

LEARNING AND REFLECTION: AN EXPLORATORY CASE STUDY OF
SINGAPORE TEACHERS LEARNING IN AN ONLINE PROFESSIONAL
DEVELOPMENT COURSE

by

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ABSTRACT

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Florence Ching Ting Lee

Online teacher professional development (oTPD) has gained momentum globally as a mode of teacher professional development (Dede et al., 2009; Lieberman & Mace, 2010), appealing to teachers who prefer the convenience of online learning and/or the autonomy of self-paced learning. With oTPD gaining traction, especially in this climate of COVID-19 pandemic where many face-to-face interactions have shifted to an online space, there is insufficient research done on teachers' learning experiences and the type of reflective thinking observed during teachers' participation in oTPD activities. This is compounded by the ubiquitous but poorly defined use of reflection in literature pertaining to learning and professional development (Finlay, 2008; Roessger, 2014).

In Singapore where teachers have access to a range of oTPD opportunities, this problem is similarly observed. Very few studies have been undertaken in Singapore to understand teachers' learning experiences and how teachers reflect when they engage in TPD or oTPD. In light of the growing popularity of oTPD as a means for Singapore teachers to learn and improve their classroom practice, this exploratory case study sought to contribute to TPD research by studying the oTPD experiences of Singapore teachers. Specifically, this study explored factors that facilitated and/or impeded teacher learning in oTPD and the level of reflective thinking observed in teachers' oTPD participation. The motivation for this study stems from an appreciation of the complexity of classroom practice and the recognition that what teachers do in their respective classrooms is pivotal to student learning. This study recognizes the crucial need to support teacher learning through oTPD.

Findings from this study may inform the design and implementation of oTPD in Singapore and address the paucity of research in this area by providing qualitative case study data on the understudied area of oTPD and teacher learning. Recommendations pertaining to the design and implementation of oTPD may benefit professional development providers and the teachers they serve, as well as teacher leaders hoping to support teacher learning. This study and the recommendations it proposes will also be of interest to researchers in educational research who seek to understand the phenomenon of oTPD.

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DEDICATION

This dissertation is dedicated to my grandmother. Thank you, grandma, for showing me what it means to love unconditionally, learn continuously and to always strive to do better.

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It feels almost surreal for me to come to the end of a meandering journey of interesting possibilities, endless discoveries and disconcerting dissonance and doubt. This journey has revealed areas of growth and sources of strength that I will take time to process and inspect more closely. While learning does not and should not end with the completion of a doctoral dissertation, the physical and psychological exhaustion of having to juggle part-time study and full-time life compelled me to complete my dissertation. However, even with the best of my ability, I would not have been able to complete this dissertation without the love and support of a number of people.

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I count myself fortunate to have been able to work with many colleagues and friends from the teaching fraternity in Singapore. So many of them have such passion for their craft and such big hearts for their students. Learning together with them and watching them in action fill my work with purpose.

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F.C.T.L.

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Chapter I

INTRODUCTION

Context

Teacher Professional Development

Teachers are important in societies everywhere. Being the main designers and creators of classroom experiences, teachers and what they do in their classrooms is an important lever in educational reform and change (Swanson & Stevenson, 2002; Yendol-Hoppey & Dana, 2010; Youngs & King, 2002). Citing the *2001 Report of the Task Force on Teacher Leadership*, Yendol-Hoppey and Dana (2010) note that “no single principle of school reform is more valid or durable than the maxim that student learning depends first, last, and always on the quality of the teachers” (p. 1). Research on the effectiveness of educational reforms also suggests that intervention at the classroom level is more significant than the school and system levels in explaining the variance in student achievements, and that the quality of teaching is of vital importance at the classroom level (Alton-Lee, 2003; Kyriakides & Creemers, 2008; Seidel & Shavelson, 2007; Teddlie & Reynolds, 2000). This research points to the pivotal role teachers play in ensuring desired student outcomes. Hargreaves and Shirley (2012) summarize this succinctly when they argue that “there are no instances of educational excellence without high-quality teachers and teaching” (p. 192).

As countries strive for educational excellence, teachers are faced with the need to implement policy reforms while keeping abreast of new developments in their subject areas. The use of information and communication technologies in teaching, already

widespread in the 21st century, escalated rapidly following school closures and safe distancing measures during the COVID-19 pandemic. At the same time, within the classrooms, teachers are encountering an increasingly diverse range of students in terms of interests, aptitudes and abilities (Organization for Economic Co-operation and Development (OECD), 2007). These changes within the classroom and in the larger educational and societal landscape put pressure on teachers to continue learning so that they can keep up with the rapid technological advancements that are profoundly changing the way students learn and communicate. Beyond teacher preparation courses, ongoing teacher professional development (TPD) for in-service teachers provides them with the opportunities to learn the necessary knowledge and skills, or sharpen existing ones so that they are sufficiently equipped to deal with the complex realities in their various contexts (Darling-Hammond, 2000; Darling-Hammond & Richardson, 2009; Guskey, 2000; Guskey & Yoon, 2009; Killion & Hirsh, 2001; Reeves, 2009). Liu and Tan (2015) observe that “effective teachers of the 21st century are expected to have a drive to learn... and it is imperative that they are able to constantly learn and re-learn, adapt and re-structure their knowledge, gain new competencies and assume new roles” (p. 341). Seen against this backdrop, the importance of TPD in the form of structured learning opportunities to improve teacher knowledge and practices has been widely promulgated (Avalos, 2011; Borko & Koellner, 2010; Darling-Hammond et al., 2017; Desimone, 2009; Garet et al., 2001; Villegas-Reimers, 2003; Yoon et al., 2007).

Growing Popularity of Online Teacher Professional Development

Yet, teachers today face many different demands on their time. In addition to curriculum time spent in their respective classes, teachers also have to attend to extra-

curricular activities, carry out assessment and administrative work, and communicate with parents and other stakeholders. Given such competing demands and commitments, online teacher professional development (oTPD) has emerged as a popular choice of professional development for teachers because of its ease of access and the convenience it affords (Dede et al., 2009; Parsons et al., 2019). Dede et al. (2009) note that

the need for professional development that can fit with teachers' busy schedules, that draws on powerful resources often not available locally, and that can create an evolutionary path toward providing real-time, ongoing, work-embedded support has stimulated the creation of online teacher professional development programs. (p. 2)

Online teacher professional development (oTPD) has also been championed as the “anytime, anywhere” option that provides flexibility and convenience for teachers, whatever their geographical locations, to balance their learning needs with their work and personal responsibilities (Dede et al., 2009; Fletcher et al., 2007). Yang and Liu (2004) note that professional development that is conducted virtually enables teachers to have access to learning opportunities that would otherwise be prevented by “geographic and professional isolation, time, financial resources, and the irrelevance of aspects of conventional PD to rural teachers” (p. 734). The attraction of oTPD also mirrors a larger and more general trend towards learning in an online environment that is facilitated by easy-to-use online tools as well as the growth of social networking (Prestridge, 2017; Prestridge & Tondeur, 2015). In addition, budgetary constraints (Smith & Sivo, 2012) and safe distancing measures due to COVID-19 pandemic (Hartshorne et al., 2020) have also added to the attractiveness of online learning as a form of professional development for teachers.

Professional Development Landscape in Singapore

Education in Singapore is centrally managed by the Singapore Ministry of Education (MOE) and the Singapore MOE oversees policy development and implementation. As a small city-state with no natural resources, the prevailing national narrative since Singapore's independence in 1965 has been to invest in human resources, so that Singaporeans will have the means to survive and thrive in a global economy. The mission of the Singapore MOE is to “mold the future of the nation” and its vision is “Thinking Schools, Learning Nation” (MOE, 2012). This vision describes a nation of thinking and committed citizens capable of meeting the challenges of the future, and an education system geared to the needs of the 21st century. For this vision to be realized, the Singapore MOE recognized that teachers are the “key to everything we do in education, under MOE's Strategic Thrust 5 of ‘Building a quality teaching service’” (MOE, 2020, p. 53).

In 2008, then-Minister of Education Dr. Ng Eng Hen exhorted the teaching fraternity to play its part to grow and develop teachers as self-directed learners (MOE, 2011). He outlined and established policy support for Singapore schools to provide professional development opportunities for all teachers. This included the review of existing support structures that led to the creation of School Staff Developer, a key personnel position that is dedicated to ensuring professional growth of the teacher community in every school, and the creation of Time-Tabled Time, a dedicated time for teachers to meet to discuss professional matters and engage in activities that lead to their professional growth. These policy measures attest to the importance the Singapore MOE places on TPD in raising student outcomes so that teachers can keep pace with rapid

social and geopolitical changes occurring in the world (Breakspear, 2012, p. 75).

Consequently, Singapore teachers are given provisions to take up to 100 hours off from their school duties for professional development every year, to ensure that they stay relevant in terms of their content mastery and pedagogical skills (MOE, 2012).

In 2010, the Academy of Singapore Teachers (AST) was established to “be a dedicated organization focusing on teacher professionalism and the professional development of teachers” (AST, 2020). Guided by its mission to foster a culture of professional excellence focusing on students’ well-rounded development, it aims to achieve this by building “strong teacher leadership and teacher ownership; collaborative professionalism and system-wide mentoring, and continuous learning and improvement” (AST, 2020). The AST offers teachers with a wide range of opportunities and platforms to learn and improve, including face-to-face, blended or online courses; learning programs and conferences; networked and professional learning communities where teachers can work closely with other teachers in their school or across schools to inquire into their classroom practice; and system-wide mentoring of less experienced teachers using the skills and tools in AST’s mentoring program. These platforms and opportunities ensure that teachers have access to multiple modes of learning for their professional development, giving every teacher a myriad of opportunities to grow through the learning modes and platforms that are most suited to their needs and contexts (AST, 2019; Koh et al., 2019).

In recent years, online learning has gained momentum as a mode of learning amongst Singapore teachers just as it has elsewhere in the world (Dede et al., 2009; Lieberman & Mace, 2010), appealing to teachers who prefer the convenience of online

learning and/or the autonomy of self-paced learning (Koh et al., 2019). In 2020, during the outbreak of the COVID-19 pandemic, all non-essential professional development activities offered by the AST and many other professional development providers were shifted online to minimize social mixing and the possible spread of the virus. This led to an exponential increase in the number and types of oTPD offerings for teachers in Singapore.

Reflective Thinking and Teacher Learning

In order for teachers to get the most out of their professional development endeavors and grow professionally, they are often encouraged to reflect on their learning and engage in reflective practice (Clarke & Hollingsworth, 2002; Finlay, 2008; Hatton & Smith, 1995; Rodgers, 2002). Reflective practice is seen as “a professional imperative” for teachers (Finlay, 2008, p. 3) and described as “an indispensable methodology of professional development” (Roessger, 2014, p. 18). Darling-Hammond et al. (2017) found that when professional development models incorporate time for teachers to reflect and think about their practice, this is often associated with gains in student learning.

One of the earliest and often-cited definitions of reflection as it relates to learning, is attributed to Dewey (1933) who describes it as the “active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends” (1933, p. 6). Dewey’s definition suggests that the process of reflection in professional development endeavors requires teachers to do more than passively recall their learning experience. Instead, teachers have to undertake a deliberate examination of new ideas and knowledge

encountered or acquired during their learning experience and actively make sense of how these new ideas and knowledge will affect their classroom practice.

