

Developing the developers: Supporting and researching the learning of professional development facilitators

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3 **Developing the developers: Supporting and researching the learning of professional**
4 **development facilitators**
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7 **Authors**
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9 **Emily Perry (corresponding author)**
10

11 Sheffield Institute of Education, Sheffield Hallam University, City Campus, Sheffield, S1
12 1WB, United Kingdom
13

14
15
16 Email: e.perry@shu.ac.uk
17

18
19 Phone: 0114 2255344
20

21 **Mark Boylan**
22

23
24 Sheffield Institute of Education, Sheffield Hallam University, City Campus, Sheffield, S1
25 1WB, United Kingdom
26

27
28 Email: m.s.boylan@shu.ac.uk
29

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31 Phone: 0114 2256012
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Developing the developers: Supporting and researching the learning of professional development facilitators

Abstract

Research on teacher professional development is extensive but there are fewer studies about the practitioners who facilitate professional development. Here we report on a pilot programme for professional development facilitators rooted in a cycle of action research. Informed by a categorisation of professional knowledge and skills of facilitators, in the ‘developing the developers’ programme, professional development facilitators enquired collaboratively into their practice using video observation and peer review and engaged with theories of professional learning. The impact of the programme was evaluated using a framework based on Clarke and Hollingsworth’s (2002) interconnected model of teacher professional growth. The programme was effective in allowing participants to gain insights into their practice to develop it further and to identify participants’ learning needs. The latter related to improving facilitation skills and knowledge and improving knowledge about professional development. The interconnected model was found to be applicable to professional development facilitators with some adaptations. Its use enabled understanding of the impacts of the programme and the learning processes involved. Although limited in scale, our study offers a model for professional development that is potentially useful in other contexts. Further, the theoretical frameworks developed may support the design and evaluation of similar programmes.

Key words

Professional development, facilitator, professional learning, video observation, interconnected model of teacher professional growth

Developing the developers: Supporting and researching the learning of professional development facilitators

Introduction

There is an established body of literature that illuminates the processes of teacher professional learning and development (for example, Fraser et al. 2007, Evans 2008, Clarke & Hollingsworth 2002, Vermunt & Endedijk 2011, Guskey 2000, Coldwell & Simkins 2011, Desimone, 2009 and van Driel et al. 2012). In contrast, there are, so far, only a relatively small number of studies about those who lead professional development and even fewer about the professional learning itself of these practitioners. The study reported here contributes to addressing these gaps.

Leadership of professional development encompasses two strands: the management of organisational structures for professional learning, such as in-school training programmes and school-to-school support, and the design and facilitation of professional development activities such as workshops, mentoring and coaching (Boylan 2016a). In this study, we focus on practitioners of the latter, that is, those who design and facilitate teacher professional development activities. Although a number of recent studies recognise that teacher leadership often involves facilitation of professional development (Fleet et al. 2015, Margolis 2012, Margolis & Deuel 2009, Fairman & Mackenzie 2014), there is limited research into the practice of professional development facilitators and therefore little knowledge of how to support them to learn, carry out and improve their roles (van Driel et al. 2012, Lange & Meaney 2013, O'Dwyer & Atli 2015).

This paper makes three contributions towards addressing this research gap. Firstly, we describe a successful professional development programme for professional development facilitators (PDFs) working in secondary science education in England. The programme was designed to support PDFs' professional learning and thus in turn improve the professional learning of teachers. The programme involved collaborative inquiry into practice using video observation, a technique widely employed for teachers' professional development (Gaudin & Chalies 2015). Video observation provided a stimulus for reflection and discussion of practice which enabled the PDFs to share knowledge and improve understanding of successful pedagogies, to explore models of professional learning and its evaluation and to better understand their own attitudes to teacher learning (Ince 2016). We describe the study and its outcomes.

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3 Secondly, we identify PDFs' professional development needs and suggest ways some of
4 these needs can be met. One notable feature of our study was the introduction to PDFs of
5 theoretical models of professional learning. This supported the PDFs involved in the study to
6 improve their understanding of professional development and, further, to use these models
7 themselves in their own practice with teachers. This engagement with theory for the
8 improvement of practice points to a way in which professional learning for PDFs can be
9 transformative (Kennedy 2014) or support a reimagining of practice (Sachs 2011).

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11 Finally, we address a need for theoretical tools to design and research professional
12 development facilitators' learning. In this study, we extended the use of the interconnected
13 model of teacher professional growth (Clarke & Hollingsworth 2002) as a framework to
14 analyse the learning of the participants in the programme and, as a result, we reflect on its
15 utility in this new context.

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17 In the next section, we consider previous research on professional development facilitators'
18 learning needs. Following a description of the study's methodology and the 'developing the
19 developers' programme, we summarise the outcomes of the programme, illustrated by the
20 learning of three participants. We reflect on the learning needs of PDFs, the effectiveness of
21 the programme in meeting these needs and our methodological approach for analysis of the
22 programme's effectiveness. We conclude by considering the implications of this study for
23 practice and further research.

24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 **The professional knowledge and skills of professional development facilitators**

39 In this section we consider the professional knowledge and skills needed for professional
40 development facilitation. This review of the literature informed the design of the 'developing
41 the developers' programme.

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45 In England, current policy agenda advocates teachers taking on the leadership of professional
46 development (Husbands 2015, Boylan 2016a) but professional development facilitators
47 (PDFs) are not exclusively teachers and few practitioners operate solely in the role of PDF.
48 Some studies have identified facilitation of professional development as one of the roles of
49 teacher leaders alongside wider activities such as the organisation and brokering of
50 professional development programmes (Margolis 2012, Boylan 2016a, Fairman & Mackenzie
51 2014) and many PDFs have other roles including school leaders, university staff, researchers
52 and independent consultants (Lange & Meaney 2013, Krell & Dana 2012, Margolis 2012,
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3 van Driel et al. 2012, Jackson et al. 2015). As a way of distinguishing between these roles the
4 concept of a 'second order' role (Murray & Male 2005) is useful. A 'second order' role is one
5 which is one step removed from the classroom, such as an initial teacher educator. Some
6 PDFs, such as university-based staff, are continually in a second order role (at least in
7 relation to schooling), whereas teacher PDFs move between the first order role of teaching
8 and the second order role of facilitation.
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14 In developing a conceptual framework of PDFs' knowledge and skills, we begin by
15 considering recent discussion of the relationship between the capacities needed for and
16 developed by teaching and those needed for another second order role, initial teacher
17 educator. This supports the development of an initial framework in which we suggest a
18 categorisation of professional learning needs for PDFs. Our focus is on the different types of
19 knowledge and skills needed for teaching and for facilitation. We acknowledge that a
20 distinction between knowledge and skills is not unproblematic, particularly if a view of
21 knowing in practice (see for example, Lave & Wenger 1991) or knowledge in action (Schön
22 1995) is adopted in which the difference between knowledge and skills blurs. We also
23 acknowledge that these categories do not address other aspects of professionalism such as
24 values and identity (Loughran 2006). However, our framework is devised in relation to the
25 types of professional learning identified through the study of the programme described in this
26 paper.
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37 Expertise in teaching is, we contend, a prerequisite for effective professional development
38 facilitation (Byington & Tannock 2011). For PDFs to be credible, they must have and be able
39 to demonstrate their knowledge of the subject matter of the professional development
40 activity, including subject specific pedagogical content knowledge (O'Dwyer & Atli 2015).
41 PDFs must be able to make explicit their knowledge of how children learn their subject, such
42 as being able to describe common student misconceptions and they must situate the learning
43 of teachers in an appropriate context, demonstrating knowledge of educational frameworks
44 such as curriculum content, assessment structures and the wider education environment
45 (Byington & Tannock 2011). We suggest therefore that professional development facilitators
46 need opportunities to develop and maintain their knowledge of the subject and how it is
47 effectively taught. We recognise this need as *knowledge and skills for teaching*.
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56 The importance of knowledge and skills for teaching in undertaking second order roles has
57 been recognised in research on the role of initial teacher educators (Chauvot 2009; Field
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2012, Goodwin & Kosnik 2013, Selmer et al. 2016). One example is a three-stage model of knowledge acquisition for teacher educators (Field 2012):

- subject knowledge;
- knowledge of how to teach others;
- knowledge of how to teach others how to teach (your subject).

However, Field's second category 'knowledge of how to teach others' is not homogeneous. Following Shulman (1987) the different types of knowledge needed for the first order role of teaching have been much explored, especially in science and mathematics (see, for example, Settlage 2013 and Goos 2013). In relation to the second order role of teacher education, and specifically mathematics teacher educators, Chauvot (2009) draws on Shulman's framework, and Grossman (1990) and Murray and Male's (2005) notion of pragmatic knowledge of context, to draw distinctions between:

- subject matter content knowledge;
- pedagogical content knowledge;
- curricular knowledge;
- knowledge of context.

These forms of knowledge for teacher educators are related to but distinct from those for mathematics teachers. This approach could be adapted for teacher educators in other subject areas. Selmer, Bernstein and Bolyard (2016) develop the approach further, influenced by Goodwin and Kosnik's (2013) review of types of teacher educator knowledge. They propose a multi-layered model with three major elements: content specific knowledge, context knowledge and general pedagogical knowledge. These elements are divided into specific sub-elements and sub-sub-elements related to teaching and teacher education to give a total of 25 different categories.

