EDeR

Educational Design Research

Volume 5 | Issue 2 | 2021 | Article 36

Contribution Academic Article

Title **Adapting to a Design-Based Professional Learning Intervention**

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Funding Alberta Education Partnership Research Grant, Contract Number 2018-0041

Acknowledgements We would like to thank our text-mentor (reviewer) in phase 1, Dr. Mary Stordy, Associate Professor, Faculty of Education, Memorial University and the phase 2 peer-reviewers for critical feedback that helped strengthen the article.

Abstract Designing a systematic inquiry-based, and knowledge-building experience through continuing professional learning for teachers is a key challenge for school authorities. A total of 26 teachers, five principals, three researchers, one graduate student, and

two contract professionals from a university were involved in a research-practice partnership. The partners engaged in a year-long design-based professional learning series. In this study, design-based research was used as the methodology to understand the participant responses to professional learning during the design, enactment, and refinement phases used to design the professional learning series. Open-ended survey responses, researcher field notes and documents from the professional learning sessions were analyzed throughout the study and during three phases of the learning design. The results indicated there were four key shifts and corresponding adaptations made by the participants as they responded to and engaged in a continuing model of professional learning.

Keywords professional learning
design-based professional learning
collaborative professionalism
design-based research

DOI dx.doi.org/10.15460/eder.5.2.1658

Citation Brown, B. et.al. (2021). Adapting to a Design-Based Professional Learning Intervention. *EDeR – Educational Design Research,* 5(2), 1-24.

dx.doi.org/10.15460/eder.5.2.1658

Adapting to a Design-Based Professional Learning Intervention

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1.0 Introduction

An extensive body of research has documented elements of high-quality teacher professional learning and called for shifts in how ongoing professional learning is conceptualized, designed, and led (Archibald, Coggshall, Croft, & Goe, 2011; Darling-Hammond, Hyler, & Gardner, 2017; Desimone, 2009; Labone & Long, 2016). These shifts in recommendation and practice are based on the recognized limitations of conventional professional development, particularly its emphasis on single-event deliveries of activities and the mental processes of individual learners, its view of teachers as implementers of the knowledge and assurances of others, and its inattentiveness to the multiple dimensions of teacher context (Borko, Jacobs, & Koellner, 2010; Dadds, 2014; Stein, Smith, & Silver, 1999; Webster-Wright, 2009). As a result, many approaches to professional learning are moving toward the practical, social, and organizational contexts in which teachers work, towards collective as well as individual learning, and towards responsive planning that is based on collaborative examinations of evidence from ongoing teacher and student actions (Archibald et al., 2011; Ingvarson, Meiers, & Beavis, 2005; Labone & Long, 2016; Stein et al., 1999; Timperley, 2011).

While there is growing attention on the effectiveness of such professional learning experiences, both conceptually (Boylan, Coldwell, Maxwell, & Jordan, 2018; Clarke & Hollingsworth, 2002; Keay, Carse, & Jess, 2019; Opfer & Pedder, 2011) and empirically; (Mulcahy, 2012; Wongsopawiro, Zwart, & van Driel, 2017), such research rests more on confidences that new forms of professional learning are welcomed by teachers than on questions of how making such shifts as teacher-learners might also be a process that requires understanding and support. The study we report here, while concurring with the importance of contextualized, dynamic, and sustained professional learning, takes the latter approach. It considers adjustments in response and participation among a group of teachers newly encountering professional learning based in iterative design cycles of collaborative study and classroom action.

In this study, we used a design-based research approach (Dai, 2012; McKenney & Reeves, 2019) through a professional learning intervention with a focus on the responses of teachers to the intervention. We describe how teachers responded to a non-linear and multi-occasioned design-based professional learning (DBPL) intervention to

strengthen teachers' assessment literacy and practice. DBPL is an approach to professional learning in which teachers engage in sustained, collaborative systematic inquiry, and design processes with colleagues to improve their own practices and the practices of the community (Brown, Friesen, Beck, & Roberts, 2020; Chu, Brown, & Friesen, 2020; Friesen & Brown, 2020; Friesen & Jacobsen, 2015). Teachers systematically examine their own and their colleagues' practice based on student work, evidence they bring forward from their classrooms (current practices) and set goals for their practice (improved practices) based on the learning needs of their students; they receive feedback from colleagues and researchers; and reflect on the community's progress as well as their own (Bereiter & Scardamalia, 2014; Katz & Dack, 2013; Timperley, 2011, 2015). The purpose of the research was to analyze and understand teachers' responses throughout the phases of the DBPL intervention, a form of professional learning consistent with the research base for high-quality professional learning and an approach new to the teachers in this study. The following question guided the study: How did teachers respond to the design, enactment and refinement phases of the DBPL series? In the next sections, we situate the study in the literature and the theoretical framework that informed the design of the professional learning intervention.

2.0 Literature Review

2.1 Professional Learning

While some researchers argue the terms professional development and professional learning are interchangeable (Campbell, Osmond-Johnson, Faubert, & Hobbs-Johnson, 2016), others contend the terms are based in differing views of how teacher learning should and could happen and to what end (O'Brien & Jones, 2014). The term *professional development* often comes with connotations of the delivery of information to teachers during specific activities (Katz & Dack, 2013) and events (Timperley, 2008) while the term *professional learning* is associated with efforts to move beyond fragmented and transmission-oriented approaches that "position teaching and learning to teach as technical, process-product acts" (Strom, Martin, & Villegas, 2018, p. 8). The term professional learning emphasizes teachers and the contexts in which they work as active components of the learning process (Guskey, 2002). It is based on ideas of situated and constructivist or complex images of learning (Keay et al., 2019; Opfer & Pedder, 2011; McMillan & Jess, 2019; Stein, Smith, & Silver, 1999) and supports teachers to consider the purpose and effect of their educational actions in a deep and ongoing way (Francisco et al., 2021). Teachers' learning, like the learning of their students, is not seen as "merely accumulative but rather a recursive, adaptive and elaborative process" (Reed, 2011, p. 359), emerging in social activity and reciprocally influencing the knowledge, orientation, memory, and capacities of the socio-cultural (professional) group (Farnsworth et al., 2016).