Building on Dewey's work, Schön (1983) extended the notions of reflection by framing it within the context of how professionals think and act. Schön's conception of reflective practice and his argument of its value for improving practice have been highly influential in the field of TPD. Schön formulated two aspects of reflective practice, namely reflection-in-action and reflection-on-action. Situating the discussion in TPD, reflection-in-action refers to reflection that takes place when teachers are in the midst of the 'doing' stage, for example, during the enactment of their lesson. On the other hand, reflection-on-action is reflection that takes place after the action is completed. This allows teachers to look back on the action and consider the situation again after it has happened. This calls on teachers to examine their practice outside of the learning experience and retrospectively examine what they have learned against their current knowledge and experience. Reflection-on-action allows some space and time between the action and the reflective process and this may help teachers arrive at deeper insight or prompt them to explore other options. This form of reflecting back is important "in order to discover how our knowing-in-action may have contributed to an unexpected outcome" (Schön, 1983, p. 138).

Situating the discussion on reflection and reflective thinking as an adult learning theory, Mezirow (1991, 1992, 1998, 2000) contributed extensively to the conceptualization of reflection. He built on Dewey's (1933) definition of reflection to propose a framework of reflective thinking. Making a distinction between non-reflective action and reflective action, Mezirow contends that there are three types of non-reflective

actions and two types of reflective actions. He terms the three types of non-reflective actions as habitual action, thoughtful action and introspection, and the two levels of reflective action as reflection and critical reflection (Kember et al., 2000). Mezirow also uses the terms content, process and premise reflection (1991) to provide greater distinctions between different types of reflection and critical reflection. Mezirow's framework of reflective thinking was later operationalized into instruments for assessing reflections and reflective thinking by Kember et al. (1999, 2000, 2008). These conceptions of reflections and instruments provided a useful lens to examine the phenomenon of oTPD and address the gaps in current literature where teacher learning, reflection and oTPD are concerned.

Research Problem

With online professional development for teachers gaining traction, especially in this climate of COVID-19 pandemic where many face-to-face interactions have shifted to an online space, there is insufficient research done on teachers' learning experiences in oTPD. Not enough is known about what and how teachers learn during their participation in oTPD and the type of reflective thinking observed during their participation. This is compounded by the ubiquitous but poorly defined use of reflection in literature pertaining to learning and professional development (Finlay, 2008; Roessger, 2014; Smyth, 1992).

In addition, there is also insufficient research regarding factors that facilitated and/or impeded teacher learning in oTPD courses. Dede et al. (2009) observe that "although such programs are propagating rapidly and consuming substantial resources both fiscally and logistically, little is known about best practices for the design and

implementation of these oTPD models” (p. 2). Wilson and Berne (1999) propose that teacher learning may be the most challenging facet to understand in professional development, noting that

as a field, we know very little about what teachers learn across those multiple opportunities... [and] we have little sense of what exactly it is that teachers learn and by what mechanisms that learning takes place. What knowledge do teachers acquire across these experiences? How does that knowledge improve their practice? These questions are left unanswered. (p. 174)

Desimone (2009) also argues for “more work in identifying, conceptualizing, and assessing teacher learning, including delineating the categories of knowledge that teachers should possess in a particular subject, building a conception of teacher knowledge that includes student thinking, and increasing our understanding of how teacher knowledge enables practice” (p. 191). In recommending a specialized research agenda for oTPD, Dede et al. (2009) state that although research about face-to-face TPD share common themes with oTPD, there are significant differences when the learning experience is delivered via an online modality.

In Singapore where teachers have access to a range of oTPD opportunities, this problem is similarly observed. Even though there are studies on the professional development landscape in Singapore (Bautista et al., 2015; Chang et al., 2014; Tan et al., 2015), very few studies have been undertaken in Singapore to understand teachers’ learning experiences and how teachers reflect when they engage in TPD or oTPD. In addition, little is known about what supported and/or impeded the learning of Singapore teachers during their oTPD experience. In light of the growing popularity of oTPD as an important means for Singapore teachers to learn and improve their classroom practice, there is a need to address this paucity in current literature.

Purpose of Study and Research Questions

Despite the vast amount of time, energy and financial investment that teachers, providers of professional development as well as the Singapore MOE have put in to support teachers' professional growth through professional development opportunities, there is insufficient understanding of what happens when Singapore teachers participate in oTPD experiences. In this exploratory case study, I sought to contribute to research by studying oTPD experiences of Singapore teachers. Specifically, this study was carried out to examine factors that facilitated and/or impeded teacher learning in oTPD. In addition, the level of reflective thinking observed in teachers' oTPD participation was assessed.

The two research questions that guided this study were as follows:

1. What factors facilitated and/or impeded teacher learning in an oTPD course?
2. What is the level of reflective thinking observed in teachers' participation in oTPD?

Research Design

This study employed an exploratory case study approach to answer these questions. Yin (2009) notes that the case study “is preferred in examining contemporary events... when the relevant behaviors cannot be manipulated” (p. 11). Citing Yin and Davis (2007), he explains that the case study is used to “understand a real-life phenomenon in depth, but such understanding encompassed important contextual conditions... highly pertinent to the phenomenon of study” (p. 18). As such, in a case study inquiry, the researcher would have to cope “with the technically distinctive

situation in which there will be many more variables of interest than data points” (Yin, 2009, p. 18).

In this study, I inquired into the experiences of Singapore teachers who had participated in an oTPD course in 2019 or 2020. The sample for this study comprised two pools of Singapore teachers. In the first pool, 12 teachers from different subject disciplines and teaching levels, and who had each attended a different oTPD course, were interviewed to understand their learning experience and factors that facilitated and/or impeded their learning. These interviews were transcribed and analyzed thematically using a coding scheme derived both from the data and from the literature review. The second pool consisted of 106 participants in “Disciplinary Literacy,” an oTPD course offered by a Singapore TPD provider, Institute of Professional Learning (IPL). This course was premised on the importance of disciplinary literacy (Shanahan & Shanahan, 2012) and offered to teachers interested to help their students cope with the literacy demands in their subject disciplines. Using the reflective thinking coding scheme developed by Kember et al. (2008), I carried out a line-by-line thematic analysis of the reflections posted by these participants during their online discussions to understand the level of reflective thinking shown in these discussions. In addition, 34 participants from this pool responded to the course evaluation survey administered by IPL and 10 participants from this pool of 106 responded subsequently to a reflection questionnaire administered for this study. These four sets of data, interviews, reflections, course evaluation responses and questionnaire responses, were first analyzed separately and then combined to present a narrative of teacher learning and reflective thinking in oTPD participation in Singapore.

Assumptions of the Study

In the conduct of this study, I held several assumptions which are outlined here:

1. Learning involves a conscious, active and often collaborative process (Dewey, 1933; Vygotsky, 1978).
2. Characteristics of effective TPD also apply to oTPD.
3. Reflection is an integral aspect of teacher learning (Finlay, 2008; Roessger, 2014).
4. Reflective thinking can be assessed (Kember et al., 1999, 2000, 2008).

Anticipated Outcomes

It is anticipated that this study may yield insights in thinking about how learning and reflection can be better supported in oTPD. This study's findings and analysis may elucidate the characteristics of oTPD that facilitate teacher learning and inform the work of TPD providers and those designing learning experiences for teachers. Teachers looking to examine their own reflective practices can also leverage the findings from the study and incorporate recommendations that are relevant to their development. Insight into the factors that facilitate or impede teacher learning can help school teams foster conducive conditions for teacher learning.

Rationale and Significance

The rationale for this study stems from an appreciation that what teachers do in their respective classrooms is pivotal to student learning. Teaching in today's fast-

changing world has become more complex than ever. This study recognizes the crucial need to support teacher learning through TPD. As TPD is increasingly carried out via an online modality, in Singapore and elsewhere in the world, there is an urgent need to understand what facilitates learning in oTPD. Yet, it is not clear how teachers learn and reflect when they participate in oTPD and what facilitates or impedes their learning. Without this knowledge, it is difficult to determine what design elements are effective or useful in the design and implementation of learning experiences for teachers.

This study is significant in several ways. The findings may inform the design and implementation of oTPD in Singapore and help fill gaps in the existing literature by providing qualitative case study data on the understudied area of oTPD and teacher learning. Recommendations pertaining to the design and facilitation of oTPD may benefit professional development providers and the teachers they serve. This study and the recommendations it proposes may be of interest to researchers in educational research who can use the findings to understand the phenomenon of oTPD. Teacher leaders hoping to support teacher learning can use the recommendations and work with TPD providers to incorporate supports, or to remove barriers for teacher learning.

Researcher Perspectives

I am an educator in Singapore with more than 20 years of field experience. I had taught at the primary, secondary and junior college level and was involved in curriculum design and development in Singapore. Whilst working as a curriculum developer, I came to appreciate the vital role teachers play in helping students achieve the aspirations set out in curricula documents. This prompted me to embark on a master's degree (Ed.M.) and

subsequently to pursue a doctoral degree (Ed.D) in Adult Learning and Leadership at Teachers College, Columbia University. That experience was deeply transformative. Up to that point, I had not been educated outside of Singapore and did not know much about theories of adult learning, being mostly concerned with pedagogies and curriculum design in my professional work. During the course of my studies, I was confronted with new and often disorienting experiences that made me re-examine my beliefs and assumptions and made me more sensitive to nuances and complexities around me.

In my current work designing and facilitating face-to-face and online learning experiences for teachers, I interact with many teachers and have had the opportunity to observe how they learn, reflect and apply their learning. Together with my colleagues, I also reviewed TPD courses offered by my employer, referred in this study as “Institute of Professional Learning” (IPL). As part of our ongoing review of our processes, we regularly conduct post-course evaluation on our TPD offerings to assess their quality and impact on teacher learning. When the COVID-19 pandemic hit Singapore early in 2020, I had already carried out a pilot study and was already in the midst of preparing my proposal for this study. Even though I had to make certain modifications to my original plan, the pandemic brought an urgency to my research in oTPD. All non-essential TPD had to be redesigned and shifted online and those that needed some form of face-to-face interaction adopted a blended approach. Like many around me, I found myself unprepared and somewhat inadequate for this task of redesigning our courses even though I had taken many online courses and had attended courses about designing online experiences. Although the pandemic shook and dismantled many of our existing structures, disrupting lives and unsettling organizations, it also afforded us a rare chance

to do things very differently. In the process of meeting the challenges presented by the situation, I had to learn, unlearn and relearn some of the frames of reference that I had taken for granted. The learning, interactions and opportunities that I had before and after the outbreak of the COVID-19 pandemic gave me access to rich and layered narratives of teacher learning and motivated me to carry out a more in-depth study in the area of oTPD.

Organization of the Dissertation and Chapter Summary

This study is organized in six chapters. Chapter I provides an overview of the research study by presenting the research context and this includes a discussion of the importance of TPD and the growing popularity of oTPD. This is followed by an overview of TPD landscape in Singapore. The gaps in current literature pertaining to oTPD were identified and research questions that attempted to address this gap are presented. Chapter I ends with the definition of key terms used in the study. Chapter II covers the literature review of this study and two main topics were reviewed. The first is a survey of relevant literature in the field of TPD, exploring notions of TPD, the emergence of oTPD (Brown & Green, 2003; Dede et al., 2009; McNamara, 2010; Reeves & Pedulla, 2013; Parsons et al., 2019; Surette & Johnson, 2015; Yang & Liu, 2014) and characteristics of effective TPD (Garet et al., 2001; Darling-Hammond, 2017; Desimone, 2009). The second reviews definitions of reflection (Dewey, 1933; Mezirow, 1991, 1992, 1998, 2000; Schön, 1983, 1987) and the work done in the development of instruments to assess reflection (Kember et al., 1999, 2000, 2008). At the end of Chapter II, a conceptual framework that guided the conduct of this study is presented. In Chapter III, the research methodology

undertaken for this study is discussed. The chapter describes how the data was collected and analyzed to address the research questions. The research findings arising from the study are presented in Chapter IV, and Chapter V discusses the analysis, synthesis and interpretations of the findings. Finally, Chapter VI concludes with the recommendations, limitations of this study and thoughts for future research.