Turning from teacher educators, for professional development facilitators (PDFs) the situation appears to be even more complex, since PDFs work with those who already know how to teach. Facilitation therefore encompasses multifaceted layers of interaction drawing on the roles of listener, expert, critical friend, coach, mentor, as well as teacher and workshop leader (Krell & Dana 2012, O'Dwyer & Atli 2015). PDFs must know when and how to deploy these roles (Higgins 2008, Elliott et al. 2009, Stein et al. 1999) in response to the

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3 needs and expertise of the teachers in front of them (Lange & Meaney 2013, Ince 2016).
4 Building on Field's (2012) stages of knowledge acquisition for initial teacher educators we
5 therefore posit the need for an additional stage: knowledge of how to facilitate the
6 professional learning of those who already are teaching the subject. Facilitation includes the
7 ability to make explicit aspects of practice which for expert teachers may be tacit (Borko et
8 al. 2014) such as through the modelling of good teaching (Margolis & Doring 2013).
9 Different skills are needed for different forms of professional development. While some of
10 these skills may be generic to teaching, such as those used in workshop facilitation, others,
11 like coaching, are more specialised. PDFs therefore need opportunities to learn and practise
12 these *facilitation skills and knowledge*.
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21 Finally, in addition to knowledge and skills of teaching and facilitation, PDFs need to
22 understand the professional learning of teachers who carry with them their own beliefs and
23 experiences (Ince 2016). This 'learning community knowledge' (Borko et al. 2014)
24 encompasses knowledge of theoretical models of how teachers learn, the principles and
25 benefits of different forms of professional development such as mentoring or action research
26 and the evaluation of professional development (Stein et al. 1999, Linder et al. 2015). Some
27 aspects of this are generic, such as understanding about different types of professional
28 development activity. Other aspects are subject specific. For example, in science teaching an
29 understanding of common scientific misconceptions may be important (Fischer et al. 2014)
30 and so PDFs need to develop knowledge of teachers' relationships to student (and their own)
31 misconceptions. This is encapsulated in the need for facilitators to have *knowledge about*
32 *professional development*.
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41 Our framework of professional learning needs for PDFs includes three categories of learning
42 needs: knowledge and skills for teaching, facilitation skills and knowledge, and knowledge
43 about professional development. For simplicity, and relevance to the video observation
44 utilised in our study, this model does not encompass other aspects of the facilitator's role that
45 sometimes may be applicable such as: organising and brokering of professional development
46 programmes (Boylan 2016a), sensitivity to the micro-politics of implementing professional
47 development activities in schools (Boylan 2016b, Fleet et al. 2016) or knowledge of context
48 found in frameworks of (initial) teacher educator knowledge (Chauvot 2009, Goodwin &
49 Kosnik 2013, Selmer et al. 2016).
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The Developing the Developers programme: design and methodology

Background and context

The ‘developing the developers’ programme was funded through the National Science Learning Network (STEM Learning Ltd 2015), a government-funded initiative in England. The network was established in 2004 to provide science teachers with continuing professional development to improve their subject and pedagogical content knowledge to increase pupil attainment and progression into scientific career pathways. The pilot programme described in this paper aimed to support the professional learning, and so improve the practice, of the network’s facilitators, who include teachers, university staff and independent consultants. The programme was developed, delivered and evaluated by Emily, one of the authors of this paper, who led one of the network’s five regional centres. The funding of the programme supported its development, delivery and evaluation and included an honorarium to the participants.

Methodology

The study described in this paper followed the principles of action research (McNiff 2002), comprising a cycle of implementation and evaluation. The aim was to trial an intervention which addressed the lack of provision for the professional learning of professional development facilitators (PDFs) working in science education. The research questions which the study sought to address were:

- What activities are effective in supporting the professional learning of professional development facilitators?
- What can we learn about the professional development needs of professional development facilitators as a result of providing such a programme?
- Can the interconnected model of teacher professional growth be extended to understand the professional learning of professional development facilitators?

Programme design

Opportunities are rare for the induction or ongoing professional learning of professional development facilitators. Thus, in designing the developing the developers programme, there were limited models to draw on. Reported examples include a mentoring model through co-delivery with more experienced facilitators (White 2014), the creation of a community of practice to improve pedagogical skills such as questioning (Tack & Vanderlinde 2014) and

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3 the observation of live professional development sessions through a one-way mirror (Ince
4 2016). Borko et al. (2014) describe a programme in which the learning of novice PDFs was
5 integrated into the facilitation of teachers' professional learning. This is a similar approach to
6 one in an Early Years context of support by university staff who 'facilitate the facilitators' of
7 practitioner enquiry (Fleet et al. 2016).
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12 The design of the 'developing the developers' programme was informed by research on
13 teacher professional development (for example, Desimone 2009) and the professional
14 learning of science teachers (van Driel et al. 2012), based on a premise that, given the
15 overlapping roles of teachers and facilitators, the professional development of facilitators
16 might operate in a similar way to that of teachers. The programme structure and content was
17 built around the following characteristics: active, collaborative and inquiry-based learning, of
18 a suitable duration, coherent with participants' professional contexts, supported by employers
19 and focussed on improving outcomes (van Driel et al. 2012). The overall aim was for a
20 transformative model of professional development (Kennedy 2014) in which participants
21 collaborated in professional enquiry into practice.
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30 Modelling professional development for facilitators on what is effective for teachers does
31 have limitations, particularly in the difference between the intended outcomes of professional
32 development for teachers and PDFs. While effective professional development for teachers is
33 focussed on improving student outcomes (van Driel et al. 2012), for PDFs the impact on
34 student outcomes is mediated by the 'second order' nature of their role (Murray & Male
35 2005) which separates them from direct classroom impact (Parr & Timperley 2010). In the
36 'developing the developers' programme, therefore, the focus was on improving facilitation
37 skills and knowledge, and knowledge about professional development and, where possible, in
38 measuring that improvement through observation of teachers' engagement and learning.
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46 In accordance with these design principles, participants were actively engaged over a number
47 of months through varied activities and collective participation which allowed them to direct
48 the focus of participation (Desimone 2009) in a supportive, constructive environment of
49 critique and reflection (Schuck & Russell 2005). Video observation formed a key part of the
50 programme. With teachers, video observation has been shown to add value to professional
51 learning by providing a stimulus for reflection and discussion (Grant & Kline 2010). In this
52 programme, we piloted an extension of the use of video to the professional learning of
53 professional development facilitators. Participants recorded themselves facilitating
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3 professional development and then shared these videos in small groups. This provided
4 authentic examples of practice for discussion, reflection and analysis (Coles 2013, Newton &
5 Sorensen 2010, Sherin & van Es 2009). Involvement was supported by participants'
6 employers and leaders, through consent where appropriate and honorarium payments, with
7 financial support provided by the National Network of Science Learning Centres, which
8 therefore offered a level of credibility and authority for the programme. The programme
9 design also gave insight into which aspects of practice the facilitators felt were important,
10 thereby signalling their professional learning needs.
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16 17 18 *Participants*

19 An invitation to participate in the 'developing the developers' programme was sent by email
20 to around one hundred professional development facilitators working for the network. The
21 invitation detailed the programme's aims, content and structure and provided information
22 about the research study.
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27 Seven professional development facilitators (PDFs) chose to take part (Table 1). All had been
28 facilitating professional development for at least four years. Ben was a 'hybrid teacher leader'
29 (Margolis 2012), who combined classroom teaching of science with the facilitation of
30 professional development for other teachers. All the other participants had been secondary
31 science teachers and were now independent consultants, employed as short-term contractors
32 by various organisations, or university employees, with two participants combining these
33 roles. As mentioned above, one of the authors of this paper devised and facilitated the
34 programme, and, as a PDF herself, took part in the video observation sessions. All
35 participants had previously worked with or knew through professional networks at least one
36 other participant. Given that the participants were volunteers for the programme, they cannot
37 be taken to be a representative sample of all the professional development facilitators invited,
38 who in turn are not representative of all professional development facilitators. This is a
39 limitation of our study. However, whilst not statistically representative, based on our
40 professional experience, the range of different roles and experiences accords with profiles of
41 those engaged in this type of professional development in England at the time of the study.
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53 Table 1. Programme participants
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55 Through a written questionnaire, which was discussed in the first face-to-face workshop, the
56 participants explained their reasons for joining the programme. These focussed on two of the
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3 three themes of learning we proposed earlier: facilitation skills and knowledge, and
4 knowledge about professional development. Around half the participants were aware of the
5 increasing use of video observation for professional development in schools, and so wanted
6 to experience its use for themselves, so that they could use it in facilitation. All participants
7 wanted to improve their knowledge of professional development, including their own
8 practice. A comment from Rose illustrates this: ‘People tell me I’m good at what I do, but I
9 don’t know why. I’ve got no evidence and I don’t actually know what I do that might be
10 good.’
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17 *Ethics*

