesting to explore whether teachers who participate in activities that incorporate all the characteristics perceive a greater impact in changes to their practices and gains in student learning.

This study enabled us to suggest avenues for further research and to make a number of recommendations regarding public policy on teacher PD that has been implemented or will be in the coming years, both within and outside Quebec. Our recommendations are based on our results and the fact that it is often up to the teachers to select the PD activities they will participate in, which further depends on the choices and options made available to them (Sykes 1996, reviewed in Opfer and Pedder 2010).

Public policy recommendations

We recommend the development of mechanisms to support offering a richer and wider variety of PD activities that meet a range of teacher and school system needs and, crucially, incorporate the characteristics that are recognised as effective in changing teaching practices and bringing about student learning gains. Such mechanisms might include:

- ensuring that information on effectiveness characteristics is more widely distributed;
- encouraging a collaborative examination of teacher PD needs;
- supporting the development of structured long-term PD plans;

- considering the decisive role that educational advisors play for PD, possibly because they have the responsibility for PD and are easily available for teachers;
- broadening the role of universities' education faculties and supporting greater access to researchers with recognised subject matter expertise (e.g., funding more action-research projects, organising support clinics for integration and professional development);
- most importantly, emphasising teachers' professional autonomy;
- significantly increasing knowledge mobilisation efforts so that teachers can more effectively translate research findings into classroom practice:
- providing more support to teachers for developing a learning attitude through a process of inquiry into their own practice, with the goal of taking control of their PD;
- ensuring that government bodies clarify their understanding of PD, and that it is shared with and understood by all education professionals;
- encouraging school staff to incorporate effectiveness conditions when planning, organising, implementing and evaluating PD activities; and
- providing more and varied support for teacher needs so as to encourage teachers to participate in effective PD activities.

Recommendations for avenues of further research

Based on the findings of the survey carried out by Opfer and Pedder (2010) and the literature review that was part of that survey (McCormick et al. 2008), it seems appropriate to conduct a closer analysis of the characteristics of PD activities offered to teachers, and to do so using a sociodemographic breakdown (e.g., job status, seniority, region, special class). The objective, naturally, would be to ensure that as many teachers as possible have access to a rich and varied selection of PD activities.

It would also be interesting to study in greater depth which factors drive certain teachers to participate in effective PD activities compared to activities that are known to be less effective at changing practices and improving student learning.

Finally, given the current theoretical and epistemological debate on what makes PD activities effective (Kennedy 2016; Sims and Fletcher-Wood 2021), it is essential to continue investigating the predictors or characteristics of effective PD activities to refine our understanding of the professional learning mechanisms that lead to real improvements in student learning outcomes.

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