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Circumstances: The Impact of COVID-19 on Schools'
Approaches to Professional Development**

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Article

Teacher Professional Development in Changing Circumstances: The Impact of COVID-19 on Schools' Approaches to Professional Development

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Abstract: The COVID-19 pandemic caused fundamental shifts in schools' and teachers' practices. At the start of the pandemic, forty schools in England were in their second year of participation in a pilot initiative intended to understand what changes could be put in place by schools in order to implement an entitlement for teachers to high-quality, sustained professional development. This paper explores the impact of COVID-19 on the participating schools' approaches to professional development. Drawing on findings from the independent evaluation and school leaders' experiences of the initiative, it describes how, before the pandemic, school leaders constructed professional development plans in alignment with school improvement objectives and address individual teachers' professional learning needs. During the pandemic, after an initial de-prioritisation of professional development, plans were adapted to new professional development ecologies in schools. Professional learning activities moved to online, hybrid and blended environments and new activities were added in response to emerging teacher professional learning needs. This study demonstrates how schools' plans for teacher professional development can, even in the most extreme conditions, be reshaped and adapted to changing circumstances and adds to the growing body of knowledge of online and hybrid professional development.

Keywords: teacher; professional development; professional learning; CPD; COVID-19; planning; online; hybrid; school



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1. Introduction

The COVID-19 pandemic brought significant and far-reaching changes in teachers' and schools' practices worldwide [1]. Creating the conditions for change in schools can be slow [2,3], but the pandemic triggered immediate, unexpected changes in practice, including shifts to online learning, as a result of the restrictions imposed on social contact in schools [4–7]. This paper describes the impact of COVID-19 on the professional development practices of a group of schools in England which were involved in a pilot initiative, the 'Wellcome CPD Challenge' [8]. The aim of this initiative was to understand what changes could be put in place for schools to implement an entitlement for teachers to sustained, high-quality professional development.

Teacher professional development is seen as a route to improved teaching worldwide, and thereby improved educational outcomes [9–11]. However, while strategic planning appears to be a key component of improvement processes in effective schools [12,13], there is a gap in the research evidence about schools' approaches to planning teacher professional development, especially when compared to other aspects of professional development such as its content, delivery and evaluation (for example, [10,14–17]). What evidence there is suggests that professional development takes varying levels of priority within school improvement plans and objectives, and, even when schools' plans make reference to teacher professional development, the goals for improvement are often not aligned with teachers' professional learning needs [14]. Therefore, there is a strong case for improved access to,

and participation in, teacher professional development which is structured, sustained and aligned with school development objectives [15]. The forty schools involved in the initiative at the heart of this study were supported to make changes to their professional development practices to meet defined criteria (detailed below) relating to the quality and quantity of teacher professional development. This included building new and revised approaches to teachers' professional development into schools' plans and improvement objectives. Full findings from the delivery and evaluation are reported elsewhere [8,16,17] and include recommendations for school leaders and policy makers, such as the appointment of a senior leader in each school with explicit responsibility for leading professional development who is given support to develop their understanding of professional development.

This paper draws on those wider findings to offer a snapshot of how schools' approaches to professional development changed as a result of the COVID-19 pandemic, focussing on adaptations of schools' professional development plans and the shift towards models of online and hybrid professional development. Before the pandemic, school leaders had begun to adapt their professional development plans to align with school improvement objectives and to address individual teachers' professional learning needs. These changes led to increases in the amount and quality of teachers' professional development [17]. During the pandemic, after an initial period where professional development was de-prioritised, schools' plans were reshaped to accommodate emerging teacher professional learning needs and new ways of working in online environments.

This paper adds to the growing body of knowledge of the benefits and challenges of online, blended and hybrid professional development [18,19]. Further, it contributes new understanding of how schools' plans for teacher professional development, when they are well-established in school practices, can, even in the most extreme and unexpected conditions, be reshaped and adapted within new professional development ecologies [20], thereby contributing knowledge which is relevant to all those who lead professional development in schools or work with schools in the delivery and support of professional development.

Professional development, professional learning and associated terms have various definitions in the literature [14,21,22]. In this paper, continuing professional development (CPD) and professional development are taken to be synonyms, following the definition employed in the initiative at the heart of this study: 'intentional processes and activities which aim to enhance the professional knowledge, skills and attitudes of teachers in order to improve student outcomes' [8]. Professional learning is used to describe the outcomes of those processes and activities, often in conjunction with 'needs', so that 'professional learning needs' indicates the intended outcomes of those processes and activities. Differing uses of these terms in the literature are acknowledged (for example [23]).