18 Institutional ethical approval was sought and obtained. Consent was obtained from all
19 participants, who were made aware that, because of the small scale of the study, anonymity
20 could not be assured in reporting. In keeping with consent agreements their names have been
21 changed for confidentiality. Within the programme, confidentiality between participants was
22 agreed, in order to set up a trusting and secure environment for sharing of practice.
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28 Given that the programme, was, as stated above, designed and facilitated by the leader of a
29 regional centre which employed some of the participants as PDFs, power issues arise.
30 Participants may have felt that participation was not voluntary or that their competence as a
31 facilitator was being evaluated or exposed which could lead to reduced offers of work. To
32 mitigate against these threats, ethical issues were explored in the first face-to-face workshop,
33 allowing participants to share any concerns. Independence was assured in terms of
34 participants’ choice of which videos to share, and which features of their practice to focus on.
35 Participants were randomly assigned to one of two groups in which to share videos. The
36 author participated in the programme by sharing videos of her own practice with other
37 participants in one of the groups, also randomly assigned.
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46 Consent was obtained from all teachers who took part in the recorded professional
47 development sessions.
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50 *Programme activity*

51 Over five months, punctuated by face-to-face workshops and online discussions (Table 2),
52 the PDFs recorded themselves facilitating professional development using a video or
53 smartphone camera. The videos were shared with other participants using Iris Connect, an
54 online environment which is widely deployed in schools (Iris Connect 2015).
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3 Table 2. Programme structure
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5 By the end of the programme, eight videos had been shared from activities including one-off
6 workshops, conference workshops, single workshops within multi-day programmes and
7 individual coaching sessions (Table 3).
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11 Table 3. Videos shared by the facilitators
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14 The PDFs were supported in discussion of their videos through a series of online prompts
15 (Table 4). They were not directed to focus on any particular aspect of practice, but instead
16 were asked to note anything in the videos which they found significant or curious. Emerging
17 issues were discussed during face-to-face workshops, online discussions and video
18 conferences.
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23 Table 4. Video observation prompts
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26 The programme also included activities which focussed on improving the knowledge of
27 professional development, including reading and discussion of four models of professional
28 learning: the ‘discipline of noticing’ (Mason 2002), self-study (Berry 2009), appreciative
29 inquiry (Giles & Kung 2010) and most significantly the interconnected model of professional
30 growth (Clarke & Hollingsworth 2002). A number of the participants found this model
31 particularly useful for thinking about their own practice, including Mike, who, as we describe
32 later, shared the model with teachers in his own practice. The interconnected model was also
33 used as an analytical tool in the research study (see below).
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41 ***Data collection***

42 Multiple sources of data, collected before, during and after the programme, were used to
43 provide information about the study (Table 5). Each data set was analysed using a method
44 appropriate to its purpose.
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48 Table 5. Data collection and analysis
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51 ***Data analysis***

52 Descriptive statistics (see Table 1) were derived from the background information survey.
53 Participants’ discussions, online and face-to-face, of the video observations were analysed
54 through an inductive process of coding and theming (Ryan & Bernard 2003) in order to
55 identify what the participants felt was important to explore in their own practice.
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3 The outcomes of the programme for participants' learning and practice were investigated
4 through the analysis of three data sets:
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- 7 • written evaluations of the programme at its conclusion;
- 8 • semi-structured interviews with pairs of participants around four weeks later;
- 9 • a follow-up questionnaire approximately eight months later, which described initial
10 findings and asked for further responses as appropriate, thereby providing participant
11 validation.
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17 The interconnected model of teacher professional growth (Clarke & Hollingsworth 2002) was
18 used as a framework for analysing this data. The model is a tool for theorising, understanding
19 and improving teacher professional learning and change. The model's conceptualisation of
20 the change environment encompasses 'the teacher's world' (Clarke & Hollingsworth 2002, p.
21 950), within which are four domains: the personal domain, the domain of practice, the
22 external domain and the domain of consequence (Figure 1). Two processes of enaction and
23 reflection mediate change between the domains. The model goes beyond other learning
24 pathway models (for example (Desimone 2009, Guskey 2000) in that it proposes a non-linear
25 style of learning predicated on the view that learning is a continual and complex process
26 which can take multiple pathways.
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34 The interconnected model is widely cited, especially in mathematics and science teacher
35 professional learning, reflecting its origins in theorising empirical studies of teacher learning
36 in these disciplines. For example, the typology of the four domains has been used to
37 categorise the aims of professional development interventions in science education (van Driel
38 et al. 2012), and the model has been used to analyse coaching and mentoring, with an
39 extension here to include the learning of the teacher mentor (referred to as the advisor
40 (Hartnett 2011) or co-operating teacher (Rodriguez 2013)).
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47 Figure 1. The interconnected model of teacher professional growth (Clarke &
48 Hollingsworth 2002)
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51 In this study, the model was used an analytical tool in two ways. Firstly, the model was used
52 as an 'interrogatory tool' (Clarke & Hollingsworth 2002). Each comment from a participant
53 which related to an impact or outcome of the programme was categorised into one of the four
54 domains of change. For example, if a participant reported that they felt more confident in
55 their understanding or knowledge of teacher professional development or its facilitation, this
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3 was situated in the personal domain. If they trialled a new technique in their practice of
4 facilitation, this was classified as professional experimentation and located in the domain of
5 practice. Further examples are given below. This analysis gave us a qualitative, evaluative
6 snapshot of the impact of the programme.
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10 Secondly, the interconnected model was used to trace 'change sequences' (Clarke &
11 Hollingsworth 2002) describing the learning of individual participants. We identified
12 participants' reported learning from the programme, located each outcome as above in the
13 appropriate domain of change and then linked these changes together into pathways. This
14 analysis allowed exploration of the ways in which the programme had operated for individual
15 participants. By using the interconnected model in these ways, we were also able to reflect on
16 its use in this new context: the learning of professional development facilitators. Outcomes of
17 the analysis were shared with participants to provide an element of participant validation.
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24 25 **Professional learning outcomes**

26 In this section we analyse the outcomes of the programme. Gathered from programme
27 evaluations, follow-up interviews and follow-up questionnaires, each participant comment
28 which related to an impact of the programme, was classified, as described above, into one of
29 the domains of the interconnected model of teacher professional growth (Clarke &
30 Hollingsworth 2002). The distribution across the domains is shown in the table below (Table
31 6).
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38 Table 6. Outcomes of the programme classified into the four domains of change
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40 Our findings relating to each domain are now presented in turn. These describe the outcomes
41 of the programme, illustrate the framework of professional learning for PDFs we described
42 earlier, and highlight our findings in the use of the interconnected model. We include our
43 analysis of participants' video observations in the domain of practice and present individual
44 change sequences from three participants to illustrate aspects of the study which relate to the
45 personal, practice and external domains.
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50 51 ***The personal domain***

52 The most numerous outcomes were situated in the personal domain. We classified these into
53 two further sub-categories (Table 7), based on the model of professional learning for PDFs
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3 we proposed earlier: facilitation skills and knowledge, and knowledge about professional
4 development.
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7 Table 7. Outcomes in the personal domain
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10 Mike's change sequence (Figure 2) illustrates the personal domain. His learning begins in
11 the external domain by engagement, during reading and discussion in the programme's
12 workshops, with the interconnected model itself (Clarke & Hollingsworth 2002). Mike
13 subsequently trialled an activity in his own professional development sessions with teachers,
14 in which he used the model to stimulate discussion of how teacher learning can occur through
15 professional development. Through this, he noticed a salient outcome: his teachers appeared
16 more engaged in their own professional learning. He felt that he had given the teachers a
17 'more accurate perception of how professional development should work', which in turn led
18 to further change in the personal domain: a belief that sharing theories of professional
19 learning with the participants leads to greater impact and engagement.
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27 Figure 2. Mike's change sequence
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30 In a follow-up interview, he said:
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33 I would use [the model] again... because sometimes my experience of delivering
34 [professional development] is you get teachers coming and they sort of know what they
35 want but they don't know what they need and I think this... is one way of me getting them
36 to reflect on just how this day that they're spending here is going to impact on them.
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40 For Mike, change in the personal domain, in his knowledge about professional development,
41 is linked in a reflective cycle with a change in practice and with salient outcomes in the
42 domain of consequence.
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47 ***The domain of practice***

