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Professional Learning in a Digital Age

L'apprentissage professionnel à l'ère numérique

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Abstract

While professional development (PD) has always been central to the teaching profession, increasingly traditional models of PD are out of step with contemporary ways of learning. Commiserate with the literature, we see the field moving along a continuum which reflects changes in what, how and when teachers learn. Following a brief sketch of the online teacher professional development (oTPD) field, we identify important considerations of emerging models of technology-mediated professional learning (TMPL). We posit the catalyst for the transformation of education, as envisioned by countless educational leaders, may lie in reimaging professional development as professional learning in a networked age.

Résumé

Alors que le perfectionnement professionnel (« PP ») a toujours été au cœur de la profession d'enseignant, les modèles traditionnels de PP sont de plus en plus décalés par rapport aux méthodes contemporaines d'apprentissage. Nous voyons ce domaine progresser dans un continuum qui reflète les changements dans ce que les enseignants apprennent, dans la façon et le moment où ils l'apprennent, et cette progression correspond à la littérature. Après un survol du domaine du perfectionnement professionnel en ligne pour les enseignants, nous cernons des considérations importantes sur les modèles émergents de la formation professionnelle assistée par ordinateur. Nous postulons que le catalyseur de la transformation de l'éducation, comme conçue par d'innombrables chefs de file de la pédagogie, pourrait être de ré-imaginer le perfectionnement professionnel comme une formation professionnelle à l'ère des réseaux.

Professional Learning in a Digital Age

Professional development (PD) is essential to the teaching profession. Not only does effective PD allow teachers to increase their knowledge and develop new instructional practices (Gore &

Ladwig, 2006), but also it can and should lead to improvements in student learning (Alberta Education, 2010; Blank de las Alas & Smith, 2008; Borko, 2004; Garet, Porter, Desimone, Birman, & Yoon, 2001). The greatest challenge with teacher PD has been in determining what professional development experiences are most effective for improving teaching and learning. Fullan (1991) pointedly states, "Nothing has promised so much and has been so frustratingly wasteful as the thousands of workshops and conferences that led to no significant change in practice" (p. 315). He has more recently predicted that unless professional development activities "motivate people to put in the effort - individually and collectively - that is necessary to get results, improvement is not possible" (Fullan, 2006, p. 8).

A significant body of research has clearly shown in order to change practice PD must: be ongoing, sustained, intensive and supported by modeling and coaching; allow educators to see and share their own and student work reflectively and collaboratively; be embedded in the curriculum, classroom and school; and, foster a supportive and inspiring environment for testing new ideas and new teaching idea (Darling-Hammond, & McLaughlin, 1995; Fullan & Hargreaves, 2002; Garet et al., 2001; Hargreaves & Fullan, 1992; Killion, 2007; Killion & Williams, 2009). While this body of work highlights the characteristics of effective traditional PD over the last 20 years, we need to update the approach relative to the changing realties and specifically the digital affordances of our time. Davis (2009) suggests the "binge" approach of traditional PD in the form of lengthy face-to-face sessions and full-day conferences could be balanced by bite-sized learning through Web 2.0 technologies. These technologies can help schools create structures for sustained, complex, and meaningful professional learning (Huber, 2010).

While technology-mediated formats for teacher professional learning are gaining popularity, it is important to recognize that these new formats are not a replacement for face-to-face experiences. Indeed much of the literature endorses a blended approach as teachers benefit most from a combination of online and face-to-face learning opportunities. As Killion and Williams (2009) state, "The advent of quality online professional learning combined with in-person, peer-based professional learning communities has enabled this approach to professional development to have the greatest success for increasing teaching quality and student learning" (p. 1). Many working in the field predict a hybrid model will emerge in the years ahead and finding the optimal mix is emerging as a key direction.