This paper firstly explores research relating to the impact of COVID-19 on schools' approaches to and teachers' participation in professional development. It goes on to describe the context of this study: the delivery and evaluation of the pilot initiative and its methodology. Next, the findings of this study are discussed, focussing on the shift to online and hybrid models of professional development and the adaptation and reshaping of schools' professional development plans. The paper concludes by exploring the limitations of this study, reflecting on its implications and offering some questions for further research.

2. Teacher Professional Development and the Impact of COVID-19

Professional development plays an important role in teachers' professional lives, providing pathways for teachers to improve their knowledge, skills, capabilities and confidence [9–11]. Teachers' participation in professional development occurs within complex ecologies of formal and informal activity inside and outside school [9,20], with professional development available through many types of activity, including courses and workshops, conferences and seminars, participation in networks, collaboration, research, reading, observation, mentoring and coaching [24].

Online professional development can similarly take multiple forms. Hybrid professional development is delivered through simultaneous in-person and online activity, with

some teachers engaging online and others in-person, while blended professional development is delivered through a combination of online and in-person activity, synchronous and/or asynchronous [25,26]. Activities carried out online often mirror those carried out in-person, including conferences and webinars, practitioner inquiry and long-term collaborations [27–29], although some activities may be designed specifically for online platforms such as discussion forums and resource-sharing [30].

For in-person professional development, there is a well-established body of evidence about what makes it effective [10,11,31,32]. Although not without critique [33], these components, which include a focus on content, active learning, coherence, duration, collective participation, and contextualisation, are often used in the planning and evaluation of in-person professional development. Less attention has so far been paid to the planning and delivery of online professional development [18], although researchers have begun to explore whether and how these components of effective professional development can or should transfer into online environments. Examples, from before and during the COVID-19 pandemic, include supporting teacher reflection through online exercises, peer feedback and coaching, models of practitioner inquiry, the use of web-based learning environments and the ways in which social and emotional dimensions of teachers' experiences are mediated through the online environment [19,28,30,34].

Studies of online professional development have identified some benefits, including: reduced cost and time for travel, flexibility of participation, access to a range of resources beyond teachers' immediate workplaces, greater autonomy of choice, and the ability to build collaborative learning communities and share practice with teachers outside immediate peer groups [25,27,28,35]. Online professional development may also provide greater opportunities for teachers in rural and remote areas [23,29,36]. However, as studies also found during the pandemic, teachers may lack confidence in using online technologies for professional development and/or be unable to access appropriate devices for participation [26,37].

Early in the COVID-19 pandemic, governments sought to limit the spread of the virus by reducing social interactions through school closures, leading to rapid movement into online and hybrid environments for teaching [1,38,39]. The impacts were not experienced equitably by pupils and teachers, with differing access to online technologies for pupils and increased gaps in learning, and variations in teachers' preparedness for teaching online [1,4,39–41]. There is substantial evidence to suggest that, especially during the early phases of the pandemic, teachers experienced significantly increased stress and anxiety [41–43].

Not surprisingly, these changes also led to shifts in teachers' access to and engagement with professional development, including swift movement towards formal and informal online and hybrid activities [4,5]. These shifts were supported by a series of interacting factors. Firstly, the immediate change to online teaching meant that many teachers needed to increase their knowledge and skills in online pedagogies; this professional development need was addressed through online professional development activity [5,25,44–46]. Meanwhile, schools, and, increasingly external professional development providers, identified opportunities to offer professional development activities using online platforms, including the use of online technologies to support collaboration and sharing practice [4]. As time passed, teachers' increasing confidence in using online technologies to support learning meant that they were also more confident to participate in professional development through online platforms.

There are now many examples of online teacher professional development, in literature from around the world, implemented in response to the COVID-19 pandemic [47]. These studies have identified broadly similar benefits and drawbacks of online professional development as those mentioned above. In addition, some other barriers have emerged, including: incursions of online learning into teachers' personal and family lives; fatigue derived from prolonged periods spent online; lack of reliable internet access in some locations; the distanced working relationships between teachers and professional development

facilitators; and a lack of opportunities for collaboration with other teachers, whether within the same school or across networks [4,26,37,44,48,49].