48 Our findings in the domain of practice provide an insight into which aspects of facilitation the
49 participants felt important for reflection and/or improvement. In Mike's change sequence,
50 change in practice involved professional experimentation in trialling a new strategy for
51 facilitation. However, for some participants, particular aspects of facilitation were simply
52 noted and discussed, rather than changed, at least during the duration of the programme. This
53 may be because of the way in which video was used in the programme, meaning that a
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3 change in practice was not, perhaps, seen as crucial to participation. We extended the domain
4 of practice to include these aspects of facilitation, even when they were not strictly
5 professional experimentation, because they illuminate PDFs' professional learning needs in
6 this domain.
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10 Participants' concerns relating to the practice of facilitation centred around two themes:
11 pedagogy and embodiment (Table 8). Both these themes fit into the category of facilitation
12 skills and knowledge we proposed earlier. In the theme of pedagogy we located skills and
13 knowledge which the facilitator used to generate a productive learning environment.
14 Examples include formative feedback techniques, ways of organising groups and questioning
15 strategies. The second theme, embodiment, encompasses the act of being a facilitator. It
16 includes actions taken, sometimes unconsciously, by the facilitator to establish their
17 competence and credibility, including being well-prepared, using humour and appearing
18 relaxed, confident and knowledgeable. We also included here ways in which the facilitator
19 used their physical presence in the room such as making eye contact and moving around to
20 talk to all group members.
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30 Table 8. Domain of practice themes emerging from the video observations
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32 Liz's change sequence (Figure 3) illustrates change in the domain of practice. Liz reported
33 that, when she facilitated professional development, the beginnings of her workshops were
34 occupied with paperwork and took too long to get started. She recorded the start of a session
35 to 'just see what it looked like' and, by sharing it for feedback, to 'know what... other people
36 do'. The other facilitators, on one hand, offered some (unexpected) appreciation that what Liz
37 was doing was more effective than their own practice and, on the other hand, provided tips on
38 how they started their sessions. Liz tried out a new way of starting sessions – a change in the
39 domain of practice – which she recorded and shared again. She felt that her new technique
40 was an improvement: the teachers were more quickly engaged with their professional
41 learning. This outcome led in turn to a consolidation of her belief about the best way to start
42 sessions. Again, we see a cycle linking the domain of practice with the personal domain, this
43 time including a link to the external domain through Liz's sharing of her videos with the
44 other participants.
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55 Figure 3. Liz's change sequence
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The domain of consequence

Relatively few outcomes or changes corresponded to the domain of consequence. Those which did, like those illustrated by Mike and Liz, related to participants noticing an increased engagement of teachers in professional learning as a result of a change in practice. A lack of change in this domain may be attributable to the programme design, particularly its timescale, with only a few months available for implementation of change and evaluation of impact. Alternatively, it may be because of an inherent difficulty, discussed earlier, in identifying what constitutes, and how to measure, a salient outcome for professional development facilitators.

The external domain

In this study, we defined the external domain as made up of two components of the programme: learning from theory about professional development and learning from participants working together through discussion and video observation. These are changes in the sense of Clarke and Hollingsworth's (2002) original descriptions, in that they are new stimuli for the learner and drivers of change in other domains. Above, we discussed learning from theory about professional development, so here we focus on learning from working together. Participants reported that collaborative reflective enquiry was a key feature of the programme. As one participant commented, working together enabled the PDFs to 'see that what we see as key features of our own approach are shared by others' (Adam).

Our third change sequence illustrates this component of the external domain. Jack's change sequence (Figure 4) begins with Liz's video of the start of her workshop, described above. Watching this led Jack to also feel dissatisfied with the beginnings of his workshops and so he too decided to experiment with new practice to start sessions. As a result of this change in the domain of practice, he felt that his teachers were more quickly engaged with their professional development: a salient outcome. Jack's sequence moves in a linear fashion through the domains.

Figure 4. Jack's change sequence

In Jack and Liz's change sequences, the external domain is formed by the community of facilitators participating in the programme. Based on this, we feel a modification to the interconnected model is appropriate for collaborative professional learning activity, such as

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3 the programme described here. In these scenarios, we propose that the external domain is
4 better termed the social domain, thereby capturing the idea of learning in a community.
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7 8 **Discussion**

9 In this section, we revisit the research questions of the study. We consider first what we have
10 learned about the professional learning needs of professional development facilitators. Next
11 we look at what activities can support the professional learning of professional development
12 facilitators. Finally we reflect on our extension of the interconnected model to the new
13 context of professional development facilitators.
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17 18 *Supporting the professional learning of professional development facilitators*

19 In designing the programme described in this study, we drew on research into effective
20 professional development for teachers (van Driel et al. 2012). We found that this was
21 successful in building a programme which was effective for the professional development
22 facilitators who took part in the study.
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28 The programme structure blended face-to-face and online activity to generate a supportive
29 environment which allowed a collaborative reflection, discussion and sharing of experiences
30 (Schuck & Russell 2005). Participants engaged in reflective enquiry (McNiff 2002) which, as
31 illustrated by Liz's change sequence, was reminiscent of many teacher action research
32 studies, with learning starting from a question about one's own practice. While Jack's linear
33 change sequence is similar to many teacher learning pathways (see Guskey 2000) for
34 example), Mike's illustrates how the second order role (Murray & Male 2005) of a PDF leads
35 to a more complex set of learning needs, different from that of a teacher, with an interlinking
36 of theory, practice and modelling (Krell & Dana 2012).
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44 Key enabling activities in the programme were collaboration with peers, the use of video
45 observation and engagement with theoretical models of professional learning. The
46 opportunity to collaborate with peers was valued by all participants and identified as a rare
47 activity in their role as a PDF, which may have been a driver for these PDFs to participate in
48 the programme. As a result of this collaborative activity, most participants trialled a new skill
49 in their professional development practice, and a few also reported evaluation of these
50 changes. These new facilitation techniques were learned through observations of and
51 suggestions from other participants, as well as engagement with theory.
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3 We found that video observation was effective, as it is for teachers (Coles 2013, Gaudin &
4 Chalies 2015, Grant & Kline 2010), in supporting the professional learning of PDFs. The use
5 of video provided a structure in which participants could share authentic examples of practice
6 for reflection and discussion through which to explore their experiences of facilitation and
7 ideas for improvement (Grant & Kline 2010). Discussions of the videos were lively, with
8 PDFs comparing their own experiences with the practice observed. Gentle advice-giving was
9 more common than critical analysis, with comments tending towards the descriptive and
10 complimentary. This suggests a potentially superficial type of learning, in the style of Sachs'
11 (2011) metaphor of professional development as 'retooling', a tinkering with practice through
12 uncritical sharing of practical skills for delivery. The 'retooling' through video observation
13 was true even towards the end of the programme, by which time it might have been expected
14 that the participants would be more confident to challenge each other. However this is also
15 true of the early stages of programmes which use video observations for teachers (Rosaen et
16 al. 2008) and so, over a longer time period, participants may have felt more confident to
17 interrogate each other's choices.
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29 Engagement with theoretical models of professional learning enhanced the learning through
30 video observation, taking the programme as a whole closer to a transformative (Kennedy
31 2014) or 'reimagining' form of professional development (Sachs 2011) in which participants
32 recognised changes to their beliefs about effective facilitation rather than simply taking away
33 new practical ideas for immediate implementation. Learning about theory led to increased
34 understanding of the creation of opportunities for teacher learning and to explorations of the
35 PDFs' own attitudes to learning, both vital components of effective facilitation (Ince 2016).
36 In some cases, illustrated by Mike's change sequence, engagement with theory led in turn to
37 improvements in practice which corresponded to changes in beliefs about practice.
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45 Our findings show that a combination of collaborative reflection on practice and engagement
46 with theory has the potential to offer an effective model of professional learning for PDFs
47 which meets the learning needs identified earlier. Video played a role in this programme in
48 stimulating reflection initially, but may not be essential in providing prolonged opportunities
49 for learning.
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54 ***The professional development needs of professional development facilitators***

55 There has been little previous research addressing what constitutes the equivalent of
56 pedagogical content knowledge or subject matter knowledge, or interaction between these,
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3 for PDFs. Above we outlined an initial framework to consider this through three interacting
4 categories: knowledge and skills for teaching, facilitation skills and knowledge, and
5 knowledge about professional development. In the ‘developing the developers’ programme,
6 participants selected for themselves which aspects of practice to explore and analyse. Our
7 findings therefore shed light on what PDFs identify as professional learning needs.
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12 In our study, we found little evidence that professional development facilitators felt a need to
13 explore their knowledge and skills for teaching. Subject-specific content and pedagogical
14 content knowledge were never discussed. The reasons for this are unclear. It may be that the
15 structure of the programme did not support discussion of this aspect of facilitation.
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18 Alternatively, we could speculate that the PDFs took for granted a level of expertise in
19 teaching which meant that teaching knowledge and skills were not considered appropriate for
20 discussion. Based on these findings, it is interesting to consider whether or not PDFs need to
21 be given opportunities to explore and improve their knowledge of teaching, and, if so, how
22 these opportunities could be provided.
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28 Next, we proposed that the ‘second order’ role (Murray & Male 2005) of PDFs requires
29 facilitation skills and knowledge. The PDFs in this programme focussed their enquiries on the
30 pedagogy of facilitation including the use of video, questioning and, as described in Liz and
31 Jack’s change sequences, the first minutes of workshop sessions. They also reflected on their
32 embodiment as facilitators through their physical presence in the room, such as the use of
33 humour or making eye contact. Their focus was on sharing and comparing strategies for
34 particular facilitation scenarios; there was little interrogation into the choice of strategy or
35 how different facilitator roles might be enacted, such as when it is appropriate to move from
36 the role of expert or coach to that of listener or mentor (O’Dwyer & Atli 2015). Even with
37 this arguably superficial level of reflection, the change sequences we describe illustrate how
38 these discussions led to changes and improvements in practice.
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47 Finally, our study suggests that knowledge about professional development is a significant
48 area of learning need for PDFs. Participants in the programme were aware of a lack of
49 ‘learning community knowledge’ (Borko et al. 2014) and were eager to improve it,
50 identifying that this would improve their understanding of their role in enabling teacher
51 learning. In this programme, the PDFs focussed on theoretical models of professional
52 learning, illustrated by Mike’s change sequence in which he improved his practice by
53 adopting the interconnected model (Clarke & Hollingsworth 2002) for use with teachers.
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3 Mike shows the value here of supporting facilitators to improve their knowledge about
4 professional development.
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7 In summary, the PDFs in this study identified professional learning needs in two areas:
8 facilitation skills and knowledge, and knowledge about professional development. They felt
9 less need for learning in the area of knowledge and skills for teaching. These findings reflect
10 the 'second order' (Murray & Male 2005) nature of the role of a PDF, differing from the
11 professional learning needs of teachers, which naturally focus on knowledge and skills for
12 teaching.
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17 *Extending the interconnected model of teacher professional growth*