Figure 1: **PD Models Continuum**

In what follows we provide a brief sketch of what is currently known about the benefits of online teacher professional development (oTPD) as well as to identify important considerations when designing effective technology-mediated professional learning (TMPL). Commiserate with the literature, we see the field moving along a continuum which reflects changes in what, how and

when teachers learn. The continuum also captures the growing interest in moving from traditional PD based models towards inquiry-based professional learning models.

Finally, we highlight an emerging body of work, Personalized Learning Networks (PLNs), which weave together the key features of oTPD and provide a fruitful starting point for reimaging professional learning in a networked age.

What is oTPD and What Benefits does it Afford?

oTPD is defined as:

> **…**professional development based on electronic technologies increasingly refers to web-based, interactive experiences combining text, video, and sound. It is often asynchronous, in that all participants do not have to be engaging in an experience at the same time (as is the case with e-mail). Yet OTPD also can be richly interactive, in that it can give participants multiple opportunities to reflect on issues, questions, or answers before responding online. (National Research Council, 2007, p. 4)

In what follows, we identify three themes emerging from the fairly meager but growing body of work on oTPD generated over approximately the last 10 years. These themes, personalization, practice-focused and community-based, were selected because they were consistent across the literature and most relevant to the current challenges and opportunities. The three themes speak to the potential of oTPD relative to some of the core issues or barriers to effective teacher learning, capitalizing on existing technologies (personal and system-wide) while also providing ways for teachers to expand their collegial circle.

Personalization.

The discourse around personalization, having roots in inquiry-based learning, is commonly used in connection with student learning especially in relation to differentiated instruction or assessment for learning (Tomlinson, 1999). However, there is evidence to suggest learning occurs when individuals are personally invested and see meaning and value in the subject (Diaz-Maggioli, 2004; Fullan, Hill, & Crévola, 2006). We identified several characteristics of effective oTPD under the banner of personalization in the literature. oTPD allows professional development to be more personally relevant, meaningful and engaging to teachers because they are able to 1) have choices in their learning experiences (e.g. opting in and out), 2) take advantage of the flexibility of the technology (e.g. learn when and where it suits their schedules), 3) customize the experience (e.g. connecting with specific colleagues and researchers) and 4) have space to be reflexive.

Dede (2006) notes the impetus for using technology grew from a desire to ensure professional development was "tailored to teachers' busy schedules…[and] available to teachers at their convenience [to] provide just-in-time assistance" (p. 2). In essence, "Web 2.0 professional development [is] …more self-paced and flexibly responsive approach to individual interests and needs" (Fontichiaro, 2008, p. 30).

The literature suggests oTPD, as part of a cultural shift in the way we engage in learning, can instigate active engagement rather than passive consumption of information. The statement below speaks broadly to the way technologies support individual interests.

> In effect, though people perpetually explore online content and materials to learn, a final ingredient is needed to truly open education for more democratic participation and personalization. That component has to do with culture and psychology as much as technology. Thus, the third macro trend electrifying all of human kind today is the creation of a culture that collaboratively builds, negotiates, and shares such knowledge and information: a participatory learning culture. (Bonk, 2009, p. 53)

Teacher learning online is by nature, a mediated interaction. While this feature is usually cast as a drawback, when compared to face-to-face experiences, some studies cite critical benefits such as: "opportunities for reflection offered by asynchronous interaction [and] the contributions of teachers who tend to be silent in face-to-face settings but 'find their voice' in mediated interaction" (Dede, Ketelhut, Whitehouse, Breit, & McCloskey, 2009, p. 9).

One study, focusing on the use of teacher-authored video case studies found in both online and face-to-face meetings that

> …both professional and personal interests and needs drive discussions. With this unrestricted blending of discussion drivers, the project has found that more relevant discussions can be launched and nurtured, managing the tensions that emerge from the curriculum and from its implementation by the teachers. (Galvis & Nemirovsky, 2003, p. 5)

Similarly, Lebec and Luft (2007) found teachers were less motivated by extrinsic rewards, such as course credits, and more apt to participate in oTPD for personal reasons. "When asked about typical motivators for learning, most individuals voiced ideas more consistent with intrinsic motivation, such as topics of interest, the usefulness of an experience, or the potential for learning something new" (p. 564). Peery (2004) suggests professional development occurs only when teachers are personally invested: "Teachers must invest in their own growth by posing their own questions and studying topics of their own choice. This personalization is the essence of development" (p. 8).

