



Towards learner-centric pedagogies: Technology-enhanced teaching and learning in the 21st century classroom

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Abstract

Effective professional development contributes to improved teacher knowledge and practice as well as deep and meaningful student learning. Despite professional development being cited by the South African Department of Basic Education as a priority goal, teacher professional development activities have been inadequate. In this article, we use a socio-cultural perspective to investigate the pedagogical affordances of digitalisation and technology integration. This study is part of a larger mixed methods study but for the purpose of this article we focus solely on its qualitative results. The aim of the study was to understand teachers' best practices with digital technologies and how these technologies are being used to inform the 21st century classroom and encourage a learner-centric environment. The findings reveal weaknesses in the professional development activities regarding digital technologies and learner-centric pedagogies that are generally episodic, one-size-fits-all events focused largely on technical knowledge. The chief impediment towards learner-centric pedagogies and the implementation of technology-enhanced teaching and learning is the misalignment between teachers' digital abilities and the demands of the 21st century technology-equipped classrooms. Our recommendation is the continual situated professional development of teachers, including the creation of professional learning communities and the harnessing of digital technologies to provide an effective blended approach to teacher learning and instructional delivery in the 21st century.

Keywords: digital capital, digital equity, digital learning environments, hybrid learning, professional learning communities, situated learning

Introduction

Recognising the importance of integrating digital technologies into teaching and learning, substantial investments have been made by the South African government to procure computer hardware and software for schools. However, these investments in digital technologies have not been matched by similar investments in professional development activities for educators. Consequently, teachers lack the necessary skills to teach effectively with technology. The recent disruptions caused by the ongoing pandemic and the subsequent push towards a blended model of teaching and learning, require teachers to have the necessary skills to be able to teach in such an environment. The meaning of the term blended learning, also referred to as hybrid learning, has evolved over the years. Garrison and Kanuka (2004) defined blended learning as a “blend of text-based asynchronous Internet technology with face-to-face learning” (p. 96). They stressed that what is important is “the quality and quantity of the interaction and the sense of engagement in a community of inquiry, achieved through the effective integration of Internet communication.” They further argued that blended learning represents “a quantum shift in the nature and quality of the educational experience” and “a fundamental reconceptualization and reorganization of the teaching experience” (p. 97), that goes far beyond the simple mixing of traditional approaches with internet-based technologies and involves, rather, a completely novel approach to teaching and learning. Bonk and Graham (2012, p. 5) proposed a working definition of the term blended learning as the convergence of “face-to-face and computer mediated instruction” suggesting that it is “the combination of instruction from two historically separate models of teaching and learning: traditional face-to-face learning styles and distributed learning systems.” We treat blended learning as a combination of face-to-face and computer mediated learning that includes both asynchronous and synchronous technologies.

Garrison and Kanuka (2004) posited that this type of learning allows students to be together yet apart and be connected anytime and anywhere to a community without being time, place, or situation bound. However, in order to create inclusive teaching and learning environments, classroom practices incorporating digital technologies must be improved, first, through the development of digital capital, and second, through the development of digital pedagogies to enhance students’ classroom experience. According to Dlamini and Nkambule (2019, p. 1), the presence of information and communication technologies (ICT) in education “has ushered in unparalleled transformation in knowledge representation and pedagogical practices and introduced new methods of communication, presentation of information, and presentation of text.” Therefore, there is no doubt about the pedagogical affordances of ICTs in the education sector. Concerning teacher professional development, one of the priority goals stated in the *Department of Basic Education’s Action Plan to 2019* focuses on “teacher capacity and professionalism” with the aim of improving “the professionalism, teaching skills, subject knowledge and computer literacy of teachers throughout their entire careers” (Department of Basic Education, 2015, p. 34). Therefore, there is an expectation that meaningful investments will be made in the development of digital skills and professional learning communities (PLCs) to improve teachers’ professional practice. However, the creation of meaningful and well-coordinated professional development opportunities demands collaboration between and

among the Department of Basic Education (DBE), provincial departments, and unions. This work acknowledges that there have been serious hurdles and that little time has been spent on professional development.