18 In describing the methodology of the study we pointed to the limitations of the specific
19 context of the study, such as the participant sample. These are less relevant in relation to our
20 extension of the interconnected model of teacher professional growth (Clarke &
21 Hollingsworth 2002) to professional development facilitators. The model offered an
22 evaluative utility by going beyond linear models such as that of Guskey (2000). We used it to
23 categorise outcomes of the programme and to identify learning through individual change
24 sequences. We found that the model was effective in supporting an analysis of the outcomes
25 of the programme, and in using it in this way we identified some areas of further
26 investigation for the model's use with PDFs and, in some cases, with teachers.
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36 We located the greatest number of outcomes in the personal domain. In Clarke and
37 Hollingsworth's model, this domain contains a complex set of attributes (knowledge, beliefs
38 and attitudes). We divided this domain into sub-categories relating to professional learning
39 needs: facilitation knowledge and skills, and knowledge about professional development. The
40 personal domain is complex for teachers as well as for PDFs, and so we suggest a need to re-
41 examine this domain in order to provide greater clarity over its constituent parts and their
42 interactions.
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49 Our study illustrates the interactions between the personal domain and the domain of practice,
50 by which gaining knowledge of new skills in the personal domain becomes professional
51 experimentation of the domain of practice and reflection on this experimentation leads to
52 change in beliefs about those skills. This is true for teachers and for PDFs. However, what
53 constitutes 'practice' for PDFs is more difficult to define because it combines aspects of both
54 teaching and facilitation. In this study, we identified two interacting sub-categories in the
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3 domain of practice: pedagogy, the deployment of particular facilitation techniques, and
4 embodiment, the act of being a facilitator. To use the model effectively with facilitators,
5 further clarification may be needed for this domain as well.
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9 In the external domain, we located activities which stimulated change in the other domains,
10 including engagement with research and input from colleagues. This classification of the
11 external domain is effective for PDFs as well as for teachers. However, we suggest that, in
12 collaborative models of professional development such as that described here, the external
13 domain is better identified as 'the social domain', in order to encapsulate the idea of learning
14 together. This notion of learning through observation of or working with a colleague is
15 important for teachers, and may be even more so for facilitators, since the most common way
16 of learning the role of a facilitator appears to be through observing others in practice. In
17 making this change we locate external influencers, such as school structures, curriculum and
18 assessment issues, and government policy, outside the 'teacher's world', or school
19 environment, (Clarke & Hollingsworth 2002, p. 950) of the four domains of change (Figure
20 1).
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30 In this study, there was a notable gap relating to the domain of consequence, which involves
31 changes in 'salient outcomes'. For teachers, these changes are observable in student learning,
32 motivation or classroom relationships. What constitutes a salient outcome is embedded in the
33 teacher's existing value system. As Clarke and Hollingsworth point out, an increase in
34 classroom talk may be perceived as either a negative or positive outcome depending on the
35 teacher's values or aims. However, in extending the model to the second order role (Murray
36 & Male 2005) of professional development facilitators, the question is raised of what
37 constitutes a salient outcome. It may be possible to discern a change in the knowledge or
38 skills of the teachers a PDF works with, but it is difficult to know whether this in turn
39 prompts a change in teachers' classroom practice or professional beliefs and even more
40 challenging to identify whether it ultimately leads to a change in pupil outcomes. We suggest
41 that further work is needed here, not just in relation to the interconnected model, but more
42 widely in order to understand how to identify or measure a salient outcome in professional
43 learning for PDFs.
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53 54 **Conclusion**

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56 In this study we offer a model of a programme of professional development for professional
57 development facilitators. The programme was built around collaborative enquiry using video
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3 observation and engagement with theoretical models of professional development. Although
4 the study was limited in scale, the outcomes suggest that similar programmes will be suitable
5 for facilitators working in varied contexts and at different stages of their careers. Given the
6 established power of video as a professional learning tool with teachers, this is perhaps
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10 unsurprising, but is nevertheless a novel finding.

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12 We presented a framework which conceptualises the learning needs of facilitators through
13 three strands: knowledge and skills for teaching, facilitation skills and knowledge, and
14 knowledge about professional development. The 'developing the developers' programme
15 allowed facilitators to learn about two of these strands: facilitation skills and knowledge and
16 knowledge about professional development. Learning led to changes in practice and in turn
17 changes in beliefs about effective professional development. Our study illuminated the
18 complex professional learning needs of this group of professional development facilitators as
19 they perceived them. They tended towards descriptive and complimentary commentary on
20 each other's practice, with gentle advice-giving more frequent than interrogation of
21 pedagogical choices or critical evaluation of the professional development being observed.
22 This suggested that video supported professional learning which, to use Sachs' (2011)
23 typology, leaned towards 'retooling', that is, the acquisition or strengthening of specific
24 practical skills rather than deeper learning or change.
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35 Further, we have demonstrated that models of teacher professional learning, including
36 research about effective professional development and the interconnected model, can be
37 effective when extended to facilitators. The interconnected model was used successfully as a
38 frame for analysis. We found that, with some adaptations, the model was useful in evaluating
39 the outcomes of the programme, and so it is effective in this new context. Further, we also
40 suggested an adaptation for its use in collaborative types of professional development by
41 reconsidering the external domain as the social domain. This is potentially applicable to
42 teacher professional development in addition to the professional development of PDFs
43 described in this study and needs further research to establish the utility of this adaptation in
44 this context.
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52 Regardless of such theoretical and methodological considerations, what it is clear is that, with
53 the increasing importance of professional development facilitators in the education system, it
54 is important to develop opportunities for facilitators to collaboratively reflect on, analyse,
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3 understand and improve their practice. The ‘developing the developers’ programme offers
4 one model for this.
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For Peer Review Only

References

- Berry, A., 2009. Professional self-understanding as expertise in teaching about teaching. *Teachers and Teaching: Theory and Practice*, 15(2), pp. 305-318.
- Borko, H., Koellner, K. & Jacobs, J., 2014. Examining novice teacher leaders' facilitation of mathematics professional development. *Journal of Mathematical Behavior*, Volume 33, pp. 149-167.
- Boylan, M., 2016a. Deepening System Leadership: Teachers Leading From Below. *Educational Management Administration & Leadership*, 1(44), pp. 57-72.
- Boylan, M., 2016b. Enabling Adaptive System Leadership: Teachers Leading Professional Development. *Educational Management Administration & Leadership*. DOI: 10.1177/1741143216628531.
- Byington, T. A. & Tannock, M. T., 2011. Professional development needs and interests of early childhood education trainers. *Early Childhood Research and Practice*, 13(2).
- Chauvot, J. B., 2009. Grounding practice in scholarship, grounding scholarship in practice: Knowledge of a mathematics teacher educator-researcher. *Teaching and Teacher Education*, 25(2), pp. 357-370.
- Clarke, D. & Hollingsworth, H., 2002. Elaborating a Model of Teacher Professional Growth. *Teaching and Teacher Education*, 18(8), pp. 947-967.
- Coldwell, M. & Simkins, T., 2011. Level models of continuing professional development evaluation: a grounded review and critique. *Professional Development in Education*, 37(1), pp. 143-157.
- Coles, A., 2013. Using Video for Professional Development: The Role of the Discussion Facilitator. *Journal of Mathematics Teacher Education*, 16(3), pp. 165-184.
- Desimone, L. M., 2009. Improving Impact Studies of Teachers' Professional Development: Toward Better Conceptualizations and Measures. *Educational Researcher*, 38(3), pp. 181-199.
- Elliott, R. et al., 2009. Conceptualizing the Work of Leading Mathematical Tasks in Professional Development. *Journal of Teacher Education*, 60(4), pp. 364-379.