The literature, on traditional and oTPD, underscores the need for teachers to be reflective practitioners (Schön, 1983). Two types of reflection are important to improving practice, reflect-in-practice and reflect-on-practice. Reflecting-in-practice is a process of "on your feet" assessment and analysis. Reflection-on-practice or reflexivity is a deeper, introspective process in which individuals look inward at their own motivations, beliefs and biases and how these personal markings influence practice. Being able to engage in reflexive analysis and share these observations with colleagues can result in insight and enduring changes. "Teachers need to be learners who engage in the learning process for themselves, are willing to refine their thinking and practice, to listen to each other as they formulate ideas and understandings, and are open to learn from errors" (Lock, 2006, p. 668). As on oTPD model noted, "reflexive thinking is a dominant component…participants are constantly invited to reflect on the activities they engage in…" (Zellermayer, Mor, & Heilweil, 2004, p. 203). oTPD can facilitate both types of reflection and foster a supportive learning community.

Some studies found video clips, selected and posted by teachers, were particularly helpful in supporting reflective practices. "Having an available, captured experience in an online forum where teachers can meaningfully reflect on a common artifact provides a rich set of resources for

stimulating collaborative PD" (Barab, Jackson, & Pickarsky, 2006, p. 169). Another study noted when participants were given the option of anonymity they felt more comfortable asking questions they were reluctant to ask in face-to-face meetings (Jaffe, Moir, Swanson, & Wheeler, 2006). The same study noted, "the writing and reading process of asynchronous online learning encourages reflection in a way that face-to-face experiences do not" (p. 93). Finally, the study cautioned against equating online activity, in the form of posts for example, with uptake or impact. In interviews "lurkers" or "invisible participants" "revealed that they were reading and thinking about the discussions regularly…and describe[d] in specific ways [how] they applied the information in their classrooms" (Jaffe et al., 2006, p. 104).

Teaching is a highly personal endeavor and the literature demonstrates oTPD can support rich dialogue, ongoing reflection and flexibility in terms of time and space. At the core, teachers are drawn to engage online and continue to contribute and learn in these distributed spaces because they find value in the content and a meaningful connection to their own inquires relative to the curriculum and student learning.

Practice-focused.

Given the limited time teachers have to participate in professional development, they are discriminating and look for programs that address difficult aspects of the curriculum or specific student learning issues. One study found teachers were most willing to participate in oTPD when common, specific "curricular topics that are both crucial to students' further progress in the field, and widely recognized as difficult to teach and learn" (Galvis, & Nemirovsky, 2003, p. 4). Further, Vrasidas and Glass (2004) found successful oTPD models "use real world, authentic tasks and activities which will help participants make the direct connection to their professional practice" (p. 330).

In the early years of oTPD much of the focus was on the technical framework, in large part due to the limitations of Web 1.0, and the PD activities (e.g. webinars, videoconferencing workshops). That is, PD developers worked with technicians to build online structures, experimenting with different platforms, and synchronous and asynchronous communication tools. Recent studies are marking the evolution of oTPD by highlighting the changes in practice as a result of oTPD and backgrounding the technical aspects and the PD activities. "Professional development in our EPD framework, is not the focus of teachers' experience but an epiphenomenon that comes out of their experience with implementing innovative curricular experiences" (Barab et al., 2006, p. 163). Studies noted most teachers are not easily enticed by technology and take a fairly pragmatic approach to professional development. Teachers "are critical consumers of professional development, and do not like to spend valuable time completing courses that do not add substantially to their knowledge of effective pedagogy" (Herrington, Herrington, Hoban, & Reid, 2009, p. 212). For this reason, successful oTPD models adopt an inquiry approach or are set in a specific pedagogical problem (Vrasidas & Glass, 2004; Dede et al., 2005).