Definitions of Key Terms

Teacher professional development (TPD): In this study, I define TPD as a process whereby teachers seek to acquire or deepen knowledge, skills and dispositions about what and how to teach, with the intent of applying what they have learned in their specific teaching contexts, to improve their students' growth and learning. I also propose a distinction between the intent and actual effectiveness of TPD, hence participation in TPD experiences is not assumed to have automatically led to teacher learning.

Online teacher professional development (oTPD): TPD that is partially or completely carried out online, with the affordances and limitations of an online modality (Fishman et al., 2013).

Characteristics of TPD: Features or design elements present in TPD programs or courses.

Effective TPD: Sometimes referred to as "high-quality" professional development" (Reeves & Pedulla, 2013, p. 53), effective TPD are formal and organized learning experiences that "lead to changes in teachers' classroom practices and improvements in student learning outcomes" (Darling-Hammond et al., 2017).

Habitual Action: Action that is carried out repetitively as part of a routine and performed mechanically without much deliberation. Kember et al. (2000) explained that habitual action is that “which has been learnt before and through frequent use becomes an activity that is performed automatically or with little conscious thought” (p. 383).

Understanding: Thoughtful action that made use of existing knowledge without any form of critical assessment (Kember et al., 1999, 2000, 2008; Mezirow, 1991).

Reflection: Defined as “active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusion to which it tends” by Dewey (1933, p. 9). While this is useful as a general view of reflection, Mezirow’s (1991, 1992, 1998, 2000) discussion of content and process reflection provides greater clarity about what reflection entails.

Content Reflection: This involves “an examination of the content or description of a problem” (Cranton, 2006, p. 34).

Process Reflection: The process of “checking on the problem-solving strategies that are being used” (Cranton, 2006, p. 34).

Critical reflection: A process of premise reflection whereby underlying beliefs and assumptions are examined to understand how they affect the way people make sense of their experiences. Critical reflection has “the potential to lead people to the transformation of a habit of mind” (Cranton, 2006, p. 35).

Disciplinary literacy refers to the specific ways different disciplines approach reading, writing, and communicating. The disciplinarity inherent in different subjects warrants specific ways of thinking and knowing. However, as these ways of thinking and knowing are not always apparent to students, the aim of disciplinary literacy, also referred to as

subject literacy, is to help students understand how ideas are communicated in different disciplines, and to equip students with the necessary literacy skills to support them in their study of these disciplines (Shanahan & Shanahan, 2012).

Chapter II

LITERATURE REVIEW

Introduction

The purpose of this exploratory case study was to understand the learning experiences of Singapore teachers who had participated in oTPD. Specifically, this study was carried out to examine factors that facilitated and/or impeded teacher learning in oTPD. In addition, the level of reflective thinking observed in oTPD participation was assessed.

Two topics in current research were reviewed and synthesized in this chapter to address the gaps in the literature about teacher learning in oTPD. The first explores notions of TPD and surveys developments in the TPD landscape, before moving into a discussion about the growing popularity of oTPD, its strengths and limitations, and characteristics of effective TPD. The second examines definitions of reflection, how reflection can support teacher learning and work done in the assessment of reflection. This literature review provided a basis for the conceptual framework that guided the conduct of this study. The conceptual framework is presented and described in the final section of this chapter.

Literature Review Process

To carry out the literature review, I accessed various online databases available through the Columbia University Library and the Teachers College Gottesman Library such as JSTOR, ProQuest and Education Resources Information Center (ERIC), the

Digital Repository available through the National Institute of Education Singapore, and Google Scholar. Using search terms such as *teacher professional development; teacher learning; online teacher professional development; teacher reflection; critical reflection; reflective thinking; and characteristics or features of effective teacher professional development*, seminal and relevant literature from late 1990 to 2020 was selected. The materials reviewed included books, academic journal articles, reports commissioned by education systems such as the United States Department of Education, dissertations and articles in influential education magazines such as the *Phi Delta Kappan*. Bibliographies from relevant books and journal articles also provided additional sources for the literature review which was ongoing throughout the proposal, data collection, data analysis and synthesis phases of the study.

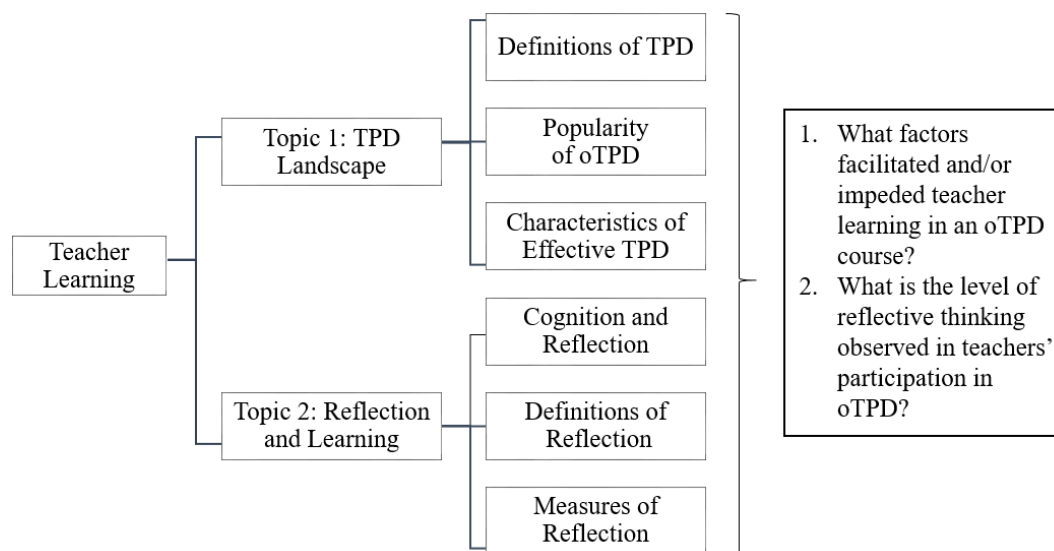
Rationale for Topics

The two topics discussed in this chapter were reviewed and synthesized as they are deemed relevant to this study. The section on TPD discusses the literature pertaining to teacher development and presents an overview of what has been defined and theorized in this field (Avalos, 2011; Borko, 2004; Creemers et al., 2012; Darling-Hammond & Richardson, 2009; Day, 1997; Evans, 2002; Guskey, 2002; Guskey & Yoon, 2009; Little, 1993; Yoon et al., 2007). Mapping out the various ways TPD and teacher learning have been discussed and described provided an important context to situate teacher learning in this study. The discussion on the emergence of oTPD and its strengths and limitations (Brown & Green, 2003; Dede et al., 2009; Fishman et al., 2013; Fletcher et al., 2007; Kim et al., 2011; McNamara, 2010; Parsons et al., 2019; Prestridge, 2017; Reeves et al., 2012; Reeves & Pedulla, 2013; Surette & Johnson, 2015; Yang & Liu, 2014) is pertinent

to the study as it helps to elucidate reasons for the growing prevalence of oTPD and provides an understanding of the phenomenon being investigated in this study. A discussion of the characteristics of effective TPD (Garet et al., 2001; Darling-Hammond et al., 2017; Desimone, 2009) is included as a subtopic as this provides a review of what is known or theorized about TPD design elements that support teacher learning, contributing to a deeper appreciation of how TPD and oTPD can be better designed and implemented to support teacher learning.

The second topic on reflection begins with an exploration of different ways of conceptualizing reflection, based on five perspectives of cognition (Fenwick, 2000; Justice et al., 2019; Lundgren et al., 2017). This is followed by a discussion of different definitions of reflection offered in seminal works by Dewey (1911, 1933), Schön (1983, 1987) and Mezirow (1991, 1992, 1998, 2000) to outline the development of reflection as a concept, and to illustrate how this concept might look like in the context of teacher learning and TPD. After this, Kember et al.'s work (1999, 2000, 2008) which drew from Mezirow's theorization on reflection, is reviewed to present thoughts about assessing reflection in learning. Reviewing and synthesizing relevant ideas from TPD and reflection advance current perspectives of how teacher learning can be better supported and enable the examination of a crucial, albeit neglected intersection between reflection and oTPD learning experiences. Figure 1 provides a diagrammatic overview of the literature review carried out in this chapter.

Figure 1

Overview of Literature Review**Topic 1: Survey of the Teacher Professional Development Landscape****Defining Teacher Professional Development**

Efforts to define and clarify what is meant by TPD have been a fairly recent phenomenon. In the late 1990s and early 2000s, a number of scholars (Evans, 2002; Fullan & Hargreaves, 1992) had pointed out the lack of conceptual clarity in discussions of teacher development, even as TPD is seen as a key lever for policy reforms and school improvement initiatives (Creemers et al., 2012; Darling-Hammond & McLaughlin, 1995; Harwell, 2003; Yoon et al., 2007). In one of the early definitions, Little saw teacher development as any kind of activity “intended partly or primarily to prepare paid staff members for improved performance in present or future roles in the school districts” (1993, p. 491). In this early definition, neither the kind of activity nor what the idea of improved performance referred to was explained. Later, Day (1997) defined TPD as “a

process by which, alone and with others, teachers review, renew and extend their commitment as change agents to the moral purposes of teaching; and by which they acquire and develop critically the knowledge, skills, planning and practice with children, young people and colleagues through each phase of their teaching lives” (1999, p. 125). In this definition, the idea of TPD as a collaborative process is put forth, and there is an attempt to situate the idea of improved performance in terms of obtaining or improving knowledge and skills that teachers can apply in their work with their students and colleagues. Building on Day’s definition, Evans (2002) interpreted TPD as “a process, which may be on-going or which may have occurred and is completed,” and which “may improve teachers’ knowledge, skills and practice” (pp. 130-131), extending the idea of TPD as a process that can occur within a clear time boundary such as duration of the TPD activity or over time even after the completion of the TPD activity. In addition, Evans’ definition also underscores the point that participation in TPD does not necessarily mean that there is teacher learning, an increase in teachers’ knowledge and skills, and subsequent application and transfer. Avalos (2011) added to the perspectives on TPD by incorporating notions of teacher beliefs and affect in her observation that teacher learning “requires cognitive and emotional involvement of teachers individually and collectively, the capacity and willingness to examine where each one stands in terms of convictions and beliefs and the perusal and enactment of appropriate alternatives for improvement or change” (p. 11).

From these definitions, it is clear that the process of TPD and teacher learning is complex and layered, one that is discussed and debated widely in the field (Avalos, 2011; Borko, 2004; Creemers et al., 2012; Darling-Hammond & Richardson, 2009; Day, 1997;

Evans, 2002; Guskey, 2002; Guskey & Yoon, 2009; Little, 1993). Acknowledging that there are diverse contexts for teacher learning, Borko (2004) explains that teacher learning can take place in different areas of their practice including:

their classrooms, their school communities, and professional development courses or workshops. It can occur in a brief hallway conversation with a colleague, or after school when counseling a troubled child. To understand teacher learning, we must study it within these multiple contexts, taking into account both the individual teacher-learners and the social systems in which they are participants. (p. 4)

Popularity of Online Teacher Professional Development

In recent years, oTPD opportunities have increased dramatically, giving teachers access to a wider range of learning experiences and more possibilities of applying new knowledge and skills (Brown & Green, 2003; Dede et al., 2009; Reeves & Pedulla, 2013; Parsons et al., 2019). Defined by Fishman et al. (2013) as “teacher learning experiences delivered partially or completely over the Internet” (p. 427), oTPD has been heralded as the “anytime, anywhere” option for teachers with competing demands on their time (Dede et al., 2009; Fletcher et al., 2007). These opportunities to engage in TPD experiences via an online modality provide teachers with the ease of access, convenience, flexibility and autonomy, allowing them to build their professional expertise, regardless of physical locations, and often at a fraction of the costs incurred in a face-to-face TPD (Dede et al., 2009; Fishman et al., 2013; Lieberman & Mace, 2010). Dede et al. (2009) observe that “the need for professional development that can fit with teachers’ busy schedules, that draws on powerful resources often not available locally, and that can create an evolutionary path toward providing real-time, ongoing, work-embedded support has stimulated the creation of online teacher professional development programs” (p. 9). Prestridge (2017) argues that “by moving teacher professional development into a context

that is not limited by time or place, or the need for face-to-face communication, it is anticipated that teacher professional development can become an embedded part of teachers' everyday practice and provide greater opportunities for and from learning communities" (p. 86). The rapid increase of oTPD as a form of TPD of choice for many teachers, especially in a post-COVID-19 reality, warrants a closer examination of its benefits and limitations and this will be discussed in the next section.