In 2019, the DBE published guidelines for the creation of PLCs, emphasising the importance of continual professional development, but it noted that these activities are still organised as isolated, one-time training sessions that lack a coherent strategy, monitoring, and follow-up. According to these guidelines, PLCs should respond to teachers' needs and be organised mainly at school level and between schools to minimise transportation and organisational costs but should take financial and logistical constraints into consideration. Continual teacher development in the affordances and integration of digital technologies is vital since digital technologies, such as computers, hand-held devices, and software apps are opaque, change rapidly, and "present new challenges to teachers who are struggling to use more technology in their instruction" (Koehler et al., 2013, p. 14). The study on which we based this article investigated the characteristics of the 21st century South African secondary school learning environment that produces rich learning experiences. We therefore explored the following question: How can teacher professional development activities in the use of digital technologies for high school teachers be reconceptualised to provide the knowledge and skills needed to teach in the contemporary classroom?

Policy aspirations for e-education

In 2004, the DBE published a White Paper on e-Education with the explicit goal of making every South African manager, teacher, and learner in the general and further education and training bands ICT capable by 2013 (DBE, 2004). However, this goal is yet to be realised. Subsequently, in 2015, the DBE published *The Department of Basic Education's action plan to 2019: Towards the realisation of schooling 2030*. While the plan reiterated the government's commitment to the integration of digital technologies into teaching and learning, it pointed to weaknesses in the system for the adoption of new technologies for this purpose (Department of Basic Education, 2015). Despite the pedagogical affordances of digital technologies, pedagogical content knowledge remains central to overall technology integration (Shulman, 1986). However, for teachers to organise their digital activities optimally in the classroom, they need continual professional development opportunities (Dlamini & Mbatha, 2018). The 21st century classroom incorporates modern technologies to enhance students' engagement and their interaction with the content.

The reasons for the poor uptake of digital technologies in the schooling sector are multi-faceted, as indicated by several studies conducted on the pedagogical integration of ICT in the classroom (Ajani, 2020; Dlamini & Dewa, 2021; Dlamini & Mbatha, 2018; Pamuk, 2012). The DBE published a *Professional Development Framework for Digital Learning* to provide a roadmap for the development of educators' digital fluency and pedagogies (Department of Basic Education, 2018). This framework is an enabler for digital education and pedagogies in arming educators with the necessary digital skills to navigate the complex digitally informed schooling environment. The development of information, media, and

technology fluency in the education context is important if we are to respond with agile pedagogies. Early adopters of digital technologies in education have indicated that technology integration is not easy (Pamuk, 2012). However, the Covid-19 pandemic has accelerated the adoption and appropriation of digital technologies. Ng'ambi et al. (2016, p. 845) asserted that the emergence of new technologies shifts the focus “to more active learning and collaborative production of knowledge enabled by social computing tools.”

Context is key to any transition, but in South Africa there has been systematic delegitimisation of the identities and cultures of most South Africans, and this has also extended to the classroom. Thus, any one-size-fit-all approach to the pedagogical integration of ICT into schools is flawed. Fataar and Norodien-Fataar (2021) argued for “an approach based on e-learning ecologies, promoting students’ critical epistemic engagement to enable them to secure viable futures” (p. 155). In this article, we advocate for differentiated professional development activities on digital pedagogies and the development of PLCs to enhance classroom practices. According to Borko et al. (2010), “the opportunity for teachers to participate actively and collaboratively in professional communities is an essential component of high-quality professional development” (p. 549). Such communities will see teachers working and learning together in “collegial teams” and will help them “develop and draw on collective intelligence” and, in this way, develop a new professionalism (Hargreaves, 2003).

The chief impetus in our research was the inequalities that exist in schools in South Africa, especially public schools where there is insufficient digital equipment to accelerate the application of digital pedagogies. There are also insufficient well-coordinated and meaningful professional development opportunities aligned with the future of education. Well-coordinated, meaningful professional development opportunities have the potential to cultivate teachers’ digital acumen to enhance their teaching modalities. Koehler et al. (2013) argued that “many approaches to teachers’ professional development offer a one-size-fits-all approach to technology integration when in fact teachers operate in diverse contexts of teaching and learning” (p. 14). Angeli et al. (2015, p. 306) held a similar view and blamed this approach for teachers’ lack of skills to teach effectively with technology since it emphasises “teaching technical skills” and spends “a limited amount of time that is usually devoted to matters of how technology interacts with subject matter, pedagogy and learners’ conceptions about specific content domain.” The above examples point to a decontextualised approach to teacher learning.