One unique affordance of the oTPD environment is supported by the more technical nature of the media and relates to the visibility of practice. Few teachers are often able to observe their colleagues practice. While we know these experiences are highly beneficial to teachers, they are logistically difficult and costly (e.g. substitute teachers). In oTPD, teachers are able to "view'" their colleagues' work in "detailed and visible ways" through for example videos, sharing of

plans, and discussions (Whitehouse, 2010, p. 32). One teacher commented "seeing the work of other teachers, and having the opportunity to discuss that work gave [her] confidence in her ability" (Whitehouse, 2010, p. 32).

The following conclusion best represents teachers' preference with respect to the format and focus of oTPD:

> …the respondents in general prefer a blend of different learning arrangements, combining both face-to-face and distance learning, aimed at both skills and knowledge. Herein, authentic ways of learning, like performing educational projects, are given priority. (Akkerman, Lam, & Admiraal, 2004, p. 263)

Teachers also value the way oTPD creates a place to learn discipline-specific pedagogical approaches from and with their colleagues. "Knowledge about teaching and learning can be acquired, but learning how to apply that knowledge to the problems of practice requires work for learning's sake" (Randi & Zeichner, 2004, p. 207).

Professional learning community.

The concept of the professional learning community (PLC) has been a well-researched topic for over 10 years (Wenger, 1998) acknowledging the ways in which the school culture can contribute to fostering rich learning spaces for teachers to hone their practice with their colleagues.

> By using the term professional learning community we signify our interest not only in discrete acts of teacher sharing, but in the establishment of a school-wide culture that makes collaboration expected, inclusive, genuine, ongoing, and focused on critically examining practice to improve student outcomes. ...The hypothesis is that what teachers do together outside of the classroom can be as important as what they do inside in affecting school restructuring, teachers' professional development, and student learning. (Seashore, Anderson, & Riedel, 2003, p. 3)

Over the years, this conception of a PLC, while certainly encompassing the core purposes and reasons for investigating and supporting PLCs in education, has shifted to reflect the ways in which professional relationships and school cultures can thrive both within the school walls and online. Increasingly, individuals are moving online to increase membership, share their message and motivate actions.

> This adds a slant to the meaning of 'communities' in PLCs because of the imperative to learn together, not only within but between schools. A further push comes from new technologies transforming learning and knowledge sharing. A networked society may offer possibilities for closer cooperation between schools, and between schools and their communities. (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006, p. 242)

Indeed, one could argue the meaning of community in a networked age is being extended and reimagined. In the past, the term blended learning environments has been used to denote a combination of online and face-to-face teaching and learning experiences but a new term is beginning to surface in the literature which suggests a much more fluid environment.

> Blended learning environments are generally clear—one is either online in some learning context, or one is face-to-face. Blurred learning environments occur in networked learning contexts because the learners are often working synchronously across distance and at the same time working face-to-face with a group. The meaning of being "present" blurs as one works across time and distance, and brings new dimensions of learning in networked learning environments. (Whitehouse, 2010, p. 10)

It seems then, relative to PLCs, teachers engaged in oTPD could be experiencing learning in a variety of contexts based on their needs, interests and resources. In a relatively short time, the notion of PLC has radiated out from the school staffroom and is becoming a chief factor in shaping new ways of conceiving of professional learning in the years ahead.

Theorizing Professional Learning in a Digital Age: Reconceptualizing PD

The evolution of oTPD to TMPL is marked by the following characteristics, which are factors of changes in technology, ways of learning and the growth of social networking[1].