Benefits of oTPD

Drawing on their research in policies and practices of TPD in high-achieving countries such as Singapore, South Korea and Finland, Lieberman and Mace (2010) note that availability of oTPD opportunities has increased the rates of teacher participation in learning experiences. One of the key reasons for this is access to learning, a point that a number of other researchers have also stressed (Brown & Green, 2003; Dede et al., 2008; Surette & Johnson, 2015; Yang & Liu, 2014). Brown and Green (2003) suggest that convenient access to learning is possibly the most significant advantage of oTPD. This is consistent with the premise of the e-Learning for Educators Initiative, a large-scale oTPD initiative commissioned by the U.S. Department of Education between 2006 and 2011 in ten states in the United States (Reeves & Li, 2012), that "scheduling and access represent critical barriers to teachers' participation in 'high-quality' professional development" (Reeves & Pedulla, 2013, p. 53). With oTPD, teachers are able to access learning materials and asynchronous learning experiences as these are no longer constrained by time or location, unlike what is usually the case with a face-to-face TPD (Brown & Green 2003; Dede et al., 2009). Parsons et al. (2019) support this view, reporting in their study that teachers perceived the ability to gain access to learning resources anytime as the

most important benefit of oTPD. In addition to physical access, oTPD may also help with social access as asynchronous interactions can be less stressful and intimidating as compared to real-time discussions for some teachers, allowing those who usually stay quiet in face-to-face TPD to compose and offer their thoughts in their own space (Brown & Green, 2003), or to “find their voice in mediated interaction” (Dede, 2006).

Other than access, another advantage is the flexibility and autonomy oTPD affords to teachers. McNamara (2010) surveyed over 300 K–12 teachers in the United States for her doctoral study and she found that teachers appreciated the autonomy to manage their pace of learning in oTPD. The ability to slow down or speed up their learning experiences or review the learning resources when necessary provide teacher with greater ownership over their learning (p. 149). oTPD also affords teachers the possibility of planning their schedules such that there is “real-time, continuous, and work-embedded support” (Dede et al., 2009), ensuring that there is little or no downtime between their learning experience and classroom practice. It is also easier to implement oTPD to support teachers over a sustained period of time as compared to face-to-face support (McNamara, 2010). In addition, oTPD can be embedded in teachers’ professional contexts, offering teachers greater flexibility in terms of their scheduling needs. This facilitates the transfer of learning to classroom practice as learning is on-going, embedded in actual school contexts and available to teachers at their convenience (Dede et al., 2009).

The flexibility of oTPD also includes the variety of learning experiences teachers can have. With oTPD, teachers can be a part of an online learning community and collaborate with other educators to address common learning needs. Transcending

physical boundaries, oTPD enables teachers to connect with people outside of their immediate geographical area, offering educational professionals varied avenues for social interaction (Parsons et al., 2019) thereby allowing for a broader exchange of ideas that can be refreshing. Yang and Liu (2004) carried out a study involving 128 pre-and in-service mathematics teachers involved in an oTPD in Taiwan. They found that oTPD was able to provide an “effective medium through which teachers can share expertise, try out new ideas, reflect on practices, develop new curricular ideas and, most importantly, develop an online learning/teaching community” (p. 735). McNamara (2010) contends that oTPD “has the unique potential to foster reflection, deep thought, and analysis... [thriving] on the interaction and sharing of ideas between colleagues in job-alike situations” (p. 149).

The review of these studies in oTPD shows that oTPD has several advantages over face-to-face TPD, giving teachers access, autonomy and flexibility, and expanding the range of learning possibilities for teachers.

Limitations of oTPD

Despite the advantages that oTPD afford, it is not without limitations. Kim et al. (2011) report there is “considerably high dropout rates of online learners” (p. 44). This suggests that even though more teachers are participating in oTPD, not all of them would complete the course. The main reason cited for not completing the online learning experience is not having enough time. Kim et al. explain that this is often the result of misconstruing online learning as requiring less work than face-to-face interaction. Teachers who did not complete their oTPD engagement often confuse the convenience offered by oTPD and the time saved from not having to travel physically as not requiring

the time investment that is needed in any form of learning endeavor. The authors contend that many teachers may not have realized that while time is saved because there is no need to travel, teachers often need to spend time navigating the online platform to familiarize themselves with how learning experiences and resources are organized. As a result, teachers who do not put aside sufficient time for their learning often find themselves unable to complete the tasks and assignments in their oTPD participation.

Secondly, while oTPD may offer teachers wider and more immediate connections to other professionals in the fraternity, there are questions about the quality of these online interactions and connections. Brown and Green observe that “important connections among people are forged during live, face-to-face activities” (2006, p. 150). Furthermore, Smith and Sivo (2012) also note that a lack of social presence, particularly in self-paced non-instructor-led oTPD, may impede teacher learning. Some teachers may not be motivated to participate actively in oTPD experiences if they feel their peers are unlikely to engage with them.

These observations about oTPD suggest that moving TPD online is no panacea for problems associated with TPD and factors that hamper teacher learning. Curtis (2018) argues that while the shift from face-to-face TPD to oTPD has been a consequential development in the field, this move has not altered the fundamental characteristics of TPD. The next section discusses ideas about what makes TPD effective in terms of teacher learning.

Characteristics of Effective Teacher Professional Development

The difficulty of discussing teacher learning is compounded when the supply side of the discussion is taken into consideration. Not all TPD programs are of high quality or

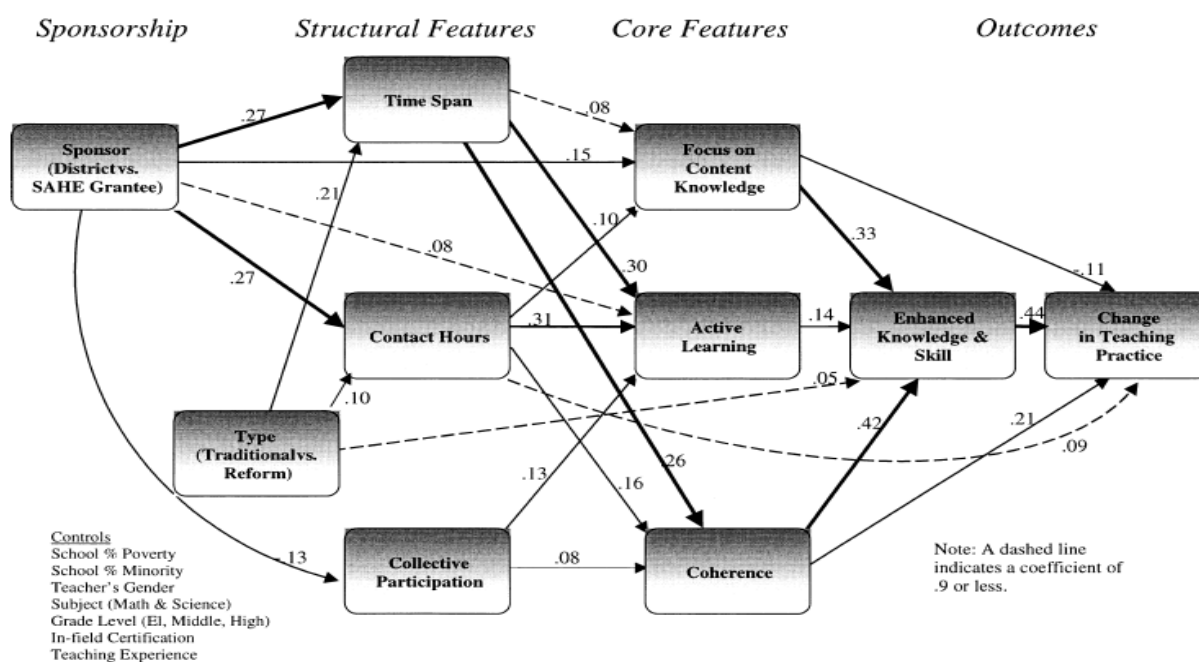
relevant to teachers' learning needs. TPD has often been criticized for being ad-hoc, fragmentary and disconnected from the realities and contexts that teachers operate in, and/or overly prescriptive (Beavers, 2009; Bolt, 2012; Borko, 2004; Brookfield, 1990; Cohen & Ball, 1999; Guskey, 2002; Wilson & Berne, 1999). Given the substantial investment put into TPD in terms of time and money, there is an urgency to identify and understand features of TPD that were deemed effective by teachers (Birman et al., 2000; Wayne et al., 2008).

Darling-Hammond et al. (2009) note that professional development is most effective when it helps teachers deal with the "concrete, everyday challenges involved in teaching and learning specific academic subject matter" (p. 10). Borko et al. (2010) maintain that high quality TPD needs to be situated in teachers' actual practice and targeted on students' learning. In an influential study drawing on nationally-representative TPD data collected in the United States, mainly in mathematics and science, Garet et al. (2001) designed a study to investigate the connection between features of effective TPD and what teachers reported had changed in terms of their knowledge and skills and classroom teaching practices. These features were identified from emerging literature in best practices in TPD and comprised three features about the structure of TPD, *form*, *duration* and *collective participation* and three core features, *content focus*, *active learning* and *coherence*. Participants were asked to recall their experiences in the TPD activities and to respond to different aspects of these features. The authors found that different features yielded different impact on what teachers reported to have increased or changed in terms of knowledge, skills and classroom practice, with the three core features, *content focus*, *active learning* and *coherence*,

having significant positive impact. Through these core features, structural features, especially, *duration*, also have positive though less significant effect sizes. For instance, the authors found that TPD that is focused on academic content areas, provides teachers with opportunities for active learning and is coherently integrated into teachers' school context, is more likely to improve their knowledge and skills. They also found that sustained and intensive TPD is likely to have greater impact than shorter ones. Figure 2 presents a diagrammatic representation of the relationship of features of professional development and teacher outcomes from their study.