While contemporary practices of both professional development and professional learning may be organized and recognized as intentional, ongoing, and systematic processes (Guskey, 2000), distinctions between the techniques and goals of conventional information- and technique-based workshops and "the use of multiple professional development strategies to build teacher capacity to understand subject matter, pedagogy, and student thinking" (Stein et al., 1999, p. 263) remain significant concepts in understanding the characteristics and purposes of high-quality professional learning. Scholarship on high-quality professional learning highlights its connections to specific content and standards; active learning and self-reflection; job-embeddedness; collaboration; involvement of university researchers; sustained and ongoing attention, and the importance of being aligned with school goals, standards and assessments, and other professional activities (Archibald et al., 2011; Avalos, 2011; Campbell et al., 2016; Cordingley et al., 2015; Darling-Hammond et al., 2017; Labone & Long, 2016; Timperley, 2011; Xu & Pedder, 2016). Its features are oriented to a "more critically reflective and less performative approach to professional learning" (O'Brien & Jones, 2014, p. 684) and connect experiences designed for teachers with an active sense of teacher agency and professional inquiry over time. Emirbayer and Mische (1998) conceptualize agency as social engagement that is both future-oriented and informed by past experiences. Professional agency is practiced when professionals or communities "exert influence, make choices, and take stances in ways that affect their work and/or their professional identities" (Eteläpelto, Vähäsantanen, Hökkä, & Paloniemi, 2013, p. 62) within the context of their workplace.

The OECD (2019) defines professional learning as "formal and informal activities that aim to update, develop and broaden the skills, knowledge, expertise and other relevant characteristics of in-service teachers" (p. 11). An orientation to continued professional learning requires an individual commitment to being a student of one's own practice and the nuances of student learning, and a collective professional investment in the dynamic nature of professional expertise, to knowledge-building (Bereiter & Scardamalia, 2014) through collective responsibility for the "production and continual improvement of ideas" (p. 36). Design-based professional learning is premised on these tenets.

2.2 Design-Based Professional Learning (DBPL)

DBPL is an approach to professional learning consistent with the qualities of high-quality professional learning noted above and synthesized by Desimone (2009) as content focus, active learning, coherence, duration, and collective participation; as well as design-based features of iterative action, reflection, and shared responsibility that make this model of advancing teacher learning and leadership unique. Unlike professional development events focused on additive changes that can be accomplished in half-day training sessions, DBPL focuses on transformative changes that take extended time, and require a long-

term commitment (Campbell et al., 2016; Hargreaves & O'Connor, 2018a, 2018b; Timperley, 2011, 2015).

Collaboratively examining student work is an important part of a high-quality professional learning experience (Desimone, 2009; Hargreaves & O'Connor, 2018a, 2018b). However, collaboratively examining teachers' practice and student work is not an explicit practice in most professional learning experiences (Labone & Long, 2016). Reflection is also a key part of examining the work since design involves both action and reflection (Schön, 1994). While a growing body of research evidence suggests that teacher collaboration can contribute to school improvement (Campbell et al., 2016; Hargreaves & O'Connor, 2018a), concern has also been expressed by Ainscow (2015), and Hargreaves and O'Connor (2018b) that collaboration without a prescriptive structure is unlikely to result in improvements in action. In DBPL, teachers engage in collaborative and critical reflection or a process of reviewing work with colleagues and engaging in self-evaluation of their teaching practices through looking at student work with prompts for critical reflection and with guidance from researchers (Brown, Friesen, Beck, & Roberts, 2020; Chu, Brown, & Friesen, 2020; Friesen & Brown, 2020; Friesen & Jacobsen, 2015). Hargreaves and O'Connor (2018a, 2018b) identify this form of collaboration as prescriptive rather than descriptive resulting in collaborative professionalism.

Hargreaves and O'Connor (2018a) use the term collaborative professionalism to describe professional learning that is designed to "transform teaching and learning" (p. 3) using an evidence-informed approach, demanding dialogue, feedback, and ongoing collaborative inquiry. The requirements of collaborative professionalism within an orientation of continuing professional learning impact how professional learning is organized, supported, and experienced for both those offering and participating in professional learning activities. They offer a reminder that the difference between the ideas and commitments of professional development and professional learning are often more experiential than semantic.

3.0 Theoretical Framework

Constructivism is a learning theory that describes learners as active participants constructing meaning through experience (Piaget, 1950). Dewey (1938) viewed thinking and doing as interconnected and learning as an ongoing experience. The active learning in DBPL is consistent with an epistemology that is "holistic and critically subjective in participatory transaction, and critical subjectivity, understanding how we know what we know and knowledge's consummating relations" (Lincoln, Lynham, & Guba, 2017, pp. 115-116). From an ontological perspective, DBPL is based on a participatory paradigm (Lincoln et al., 2017) and requires researchers and professional learning facilitators to be aware of their positioning in the learning design and research.