Notwithstanding these challenges, online activity is certain to play a continued, important, role in schools' ecologies of professional development [4]. However, as mentioned earlier, many schools do not have professional development plans, for either online or in-person activity, in which individual teachers' needs are aligned with school improvement objectives [14]. Therefore, it is essential that we continue to study the design, affordances and impact of online and hybrid professional development, in order to understand how to integrate it within each school's professional development ecology, and, in turn, to align each teacher's professional learning needs with their school's wider strategies and objectives.

3. The Wellcome CPD Challenge: Design and Methodology

At the start of the pandemic in 2020, forty schools in England were in their second year of participation in the Wellcome CPD Challenge, the pilot initiative which provides the context of this article [8]. The aim of this initiative was to understand what changes could be put in place for schools to implement an entitlement for teachers to high-quality, sustained professional development. This is in the context of an English education system in which, while professional development is widely available through a range of providers and in-school provision [50], there is no statutory entitlement to professional development beyond the first two years of teachers' careers [51] and teachers' engagement with professional development varies in quantity and quality [52]. This section describes the design, delivery and evaluation of this initiative.

The 'Wellcome CPD Challenge', as the initiative was known, was commissioned by Wellcome [53] alongside an external evaluation [17] and ran for three years, from 2018 to 2021. Forty primary, secondary and special schools in England, selected to represent a mix of school types and contexts, were set the challenge of meeting defined criteria relating to the quality and quantity of teacher professional development. These criteria, based on evidence from research and tested by stakeholders [8] were defined as:

- Continuing professional development (CPD) meets the needs of the individual teacher and is predominantly focussed on subject-specific development;
- CPD is high-quality and aligns to the Department for Education's [54] standard for teachers' professional development;
- Every teacher participates in a minimum 35 hours of CPD annually.

The criteria were intended to act as ambitious but achievable targets, independent of schools' starting points. In meeting these criteria, it was hoped that all teachers would participate in a transformational amount of high-quality professional development directly relevant to their practice and contexts.

Each school designated a 'CPD Challenge Champion' (or 'Champion') to lead change in professional development practices in their schools. These change agents [55,56], who were often members of school leadership teams, were supported through schools' briefings which brought the Champions together to share practice and consider research evidence relating to professional development. In addition, they had regular contact with a CPD Challenge Facilitator, external to the school, who acted variously as problem-solver, mentor and coach, critical friend and a link to other schools [8,17]. Each school received an incentive payment as a recognition of the time needed to engage in the initiative. This was not ring-fenced to activities relating to teacher professional development, and it was not expected that, for most schools, the funding would be sufficient to enable meeting the criteria. Schools' participation in the CPD Challenge began in summer 2018, with baseline data collection and a briefing for Champions, and ended in December 2021.

Full details of the evaluation methodology are reported elsewhere [16,17]. Summarising briefly, the independent evaluation [17] collected qualitative and quantitative data from Champions, teachers and leaders in each of the schools, including:

- case study interviews with teachers, Champions and school leaders;

- professional development records completed by teachers, Champions and school leaders three times each year;
- annual attitudinal surveys completed by teachers, Champions and school leaders.

Complementing this data, the delivery team compiled and analysed termly reports completed by Champions, working closely with them through meetings and schools briefings to understand and support the leadership of change in their schools [8].

The data collected were analysed [17] against the following themes:

- the participating schools' and Champions' engagement in the CPD Challenge;
- the processes put in place by schools in response to participation;
- the impact of these processes on teachers' engagement in professional development;
- enablers and barriers to change.

This information was used to assess the impact of participation in the CPD Challenge, and offered formatively as feedback to the Champions about their progress, individually and as a group of schools, towards meeting the CPD Challenge criteria and to help them plan further changes to their practices.

This paper draws on the findings from the wider evaluation and delivery [8,16,17], focussing on qualitative data collected for the evaluation during the COVID-19 pandemic and Champions' reports of their experiences. The intention is to synthesise findings from these evaluation and delivery reports in order to explore the ways in which Champions and school leaders responded to the changes enforced on their emerging professional development practices by the COVID-19 pandemic. The research question addressed is: what can we learn about schools' approaches to the planning and delivery of professional development as a result of the restrictions brought about by the COVID-19 pandemic?