Table 1: ***Characteristics of oTPD and TMPL***

oTPD	TMPL
• most commonly cited in the field • structured, internet-based learning, Web 1.0 • (e.g. learning management system) • emphasis on content/delivery • individualized modules and cohort models • learning occurs online	• less structured, technology-enabled networked learning • emphasis on interactions occurring between colleagues resulting in constructing knowledge • emerging, teacher-initiated social media-based communities, Web 2.0 (e.g. Facebook) • learning occurs in a "blurred" environment that can include f2f and online interactions

In addition to the technical affordances of our time, that is being able to connect with others through networks, and building on what we have learned about oTPD, another more epistemological aspect influences how we conceive of professional learning. Distributed cognition, the idea that the process and the interactions through which knowledge is created

[1] The key difference between Web 2.0 and Web 1.0 is users have the ability to store information, create and disseminate in the "cloud."

constitutes learning, challenges some long held beliefs which considered learning as an internalized, one-person act. While this new way of thinking about learning and knowledge generation is an outgrowth of the potential of our networked-environment, it has roots in constructivism and the work of for example, Vygotsky and Piaget. Vrasidas and Glass (2004) take up a constructivist approach to learning and draw a connection with distributed cognition:

> In other words, the knowledge which we have and need is not all in our head, but to a large extent resides in the world: in artifacts of all kinds and in the minds of other people. Distributed cognition … enriches (our) understanding about what individuals can achieve and how artifacts, tools, and socio-technical environments can be designed and evaluated to empower individuals and their learning. (p. 328)

In conceptualizing the future of professional learning in this frame, the need to continue to shift from more consumptive, passive PD to participatory, teacher-directed professional learning experiences also becomes more salient.

> Instead of starting from the Cartesian premise of "I think, therefore I am," and from the assumption that knowledge is something that is transferred to the student via various pedagogical strategies, the social view of learning says, "We participate, therefore we are." (Brown & Adler, 2008)

The literature strongly supports a thorough reassessment of what matters about professional development given what we know about learning and the realities of our networked age that moves away from "I attend, therefore I'm developed" to "We participate, therefore we are."

While TMPL is still in its infancy, it is safe to assume, and there is evidence to suggest, teachers are engaging in various forms of TMPL already. In fact, learning is occurring rather organically online as individuals seek out support, resources and inspiration. Interestingly, the findings from one study demonstrated that in addition to participating in traditional, face-to-face PD such as conferences and workshops, teachers who were members in online communities, "were committing 1–3 hours per week in time…an additional 60–80 hours per year on professional learning. This time appears to be worthwhile and necessary to the professional lives of its members, (as membership was) maintained for 1–3 years" (Duncan-Howell, 2010, p. 38).

How do Personal Learning Networks (PLNs) exemplify oTPD?

There is evidence to suggest teachers, despite the many demands on their time, are already engaging in various forms of professional learning outside of formal structures. The following data is from a 2005 study that suggests teachers are active learners on the job and at home. In Canada, "…virtually all teachers…estimate that they do a substantial amount of informal learning (about 10 hours a week) beyond their heavy employment hours and their very high participation in further education" (Smaller et al., 2005, p. 25).

This evidence, alongside what we know about teachers' use of online professional learning communities and what we surmise about their use of social media, suggests some teachers are

actively foraging from many sources to meet their own personal learning needs[2]. It appears we have reached a point of convergence where the technology is enabling the kind of personalized learning teachers are increasingly accessing. "As participative tools grow in popularity, the autonomy of learners and their control over access to information continues to increase" (Siemens, 2008, p. 15).

The literature calls upon professional development to be re-orientated with the learner, in this case the teacher, at the center, rather than the event (conference), theme or subject (assessment for learning or mathematics). According to Warlick (2009), professional learning should be organized around the teacher who "pulls" information and expertise from a variety of sources using both traditional and technology-mediates mechanisms (p. 15). He identifies three way teachers can build professional learning networks to best suit their particular interests (See Table 2we).