Figure 2

The Relationship of Features of Professional Development to Teacher Outcomes
(Garet et al., 2001, p. 933)

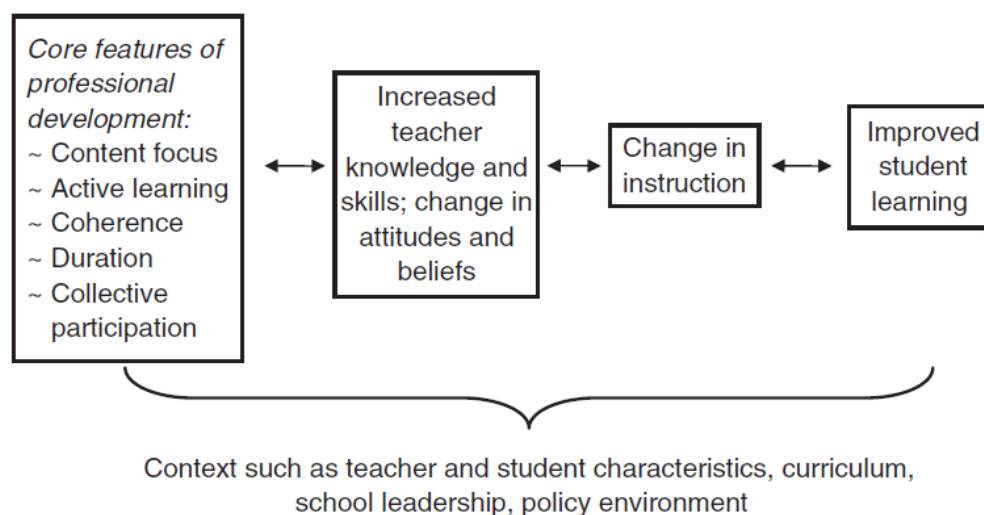


Desimone, one of the authors of this influential study, continued to review and synthesize literature emerging from the field. In her 2009 publication, she contends that there is a consensus in the features of effective TPD activities which enhance teacher

learning and classroom practice, and helped to improve student learning. She removed the distinction between core and structural features and confirmed five features of effective TPD from the 2001 study by Garet et al. that she deems critical, namely *content focus, active learning, coherence, duration* and *collective participation*. The feature that was not included in this list was the *form* of the TPD, suggesting that the type of TPD experience, for instance, whether the TPD activity was delivered as a traditional workshop or as a collaborative network, matters less when identifying features that play an important role in determining whether or not the professional development is high quality or effective. Calling these “features of PD worth testing” (p. 183), she calls on the field to test and validate these features and proposes a conceptual framework (Figure 3) to study the effects of TPD on teachers and students.

Figure 3

Proposed Framework for Studying the Effects of TPD
(Desimone, 2009, p. 185)



In a recent study, Darling-Hammond et al. (2017) seek to advance understanding in this area by selecting and reviewing 35 studies that pointed to a positive link between

TPD, teaching practices, and student outcomes. Recognizing the limitations of teacher self-reports as a means of ascertaining teacher learning and improved practices, the authors included only studies deemed to have used robust methodologies to establish a positive link between TPD and student outcomes. Defining effective professional development as “structured professional learning that results in changes in teacher practices and improvements in student learning outcomes” (p. 2), the authors coded each of the studies to identify characteristics, also referred to synonymously as design elements or components, of effective TPD. From their work, they identified the following seven characteristics and concluded that “effective TPD 1) is content-focused, 2) incorporates active learning, 3) supports collaboration, 4) uses models of effective practice, 5) provides coaching and expert support, 6) offers feedback and reflection, and 7) is of sustained duration” (p. 4). Drawing from the works of Garet et al. (2001), Desimone (2009) and Darling-Hammond et al. (2017), each of these features is elaborated below.

Content Focus

Effective TPD is focused on the subject content that teachers teach and helps teachers teach their content or discipline better. This is based on the premise that teachers with a stronger grasp of their content knowledge are more likely to be better able to support their students in learning. Shulman (1986) proposes the concept of *pedagogical content knowledge* as the “blending of content and pedagogy into an understanding of how particular topics, problems, or issues are organized, represented, and adapted to the diverse interest and abilities of learners, and presented for instruction” (p. 8), and argues that it is an important category of a teacher’s “knowledge base” (1987. p. 4). Deep

pedagogical content knowledge consists of the “most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations...that render the subject comprehensible to others” (1986, p. 9). Using this concept of pedagogical content knowledge to think about the content of effective TPD is helpful as it situates the content focus in discipline-specific curricula such as literacy or mathematics, embedded in teachers’ specific classrooms with their students. Seen in this light, effective TPD that is content-focused can take the form of workshops intended to deepen teachers’ understanding of their discipline or an ongoing exercise to analyze students’ work to improve feedback process (Darling-Hammond et al., 2017; Garet et al., 2001).

Active Learning

While a focus on content looks at what teachers learn, the second characteristic of effective TPD, active learning, takes into consideration how teachers learn. Garet et al. (2001) contend that there are many opportunities for teachers to learn actively and focused on four dimensions of active learning in their study. These dimensions include: “observing and being observed teaching; planning for classroom implementation; reviewing student work; and presenting, leading, and writing” (p. 925). Referencing Trotter’s (2006) discussion of assumptions about adult learners (Knowles, 1980, 1984), Darling-Hammond et al. (2017) suggest that “active learning opportunities allow teachers to transform their teaching and not simply layer new strategies on top of the old, a hallmark of adult learning theory” (p. 7). Active learning is differentiated from the traditional view of learning as a passive process of transmitting knowledge to learners in a prescriptive manner. Instead, teachers in effective TPD are engaged in interactive

sense-making experiences which commonly include “the use of authentic artifacts...[and] elements of collaboration, coaching, feedback, and reflection and the use of models and modeling...to provide deeply embedded, highly contextualized professional learning” (Darling-Hammond et al., 2017, p. 7). In this way, active learning takes into account the rich experiences that teachers bring to the TPD, and utilizes these experiences as resources for their learning. Active learning also allows teachers to orientate their learning based on their classroom experiences and needs, and is especially useful when reflection and inquiry are built in as part of the learning experience.

Collaboration

Collaboration is incorporated as a design element in 32 out of the 35 studies that Darling-Hammond et al. (2017) reviewed. The authors found that when TPD utilized some form of collaborative structures to provide opportunities for teachers to solve problems and learn together, this contributed to student achievement. This is consistent with the findings from Garet et al. (2001) and Desimone (2009) albeit with a slight difference. Garet et al. (2001) and Desimone (2009) use the term *collective participation* to refer to TPD participation by teachers from the same school, grade, or department, arguing that these arrangements of group participation open up opportunities for interaction and discourse amongst the teachers, leading to more meaningful learning. For Darling-Hammond et al. (2017), collaboration took more varied forms in the studies they reviewed. In addition to the types of collective participation proposed by Garet et al. (2001) and Desimone (2009), Darling-Hammond et al. (2017) found that collaboration can involve exchanges with teachers beyond their schools, as well as online collaboration via oTPD, with technology affording teachers from different geographical locations the

opportunities to learn from and with one another. These findings align well with a social constructivist view of learning (Vygotsky, 1978) that emphasizes social interaction amongst learners and the central role a learning community plays the construction of knowledge and meaning.

Use of Models and Modeling

Darling-Hammond et al. (2017) propose that uses of models and modelling is another characteristic of effective TPD. All 35 studies they reviewed included some form of curricular models and/or modeling of effective instruction to “help teachers to have a vision of practice on which to anchor their own learning and growth” (p. 11). This calls to mind Shulman’s notion of pedagogical content knowledge as well as other categories in a teacher’s knowledge base, namely, “general pedagogical knowledge, curriculum knowledge...[and] knowledge of learners and their characteristics” (1987, p. 4). Given the complexity inherent in teaching, effective TPD needs to equip teachers with the skills to tailor their subject content in a manner that meets their learners’ needs and curricula goals. Darling-Hammond et al. (2017) found that TPD that provided teachers with the opportunity to learn how to implement curricular and instructional models, and/or to observe how these models were enacted in actual classroom contexts promoted teacher learning and led to improved student achievement.

Coaching and Expert Support

Of the 35 studies Darling-Hammond et al. (2017) reviewed, the authors found that 30 of them provided coaching or some form of expert support for teachers as part of the TPD. This design element complements the earlier element on uses of model and

modelling, especially when feedback is given by an expert on a teacher's enactment of a model or when a coach offers a demonstration of strong instructional practices. Coaching and expert support is frequently achieved through the provision of one-on-one coaching in teachers' own classroom contexts or when experts share their knowledge during workshops. There are also a number of studies where expert support was rendered in the form of remote mentors utilizing technology to communicate with teachers in the TPD.

Sustained Duration

The characteristic of sustained duration refers to the number of hours spent in the TPD as well as the span of time over which the activity spreads (Desimone, 2009). Garet et al. (2001) maintain that longer TPD is more likely to give teachers more time for deeper exploration of knowledge about the content, pedagogy and learners. In addition, TPD that extends over time is more likely to provide teachers with the space to apply their learning and get feedback on it. Darling-Hammond et al. (2017) note that TPD that is sustained offers "multiple opportunities for teachers to engage in learning around a single set of concepts or practices [and] has a greater chance of transforming teaching practices and student learning" (p. 15). Desimone suggests that while there is no exact figure for the number of hours, "sufficient" duration usually means that the TPD takes place over a semester and has at least 20 contact hours (2009).

Feedback and Reflection

34 of the 35 studies reviewed by Darling-Hammond et al. (2017) discuss efforts to support teachers to reflect on their practice. The authors found that TPD associated with improvements in student learning often creates time and space for teachers to "think

about, receive input on, and make changes to their practice” (p. 14). In addition, 24 of the studies also highlighted processes to provide teachers with feedback on their practice. Even though there was a clear distinction between feedback and reflection, the authors contend that they were complementary in nature and often worked together to provide teachers with more active learning experiences and richer environments to move their learning and practices forward. As such, they present feedback and reflection as a combined characteristic of effective TPD. Desimone (2009) notes that teacher reflection is a potentially important component that warrants further research, even though she did not include it in her list of critical features.

Thoughts on Teacher Professional Development

After reviewing and synthesizing research examining the characteristics of effective TPD, definitions of TPD, and developments in oTPD offered by key researchers in the field, I propose a distinction between the intent and actual effectiveness of TPD, and define TPD as a process whereby teachers seek to acquire or deepen knowledge, skills and dispositions about what and how to teach, with the intent of applying what they have learned in their specific teaching contexts to improve students’ growth and learning. Participation in TPD therefore does not automatically mean that teachers have learned. The same is true of participation in oTPD, which is defined as TPD that is partially or completely carried out online (Fishman et al., 2013), with the affordances and limitations of an online modality.

Although reflection is deemed an important component of teacher learning and widely cited in TPD literature, there are few studies that examine it in-depth in the context of oTPD literature. The next section explores the notion of reflection in greater depth.

Topic 2: Reflection and Learning

Cognition and Reflection

Despite its ubiquitous presence in TPD literature, it is not always clear what different authors mean when they use the term *reflection*. Smyth (1992) observes that reflection is often used as an “umbrella or canopy term to signify something that is good or desirable” (p. 285) and can mean vastly different things to different people depending on their interpretations. Echoing Smyth, Creemers et al. (2013) note that the term has been used to refer to very different practices, ranging from “reflection as a component of skill and a means of fostering effective teaching to reflection as a heightening of awareness of social justice in educational practice” (p. 29). Justice et al. (2019) offer useful thoughts on reflection that can be applied in the context of TPD in their attempts to operationalize reflection in experience-based workplace learning. The authors drew upon the five perspectives on cognition offered by Fenwick (2000) namely, “1) constructivist, 2) psychoanalytic, 3) situative, 4) critical cultural, and 5) enactivist” (p. 3) in their discussion of reflection.