In the early months of the COVID-19 pandemic, the requirements of data collection and reporting were scaled back in order to minimise administrative tasks and enable teachers to deal with ongoing, and often fundamental, adaptations to their practices necessitated by emerging and changing restrictions on schools' activity [4]. Accordingly, teachers were not asked to complete a professional development record in the summer of 2020 and Champions did not complete a termly report for that period. Instead, a survey focussed on responses to COVID-19 was circulated from the evaluation team to Champions for distribution, at their discretion, to their schools, and case study interviews were carried out only with Champions [16]. An optional schools' briefing was held to bring together those Champions who could attend, and voluntary keep-in-touch calls and emails were held between Champions and the CPD Challenge Facilitators. As the pandemic continued into the following academic year, the CPD Challenge continued with lighter-touch models of support and evaluation, including optional contact with the CPD Challenge Facilitators and schools' briefings, before returning to more structured data collection and reporting in the final months of the initiative.

Data collection and analysis were subject to ethical approval and followed the ethical protocols of the respective organisations. All participants gave informed consent for participation and the inclusion of their data.

4. Findings and Discussion

This section begins with a brief summary of the impact of participation in the initiative, setting the scene for the situation in participating schools before the COVID-19 pandemic and illustrating some of the changes which schools made to their approaches to professional development. It then describes the immediate impact of the pandemic on schools' approaches to professional development, before looking at the longer term consequences of the move towards online and hybrid environments for professional development and the resilience and adaptability of schools' plans for professional development.

4.1. The Impact of Participation

At the start of the initiative, the schools involved were, from the data available, quite typical in relation to professional development with varying structures and processes

in place [14]. Only 9% of Champions reported that their schools had processes for systematically recording teachers' participation in professional development. Whole-school, department and age-phase and individual approaches combined in often unplanned and ad hoc ways to create complex professional learning ecologies [20]. Few schools had systems to support teachers in identifying and addressing their individual professional learning needs [17], and, in common with other studies [14,15], where professional development plans existed, they were often not linked to wider school improvement plans and objectives [8,17].

By the end of the initiative in 2021, over 70% of Champions reported that they had implemented or improved systems for recording teachers' professional development. As a result, professional development plans were more formalised and comprehensive and could be used to 'monitor individual staff development, identify training needs and personalise the school training plan appropriately' [17]. Planning for professional development intended to address individual teachers' needs gained greater alignment with school improvement objectives and closer integration with wider school development objectives, such as curriculum redesign, pedagogical development and support for pupils with special educational needs and disabilities [57,58]. By the end of the initiative, over 80% of teachers and school leaders stated that professional development was linked, at least to some extent, to their school improvement plans and schools' re-structured plans gave priority to teacher professional development alongside other objectives [17].

To achieve this, new processes and routines [8,17] included:

- shared, whole-school understandings and definitions of professional development;
- new and adapted systems for the planning, delivery and evaluation of professional development activities, including consideration of professional learning needs alongside performance management and appraisal processes;
- new and adapted approaches to individualised and subject-specific professional development, such as the implementation of teacher research projects, allocations of time for subject and age phase groups to work together in developing their practice and subject specialists taking greater responsibility for subject-focussed professional development.

At the start of the pandemic, changes to teachers' participation in, and the outcomes of, professional development were observed [17]. These included:

- increases in the quantity of professional development teachers participated in;
- increases in the perceived quality of this professional development;
- positive impacts on teachers' attitudes towards professional development;
- positive impacts on pupils as a result of changes in teaching practice.

In those schools where less progress towards change was identified, staff often experienced competing priorities such as impending or recent inspections and curriculum changes. As shown in other studies [59,60], these immediate concerns eclipsed school leaders' and teachers' ability to maintain a focus on professional development. As a result, the Champions in these schools were less able to lead change intended to improve engagement with professional development [8].

4.2. The Immediate Impact of COVID-19: De-Prioritisation of Professional Development

When the COVID-19 pandemic began, schools had been engaged in the initiative for around 18 months. The new professional development systems described above were becoming established, embedded and refined [16]. However, the immediate response to the pandemic and its restrictions [1,6] was a de-prioritisation of professional development. Around 70% of Champions reported that in these early months, other aspects of teaching took priority over professional development [16]. School leaders decided that they would not expect continued participation in professional development activity since this might increase the actual or perceived workload of staff, at a time when teachers in general were feeling greater pressure [61].

Therefore, schools' existing plans for professional development were put on hold so that teachers could deal with immediate issues, such as, in common with other schools, the logistics of teaching and learning through online and hybrid environments [4,16,17]. This illustrates how unexpected circumstances can throw schools' plans off-course [59,60] and reflects how, throughout the initiative, as mentioned above, competing priorities, separate from COVID-19, left a few schools struggling to engage.