Social constructivism theorizes that learning extends beyond the individual to include the context of the learning (Vygotsky & Cole, 1978). Learning, including professional learning, is situated and involves the tools, other people, and cultural and historical context in which knowledge is applied (Sawyer, 2014). Knowledge is not considered a static mental structure but is developed through dialogical and dialectical processes. From a theoretical perspective, cognition within DBPL is distributed across the knower, the activity, and the context in which it occurs (Barab & Squire, 2004). It is situated, context driven (Labone & Long, 2016), and occurs within community (Wenger, 1998; Scardamalia & Bereiter, 2010). Through the iterative professional learning design, a community of practice can be formed (Lave & Wenger, 1991). By consciously engaging teachers in a process of design, stakeholders engage in processes that in turn can inform research (Davis, 2018). The professional learning that results can be considered non-linear and expansive (Daniels, 2004; Engeström, 2011; Sannino, Engeström, & Lemos, 2016).

4.0 Methodology

This study drew upon McKenney's and Reeves' (2019) design-based research cycles to frame the iterative phases of this research. Design-based research is a methodological approach to studying the implementation of design solutions or interventions as they are being implemented in naturalistic settings using an iterative approach. In this design-based research, DBPL was the professional learning approach used for the six sessions which formed the central part of six cycles of the study. The six cycles occurred over the timeframe of one school year for a group of teachers new to this type of professional learning. Each cycle included the design of the session and the enactment of the in-person session that took place at a school location for a half-day in the afternoon, followed by the applied learning tasks completed between sessions. Three design phases (design, enactment, and refinement) were used in the study (Dai, 2012; McKenney & Reeves, 2019) and informed each cycle. Appendix A provides more detail about the content and flow of the six cycles.

Educational design research is often conducted *for* interventions, *on* interventions and *through* interventions (McKenney & Reeves, 2019, p. 23). In this article we describe a study that was conducted *through* a DBPL intervention with a focus on the responses to the intervention. We examined the participant responses that emerged during the design, enactment, and refinement phases in each of the six DBPL cycles as shown in Figure 1. The purpose was to gain an understanding about ways teachers responded to the phases of the DBPL series to uncover the shifts that can occur as a group of teachers engages for the first time in this model of professional learning.

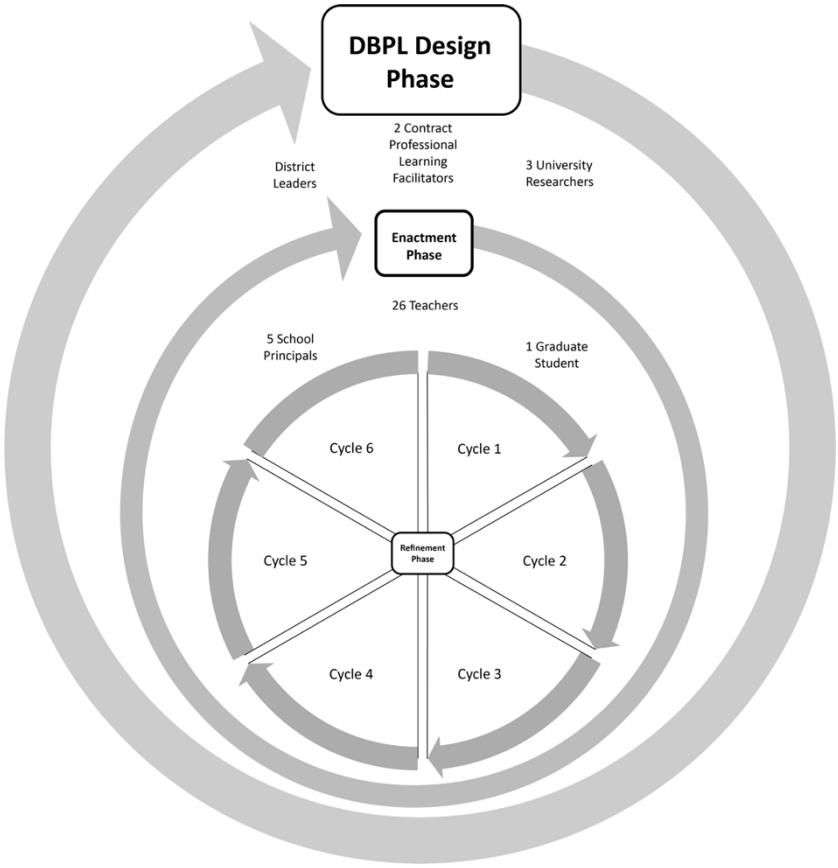

Figure 1: Design, Enactment and Refinement Phases in Six DBPL Cycles

5.0 Design-based Research Phases

5.1 Design Phase

The design team comprised of researcher-practitioners from a university-based professional learning organization, members of the research team (university faculty and graduate student), district leaders and school principals. In response to the district's and school leaders' request for professional learning in assessment literacy, a proposed solution was to meet with lead teachers in junior high schools who were responsible for teaching core subject areas (English, Social Studies, Science and Mathematics) as a professional learning community and to engage in continuing professional learning with a focus on assessment literacy. The design team decided to use a proven model of DBPL as an intervention in this study based on success from other studies using this intervention (e.g., Brown, Friesen, Beck, & Roberts, 2020; Chu, Brown, & Friesen, 2020; Friesen & Brown, 2020). The design phase consisted of designing six cycles of DBPL based on the principles of knowledge building. Each cycle aimed to engage the participants in continual co-creation and analysis of evidence of student learning. The designs were intended to be responsive with active learning components based on social constructivism.