Table 2: ***Types of PLNs***

PLN	Example
Personally maintained synchronous connections	Virtual meetings with close colleagues contacted through for example, Skype or e-mail
Personally and socially maintained asynchronous connections	Comments, questions and discussions occurring in fairly quick succession but not in real-time through for example in chat windows or messages in Facebook
Dynamically maintained asynchronous connections	Connections with content sources self-identified as valuable through RSS aggregators such as Google reader or Pageflakes

It is important to note, the quality of a professional learning networks is highly contingent on the quality of the connections themselves. Indeed, oTPD needs to be critically assessed to guard against the allure of the technology itself. Often times, in speaking of the value of PLNs, fantastic examples are cited which demonstrate how individuals can mine their networks for rich, just-in-time responses to any inquiry.

"I posted the following message on Twitter: 'Writing article about PLN. What's your favorite PLN tool—besides Twitter... :-)' Over the next two hours, 33 Twitter-using educators from across the United States responded…" (Warlick, 2009, p. 13). The implication is that one can toss a query into the pool and ripples of wisdom will follow in close succession. While Warlick is able to draw from a deep pool of colleagues others new to social media will need to develop a

[2] 2009 figures from Statistics Canada shows over 50% of adults access the Internet for education, training or school work (http://www40.statcan.ca/l01/cst01/COMM29A-eng.htm).

network over time. However, the platform is available and connections can occur quickly and exponentially.

Recommendations

While our paper has focused on the role of technology in supporting these new models, we recognize a more systemic change is required.

> An orientation toward professional learning also requires thinking differently about where learning takes place, about leadership and governance, about data collection and use, about appropriate learning activities, about evaluation of professional learning, about role changes, and - ultimately - about cultural changes that both promote and result from learning. (Easton, 2008, p. 756)

The following three guiding principles, often mentioned in the oTPD literature, speak to this cultural shift and could form a valuable basis for future development of TMPD.

Focus on the people

While a structure can easily be created online, through a Moodle, wiki or Google site, the site will grow and become valuable only if a critical mass actively participates. As Lock (2006) notes, "The power and direction of the community must come from community members. It cannot be imposed on them, if the community is to be sustained" (p. 373). There are many examples of beautifully designed but vacant online communities. The "if-we-build-it-they-will-come" theory has been disproven and we now know participants need to find personal meaning in the community and facilitation can be key to engaging members and creating a thriving constructivist learning environment (Gray, 2004). Redmond and Lock (2011) describe how some individuals, often instructional leaders or coaches, play a "key role in facilitating and scaffolding learning so to empower all participants to share knowledge, to find and integrate new information as they constructed meaning, to provide meaningful access to and interaction with resources and to explore multiple perspectives within a global context" (p. 4).

Warlick notes a less obvious, but important, negative aspects of personal networks. As individuals set out to build connections they are more likely to choose like-minded colleagues. While this is comfortable and certainly affirming, professional and personal growth is often fostered in challenging situations.

> Although they help us roam beyond our normal geographic reach, they can easily become limited in their range of perspective. It is human nature to incline toward sources that agree with our own worldviews, so we must try to cultivate networks that challenge our thinking and frames of reference. That is how we all learn. (Warlick, 2009, p. 16)

Gather evidence

In recent years, the emphasis on accountability has precipitated a focus on gathering data on the impact of professional development, specifically change in practice rather than replication, and improved and enhanced student learning. Teachers, like the students they teach, need to

understand what they are doing well and identify areas of improvement (Fullan, 2006; Hargreaves & Fullan, 1992; Killion, 2007). TMPD is no different in this regard. In the past, the PD event or the resource (e.g. the inputs) was accepted as evidence of impact, but it is increasingly apparent professional learning must reinforce teacher efficacy, change practice, enhance student learning and ultimately lead to systemic educational change. TMPL has the potential to support a shift in how we measure the impact of teacher learning. TMPL can deprivitize practice by providing powerful models of teaching practice and opportunities for embedded coaching.