Literature review

The advancement of digital technologies is fundamentally changing how education is delivered, and the reality is that governments must invest in professional development activities and digital infrastructure. Desimone (2009) noted that teacher professional development not only increases teachers’ knowledge and skills but changes attitudes and beliefs and leads to an improvement in pedagogical approaches and, ultimately, student learning. Continual professional development activities that are grounded in teachers’

classroom practices will help teachers respond to the various demands of the 21st century classroom and to unpredictable situations. A situated approach to teacher learning has been proposed as a way of improving teacher knowledge and practices and of contributing to improved student learning outcomes (Borko, 2004; Borko et al., 2010; Darling-Hammond et al., 2017; Putnam & Borko, 2000). Putnam and Borko (2000) posited that a situative perspective “should be grounded in their teaching practice [and] be meaningfully situated in their own classrooms, group settings, where participants’ teaching is the focus of discussions” (p. 12).

Darling-Hammond et al. (2017) defined effective teacher learning in terms of the following key principles: be content focused; incorporate active learning; support collaboration; use models of effective practice; provide coaching and expert support; offer feedback and reflection; and be of a sustained duration and not episodic nor fragmented since this does not afford sufficient time for rigorous and cumulative learning. Active learning encompasses aspects of collaboration, coaching, feedback and the use of models and modelling, involves the use of authentic artefacts, is interactive and highly contextualised, and provides the opportunity for teachers to engage in the same types of learning they design for their students. Furthermore, collaborative activities could range from “one-on-one or small group interactions to school wide collaboration, to exchanges with other professionals beyond the school” and be either face-to-face or facilitated by technology with opportunities for “cyber collaboration” among teachers or with a coach or mentor (Darling-Hammond et al., 2017, p. 10). Regarding the use of a technology coach, Drennan (2019) proposed the concept of an educational technology coach who would assist teachers to harness the affordances of technology and Ipad in particular.

Borko et al. (2010, p. 554) argued for the incorporation of electronic technologies into professional development activities to “provide just-in-time work-embedded support and accommodate individual teachers’ busy schedules.” A blended approach has therefore been advanced as a viable model for teacher professional development (Owston et al., 2008). They posited that with blended learning, teacher learning activities could be designed to take place over an extended period without teachers having to neglect their classrooms. The online aspect of the learning could further provide teachers access to different contexts and to an online community beyond their immediate school environment. According to Goldman (2001, p. 22), “many forms of electronic technologies can overcome time and place constraints and provide the means to reach large numbers of individuals, potentially at costs lower than those associated with the physical presence of professional development personnel.”

Despite the widespread recognition of the importance of teacher professional development, activities focused on technology integration have been largely ineffective in changing teacher practices regarding the adoption of digital technologies. Tarling and Ng’ambi (2016, p. 554) postulated that “they tend to fail to create sustainable change in teachers’ practices using emerging technologies.” Looi et al. (2008) suggested that one possible explanation for this is the lack of relevance of “pre-packaged training courses” initiated and conducted by external

agencies that “presuppose the needs of teachers” with limited input and feedback. For Li and Choi (2014),

[c]onventional models of technology infusion generally suggest that changing teachers’ perceptions of the value of technology and equipping them with relevant pedagogical skills through proper teacher professional development programmes is one of the key determinants of success in integrating technology into schools. (p. 2)

Developing teachers’ digital pedagogical skills therefore requires a fundamental shift in our current approaches to teacher professional development. Mishra and Koehler (2006) initially developed the Technological Pedagogical Content Knowledge (TPACK) framework building on Shulman’s (1986) concept of pedagogical content knowledge. This framework, as articulated in Mishra and Koehler (2006), and, more recently, in Koehler et al. (2013) advances seven different knowledge domains: Technological knowledge (TK); Content Knowledge (CK); Pedagogical Knowledge (PK); Technological Content Knowledge (TCK); Pedagogical Content Knowledge (PCK); Technological Pedagogical Knowledge (TPK) and Technological Pedagogical Content Knowledge (TPACK). These domains indicate the types of knowledge teachers need for technology enabled learning with TPACK being crucial.