Viewed with a constructivist lens, reflection is an active and purposeful endeavor, and those who reflect do so consciously as they attempt to make sense of their experiences. From the psychoanalytic perspective, reflection “helps to resolve intra-personal conflicts to potentially transform an individual’s capacity for adaptation” (p. 3). This suggests that the focus of reflection in the psychoanalytic tradition is on the mind, helping those who are reflecting understand how experiences from their past may be lodged in their conscious or unconscious mind and causing impediments to their ability to learn in the workplace. This is in contrast with a situative perspective that views

reflection as one of many learning experiences that are embedded as one performs one's duties in the workplace. "Viewed from the situative perspective; work-based tools and systems trigger participation and collaboration between learners and in interaction with their context – with little organizing or formal intervention required" (Lundgren et al., 2017, p. 307, cited in Justice et al., 2019, p. 3). This suggests that reflection is viewed simply as a trigger that can contribute to the goal of learning in the workplace, and in and of itself, is of little importance to situative theorists. By comparison, the critical-cultural view deems reflection as a means to utilize dialogue and discourse to discuss, question and dismantle existing power structures that privilege some at the expense of others. Seen in this light, reflection is intended to create discomfort and constant negotiation with the existing power dynamics and status quo. The enactivist perspective views reflection as a "process-based mindfulness embedded in co-evolving and co-emerging systems" (p. 3). From this perspective, reflection is in itself a form of learning and understanding that is constantly interacting with and mediated by the environment or system in which it exists. As the process of reflection takes the form of an evolving interaction between systems; those who are reflecting are mindful of how this process contributes to meaning-making process, sharing some of the attributes with the constructivist view of reflection (Justice et al., 2019)

Each of these perspectives has drawn from their respective traditions to propose a view of reflection that underscores their premise and aims. It is not the intent of this literature review to debate the merits and weakness of each of the perspective, and it suffices to say that invariably, each perspective will have its own set of strengths and limitations. For this study on TPD, I have chosen to adopt a constructivist view of

reflection to frame my discussion of teacher learning as the premise for a constructivist view of learning, that learning is constructed by the individual in a conscious, active and often collaborative process, is closely aligned with many of the characteristics of effective TPD. In the next section, seminal work from Dewey (1911, 1933), Schön (1983, 1987) and Mezirow (1991, 1992, 1998) will be discussed to provide a more comprehensive view of reflection.

Towards a Definition of Reflection

Dewey's View on Reflection

One of the earliest and often-cited definitions of reflection as it relates to learning, is attributed to Dewey (1910, 1933) who describes it as the “active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends” (1933, p. 9). Rodgers (2002) reviewed Dewey’s writing on reflection and suggests four criteria to clarify Dewey’s notion of reflection. She explains that firstly, reflection should be seen as a “meaning-making process that moves a learner from one experience into the next with deeper understanding of its relationships with and connections to other experiences and ideas” (p. 845). Reflection is therefore an on-going process that moves the learner along a continuum of progress. Secondly, reflection is not simply any kind of thinking but a systematic and robust inquiry process. Thirdly, reflection is often a social process that take place within a community. Finally, reflection requires the adoption of a learner disposition, where personal growth of oneself and of others is valued (Rodgers, 2002).

Schön's View on Reflection

Schön's work on educating professionals for reflective practice (1983, 1987), although not explicitly constructivist in orientation, has nonetheless been observed to be underpinned by a constructivist orientation (Kinsella, 2006; Osterman, 1998). Schön's conception of reflective practice and his argument of its value for improving practice have been highly influential in the field of TPD. Schön proposes that experienced practitioners are able to carry out their routine tasks by drawing on what he termed as "knowing-in-action," a form of tacit knowledge that allowed these practitioners to perform these task without being explicitly conscious of what they are doing. He describes this form of knowing as the "capacity to do the right thing.... exhibiting the more that we know in what we do by the way in which we do it, is what we mean by knowing-in-action" (1987, p. 62). Schön also conceptualizes two aspects of reflective practice, namely reflection-in-action and reflection-on-action, and explained that the former involved the ability to respond to new and unexpected situation by thinking and reacting in the moment. Situating the discussion in TPD, reflection-in-action refers to reflection that takes place when teachers are in the midst of the 'doing' stage, for example, during the enactment of their lesson. Expanding on this example, teachers may reflect on their use of a certain instructional model during the lesson, based perhaps on how their students are responding to it. When a new situation presents itself, teachers can use reflection-in-action to assess the action they may take and the likely outcome of the action (Schön, 1983). In this way, they can think about how they can modify their actions to achieve greater success. This reflection provides teachers with information as to how they should react or adapt their teaching. This way of reflecting whilst doing gives

teachers with a powerful way to learn and develops their ability to problem-solve in their teaching contexts.

Reflection-on-action is reflection that takes place retrospectively after the action is completed. It allows teachers to look back on the action and consider the situation again after it has happened. Using the example of classroom enactment, reflection-on-action may involve teachers considering reasons for their students' responses and squaring them with other sources of data such as their assignments or other teachers' observation. Reflection-on-action allows some space and time between the action and the reflective process and this may help teachers arrive at deeper insights or prompt them to explore other options. This form of reflecting back is important "in order to discover how our knowing-in-action may have contributed to an unexpected outcome" (Schön, 1983, p. 138).

Mezirow's View on Reflection

Mezirow (1991, 1992, 1998, 2000) also wrote extensively on the subject of reflection and reflective thinking (Cranton, 2006; Kember, 1999, 2000, 2008). Situating the discussion on reflection and reflective thinking as an adult learning theory, Mezirow (1991) argues that reflection is a critical process by which adults learn and built on Dewey's (1933) definition of reflection to propose a framework of reflective thinking. Making a distinction between non-reflective action and reflective action, Mezirow contends that there are three types of non-reflective actions and two types of reflective actions. He terms the three types of non-reflective actions as: habitual action, thoughtful action and introspection, and the two levels of reflective action as reflection and critical reflection (Kember et al., 2000). Mezirow also uses the terms content, process and

premise reflection (1991) to provide greater distinctions between different types of reflection and critical reflection. Cranton (2006) explains that as a form of reflective thinking, *content reflection* could be the start of one's examination of existing own frames of reference, defined by Mezirow (1998) as comprising our habits of mind and the resulting points of view. While our habit of mind is a set of broad and generalized assumptions that help us filter and interpret the meaning of our experiences, our points of view are essentially the expression of our habits of mind. Thus points of view are cluster of meaning schemes comprising "specific expectations, beliefs, feelings, attitudes and judgment that tacitly direct and shape a specific interpretation and determine how we judge, typify object and attribute causality" (p. 6).

By asking reflective questions such as "What is happening here?" or "What is the problem?" when teachers perform a task during their TPD experience, teachers begin to examine the content or description of the content more closely, and this provides them with ideas and thoughts that can lead them to the next type of reflection, process reflection. *Process reflection* "is the asking of questions of the form... [and] the learner is reflecting on the process of understanding the problem" (Cranton, 2006, p. 34). In process reflection, teachers could ask "How did this come to be?" when encountering a problem with enacting the learning task. This allows them to review their learning process and allow them to consider how they may deal with the problem. *Premise reflection* occurs when learners start to question the problem itself and examine the basis that undergirds it. This process is often seen as the highest level of reflection, and Mezirow (1998) refers to it as critical reflection in his later work, arguing that premise reflection has "the potential to lead people to the transformation of a habit of mind"

(Cranton, 2006, p. 35). When reflecting on the premise, teachers may ask “Why is this important to me?” or “What are my assumptions?” as they consider how they may enact a particular strategy in their classroom practice and what this may reveal about their assumptions of their learners.

Assessing Levels of Reflective Thinking

Using Mezirow’s extensive work on reflective thinking (1991, 1992, 1998, 2000), Kember and his colleagues developed a coding scheme (Kember et al., 1999, 2008) and a reflection questionnaire (Kember et al., 2000), to assess the level of reflective thinking. During their development process, Kember and his team decided that content and process reflection are of the same level within the category of reflection and removed the sub-division, while premise reflection belongs in the highest level of critical reflection. In addition, they excluded the introspection scale from their instruments, as they deemed that it refers to the affective domain, and also due to psychometric reasons as they did not get a valid measurement of introspection (Kember et al., 2000). Each of the scale on the coding scheme and the reflection questionnaire is discussed in the following paragraphs.

Habitual Action

Habitual action refers to action that is carried out repetitively as part of a routine and therefore performed mechanically without much deliberation. Kember et al. (2000) explain that habitual action is that “which has been learnt before and through frequent use becomes an activity that is performed automatically or with little conscious thought” (p. 383). In the context of teaching and learning, examples can include teachers explaining a certain concept in the same way that they have done numerous times, or grading an

assignment using the same yardstick without attempting to understand students' learning needs or challenges. In the context of TPD and teacher learning, teachers may carry out the learning task or pedagogical strategies in their TPD activities by rigidly following the steps without a real appreciation of its applicability.

Understanding

Mezirow (1991) describes thoughtful action as the use of existing knowledge without any form of critical assessment. Describing thoughtful action as a cognitive process, Kember et al. (2000) note that existing knowledge is made use of, showing understanding, but there is no attempt to evaluate the knowledge. Hence, "learning remains within pre-existing meaning schemes and perspectives" (p. 384). The authors cite 'book learning' as an example of thoughtful action which can involve understanding and application but stop short of surfacing and questioning underlying assumptions of the action (Kember et al., 1999, p. 21). This suggests that the action shows an understanding of the content, or the 'what' but fails to examine the 'why.' Using Bloom's taxonomy (1979) to operationalize thoughtful action, Kember et al. decided to include only the category of comprehension, as they felt that Bloom's (1979) definition of comprehension as "understanding without relating to other situations" captured the vital distinction of "reaching an understanding of a concept without reflecting upon its significance in personal or practical situations" (p. 384). Elaborating on this construct, Kember et al. (2008) explain that at the level of understanding, concepts remain as theory and connections are not drawn to one's personal experiences or applied to real-life situations. Consequently, these concepts assume no personal meaning for those holding it and are not assimilated into their knowledge structure. In the context of TPD and teacher

learning, teachers can learn strategies or curricular models and demonstrate the ability to explain them or carry them out. However, they may not relate what they have understood to the classroom context and so what they have learned is unlikely to lead to any sustained impact on their classroom practice.

Reflection

The category of reflection goes beyond ‘book learning’ and is deemed a form of reflective thinking unlike the understanding category which is considered non-reflective (Kember et al., 1999, 2000, 2008). In operationalizing this category, the authors relied on Dewey’s (1933) definition of reflection as “active” with “careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusion to which it tends” (1933, p. 9) and Mezirow’s (1991) view of reflection as the critical evaluation of assumptions about the content or process of problem solving (Cranton, 2006). In reflection, theoretical understanding of concepts is now applied to practical applications and related to personal experiences. In this way, a concept becomes associated to existing knowledge and prior experience, and personal meaning is attached to the learning, resulting in personal insights (Kember et al., 2008). In TPD experiences, teachers demonstrating this level of reflective thinking will situate the learning of the strategies or models in their classroom contexts and consider how they may apply what they have learned in ways that are meaningful and consistent with their existing frames of reference.

Critical Reflection

In the coding scheme and reflection questionnaire by Kember et al. (1999, 2000, 2008), the highest level of reflection is referred to as critical reflection. Kember et al.

(1999) note that Mezirow uses the term premise reflection to describe critical reflection, a type of reflective involving “us becoming aware of why we perceive, think, feel or act as we do (Mezirow 1991, p. 108 in Kember et al., 1999, p. 23). Mezirow contends that premise reflection has the “potential to lead people to the transformation of a habit of mind (Cranton, 2006, p. 35) as the examination and reassessment of what led us to feel and act in a certain way will help us uncover beliefs and values which we have incorporated from our environments and internalized, often unconsciously. In order for teachers to reflect critically, they will have to review their existing beliefs, values, assumptions and presuppositions from prior experiences and learning about their knowledge of the subject content, learners, learning process to achieve new insights. As these existing beliefs and assumptions are often deeply ingrained, they are hard to change because teachers are not conscious of them (Kember et al., 2008). Thus, critical reflection is unlikely to take place frequently in TPD.