Although formal professional development took lower priority in the early stages of the pandemic, the move to online and hybrid teaching led to rapid gains in teachers' professional knowledge and expertise [16]. This learning came about through practice, through mixtures of formal and informal knowledge-sharing with colleagues and, for some, through participation in externally provided online professional learning activities. Even though the circumstances surrounding this professional learning were unprecedented, this complex ecology of professional development is representative of many teachers' learning [9,24] and reflects other studies where teachers gained, by necessity, knowledge of online practice [5,25,44–46].

Interestingly, in these first months of the pandemic, some teachers found that they had more time to participate in professional development than previously [16]. These teachers, in common with other studies, were able to identify and engage in professional development which aligned with their own interests [5]. However, other teachers, particularly those juggling family and other personal commitments, were less able to participate, with over half (57%) of the teachers in the initiative reporting challenges in balancing personal responsibilities alongside teaching and professional development. This issue of equity of access to professional development has been identified elsewhere [47], and points to a challenge for school leaders and those delivering professional development in ensuring that all teachers are equally able to participate, particularly through online environments.

4.3. Re-Focussing on Professional Development

As other studies have identified [1,6], the move to online, hybrid and blended teaching and professional development happened quickly. Over the months following the initial shift, a new ecology of hybrid and blended models, combining online and in-person professional development in various approaches, became standard for the schools participating in the initiative. School leaders and Champions returned to their previous professional development plans, re-establishing professional development as an expectation within teachers' practice, and reshaping their plans to accommodate the changes necessitated to teaching and professional development. The participating schools' professional development plans, put in place before the pandemic, proved to be adaptable and resilient within the new, shifting environments brought about by COVID-19, and, in common with other studies of professional development during the pandemic, this flexibility was important, since it meant plans were not discarded [62].

The adaptations made to schools' plans fit into two main themes: new professional learning priorities, and the continued move towards online professional development delivery and participation. Looking first at new professional learning priorities, as the pandemic continued, many school leaders and Champions identified the need for teachers to continue to develop their knowledge of online and hybrid teaching. Alongside this, another professional learning priority emerged: managing the significant risks to, and changes in, pupil health and wellbeing brought about by the pandemic [4,63]. Plans were adapted to provide opportunities to address these emerging needs through activities such as online training in childhood adverse experiences [17], alongside the maintenance of pre-existing professional learning priorities, such as developing the curriculum. While the immediate impact of the pandemic led to a shift towards generic, less subject-specific professional development, over time, professional development activities regained a focus on subject-focussed and individualised learning needs.

Next, the delivery of professional development continued through a mix of in-person, online, hybrid and blended environments [25,37]. Professional development shifted back

towards structured, formalised and planned activity, as schools adapted their plans to the new circumstances and, importantly, as teachers gained confidence in their use of online environments for professional learning alongside teaching. Expectations of participation increased and Champions developed new models for identifying and sharing professional development opportunities. These included:

- signposting and cataloguing recommended activities and reading;
- directly organising and delivering activities, such as online 'how to' videos;
- providing menus of mandatory and optional professional development activities.

This variety of approaches meant that, for many teachers, there was less immediate pressure to participate in professional development, greater autonomy in choosing professional development and more opportunities to pursue individual interests [8,16]. For some schools, professional development activity which had previously taken place in person was transferred online. This included staff meetings, collaborative activity and courses run by external providers. In one school, teachers had been working together before the pandemic on research projects and this model was moved online so that teachers were grouped through common professional learning interests and researched shared themes together using online resources [8].

However, the transfer of in-person to online activity was not always straightforward. For Champions, online professional development reduced opportunities for discussion with individual teachers. This meant they found it more difficult to understand teachers' engagement with activities, especially where teachers were following individualised learning activities, and to evaluate the quality and impact of professional development [8,16]. Meanwhile, some teachers experienced initial reluctance to engage with online professional development activities, feeling a lack of in-person contact and reduced opportunities for collaboration, an important component of professional development [54,64,65]. Some experienced 'screen fatigue' [44] from prolonged time online and, as mentioned above, difficulties in engaging while balancing personal and professional commitments. Many found that they were less able, during this time, to engage with professional development as part of a sustained programme [16]. Similarly, some schools which had previously built strong culture of in-person collaboration, such as classroom to classroom support, did not initially find it easy to translate this into online environments [8]. This is in contrast to some pre-pandemic studies which show that online environments can support community building [27]. In addition, there were mixed views of the quality of some professional development delivered online by external providers [16].