- 1
2
3 Evans, L., 2008. Professionalism, Professionality and the Development of Education
4 Professionals. *British Journal of Educational Studies*, 56(1), pp. 20-38.
5
6
7 Fairman, J. C. & Mackenzie, S. V., 2012. Spheres of Teacher Leadership Action for
8 Learning, *Professional Development in Education*, 38(2), pp.811-826..
9
10
11 Field, S., 2012. The trials of transition, and the impact upon the pedagogy of new teacher
12 educators. *Professional Development in Education*, 38(5), pp. 811-826.
13
14
15 Fischer, H. E., Boone, W. J. & Neumann, K., 2014. Quantitative Research Designs and
16 Approaches. In: N. G. Lederman & S. K. Abell, eds. *Handbook of Research on Science*
17 *Education, Volume II*. Abingdon: Routledge, pp. 18-37.
18
19
20
21 Fraser, C., Kennedy, A., Reid, L. & Mckinney, S., 2007. Teachers' Continuing Professional
22 Development: Contested Concepts, Understandings and Models. *Journal of In-Service*
23 *Education*, 33(2), pp. 153-169.
24
25
26
27
28 Fleet, A., De Gioia, K., & Patterson, C. 2016. *Engaging with Educational Change: Voices of*
29 *Practitioner Inquiry*. London: Bloomsbury Publishing.
30
31
32 Gaudin, C. & Chalties, S., 2015. Video viewing in teacher education and professional
33 development: A literature review. *Educational Research Review*, Volume 16, p. 41-67.
34
35
36
37 Giles, D. & Kung, S., 2010. Using Appreciative Inquiry to explore the professional practice
38 of a lecturer in higher education: Moving towards life-centric practice. *Australian Journal of*
39 *Adult Learning*, 50(2), pp. 308-322.
40
41
42
43 Goodwin, A. L., & Kosnik, C., 2013. Quality Teacher Educators = Quality Teachers?
44 Conceptualizing Essential Domains of Knowledge for Those Who Teach Teachers. *Teacher*
45 *Development* 17(3), pp. 334-346.
46
47
48
49 Goos, M., 2013. Knowledge for teaching secondary school mathematics: what counts?
50 *International Journal of Mathematical Education in Science and Technology*, 44(7), pp. 972-
51 983.
52
53
54
55 Grant, T. J. & Kline, K., 2010. The Impact of Video-Based Lesson Analysis on Teachers'
56 Thinking and Practice. *Teacher Development*, 14(1), pp. 69-83.
57
58
59
60

1
2
3 Grossman, P. L., 1990. *The making of a teacher: Teacher knowledge and teacher education*.
4 New York: Teachers College Press.
5

6
7 Guskey, T. R., 2000. *Evaluating Professional Development*. London: Corwin Press.
8

9
10 Hartnett, J. E., 2011. *Professional growth through working together: a study of reciprocal*
11 *benefits for teacher and education advisor through classroom based professional*
12 *development*, Queensland University of Technology: Professional Doctorate thesis.
13

14
15
16 Higgins, T., 2008. *Through the eyes of professional developers: Understanding the design of*
17 *learning experiences for science teachers*. Berkeley: University of California.
18

19
20 Husbands, C., 2015. What are teaching schools for? *Management in Education*, 29(1), p. 31–
21 34.
22

23
24 Ince, A., 2016. Managing risk in complex adult professional learning: the facilitator's role.
25 *Professional Development in Education*. DOI: 10.1080/19415257.2016.1164743
26

27
28
29 Iris Connect, 2015. *Theoretical Background and Impact of IRIS Connect*. [Online] Available
30 at: <http://www.irisconnect.co.uk/who-we-are/research/> [Accessed 30 April 2016].
31

32
33 Jackson, K. et al., 2015. Investigating the development of mathematics leaders' capacity to
34 support teachers' learning on a large scale. *ZDM Mathematics Education*, Volume 47, pp. 93-
35 104.
36

37
38
39 Kennedy, A., 2014. Understanding continuing professional development: the need for theory
40 to impact on policy and practice. *Professional Development in Education*, 40(5), pp. 688-697.
41

42
43 Krell, D. E. & Dana, N. F., 2012. Facilitating action research: a study of coaches, their
44 experiences, and their reflections on leading teachers in the process of practitioner inquiry.
45 *Professional Development in Education*, 38(5), pp. 827-844.
46

47
48
49 Lange, T. & Meaney, T., 2013. Professional development facilitators: reflecting on our
50 practice. *Professional Development in Education*, 39(4), pp. 531-549.
51

52
53
54 Lave, J. & Wenger, E., 1991. *Situated learning: legitimate peripheral participation*.
55 Cambridge: Cambridge University Press.
56

1
2
3 Linder, S. M., Rembert, K., Simpson, A. & Ramey, M. D., 2015. A mixed-methods
4 investigation of early childhood professional development for providers and recipients in the
5 United States. *Professional Development in Education*, DOI:
6 10.1080/19415257.2014.978483.
7
8

9
10 Loughran, J., 2006. *Developing a Pedagogy of Teacher Education: Understanding teaching*
11 *and learning about teaching*. Abingdon: Routledge.
12
13

14
15 Margolis, J., 2012. Hybrid teacher leaders and the new professional development ecology.
16 *Professional Development in Education*, 38(2), pp. 291-315.
17
18

19
20 Margolis, J. & Deuel, A., 2009. Teacher Leaders in Action: Motivation, Morality, and
21 Money. *Leadership and Policy in Schools*, 8(3), pp. 264-286.
22
23

24
25 Margolis, J. & Doring, A., 2013. What Do Today's Teachers Want (And Not Want) From
26 Teacher Leaders? *The New Educator*, 9(3), pp. 192-209.
27
28

29
30 Mason, J., 2002. *Researching Your Own Practice: The Discipline Of Noticing*. London:
31 Taylor & Francis.
32
33

34
35 McNiff, J., 2002. *Action Research for Professional Development*. [Online] Available at:
36 <http://www.jeanmcniff.com/ar-booklet.asp> [Accessed 29 April 2016].
37
38

39
40 Murray, J. & Male, T., 2005. Becoming a teacher educator: evidence from the field. *Teaching*
41 *and Teacher Education*, Volume 21, pp. 125-142.
42
43

44
45 Newton, L. R. & Sorensen, P. D., 2010. *Science teacher development through constructive*
46 *engagement with digital video: some experiences from the field*. York, National Science
47 Learning Centre.
48
49

50
51 O'Dwyer, J. B. & Atli, H. H., 2015. A study of in-service teacher educator roles, with
52 implications for a curriculum for their professional development. *European Journal of*
53 *Teacher Education*, 38(1), pp. 4-20.
54
55

56
57 Parr, J. M. & Timperley, H. S., 2010. Multiple "Black Boxes": Inquiry into Learning within a
58 Professional Development Project. *Improving Schools*, 13(2), pp. 158-171.
59
60

1
2
3 Rodriguez, S. R., 2013. *What They See: Noticings of secondary science cooperating teachers*
4 *as they observe pre-service teachers*, The University of Texas at Austin: PhD.

5
6
7 Rosaen, C. L. et al., 2008. Noticing Noticing: How Does Investigation of Video Records
8 Change How Teachers Reflect on Their Experiences? *Journal of Teacher Education*, 59(4),
9 pp. 347-360.

10
11
12 Ryan, G. W. & Bernard, H. R., 2003. Techniques to identify themes. *Field Methods*, 15(1),
13 pp. 85-109.

14
15
16
17 Sachs, J., 2011. Skilling or Emancipating? Metaphors for Continuing Professional
18 Development. In: N. Mockler & J. Sachs, eds. *Rethinking Educational Practice Through*
19 *Reflexive Inquiry: Essays in Honour of Susan Groundwater-Smith*. London: Springer Verlag,
20 pp. 153-167.

21
22
23
24 Schön, D. A. (1995). Knowing-in-action: The new scholarship requires a new epistemology.
25 *Change: The Magazine of Higher Learning*, 27(6), pp. 27-34.

26
27
28
29 Schuck, S. & Russell, T., 2005. Self-Study, Critical Friendship, and the Complexities of
30 Teacher Education. *Studying Teacher Education*, 1(2), pp. 107-121.

31
32
33
34 Settlage, J., 2013. On Acknowledging PCK's Shortcomings. *Journal of Science Teacher*
35 *Education*, 24(1), pp. 1-12.

36
37
38 Selmer, S., Bernstein, M., & Bolyard, J., 2016. Multilayered Knowledge: Understanding the
39 Structure and Enactment of Teacher Educators' Specialized Knowledge Base. *Teacher*
40 *Development*, 20(4), pp. 437-457.

41
42
43
44 Sherin, M. G. & van Es, E. A., 2009. Effects of Video Club Participation on Teachers'
45 Professional Vision. *Journal of Teacher Education*, 60(1), pp. 20-37.

46
47
48 Shulman, L. S., 1987. Knowledge and Teaching: Foundations of the New Reform. *Harvard*
49 *Educational Review*, 57(1), pp. 1-22.

50
51
52
53 Stein, M. K., Schwan Smith, M. & Silver, E. A., 1999. The development of professional
54 developers: Learning to assist teachers in new settings in new ways. *Harvard Educational*
55 *Review*, 69(3), pp. 237-269.