5.2 Enactment Phase

During the enactment phase, each of the six DBPL cycles involved a *content focus, active learning, coherence, collective participation, and duration* (Desimone, 2009; Katz & Dack, 2013). The professional learning facilitators worked with the researchers to determine the content, learning progression, and working documents for each of the six sessions (one session per cycle). Each session started with an overview of the learning intentions (*content focus*). This also included a recap of the previous session and connection to next steps (*coherence*). The professional learning facilitators used research-informed video case studies to stimulate dialogue and reflection among the participants. Each session aimed to establish a culture of critique and the facilitators used a range of protocols for dialogue, critique and reflection (*active learning*). The members of the research team were also participants in the sessions, learning alongside teacher participants and contributing to the table conversations and writing field notes. Two or three members of the research team attended each of the sessions. Participants shared evidence of student learning from their classrooms and schools (*coherence*). This provided the participants with an opportunity to reflect on their learning. Participants also reflected on their leadership and how they worked with colleagues in their school to build assessment literacy (*collective participation*). At the end of each session, teachers were provided with applied learning tasks directly tied to their teaching practice and leading the work in their schools. Participants were asked to complete the applied learning in their classrooms prior to the next session (*duration*).

5.3 Refinement Phase

The refinement phase of the six DBPL cycles occurred between the sessions. Data gathered during each of the learning cycles were used to inform refinement of the subsequent DBPL sessions. Between sessions, the participants engaged in an applied learning component and worked on strengthening and refining their practices. Participants collected artifacts of student learning as evidence to demonstrate how ideas from the session were enacted and continually refined and collected evidence of working with their colleagues and leading the work in their schools. At the same time, the researchers analyzed data between sessions and shared their analysis and recommendations with members of the design team to inform the pedagogical and content decisions of the next DBPL session. While the teachers were engaged in ongoing cycles of collecting evidence of student and teacher learning, including identifying their learning needs and interests, the research team was engaged in analyzing the data from each of these cycles, recognizing that improvements *in* the professional learning series would not only support improved understandings *of* the intervention but also changes and improvements in their own assessment practices that were happening *through* the learning series.

5.4 Participants

Five schools in a large urban district were involved in the DBPL series. This was the first time these schools were involved in this type of professional learning. In this case, there were 26 teacher participants. Participants committed to attending all six sessions in the series over one school year and agreed to complete the applied learning tasks between sessions. They were classroom teachers and informal leaders (not assigned to a formal leadership role in the school) working in grades seven to nine. Participants in the DBPL cycles ranged from having 3-5 years teaching experience (*n* = 7), 6-10 years teaching experience (*n* = 3), and more than 10 years teaching experience (*n* = 16). All had participated in numerous professional development events (sessions, workshops, and conferences) during their careers and experiencing DBPL for the first time.

5.5 Data Collection and Analysis

Data sources included researcher field notes, open-ended survey responses, and documents from the professional learning sessions. The field notes were gathered during each DBPL session by two or three members of the research team. The survey questions were administered to participants two times during the series, one at the beginning and one at the end of the series. Survey 1 (S1) was completed by 26 participants and Survey 2 (S2) was completed by 17 participants. Through matching unique identifiers, researchers were able to confirm that there were 14 respondents who completed both Survey 1 and Survey 2.

Each participant in the survey was identified as T followed by a number. Excerpts from the open-ended survey responses included in the findings section of this article describe salient themes derived from examining the responses. The selected excerpts are labeled to indicate the Survey number (1 or 2) and the participant number (T1, T2, ….). Documents from the DBPL sessions were also examined and included session slides and working documents. The analysis of the textual responses from the surveys was conducted by four members of the research team using two cycles of coding (Miles et al., 2014). Descriptive coding was used for the first cycle of coding and this was followed by collapsing similar codes during the second cycle. Condensing first-pass codes revealed emerging themes related to the responses of the participants during the design, enactment and refinement phases of the DBPL. Documents from each of the sessions and researchers' field notes from the sessions were analyzed in a similar way through careful reading by the members of the research team. The researchers condensed the data into descriptive codes that required deeper reflection about the ways teachers responded to the phases of DBPL and discussion about the meaning of the codes. During the second cycle of coding, the team discussed the codes, collapsed similar codes and clarified the emerging themes (e.g., consistencies/inconsistencies in requests

from participants and observations made by the researchers) alongside the open-ended survey responses.

6.0 Results

In this section, we report on the data related to the specific way teachers responded to the design, enactment, and refinement phases and the resulting adaptations and shifts in thinking that occurred during the DBPL series.

6.1 Design Phase

In some cases, the data showed that participant responses were more consistent with transmission-oriented forms of professional development and inconsistent with the principles of DBPL. As fidelity to the tenets of DBPL was important, such as a responsive, emergent design, based on participants' learning, these inconsistencies were discussed with the design team and, while not incorporated exactly as requested in the next session, were addressed as part of the learning experiences. For example, researchers noted that, inconsistent with an emergent design in DBPL, the participants requested a list of specific topics that would be covered during future sessions. The design team's response was to make more visible to the teachers the way conversations and experiences from each session were building, were being returned to, and were informing subsequent sessions. A second inconsistency with the design was that in the early cycles, participants returned to the sessions with artifacts of learning that showcased their perceived "best practice" and success in the classroom instead of sharing artifacts that could be critically discussed and improved upon during the sessions. Third, the researchers noted it was common for participants in the early cycles to ask if a repository or database could be developed for participants to share lesson plans that were brought to the sessions. Some participants requested ideas for a new lesson to try out in the classroom the next day. As the sessions progressed, the findings indicated that participants started to share more artifacts that required improvement during the sessions and there were fewer requests to include a repository or database to share lesson plans as part of the design. Requests from participants that were inconsistent with tenets of DBPL and professional learning more generally, tended to be noted less frequently by the researchers with each subsequent DBPL cycle.