However, Brantley-Dias and Ertmer (2014) in critiquing the TPACK framework, argued that it is too vague and, hence, a possible barrier to technology-enhanced teaching and learning. They believed that an important distinction should be made between knowledge of something and the ability to apply that knowledge in practice. One way of applying that knowledge in practice is for teachers to become learning designers or co-designers (Cviko et al., 2014; Emin-Martinez et al., 2014; Kafyulilo et al., 2016). Emin-Martinez et al., suggested that learning design “is informed by subject knowledge, pedagogical theory, technology know-how and practical experience” (2014, p. 4). It involves the design of new practices, plans, and resources aimed at realising specific educational goals. In a Tanzanian study investigating the impact of teacher design teams as an aspect of their professional development in technology integration, teachers collaborated in small design teams (Kafyulilo et al., 2016). This study was conceptualised around the TPACK framework and involved teachers collaborating to redesign and implement aspects of the science curriculum using digital technologies. Findings confirmed that teacher learning could be effective if it is meaningfully situated in teachers’ practices. Although poor teacher technological knowledge was cited as one of the weaknesses, it was concluded that the formation of teacher design teams is an effective collaborative professional development strategy to advance technology-enabled learning. Teacher collaboration as co-designers to create new resources could be one way in which TPACK could be actualised for technology-enhanced teaching and learning.

Theoretical underpinning

A socio-cultural approach to learning has its roots in Vygotsky’s (1978) social constructivism that emphasises the social aspects of knowing that is “participatory, distributed and socially grounded” (Crook, 2001, p. 19). Another fundamental aspect of the socio-cultural theory is

the notion that learning is situated and this suggests that knowing and doing cannot be separated (Seely Brown et al., 1989). The situated view of learning originated with Lave and Wenger (1991) who argued that learning is first social and best occurs in authentic, real-life situations as a product of context, activity, and culture. This implies that learning is not an individual activity but a process of becoming a member of a sustained community of practice. Social interaction and participation are thus integral to learning. Wenger (1998) developed the concept of a community of practice to refer to a shared enterprise that is continually negotiated by its members and functions as a mutual engagement that binds them into a social entity and produces a shared repertoire of resources. Such communities develop around things that matter to people and consequently, the practices of these communities would reflect issues which they consider important (Wenger, 1998).

Research approach

Although this study is part of a larger mixed methods research project, this article is focused solely on the qualitative results. A convergent mixed methods design, following Creswell and Plano Clark (2017), was used as a framework to plan, implement, and analyse this study. With this design, qualitative and quantitative data were collected concurrently, and then analysed and the results merged. “A key feature of mixed methods is its methodological pluralism” since it does not privilege qualitative methodology over quantitative methodology but instead combines the strengths of both and thereby leverages their benefits to provide “the best opportunities for answering important research questions” (Johnson & Onwuegbuzie, 2004, p. 16). By intensively investigating the 21st century classroom, the qualitative data collection involved non-participant observations of 10 history classrooms and 10 English classrooms. The purpose of these observations was to get insight into teachers’ day-to-day practices with and without digital technologies and to observe one of their teacher learning activities. Semi-structured interviews were also conducted with educators participating in the qualitative phase of the study.

Participants

Two well-resourced public schools and three well-resourced private schools participated in the study. The total number of educators who participated in the qualitative phase of the study was 21, which represents 10 subject teachers, 5 heads of Information Technology/Innovation; 5 principals and the head of the Growth Curriculum and Enrichment of one of the schools that had recently implemented an integrated curriculum for children between the ages of 13 and 16. In this article, each school is referred to by a pseudonym. The pseudonyms for the private schools are Queenstown College, Baker College, and Duke’s College, and those for the public schools are Hampton High School and Southridge High School.

Data collection and analysis

Data collection involved non-participant observations of 10 history classrooms with children between the ages of 13 and 16 and 10 English classrooms with children between the ages of

14 and 16. The purpose of these observations was to gain insights into teachers' day-to-day practices with and without digital technologies and to observe one of their teacher learning activities. Semi-structured interviews were also conducted with the educators participating in the qualitative phase of the study. The most significant insights into teacher professional development came from the semi-structured interviews with the various teachers, and this article is framed within these insights.

Inductive and deductive approaches were used to analyse the qualitative data. Creswell (2014) described the use of both approaches as the process in which pattern, categories, and themes are built from the bottom up and where data is organised into more abstract units of information. Therefore, an iterative and inductive process of open coding was first used to see which categories would emerge from the interview transcripts and fieldnotes. Then key concepts from the research questions along with the identified categories were deductively used to identify themes that were subsequently used to group the findings from the research. The results were therefore analysed using thematic content analysis.