There were also positives in the move to online professional development. Some Champions felt that online activity enabled the development of long-term, sustained learning, with opportunities for collaborative input, discussion, practice and reflection. Meanwhile, around a third of teachers felt that they had undertaken more professional development that met their individual needs than before the pandemic [8,17]. Other benefits to the use of online environments largely reflected those described above in other studies [25,27,28,35], including: flexibility of access and reduced cost and travel time needed, where activities had previously taken place in person and off-site. As mentioned above, in some schools teachers were given greater choice over their engagement with online professional development activities. Further, some activities enabled synchronous and asynchronous learning, so that teachers could engage at their own pace and at times which suited their professional and personal commitments.

For the schools in this initiative, professional development was a priority in their planning before the pandemic; this study shows that, for the majority of schools, it maintained this status during and after the pandemic. The changes made by schools to their planning processes appeared to be sustainable, through times of substantial ongoing change. Champions reported that beyond the pandemic, and the conclusion of the initiative in 2021, they intended to continue to refine their planning processes in order to gain further alignment of individual teachers' professional learning needs with school development objectives and further increase the time given to and frequency of professional development [8,17].

Crucially, the impact of COVID-19 did not affect most teachers' views about the importance of professional development: in the year following the outbreak of the pandemic over 70% of teachers agreed that professional development was as important as before [17].

5. Conclusions

This study offers a snapshot of the experiences of a group of forty schools in England, using findings from the analysis of data sets collected during a pilot initiative focussed on improving teachers' professional development [8,16,17]. The data used in this study were not collected for the purpose of exploring the shift to online professional development, nor the resilience of schools' professional development plans in the face of unexpected circumstances. Instead, they were collected for the purposes of understanding the impact of participation in an initiative which aimed to understand what changes could be put in place for schools to implement an entitlement for teachers to sustained, high-quality professional development, and the findings relating to the impact of COVID-19 were synthesised for this study. It is possible that a study focussed specifically on the shift to online professional development and/or the resilience of schools' professional development planning might obtain different findings. Meanwhile, the conditions of this study were, in many ways, exceptional. The COVID-19 pandemic brought about unprecedented circumstances which necessitated immediate and prolonged change in all teachers' practices. Furthermore, as a result of participation in the initiative, by the start of the pandemic, staff in this group of schools had already invested significant time and made measurable progress in reflecting on and improving their processes for professional development. Therefore, their approaches to professional development planning, delivery and participation are not necessarily typical or representative of other schools.

Notwithstanding these limitations, this study contributes new understanding of how schools' professional development plans can be made resilient to unexpected circumstances and shifting priorities and are likely to be applicable to schools in other contexts. The school leaders and Champions in this study found that, thanks to the changes they had made before the COVID-19 pandemic, their plans were adaptable and able to accommodate new and emerging professional learning needs alongside those which were previously identified. Meanwhile, they were able to adapt their delivery models and to build new models of online professional development to support those emerging teacher learning needs. This demonstrates that, in any circumstances, plans for individual teachers' professional development can be aligned with school improvement objectives, although support, such as that provided through this initiative, may be needed for school leaders to develop their skills and confidence in managing and leading these processes, and in working with colleagues to do the same. Importantly, this study indicates that schools' professional development plans, when developed in alignment with other priorities, can be sustained and adapted, rather than decelerated or abandoned as previous studies have suggested, when external circumstances change.

Further, the study adds to the growing body of knowledge identifying the affordances and drawbacks experienced by teachers in the move from in-person to online professional development. The shift in professional development ecologies to accommodate online and hybrid models is welcome in many respects: it increases flexibility of access, reduces cost, and supports teachers to develop their knowledge and skills in using online platforms for teaching. However, there are drawbacks, including a reduction in opportunities for collaboration. Moreover, online and hybrid professional development may lead to increased participation outside school time, and thereby put engagement out of reach for those teachers who have family and other personal commitments. As professional development continues its move into online and hybrid environments, this issue of equitable access to professional development must be addressed by school leaders and professional development providers.

This study raises some further questions for research. Firstly, it demonstrates how a particular group of schools embedded sustainable professional development plans in

their practice. More research could explore how school leaders in other contexts can achieve similar changes in their practices relating to professional development, so that individual teachers' professional learning needs are aligned with school improvement objectives, and professional development plans are sustainable and adaptable to shifting external circumstances. Finally, as the ecology of professional development in schools has shifted, perhaps permanently, to accommodate a greater proportion of hybrid and online participation, we need more knowledge of how online and in-person professional development can be used in conjunction so that the benefits of both are maximised for teachers' professional learning.

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