6.2 Enactment Phase

Researchers noted that active learning strategies were used during the DBPL sessions by the facilitators to promote a generative dialogue among the participants. Participants analyzed research-based video cases during the sessions. Researchers observed that each DBPL session required participants to be open to an iterative process as facilitators scaffolded activities during the sessions to support participants

as they were adapting to the notion of examining their practice among of a community of learners.

In some cases, researchers observed that some participants continued to express some difficulty in adapting to this new form of professional learning. For example, participants tended to request more large-group activities requiring participants to be in a passive recipient role. We heard this as a request to return to their more familiar forms of professional development, along with the accompanying delivery of information and with less time to work in small collaborative groups or engage in active learning. Participants also requested to view specific video cases that would portray their exact teaching situation. Such requests were understood from an orientation to teaching as developing routine expertise, that is modeling the skills and routines of other teachers. Some participants were still experiencing some disequilibrium in coming to see their students and their practice as the site of their professional learning. Other participants were skeptical of the iterative process in the early cycles and did not engage in the active learning as noted by the researchers who joined the table groups during the sessions. It was also evident, however, that some of the teachers were beginning to adapt to DBPL. As the cycles progressed, researchers observed more participants engaging in active learning in small groups, critically analyzing video cases and making personal connections to practice and investing time in the applied learning components between sessions.

One of the survey questions asked participants about the frequency adapting their assessment practices to reflect the new learnings gained in the sessions. Teachers were asked, “How often do you provide feedback on student learning?” The researchers noted that participant responses showed an increase in use of daily formative assessments that were based on students’ needs and involved a variety of individual and whole class strategies. Researchers also noted, that as the cycles progressed, the participants reflected on and openly discussed their daily practice as the site for their professional learning, and their focus on student learning helped guide their professional growth and learning. In this way, the researchers observed that participants were discussing student learning and their teaching bound in a reflexive relationship through a series of adaptations they made to their practice.

Participants were asked to provide specific examples of how they used evidence of student learning to inform subsequent teaching steps. In the first survey (S1) administered during the first session, participants provided examples such as rubrics, an online gradebook to display averages, and a thumbs-up action for students to signal understanding. In the second survey (S2) administered during the final session, participants provided more specific examples of collecting evidence of student learning and then supporting students individually (e.g., sitting with the student who required reteaching, having the student explain his or her understanding orally, students reflecting on their learning, using responsive teaching strategies determined by asking critical questions, and using exit slips). In some cases, the participants had

completely different responses between the first and second survey. For example, in the first survey participant (T23) discussed providing students with feedback by including comments with a graded assignment and offering help during tutorials or after school:

> Assignments are marked and returned to students with comments, if a number of students have an issue with a concept we will go back over the concept and find a way to reteach it. If it is just a few individuals, I will provide one-on-one tutorials during lunch or after school. (S1 – T23)

After six DBPL cycles, the participants provided examples of strategies used on a daily basis at the beginning of a lesson and at the end of the lesson. In the final survey, participant (T23) provided two specific strategies and referred to using questions to help determine the direction of the lesson and the use of exit slips to ascertain student understanding:

> Revise the lesson based on the student's ability to answer a question at the beginning of the class. Use exit slips to collect information on student understanding of a topic (S2-T23)

In the surveys, participants indicated that circulating during class and asking questions, maintaining anecdotal notes, and continually providing students with feedback was important while the work was taking place instead of providing students with feedback the next day or a later time. The survey results, along with evidence of teaching improvements from each of the sessions, indicated that teachers were beginning to make adaptations to their practice. The researchers also noted that participants started to foreground the knowledge and skills of focus gained during the DBPL sessions in their practice. Researchers observed that participants were more attentive to: (i) how evidence of student learning was used to inform their next pedagogical moves, (ii) how they were adapting their pedagogy to become more responsive, intentionally making the next pedagogical move based on what they were seeing and hearing from their students, and (iii) the ways accounting for their teaching improvements using artefacts of student learning to demonstrate their use of formative assessment strategies, such as providing students with exemplars/non-exemplars to clarify learning intentions. Our analysis suggests that there was evidence that participant perspectives started to shift from discussing assessment in terms of its tools and techniques with a focus on what and how information is gathered to seeing assessment as part of informed professional judgement with an expanded focus on purpose and responsiveness to the information gathered.

6.3 Refinement Phase

At the end of each session, participants were asked to engage in an applied learning component and gather artifacts of learning demon-

strating how ideas from the session were enacted and refined. Researchers noted that participants continued to gather evidence of their students' learning as part of the applied learning activities required between sessions and increasingly participants shared their artifacts during the sessions. For example, at the end of Session 3, participants were asked to bring back one artifact from their classroom that demonstrated how they used self-assessment and peer assessment in the classroom. As noted in the researcher field notes, most of the participants brought forward and shared their artifacts by the third session and this trend continued during the subsequent sessions in the series. For most participants, a level of trust had been sufficiently developed; so they felt comfortable opening their practice to each other, asking for feedback to improve their practice, and adapting their practice by considering evidence from the classroom as well as the research literature.