Scope and limitations

While this study focused on well-resourced private schools and public schools that could be described as more privileged, this could be seen as limiting in some respects, some of the findings with regard to professional development are applicable to most schools. Some of the lessons learnt and recommendations from this study can also be adapted and applied to other learning environments.

Findings

Teachers in Queenstown and Baker Colleges, both technology-rich schools, had access to weekly professional development activities. At Baker College, a so-called Microsoft Showcase school, most of the academic staff members were trained as Microsoft Certified Educators. The principal stated, "I'm a big proponent of professional development and creating professional learning networks." Since professional development was deemed a priority, the role of the Head of Innovation and IT Services had been expanded to include staff development. In response to the question about ongoing training, this head stated that "we do [this] in both schools every week . . . [and it] ranges between 20 minutes to half an hour, 40 minutes maximum, depending on the school." Baker College also created a new portfolio, that of a Curriculum Innovation Mentor, generally known as the Education Technology Coach, whose role, according to the principal, was "to liaise with teachers in ways in which they can be more active in integrating technology in their subjects."

Teachers at Queenstown College were Apple Accredited teachers while some were also Microsoft Certified educators. When asked about teacher professional development, the principal stated, "It's part of what we do", although she acknowledged that the system was not perfect. In our interview she stated that some form of staff training was conducted once a week and this had been ongoing for a number of years. She added,

You can't expect staff on top of all that they are doing. You've got to give them the time to train. And as I say, some people jumped on particularly like the Apple Educator . . . and that was something they could do in their own time as well. So, we had the initial training together and then you could continue and there are different levels that you could do. So that was really, really important.

However, in Duke's College, a mixed learning environment was encouraged, and this meant that the school was not tied to any one platform, so teacher learning in digital technologies was not a regular occurrence. The IT director, who had been employed eight months prior to our classroom observations, stated that his focus was to sort out the issues with technology. He said, "I've sent a lot of the teachers over the last few months for Google training where they do Google certified educators' level 1." However, the history teacher who had been employed at the school for over four years said, "I did go on an iPad summit but for me I fail to see where I could bring in those ideas", while the English teacher who had recently been employed at the school did not attend any of the school's teacher learning activities. However, she stated, "I haven't had a lot of formal training (but) I figured most of it out myself . . . I've experimented with a lot of apps and technologies." A similar comment was made by the English teacher at Queenstown College; this suggested that intrinsic teacher motivation and interest also contributes to teacher learning

Hampton High School and Southridge High School are both government schools with less digital access than the three private schools enjoy. The Head of IT at Hampton High School that used the Microsoft Office 365 platform, indicated that training in the use of digital technologies occurred as the need arose. One session on Microsoft Teams had been conducted at the beginning of that year and a follow-up session was held but with minimal staff attendance. The English teacher confirmed what was mentioned in the DBE Action Plan (2015) that "sometimes the unions provide it (training). Sometimes the department provides it. Sometimes the school provides, but it's on a needs basis." The Head of IT further highlighted the challenges with getting teachers to attend such training sessions stating, "(T)he problem I have with training, is it's very difficult to get the teachers to the training because we're such a busy school. There's so many things happening and activities happening and to try and get them to the training is difficult."

Southridge High School is technology constrained with limited access to digital technologies, particularly for learners. No digital learning was provided for teachers according to the Head of Computers since continuous wi-fi access is limited to staff and students who did Information Technology as a subject. The English teacher, however, indicated an awareness of the workshops offered by the National Professional Teachers' Organisation of South Africa (NAPTOSA), through their newsletter although she had not attended any.

Regarding the content of teacher development activities, the data suggests that these were focused mainly on technical skills. In Hampton High School, the teachers were taught to use Microsoft Teams with the training being conducted by an external facilitator. According to the English teacher, "He came and showed us how Teams works." Based on this training she

was not convinced that Microsoft Teams worked for every subject particularly English and hence she hardly used it.

The iPad and Google workshops attended by teachers at Duke's and Queenstown Colleges focused on how to use different Apple and Google apps. Teachers at Queenstown College also extended their technological knowledge by doing other "Apple courses" either individually or as a staff, according to the principal. The history teacher added that apart from the iPad workshops, "[W]e're given lots of opportunities to go and learn and gain more skills and knowledge" while the English teacher stated that she attended the iPad summit, which "really shifted my teaching practice."