Chapter Summary

The important work that teachers do cannot be emphasized enough. While there is an abundance of theorization and research done in the area of teacher learning and TPD, the field of teacher learning, being richly layered and full of complexities, remains an emerging field where more work needs to be done. As more research is directed to examine the impact and effectiveness of TPD, there is some consensus with regard to what kind of TPD design features facilitates teacher learning. However, this consensus has not been established in oTPD research, given that this learning modality is a fairly recent occurrence. Concurrently too, there has been much attention on the role of

reflection in learning, However, despite reflection or reflective practice being frequently cited in TPD literature, its conceptualization is often inadequate. The presence of these gaps in current literature provided the motivation for this study.

Conceptual Framework

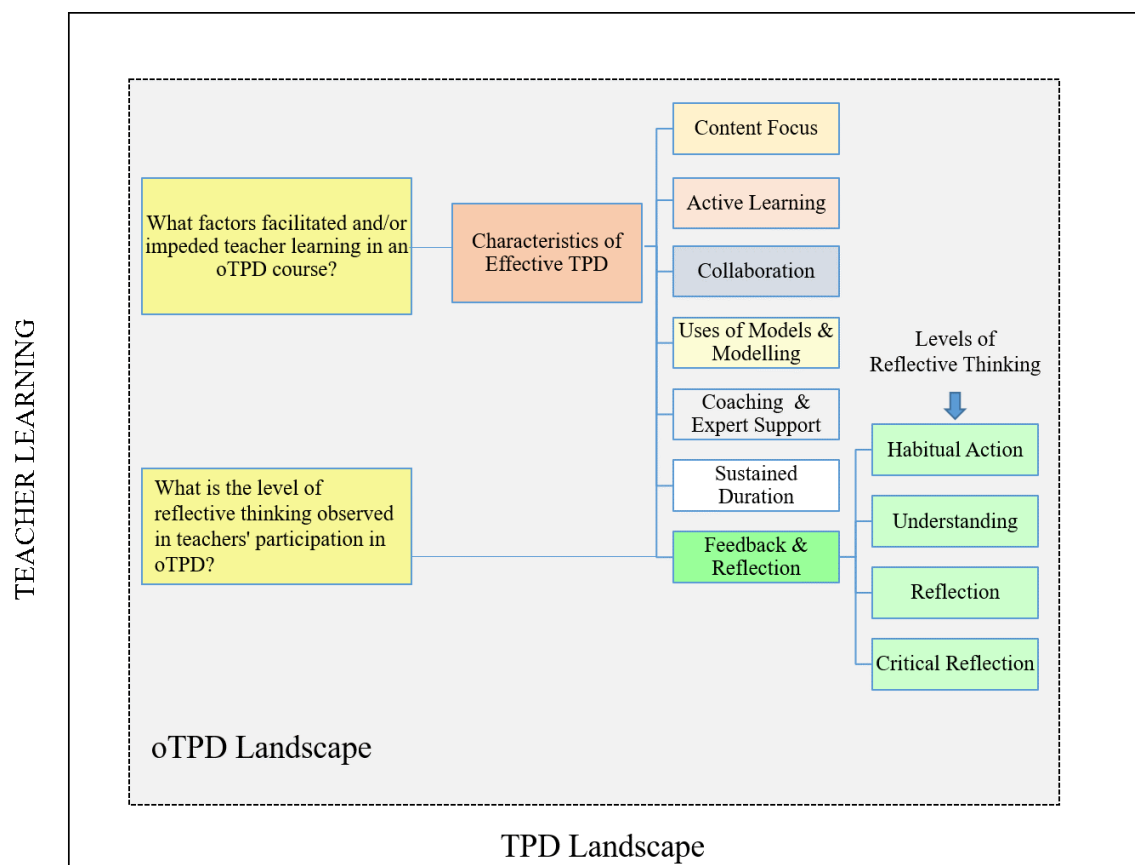
The conceptual framework, argue Bloomberg and Volpe (2012), “gives meaning to the relationship between variables by illustrating that theories have the potential to provide insight and understanding regarding research topics [and]... it becomes the lens through which your research problem is viewed, providing a theoretical overview of intended research as well as sort of methodological order within that process” (p. 89). Seen in this light, the conceptual framework offer the researcher and the study a blueprint to guide the study and becomes “the current version of the researcher’s map of the territory being investigated” (Miles & Huberman, 1994 in Bloomberg & Volpe, 2012, p. 88).

Synthesizing the main themes from the two topic areas of TPD and reflection, a conceptual framework for studying the factors that facilitated or impeded teacher learning, and observations about teacher reflection in oTPD is derived. The conceptual framework incorporated seven characteristics on effective TPD offered by Darling-Hammond et al. (2017) which built on earlier works by Desimone (2009) and Garet et al. (2001). Using their review of 35 research studies that met their inclusion criteria, the authors proposed that “effective TPD 1) is content-focused, 2) incorporates active learning, 3) supports collaboration, 4) uses models of effective practice, 5) provides coaching and expert support, 6) offers feedback and reflection, and 7) is of sustained duration” (p. 4). One of these characteristics, reflection, was further explored using the

four categories for measuring reflection, Habitual Action, Understanding, Reflection and Critical Reflection delineated by Kember et al. (1999, 2000, 2008) from Mezirow's extensive work in transformative learning. Together, these seven features and four categories formed the conceptual framework. Presented graphically in Figure 4 below, the conceptual framework guided the conduct of this study on teacher learning and the types of reflection observed during oTPD experiences. Developed in an iterative process, the conceptual framework was revised as new insights and understanding were gained from the literature review. The original conceptual framework can be found in Appendix A.

Figure 4

Conceptual Framework



Chapter III

METHODOLOGY

The purpose of this exploratory case study was to understand the learning experiences of teachers who had participated in oTPD. Specifically, this study was carried out to examine factors that facilitated and/or impeded teacher learning in oTPD. In addition, the level of reflective thinking observed in oTPD participation was assessed. The research questions that guided this study were:

1. What factors facilitated and/or impeded teacher learning in an oTPD course?
2. What is the level of reflective thinking observed in teachers' participation in oTPD?

This chapter is organized into the following sections: research design, discussion of setting and sample, and data collection and data analysis, literature on data collection methods, overview of information needed, ethical considerations, issues of trustworthiness and limitations of this study.

Research Design

This study employs an exploratory qualitative research design in an attempt to answer these research questions. Citing Dabbs (1982), Berg and Lune (2012) note that the notion of quality is “essential to the nature of things” and qualitative research refers to a study of “the meanings, concepts, definitions, characteristics, metaphors, symbols, and descriptions of things” (p. 3). Creswell (2013) defines qualitative research as “a situated activity that locates the observer in the world” (p. 43). By undertaking qualitative research for this study, I hope to contribute to current understanding about how teachers

learn in the context of oTPD, collecting data and making interpretations that shed light on this particular aspect of the world, making it “visible” (Creswell, 2013, p. 43). The research design for this study is underpinned by social constructivism, a research philosophy that holds the worldview that individuals make sense of their experiences in subjective ways, deriving “varied and multiple” meanings from these experiences and the things in it (Creswell, 2013, p. 24). While there can be a reality, it is perceived and experienced by individuals who view it through their distinct lenses that come about as a result of their beliefs, prior experiences and assumptions, “co-constructed between the researcher and the researched and shaped by individual experiences” (Creswell, 2013, p. 36). The variety and multiplicity of participants’ subjective views and experiences create unique opportunities for the qualitative researcher to examine and explore this complexity, and the research process becomes a meaning-making process where the researcher seeks to uncover and understand the different meanings that have been ascribed. In this study, the personal and subjective experiences, perceptions and views of the participants in the study were much valued and relied heavily upon to address the research questions.

An exploratory case study methodology situated in a social constructivism paradigm was employed for this study. Employing case study as the research methodology offered the researcher the means to investigate “a contemporary phenomenon in depth and within its real-life context” (Yin, 2009, p. 18). As an approach to qualitative research, the case study is well-suited to support the investigation of this particular phenomenon of teachers learning in an oTPD, providing a useful framework for researchers to “engage with and report the complexity of social activity” and “to

represent the meanings that individual social actors bring to those settings and manufacture in them” (Stark & Torrance, 2005, p. 33). This approach does not see truth as an unchanging and objective entity waiting to be discovered, as with positivism and post-positivism lenses (Guba & Lincoln, 1994); instead this study took the view that there could be a variety of realities constructed through the unique lived experiences of the different teachers in this study (Creswell, 2013). In this study, these realities took the form of how teachers perceived and recounted their oTPD experiences and the meanings they ascribe to these experiences. The realities also took the form of the reflections that the teachers wrote and posted in online discussion spaces. My role as a researcher was to look for patterns from these recounts and artefacts and derived meanings from them, with full awareness the patterns and meanings came from different vantage points through which the teachers perceived their lived realities.

Yin (2009) notes that the case study “is preferred in examining contemporary events... when the relevant behaviors cannot be manipulated” (p. 11). Citing Yin and Davis (2007), he explains that the case study is characterized by the boundedness of the topic of study and is used to “understand a real-life phenomenon in depth, but such understanding encompassed important contextual conditions [that are] highly pertinent to the phenomenon of study” (p. 18). In a case study inquiry, the researcher has to cope “with the technically distinctive situation in which there will be many more variables of interest than data points...[relying on] “multiple sources of evidence, with data needing to converge in a triangulating fashion” (Yin, 2009, p. 18). In this study, I had originally intended to bound the case within a particular oTPD course that was carried out in 2019, with a group of Singapore teachers. However, when the COVID-19 pandemic hit

Singapore in 2020, teachers in Singapore schools had to cope with school closure and home-based learning, facing unprecedented disruptions to their work. I was unable to recruit any interview participants from this oTPD course, even though subsequently a small percentage responded to a questionnaire sent. I then bounded the case more loosely by examining the experiences of Singapore teachers in mainstream schools who had participated in an oTPD in 2019 or 2020. The aim of this study then, was to elucidate the particular learning experiences of this broader group of Singapore teachers, exploring the factors that facilitated and impeded their learning in their respective oTPD experiences.

Discussion of Setting and Sample

Education in Singapore is centrally managed by the Singapore Ministry of Education (MOE) and the Singapore MOE oversees policy development and implementation. Over the last ten years, there had been an increase in policy support for professional development of teachers, including implementing support structures in mainstream schools to encourage on-going and embedded TPD. There are a number of TPD providers for Singapore teachers and this ensures that they have access to a wide range of TPD opportunities and platforms to learn and improve, including face-to-face, blended or online courses; learning programs and conferences as well as networked and professional learning communities. These platforms and opportunities ensure that teachers have access to multiple modes of learning for their professional development, giving every teacher a myriad of opportunities to grow through the learning modes and platforms most suited to their needs and contexts (AST, 2019; Koh et al., 2019).

One of these TPD providers is “Institute of Professional Learning” (IPL). I am a current member of IPL and work together with my colleagues to design and conduct

professional development for in-service teachers in the Singapore MOE. This includes face-to-face courses as well as the oTPD course “Disciplinary Literacy” which was offered in 2019. This course was advertised in an online course prospectus available to all in-service teachers in MOE schools and teachers could register for it once they had the approval from their supervisors to do so. Participation in this course was voluntary and this course was not required in any way for teacher progression or for the implementation of any new educational policies or syllabi implementation.

This online course was chosen as the case to be studied because I had worked on the development and implementation of this course, refining and redesigning the content from an earlier iteration of this course which was conducted face-to-face to an online modality. As such, I had already established a level of understanding of the case as well as the context and culture that the case resided in (Unluer, 2012). As an insider-researcher (Adler & Adler, 1994), I brought to this case, experiences and prior knowledge that an outsider-researcher would not have. As this study took place only after the completion of the online course, there was no concern of how I could have affected the conduct of the course and the learning experience of the participants while the course was taking place.