One of the survey questions asked participants which assessment practices they would like to explore in greater depth to further enhance their professional knowledge and expertise. Responses included more depth in summative and formative assessment, including peer feedback, and critique. Although sessions one and three focused on the topic of creating a culture of critique (giving and receiving feedback) in the classroom and activating students as resources for one another, and peer feedback using collaboratively developed criteria, participants recognized this could be explored in greater depth to enhance their professional knowledge and expertise in assessment literacy. As a result of this observation and discussions with the design team, session six was refined and included summative assessment to help teachers develop a more balanced assessment approach.

Each DBPL cycle also involved a time for groups of teachers and their principal to engage in a school team discussion about leading teacher learning in their respective schools. School teams reflected on their learning collectively and discussed ways to work together to strengthen and refine assessment practices in their schools between sessions. One of the survey questions asked participants which assessment practice they saw as their greatest strength that they would feel confident in demonstrating to a colleague. In the final survey (S2), the responses were mostly related to formative assessment strategies. The following examples demonstrate specific examples of strategies used during the professional learning sessions that participants noted as assessment practices they are confident in demonstrating to a colleague:

> Using formative practices to move students along in understanding the larger concept through reflection, peer evaluation, and follow-up discussions with students. (S2-T16)
>
> Use of exemplar, non-exemplar (S2-T19)
>
> How to use a rubric and have a different approach to show their learning (S2-T2)

Likewise, using formative assessment strategies were often topics of conversation when participants were reflecting together as school teams and noted by the researchers in their field notes. When joining the table groups, researchers heard teachers reporting specific ways in which they were beginning to lead and refine assessment practices with and alongside colleagues in their respective schools, such as sharing assessment literacy practice, modeling practice, presenting to staff, and facilitating professional learning opportunities at the school. It was during the final sessions that our team started to note a shift in the field notes from perceptions of viewing learning and growth as an individual endeavor to perceptions of viewing learning and growth as a collective endeavor with colleagues and supported by the school and district.

In summary, there were four key shifts noted during the design, enactment and refinement phases of the DBPL series (see Appendix B): (1) In the design phase, participants started to adapt to the requirements of an iterative and responsive model of professional learning and shifted from viewing their professional growth as a one-time event to viewing professional growth as continuing. (2) In the enactment phase, participants started to adapt to the active learning components and shifted from passive recipients to active participants utilizing their daily practice as a site for professional learning and growth. (3) In the enactment phase, participants shifted from thinking about replicating pedagogical approaches modelled during the professional learning series to thinking about how to foreground the knowledge and skills in practice. (4) In the refinement phase, participants shifted from viewing a colleague as someone to sit with during a professional learning session to viewing colleagues as supports and their classroom, school, and district as a site of support for continuing professional learning.

6.4 Discussion

In this section, we consider the nature of the shifts observed by the researchers and discuss our interpretations of the adaptations that occurred during the design, enactment and refinement phases of the DBPL.

Adapting to the Design Phase. DBPL is a non-linear form of professional learning and requires a commitment to long-term and iterative design cycles (Brown, Friesen, Beck, & Roberts, 2020; Chu, Brown, & Friesen, 2020; Friesen & Brown, 2020; Friesen & Jacobsen, 2015). In the design phase, there were elements of DBPL that were possibly unfamiliar to participants or contradictory to other standard in-service experiences using more traditional approaches to professional learning. Critique of professional development for teachers often includes a "deficit" paradigm and positions teachers as professionals with a lack of skills and knowledge and in need of solving problems of practice (Guskey, 2002; Kennedy, 2005) and requires the delivery of information (Katz & Dack, 2013). For example, a more transmission-oriented approach to professional learning may suggest that hosting a one-time training session for teachers will generate change in the

classroom and result in a positive impact on student learning. Guskey's (2002) model for change shows a linear and causal relationship starting with the professional development, then leading to change in the teachers' classroom practices, to changes in student learning outcomes and finally change in teachers' beliefs and attitudes. Linear models of professional learning, such as fragmented, one-shot workshops also have shortcomings (Wei, Darling-Hammond, Andree, Richardson, & Orphanos, 2009). Researchers have proposed non-linear models of professional learning by building on Guskey's work. For example, Clarke and Hollingsworth (2002) proposed a non-linear model and framework with four interconnected analytic domains and mediating processes of enactment and reflection recognizing the individual nature of teacher growth and learning. Even so, the traditional linear approach to teacher professional learning continues to persist in educational contexts. Schools and districts schedule professional development *days* in their yearly calendar and allocate budgets to convention and conference events where teachers are passive recipients, and an identified expert leads a presentation. This remains a dominant form of professional learning for teachers globally (OECD, 2019).

We recognize there are advantages and shortcomings to different types of professional development. For example, although they are highly criticized as ineffective, workshops or summer institutes may be appropriate to help implement instructional practices (Guskey & Yoon, 2009) or keynote addresses may be paired with learning in the community (Fullan & Hargreaves, 2016). Instead of contrasting DBPL to other modes of professional learning, we argue for interrogating how modes of continuing professional learning can engender adaptations by the participants and shifts in their perspectives about professional learning.

In our study, particularly in the early cycles, we noted the participants were seeking elements of transmission-oriented approaches. However, with each subsequent DBPL cycle, there were fewer requests from participants for using approaches they may have previously experienced in a more linear design of professional learning. Participants started to engage in sustained reflection, to continue to develop assessment literacy practice instead of aiming to replicate a select lesson from the session in the classroom the next day. While some teachers experienced some disequilibrium as they became acquainted with the iterative, responsive requirements of DBPL, our analysis also indicated that participants in the study started to adapt to shifting from one-time training or fragmented activities in transmission-oriented professional learning designs to a commitment to a learning-oriented and continuing model of professional learning.