In Baker College, the compulsory and mainly whole-group weekly sessions were focused on the latest trends in technology and on increasing teachers' technological knowledge. The Head of IT Services and Staff training described it as an "ignite" session, stating,

The idea was . . . I'm going to show you something, like VR, I'm going to put you in goggles. I'm going to let you experience it and hopefully, I will light a fire under you and you know that I know that you can come back and ask me, how do I do that more? . . . Also, we try and make it very hands-on . . . even if you're going to say that this is not for me . . . Now we've started splitting it so on Monday they had Teams training or 'Stop-go' motion and in two weeks' time, the same two options on so they can go around. But we don't say you only go to stop-motion if you are a language teacher or a this. We [say] 'Go, go there! We're gonna teach you how to make a stop-motion video, a story.' . . . Like on Monday, but I'm doing 'arrow code', not every teacher needs to know how to code, but yes, every teacher does need to know how to code . . . Yes, you won't use it in your classroom, but say, 'I've coded, I've coded for an hour, I've done something.'

Baker College was the only school that organises regular PLCs for teachers. Three sessions are held yearly with teachers from other schools being invited to share their best practices with technology. The Head of Innovation and Staff Services said,

The idea came . . . if I got the community here and . . . FORCED (their emphasis) our teachers to participate, basically I'm bringing the community to you, the like-minded community to me, not to you, necessarily. . . so I hopefully get a bunch of digitally inclined teachers to come here to mix with you to share ideas. So, everybody goes away and learns something.

One of the sessions that the first author attended involved large groups of about six teachers all observing the various presentations with minimal hands-on interaction. Apart from teachers sharing various educational applications, short technology hacks were shared, such as how to do screen recordings on your iPhone and how to use Microsoft Stream to make videos, and a teacher who is a Microsoft Certified Educator gave a brief demonstration on how to use Microsoft Teams. Another teacher shared how to use Microsoft Forms to do simple language quizzes.

Additionally, Baker College, like Duke's College, selected what they called champions of technology, who provided one-on-one or small group assistance to a teacher or small groups of teachers to help them integrate technology into their lessons. At Duke's College, there was a champion for Google classroom. The Principal of Baker College described them as "the go-to people for technology", while the Head of IT Services at Duke's stated that these champions "are willing to share with other people and say, 'Look what I've done with this tool and how it works,' but at the same time show how it will work in that teacher's environment."

Discussion

Technology-enabled learning that would advance learner-centric pedagogies require active teacher learning as described by Darling-Hammond et al. (2017) and not one-size-fits all decontextualized training sessions. Teacher learning activities at Queenstown College could be described as job-embedded and linked in some respect to teachers' specific learning needs. For instance, both teachers interviewed attended the iPad workshop which, though pre-packaged, was beneficial since it "shifted her teaching practice" according to the history teacher. Additionally, the school's teacher learning activities ranged from small group interactions and school wide collaboration to collaboration with others outside the school as in line with the key features of professional development articulated by Darling-Hammond et al. (2017). Teachers also had opportunities for individual learning since they are given a choice to continue learning about the various technologies in their own time. However, the focus seems to have been on gaining "knowledge and skills" as indicated by the history teacher.

The approach of Baker College indicated an effort to provide ongoing training for teachers as described in the literature. However, their weekly learning activities were based mainly around technological trends, and not always on teachers' needs; "even if you say that is not for me", as the Head of Innovation and Staff Development indicated, teachers had to attend the sessions. These were often one-shot or one-size-fits all whole staff events in the hope that they would "light a fire" under the teachers, causing them to explore that piece of technology further. This is the very approach criticised by Angeli et al. (2015) and Koehler et al. (2013) because a limited amount of time is spent on how technology could be integrated into pedagogy. In fact, only one session was devoted to showing teachers how to use Microsoft Teams, an application that teachers were expected to use. These events were described as "hands-on", but Little (1993, p. 138) argued that "teachers do not assume an active professional role simply by participating in a 'hands-on' activity as part of a scripted workshop."

However, the informal PLCs that met three times a year focused on job-embedded activities and specifically on teachers sharing experiences from their classroom practices at staff development sessions. But, while there were opportunities for teachers to share best practices with technology, most of the activities observed focused on technology hacks and provided

no opportunities for meaningful collaborative learning among teachers. This meant that the session seemed more like a one-size-fits all ignite event.