1
2
3 STEM Learning Ltd, 2015. *National Science Learning Network*. [Online] Available at:
4 <https://www.stem.org.uk/cpd> [Accessed 30 April 2016].
5
6

7 Tack, H. & Vanderlinde, R., 2014. Teacher Educators' Professional Development: Towards a
8 Typology of Teacher Educators' Researcherly Disposition. *British Journal of Educational*
9 *Studies*, 62(3), pp. 297-315.
10
11

12
13 van Driel, J. H., Meirink, A. J., van Veen, K. & Zwart, C. R., 2012. Current Trends and
14 Missing Links in Studies on Teacher Professional Development in Science Education: A
15 Review of Design Features and Quality of Research. *Studies in Science Education*, 48(2), pp.
16 129-160.
17
18
19

20
21 Vermunt, J. & Endedijk, M., 2011. Patterns in teacher learning in different phases of the
22 professional career. *Learning and Individual Differences*, 21(3), pp. 294-302.
23
24

25 White, E., 2014. Being a teacher and a teacher educator – developing a new identity?
26 *Professional Development in Education*, 40(3), pp. 436-449.
27
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Tables and Figures

Table 1. Programme participants

Participant pseudonym	Role	Experience as a facilitator
Adam	independent consultant	11 years
Liz	independent consultant	11 years
Sarah	independent consultant	10 years
Rose	combined role of consultant and university lecturer	8 years
Mike	combined role of consultant and university lecturer	7 years
Jack	university lecturer	4 years
Ben	hybrid teacher leader	4 years

Table 2. Programme structure

Month	Activity	Throughout the programme
1	Face-to-face workshop 1	<ul style="list-style-type: none">• Video observation• Self-analysis• Analysis by other group members
2	Online discussions and video conference	
3	Face-to-face workshop 2	
4	Online discussions and video conference	
5	Follow up interviews	

Table 3. Videos shared by the facilitators

Participant	Video(s) shared
Liz	In-school twilight session; in-school departmental workshop
Adam	Conference workshop
Sarah	individual coaching session with science subject leader
Rose	No video shared
Mike	Workshop within a multi-day programme of professional development
Jack	Conference workshop
Ben	Conference workshop
Emily (author)	Workshop within a multi-day programme of professional development

Table 4. Video observation prompts

Analysis for video owner	Analysis for other group members
<ul style="list-style-type: none"> • Watch the video of yourself and then note one or two features of your practice you think are interesting, whether that's because they are effective or less effective (in your view). • What made you notice these features of your practice? • What questions would you like to have answered about your practice, whether this relates to the current video or to a future professional development episode? • If you have any other reflections from watching the video, note them here. • What do you think these features of your practice mean in terms of your effectiveness as a professional development facilitator? 	<ul style="list-style-type: none"> • Watch the video which has been shared with you and then note one or two features of the professional development facilitator's practice which you think are interesting. • What made you notice these features of their practice? • What do you think these features of their practice mean in terms of their effectiveness as a professional development facilitator? • What questions would you ask the professional development facilitator about their practice, having watched the video? • If you have any other reflections from watching the video, note them here.

Table 5. Data collection and analysis

Data	Purpose	Timescale	Collection	Analysis
Background information on participants	To record prior experiences and expertise of the participants	Before the programme	Online survey	Descriptive statistics
Participants' analyses and discussions of videos	To identify participants' professional learning priorities	During the programme	Inspection of responses to online prompts and video-recorded discussions	Coding and theming
Evaluations of the programme	To understand the impact of the programme	At the end of the programme	Questionnaire	Analysis using framework of interconnected model of professional growth
Follow-up interviews		Four weeks after the end of the programme	Interviews with pairs of participants	
Follow-up questionnaires		Eight months after the end of the programme	Questionnaire	

Table 6. Outcomes of the programme classified into the four domains of change

Reported outcomes	Domain of change			
	personal domain	external domain	domain of practice	domain of consequence
Tally	22	6	6	2

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Table 7. Outcomes in the personal domain

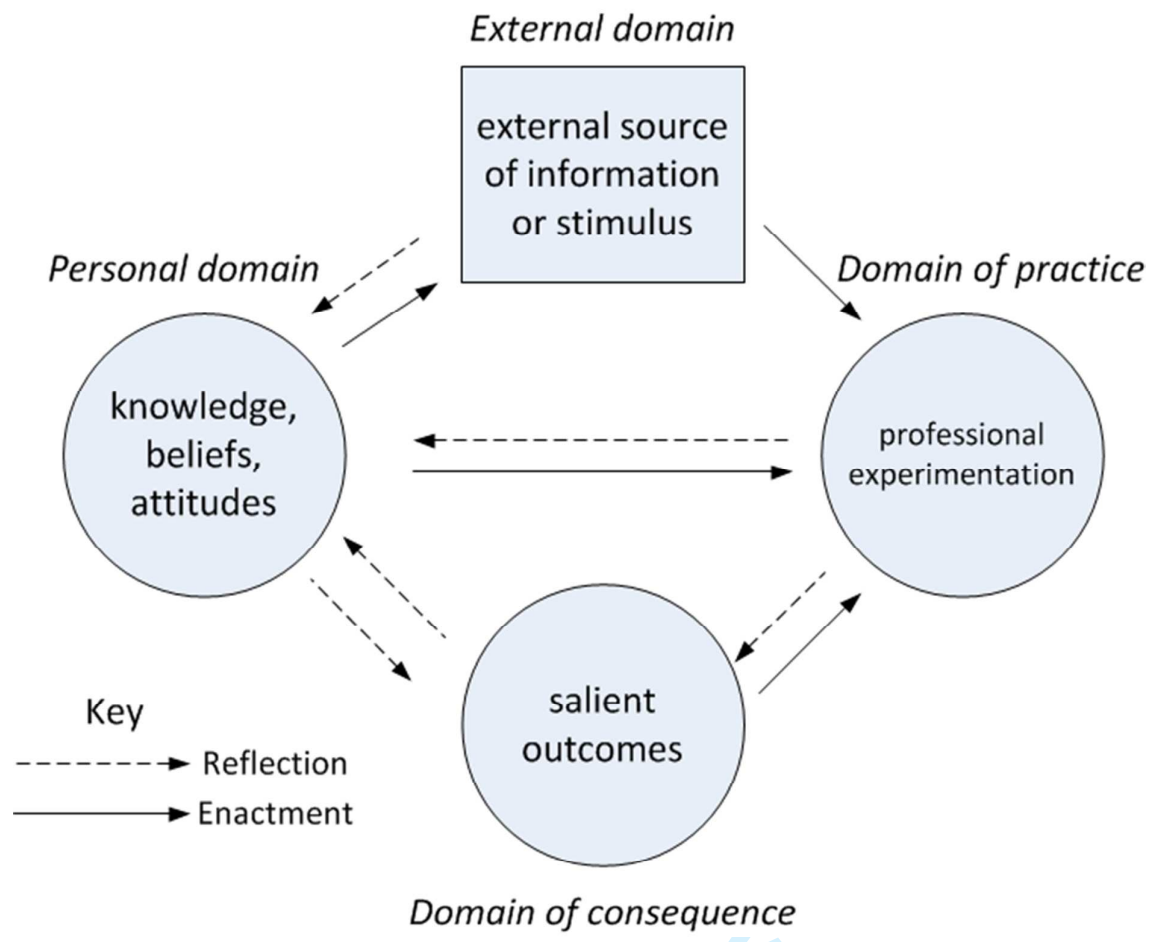
Personal domain sub-category	Sample participant comment
Facilitation skills and knowledge	<ul style="list-style-type: none"> • Shown me the huge potential of use of video to develop self-evaluative skills in teachers, something I believe is fundamental for sustained, long term development of practice. • I have become more aware of the need to be more challenging of participants, rather than simply ‘giving’ ideas to teachers that they take away. • Has definitely clarified the subtle skills used by effective professional development providers and some of the differences with teachers.
Knowledge about professional development	<ul style="list-style-type: none"> • I am aware of the need to ensure that participants have an understanding of the learning they are doing so that it is more likely to impact their own practice. • [I am now] more reflective, more critical about the way I am delivering CPD. • My knowledge of pedagogies relating to learning has been enhanced.

Table 8. Domain of practice themes emerging from the video observations

Theme	Examples
Pedagogy	<ul style="list-style-type: none">• use of questioning• working in groups• allowing discussion time• modelling a classroom activity• beginnings of sessions• gathering evidence of learning
Embodiment	<ul style="list-style-type: none">• seeming knowledgeable, confident, relaxed, or prepared• using humour and building a relaxed atmosphere• making eye contact, standing or sitting• verbal habits such as saying 'um'