Foster a critically discriminating professional culture

The professional development culture has ingrained an expert – patient relationship as teachers have often been passive recipients of information and experts the purveyors of knowledge. Teachers, in this power-laden position, rarely contribute, question or make decisions about their own professional learning. "[T]eachers are treated as objects that must be changed, instead of agents with the intentions to work on their own professional development" (Vrasidas & Glass, 2004, p. 251). It will increasingly be necessary to provide spaces for teachers to be more actively involved and critically engaged in the how, what and why of professional learning. In effect, teachers must "start being professional learners – intensely critical of the professional development we participate in and condone" (Perkins, 2010, p. 17). In this frame, the current means by which professional development is evaluated may need to be revisited. In addition, teachers will need to be professionally responsible and accountable for ensuring the professional learning in which they engage is beneficial and contributes to their professional growth. Thereby taking control of their own personal professional learning.

New evidence proves this shift in decision-making and ownership also positively impacts student achievement.

> In many high-achieving nations (e.g. Singapore, Japan, Finland, Sweden) where teacher collaboration is the norm, teachers have substantial influence on school-based decisions, especially in the development of curriculum and assessment, and in the design of their own professional learning. (Darling-Hammond, Wei, Andree, Richardson, & Orphanos, 2009, p. 6).

Conclusion

While much has changed, professional development will always be chiefly about improving the student learning experiences. Traditional professional development models that reinforce an externally-designed, stand and deliver, non-participatory type of learning environment do little to assist teachers in enacting constructivist, inquiry-based learning practices, commiserate with 21st Century learning, in their classrooms. However, when teachers are able to experience a more personalized approach to learning that incorporates contemporary technologies and makes authentic connections to their practice they are more likely to take up a similar approach with their students. In fact, the catalyst for the transformation of education, as envisioned by countless educational leaders, may lie in reimaging professional development as professional learning in a networked age.

> Investments in high quality professional learning opportunities to support teachers in designing meaningful, highly engaging, blended learning experiences for students do pay off. Professional dialogue and learning opportunities for a digital world need to be designed and led by professional mentors, teaching colleagues and school leaders who model 21st century teaching and learning practices. (Jacobsen, 2011)

In addition, the literature consistently demonstrates modeling effective practice within professional development activities is a significant way to instigate change in practice. TMPD allows modeling to be visible and accessible anytime.

> The amazing changes that teachers report—becoming learners with their students, virtually leaving the classroom door open, learning by stealth (browsing class wikis), and virtual mentoring point the way to the future of 21st century networked TPD. (Whitehouse, 2010, p. 32)

It seems many models of oTPD have foregrounded the technology and neglected to emphasize pedagogy. This is a crucial piece as many of the studies noted a key reason for teachers to become engaged online relates to the close connection with the curriculum, student learning and teaching approaches. Emerging models of TMPD acknowledge teachers are not drawn by the technological affordances of an online space, but rather participate out of a specific curricular need or collegial support.

> Certainly, using technology by itself does not support professional development; however, using technology in ways that are consistent with constructivist learning, and recognizing that online professional communities of practice can contribute to professional growth is something worthwhile to explore. (Vrasidas & Glass, 2004, p. 333)

Finally, highly-structured, organizationally orientated PD is costly whereas informal, teacher-initiated professional learning can be relatively less so. As noted by Randi and Zeichner (2004) rather than offering a wide variety of staff development activities or prescribing particular "remedies" to improve, teaching systems would do better to "encourage[e] teachers to participate in activities that require them to tap into the professional knowledge base and work together to apply their knowledge to solve problems of practice" (p. 221).

As we write, the emergence of Web 3.0, or the semantic web, is further blending the virtual and the physical world, enhancing the personalization of information and continuing to offer rich, multimedia content (Anderson & Whitelock, 2004). This new terrain could become fertile ground for virtual mentoring, modeling and an array of customized resources to support specific professional learning needs.

Going forward, it is important to learn from the lessons of others as we look to envisioning new approaches to teacher professional learning that realize the affordances of our digitally connected world while at the same time being mindful of the intricacies of professional growth.

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