Apart from these whole-group experiences with teachers from other school environments, teachers at Baker College were able to have one-on-one learning experiences with champions. The employment of a curriculum innovation mentor echoes Darling-Hammond et al.'s (2017) and Drennan's (2019) recommendation of an educational technology coach or mentor to provide expert support for teachers to help them integrate technology into their pedagogy.

The interview data revealed a fragmented and intermittent approach to professional development at Duke's College that Borko et al. (2010), more than a decade ago, likened to the traditional in-service approach using one-shot workshops away from school premises. The history teacher's comment that she failed to derive any value from the iPad summit suggested that the training was not relevant to her specific needs since she did not use any Apple products for teaching and learning. The identification of champions across different grades to provide expert assistance for Google classroom provides an opportunity for increased technology-enabled teaching and learning at Baker College.

Like Duke's College, Hampton High School had an episodic approach to teacher learning, although the training was job-embedded and linked to teachers' specific school needs. The workshop on Microsoft Teams that was held used a one-size-fits-all approach with a limited amount of time spent on technological pedagogical integration. Hence, there was insufficient time for rigorous, cumulative learning that possibly explains the English teacher's remark that she did not use Teams often since it "doesn't always work for every subject." This comment demonstrates a lack of awareness of the affordance of the application.

Our findings, therefore, revealed flawed teacher professional development strategies, especially relating to digital technologies since they tended to focus largely on technological skills instead of providing digital pedagogical skills. While Baker and Queenstown Colleges provided continual opportunities for teacher learning in technology, such activities at Hampton High School and Duke's College were episodic. Teacher technology development activities at Southridge High School were non-existent suggesting that technology-enhanced teaching and learning was not a priority. It also indicates a possible misconception about the relevance of such activities to teacher learning.

Consequently, we recommend that the current approach to teacher professional development be reconceptualised in favour of a sustained and strategic approach based on the day-to-day realities of teachers' practices. Teaching and learning in the 21st century demand a situative perspective to teacher professional development, as articulated in the literature. A situated approach involves more opportunities for active learning (Darling-Hammond et al., 2017), including collaboration, coaching, interactive activities using authentic artefacts, and other strategies that all combine to provide highly contextualized learning.

Another way for teacher professional development activities to be specific to their practices would be to use technology coaches or mentors to provide one-on-one or small group support for teachers. Examples of this are the Curriculum Innovation Mentor at Baker College and the use of champions by Baker and Duke's Colleges. However, given that most schools, and in particular government schools, cannot afford to employ an additional staff member to fulfil the role of technology coach, this could be a resource that is shared among schools or districts. Alternatively, there could be technology champions for each learning area in school districts who are also part of the DBE's structure to lead various subject specific communities of practice in schools as a means of facilitating technology-enabled learning.

Conclusion

In this article, we provide a glimpse into the teacher learning activities at five secondary schools in Johannesburg. The study, although limited in scope, confirmed statements made in the DBE's Action Plan and PLC guidelines, in particular that professional development activities are mainly isolated one-time training events that lack a coherent strategy. A situated professional development approach would, therefore, respond to teachers' specific needs in their specific environments. It would also help address the issue of technological pedagogical dissonance and provide teachers with the skills necessary to teach in the contemporary classroom.

The creation of PLCs is also a good way to foster collaboration among teachers and to provide opportunities for teachers to collaborate as designers of learning resources and challenge their misconceptions about the affordance and use of digital technologies. However, this should be a bottom-up, teacher-led grouping based on what teachers deem to be important to their work and not according to the dictates of an external department. These communities could be created with teachers in their particular educational setting or with others outside of their own school setting.

Given the great push for teachers to teach in blended learning environments, it is crucial that teachers experience what it is like to learn in such an environment. Equally, a blended approach could address concerns raised by the Head of Information Technology at Hampton High School regarding the issue of insufficient time for training and those raised in the DBE's guidelines and action plan (Department of Basic Education, 2015, 2019). Garrison and Kanuka (2004) argued for a reconceptualisation and reorganization of the teaching experience that includes a novel approach to teaching and learning. We argue that this is particularly applicable to teacher professional development activities in order to accelerate the adoption of learner-centric pedagogies.

Statement of ethics

Ethics approval was sought and granted by the University of the Witwatersrand. Permission to conduct the research and use its data for academic articles was granted in writing by the

participating schools and teachers whose identities remain anonymous. There are no known conflicts of interests, and the data is not available to open access.

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