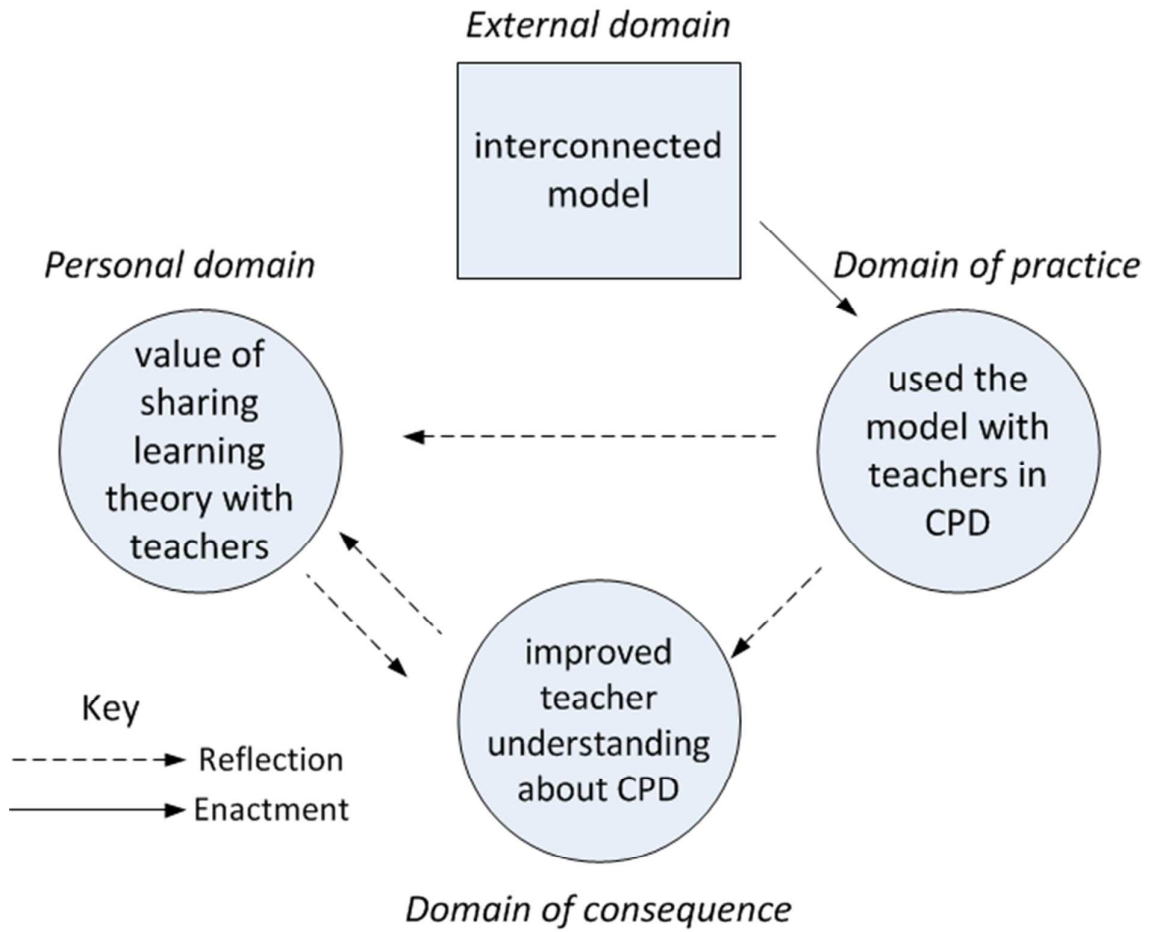
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Figure 1. The interconnected model of teacher professional growth (Clarke & Hollingsworth 2002)



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Figure 2. Mike's change sequence



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Figure 3. Liz's change sequence

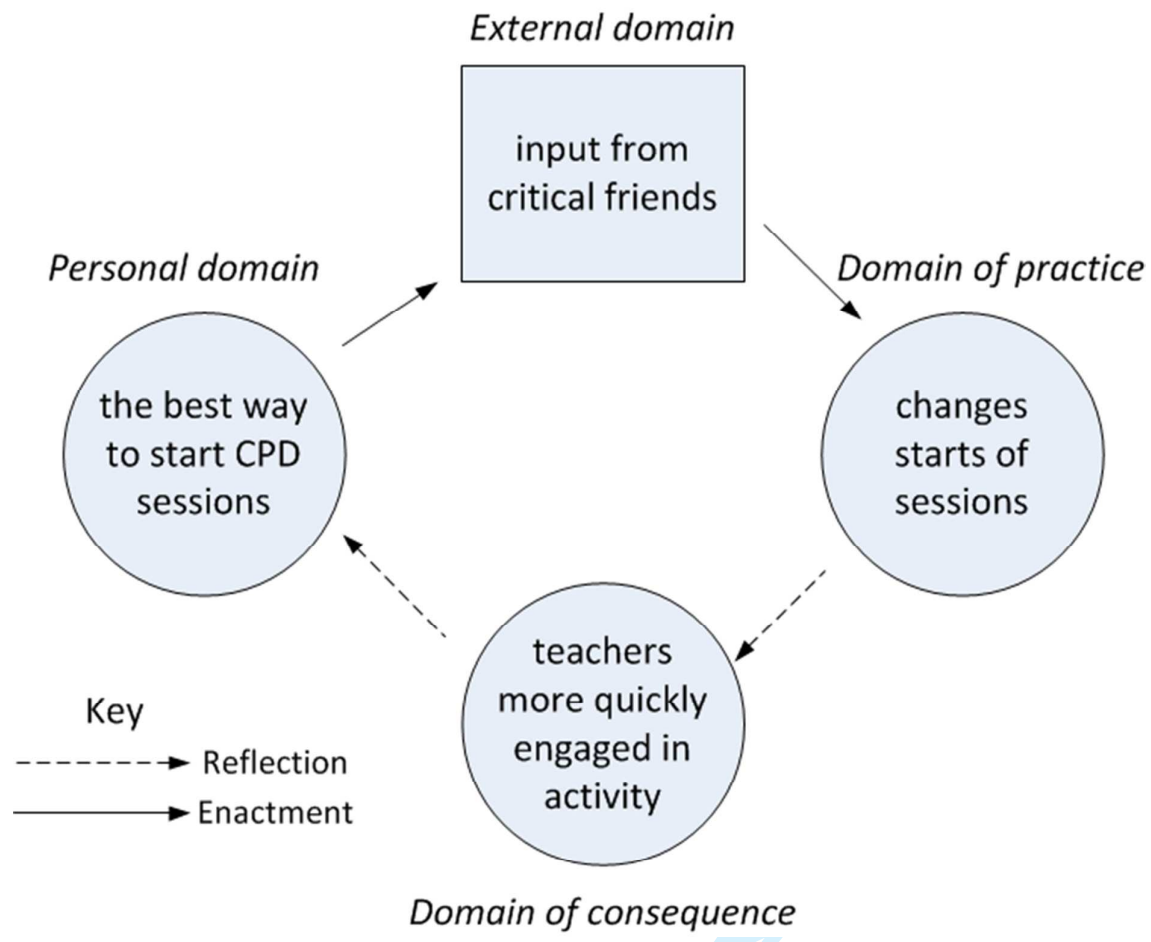
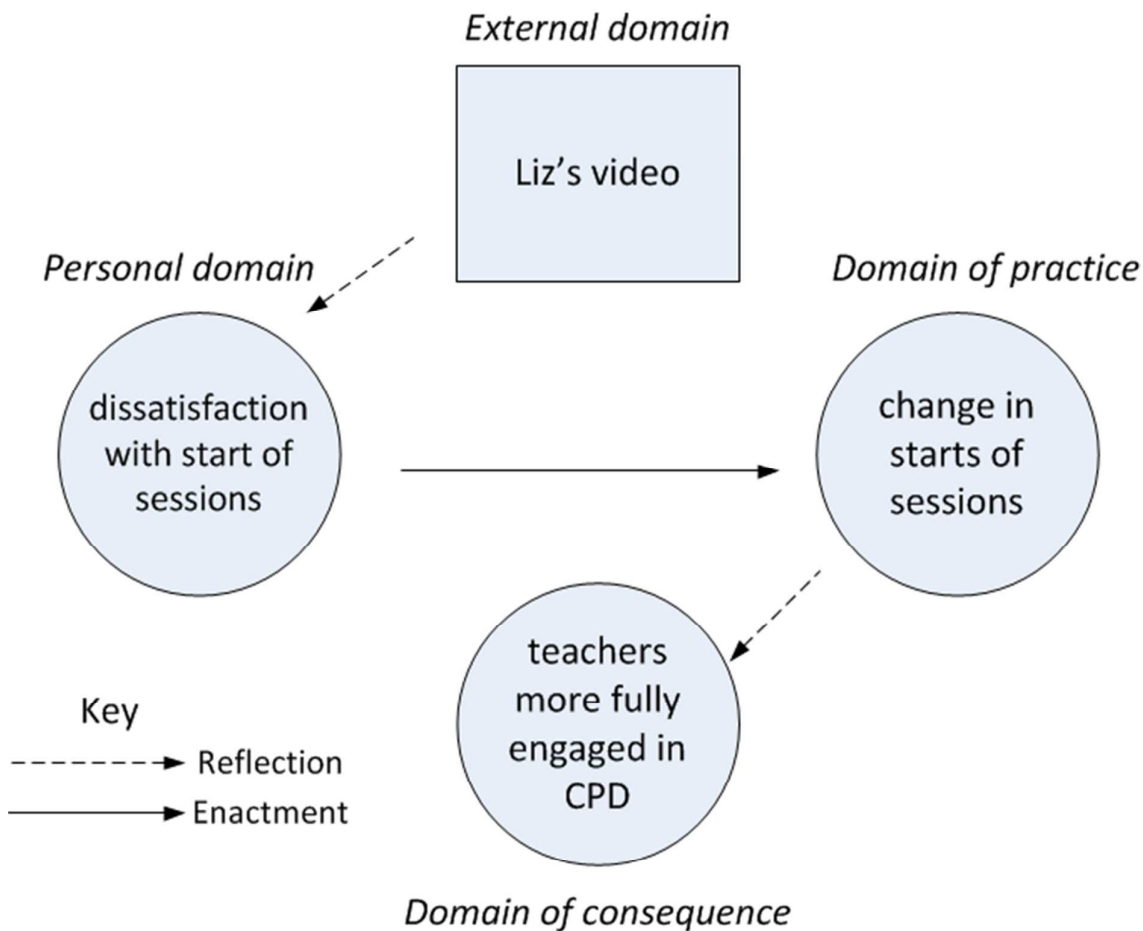


Figure 4. Jack's change sequence



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