Adapting to the Enactment Phase. As the cycles progressed, participants provided more details and examples about how they were using formative assessment strategies to inform teaching and support their students' learning (e.g., using evidence of student learning to inform next pedagogical moves; using exemplars/non-exemplars; using research-informed strategies). Participants started to adapt to actively participating in professional learning and examining records of their

daily practice. Participants collected learning artifacts and examined the artifacts with peers in an effort to improve their practice. DBPL requires participants to engage in active learning during each session and utilize their daily practice as a site for professional learning. In this study, we noted that it took time and about three cycles for the majority of participants to begin engaging in collaborative and critical reflection in small groups within a community of peers and experts, using ideas of continual idea improvement (Scardamalia & Bereiter, 2005). We noted that it takes time and multiple attempts to recognize the value of engaging in critical discussions with colleagues and researchers; reflecting on teaching, learning, and leadership; and bringing forth records of their practice, such as learning plans from daily practice and artifacts of student learning.

During the enactment phase of the DBPL cycles, participants started to recognize the value of engaging in active learning in small groups, critically analyzing research-informed video cases and making personal connections to assessment practice and educational research in assessment, and leading learning in assessment literacy in their respective schools. Participants were no longer seeking to follow routine or scripted approaches; they worked alongside and learned from colleagues demonstrating an important aspect of adaptive expertise (Hammerness, Darling-Hammond, & Bransford, 2005). Participants started to discuss the value of developing research-informed depth of knowledge, *know-how* combined with *know-why* (Bereiter, 2014), as a result of their engagement in the DBPL sessions. Participants also shared how they were beginning to lead and strengthen assessment practices with colleagues in their respective schools (e.g., sharing assessment literacy practice, modeling practice, presenting to staff, facilitating professional learning opportunities at the school). In the professional development literature, authors emphasize embedding professional learning into the school environment as a widely shared feature of effective models (Archibald et al., 2011; Campbell et al., 2017; Darling-Hammond et al., 2017). We also noted that participants were less concerned about how they could replicate what occurred during the DBPL sessions and instead, they discussed how to foreground the knowledge and skills into their practice.

Adapting to the Refinement Phase. DBPL requires continual refinement to meet the needs of the learners and learning context (Brown, Friesen, Beck, & Roberts, 2020; Chu, Brown, & Friesen, 2020; Friesen & Brown, 2020; Friesen & Jacobsen, 2015). As the cycles progressed in the refinement phases in this study, the participants discussed how their colleagues supported their professional learning. This is consistent with the literature showing that teacher collaboration and collective participation can contribute to instructional improvements (Ronfeldt, Farmer, McQueen, & Grissom, 2015; Zaslow, Tout, Halle, Whittaker, & Lavelle, 2010) and can lead to collaborative professionalism (Fullan & Hargreaves, 2016; Hargreaves & O'Connor, 2018a, 2018b). A key component of DBPL is developing teacher-leadership capacity (Robinson, 2011). The applied learning components between sessions provided participants with opportunities to refine assessment literacy and develop leadership capacity in assessment literacy in their

own contexts; however, from other studies involving DBPL we recognize that this requires a longitudinal commitment (Brown, Friesen, Beck, & Roberts, 2020; Chu, Brown, & Friesen, 2020; Friesen & Brown, 2020). By the end of the series, when returning to the next DBPL session, most of the participants collected examples from their teaching in relationship to assessment literacy or leadership practice to examine and refine further during the sessions. Participants started to discuss their growth and role in strengthening assessment literacy in their respective schools and the benefits of the collective support of colleagues, their school and the district.

In elaborating on the details of the design, enactment and refinement phases of a professional learning series and the responses of the participants during each of the phases, this article contributes to the literature with a description of recursive and elaborative practices of teacher professional learning with a group of teachers that were new to this non-linear model of professional learning. Through the findings, this study offers pragmatic and theorized descriptions of teacher participation in and adjustment to such practices. The findings can serve to inform others seeking to design, engage in, and support high-quality and iterative teacher professional learning with an understanding of what to possibly expect from participants who may need to adapt from a transmission-oriented to a learning-oriented mode of professional learning.

It can be tempting for designers of professional learning to seek input from participants at the end of one session and then respond to each request and incorporate the feedback into the next session. It is also important to recognize when the feedback from participants can be indicators of the shifts that can occur when participants are in the early phases of becoming familiar with the tenets of DBPL or other complex models of continuing professional learning. The shifts in how teachers responded to the design phases can serve to inform teachers, school and district leaders, professional learning designers, and researchers about the corresponding adaptations that can occur during early attempts of the design, enactment and refinement phases of a professional learning model. Ongoing efforts to design and work within teacher professional learning experiences exceeding the limitations of conventional approaches and aligning with dynamic, situative theories of learning, will benefit from understanding teacher interactions within and responses to such collaborative, non-linear, and participatory examples.

6.5 Conclusion

Iterative, research-informed, and guided learning experiences appropriately spaced throughout a school year can begin to shift thinking about professional learning as a fragmented and transmission-oriented experience that takes place on scheduled dates and times during the school year to a learning-oriented professional learning experience that involves a critical examination of daily practice. Teachers in this study were beginning to lead assessment practices with colleagues

in their respective schools and learn alongside their colleagues as a site for professional learning. Findings indicated that the DBPL intervention required teachers to shift their thinking from conceptions of taking on a role of passive participant during episodic professional development events, to conceptions of taking on a role of an active participant in a continuing professional learning experience in which collaborative professionalism could develop through a commitment of shared learning and improvement. The results of the study are limited by the duration of this DBPL series, the context and experience of the group of teachers, and the limited number of participants and schools that were involved in this study. Further study is recommended to examine how teachers adapt to continuing and complex models of professional learning over time.

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Appendix A: Design-Based Professional Learning (DBPL) Cycles Within the Study

Design	**Cycle 1**	**Cycle 2**	**Cycle 3**	**Cycle 4**	**Cycle 5**	**Cycle 6**
Session	Oct. 5-2018	Nov. 2-2018	Dec. 18-2018	Jan. 25-2019	Apr. 3-2019	Apr. 23-2019
Enactment *Content Focus*	Foundations for formative assessment concepts	Exemplars/Non-Exemplars	Peer feedback. Self-Assessment, Criteria	Conceptual Understanding in the Disciplines	Pedagogical Moves to support Conceptual Understanding	Balancing Formative and Summative Assessment
Active Learning	Engage in video case analysis; individual reflections; dialogue in small groups					
Coherence	Establish protocols for sharing artifacts in sessions	Share artifacts of leading culture of critique and collective participation in the school	Share artifacts of leading and using exemplars/non-exemplars	Share artifacts of leading and using peer and self-assessment strategies, co-developed criteria	Share artifacts of leading and using conceptual understanding across disciplines	Share artifacts of leading and using pedagogical moves
Collective Participation	Establish protocols for reflection	Reflect on leadership and work with colleagues	Reflect on leadership and use of exemplars/non-exemplars	Reflect on leadership and use of peer and self-assessment strategies, criteria	Reflect on leadership and using conceptual understanding across disciplines	Reflect on leadership and using pedagogical moves
Duration (between sessions)	Complete applied learning tasks to establish a culture of critique and collective participation in the school	Complete applied learning tasks in the school related to exemplars/non-exemplars	Complete applied learning tasks in the school related to peer and self-assessment, co-developed criteria	Complete applied learning tasks in the school related to assessing for conceptual understanding	Complete applied learning tasks in the school related to pedagogical moves	Complete applied learning tasks in the school related to balancing formative and summative assessment
Refinement	Survey (S1)	Researchers maintained field notes and documents from sessions Participants provided input and completed exit slips at the end of each session				Survey (S2)

Appendix B: Shifts Noted During the DBPL Series

DBPL Phases for Cycles 1-6	Description of the Phase	Summary of Participant Responses to the Phase	Participant Shifts & Adaptations
Design Phase	Each cycle aimed to engage the participants in continual co-creation and analysis of evidence of student learning, analysis of applied learning. The design of all the cycles were based on principles of knowledge building.	Participants initially requested a list of topics and plan for all the sessions at the start of the series. In the early cycles, participants suggested the design include a repository of resources to share "best practice" with the group.	In the design phase, participants started to adapt to the design of an iterative, responsive, and continuing model of professional learning and shifted from viewing their professional growth as a one-time event to viewing professional growth as ongoing.
Enactment Phase	Each of the six cycles included content focus, active learning, coherence, collective participation, and duration (Desimone, 2009; Katz & Dack, 2013). During each cycle, the enactment of the sessions required participants to engage in collaborative and critical reflection in small groups (building knowledge within a community of peers and experts).	In the early cycles, participants requested whole group activities and less active learning in small groups. In the early cycles, participants requested video cases that more closely depicted their grade/discipline/diverse learners, etc. In the early cycles, some participants were observed not sharing examples from the classroom or sharing only their best work during the sessions.	In the enactment phase, participants started to adapt to the active learning components and shifted from passive recipients to active participants utilizing their daily practice as a site for professional learning and growth. Participants shifted from thinking about replicating pedagogical approaches modelled during the professional learning series to thinking about how to foreground the knowledge and skills in practice.
Refinement Phase	Participants engaged in applied learning between sessions and collected evidence of student learning to share and refine at the next session. Between sessions, the design team reviewed research to inform pedagogical	As the cycles progressed, participants identified areas for future learning and refinement (e.g., peer feedback and critique, balancing formative and summative assessment). As the cycles progressed, participants started to share how	In the refinement phase, participants shifted from viewing a colleague as someone to sit with during a professional learning session to viewing and adapting to collaborative professionalism and their classroom, school, and district as a

	and content decisions for the next session. Researchers analyzed data between sessions to inform the design team and refine the next session.	they were strengthening assessment literacy in their classrooms and in their respective schools with the support of colleagues between sessions.	site of support for continuing professional learning.

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Journal Details

EDeR – Educational Design Research
An International Journal for Design-Based Research in Education
ISSN: 2511-0667
uhh.de/EDeR
#EDeRJournal (our hashtag on social media services)

Published by

Hamburg Center for University Teaching and Learning (HUL)
University of Hamburg
Schlüterstraße 51
20146 Hamburg
Germany
+49 40 42838-9640
+49 40 42838-9650 (fax)
EDeR.HUL@uni-hamburg.de
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In collaboration with

Hamburg University Press
Verlag der Staats- und Universitätsbibliothek Hamburg – Landesbetrieb
Von-Melle-Park 3
20146 Hamburg
Germany
+49 40 42838 7146
info.hup@sub.uni-hamburg.de
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