Before embarking on this study, I wrote to IPL and made a case for the importance of understanding teachers’ experiences in oTPD. I explained the purpose of this study and sought permission to have access to archival data from “Disciplinary Literacy” and to contact participants from the course for this study. I shared my beliefs that the research findings and recommendations arising from the study could contribute to better design and facilitation of future oTPD (see Appendix E – Site Permission Form). IPL agreed, and gave me access to the data that had been archived and kept in the

organization's repository. In addition to contact information, the first form of archival data I was given access to was reflections submitted by 106 participants at different points during the "Disciplinary Literacy" course. This data was anonymized with all forms of identifiers removed by the organization using a numeric coding system before I had access to it. IPL also gave me access to the 34 responses for the course evaluation that it had administered after the course had ended. I reviewed the reflections and carried out a pilot analysis of these reflections, to explore what it could tell me in relation to the focus of this study. The coding scheme developed by Kember et al. (2000) provided a useful lens to assess the level of reflective thinking that these reflections demonstrated and after having a preliminary idea of what the reflections showed, I decided to write to the 106 participants from "Disciplinary Literacy" to understand their experience of learning in that oTPD (see Appendix C).

However, when the COVID-19 pandemic hit Singapore in 2020, schools were closed between April and June. Teachers had to deal with an unprecedented amount of disruptions to their work and carry out home-based learning. Even though a few teachers had responded to my emails and agreed to be interviewed, these interviews had to be postponed and then cancelled when situations in schools changed for them. As a result, I did not manage to interview any participant from "Disciplinary Literacy" although I had analyzed all the reflections posted by the 106 teachers who participated in this oTPD.

I then decided to bound the case more loosely by examining the experiences of Singapore teachers in mainstream schools who had participated in an oTPD in 2020 when all non-essential professional development activities were shifted online to minimize social mixing and contain the spread of the virus. I employed convenience sampling and

recruited 12 teachers from different subject disciplines and teaching at different year levels for the interviews. I explained the purpose of the study and how the interview would be carried out. I also explained how the data would be used and emphasized my commitment to protecting their confidentiality. The teachers were given the option to be audio or video recorded via the Zoom conferencing platform and after getting their informed consent, I interviewed them to gather their perceptions of their oTPD learning experience. The teachers all attended different oTPD in 2020 and no one from this pool participated in “Disciplinary Literacy.”

Thereafter, having completed the thematic analysis of teacher reflections from “Disciplinary Literacy,” I was curious about how the 106 teachers from “Disciplinary Literacy” perceived the levels of their own reflective thinking and decided to write to them again, this time to invite them to respond to a reflection questionnaire (Kember et al., 1999; 2008). Ten responses out of 106 sent questionnaires were received. Even though the response rate was low at 9% (10 out of 106), it was used as a form of data triangulation to the interview data and the archival data comprising teacher reflections and course evaluation responses. Together with the interview and archival data, this study considered teachers who participated in an oTPD course in 2019 and 2020 as a bounded case. Figure 5 provides a visual representation of the sample in this case study.

Figure 5

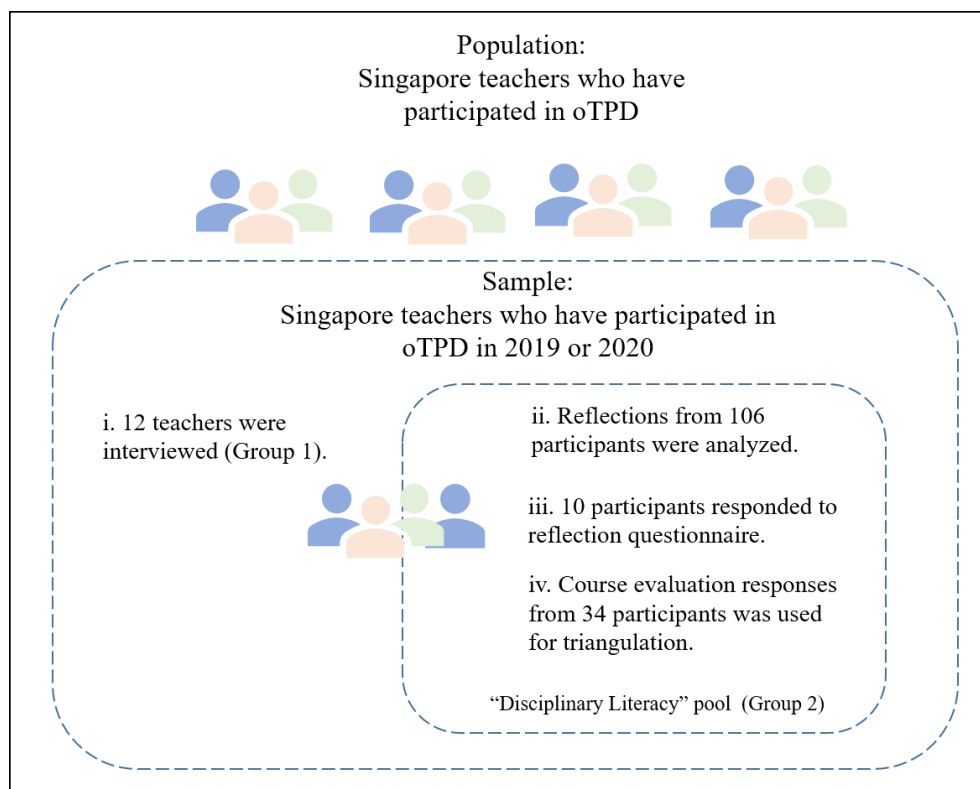
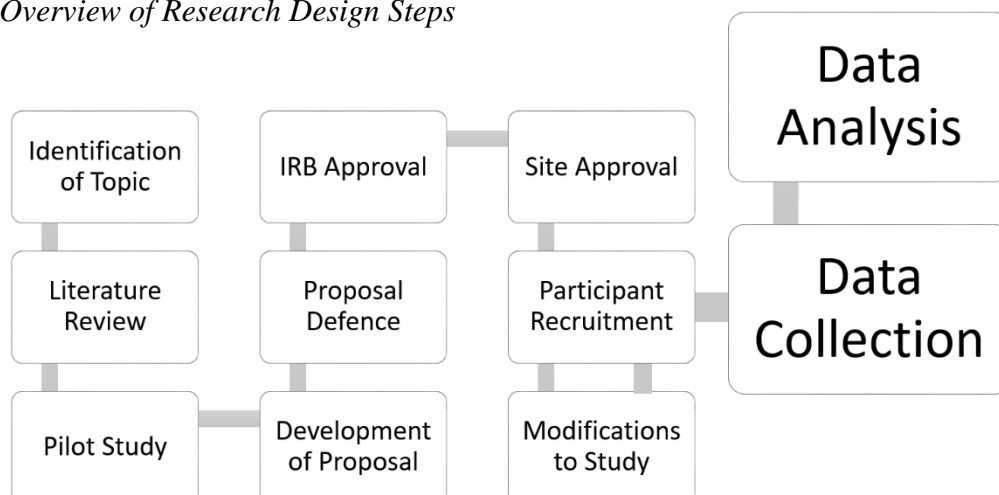
Study Sample

Figure 6 outlines the key steps in the research design taken for this study and subsequent sections explain each of these steps in more detail.

Figure 6

Overview of Research Design Steps

Data Collection

This study used an exploratory qualitative design to collect in-depth data to examine teachers' experience of learning in an oTPD course and the factors that facilitated and/or impeded their learning. This design was chosen because of the open-ended nature of qualitative research that focuses on ordinary events in their natural settings with an emphasis on the lived experiences of people (Miles & Huberman, 1994). To describe the various perspectives of teachers' participation in the online course "Disciplinary Literacy," four sources of data were collected and used to triangulate the findings. Table 1 provides an overview of these sources.

Table 1

Sources of Data & Sample Pool

Data Source	Sample Pool	Description
Archival data (Reflections)	"Disciplinary Literacy"	Reflections posted on discussion walls by 106 volunteer participants during their oTPD experience were analyzed using the coding scheme adapted from Kember et al. (2000).
Archival Data (Course Evaluation)	"Disciplinary Literacy"	A post-course survey with 11 items was administered by IPL and 34 volunteer participants responded.
Interviews	oTPD in Singapore	An interview with each of the 12 volunteer participants was carried out for 30 to 45 minutes. Participants were asked about their oTPD experiences and factors that facilitated and/or impeded their learning.
Reflection Questionnaire	"Disciplinary Literacy"	A 16-item questionnaire adapted from Kember et al. (1999, 2008) was sent to 106 participants to assess their perception of their level of reflective thinking. Responses from 10 volunteer participants were received.

The first set of data was archival data that IPL collected when it ran the “Disciplinary Literacy” online course. It comprised teachers’ reflections posted asynchronously during the oTPD. There were six units in this oTPD, and teachers were asked to post their reflections after completing Unit 2, Unit 6 and at the end of the course. The post for Unit 6 was in the form of an application task termed as “Personal Inquiry Task” and this task encouraged teachers to enact strategies introduced during the course and to reflect on their own learning. Teachers had to document this process as part of their learning using a template provided. (See Appendix G). During the duration of the course, a total of 181 reflections were posted and these were analyzed and coded using the coding scheme for reflective thinking developed by Kember et al. (1999, 2008).

The second source of data was the course evaluation that IPL collected when the oTPD ended. The organization received 34 responses for its course evaluation which had 11 items, achieving a response rate of 34%. The data was aggregated and anonymized before it was made available for this study.

To collect the third source of data, I contacted teachers from my own network and selected teachers who had participated in an oTPD in 2020. This convenience sample was adopted after attempts to recruit teachers who participated in the oTPD “Disciplinary Literacy” was unsuccessful. Convenience sampling, a type of non-probability sampling, was adopted with some elements of purposive sampling as the sample met the selection criterion of having had a recent oTPD experience and are teaching in mainstream schools in Singapore. The sample also allowed me to have access to the unique oTPD experiences of these teachers in a prompt manner given the uncertainty attached to an ongoing pandemic. As an exploratory study, convenience sampling provided quick access

to Singapore teachers with oTPD experience, enabling the development of an initial understanding of the under-researched area of oTPD.

For the study, 12 teachers who met the inclusion criteria were invited for an in-depth qualitative interview. Rubin and Rubin (2012) observe that through qualitative interviews, researchers “explore in detail the experiences, motives, and opinions of others and learn to see the world from perspectives other than their own” (p. 3). Unlike conversations, qualitative interviews are centered on research questions that the qualitative study aims to examine, and interviews allow participants to make sense of their experience. Getting participants to recall or reconstruct specific instances of their experience taps into their episodic memory (Creswell, 2013), where participants go on a mental time travel of sorts to retrieve information that is stored in their neurocognitive memory system. As participants do this, they tell stories of their experience and select details of their experience that was salient for them (Seidman, 2013). In order to give the details of their experience a coherent structure with some semblance of a beginning, a middle and an end, participants have to make sense of, and reflect on their experience. Seidman (2013) notes that “this process of constructing and organizing details of event make telling stories a meaning-making experience” (p. 7). In this way, in-depth interviewing offers the researcher the opportunity to understand “the lived experience of other people and the meaning they make of that experience” (p. 9) and readers “the possibility of connecting their own stories to those presented in the study” (p. 55).

These 12 teachers were interviewed via the Zoom conferencing platform. Before each interview, the purpose of the study, possible risks and benefits of participating in the study as well as what participating in the studied entailed were explained and consent was

sought before the interview began. With the participant's permission, these interviews were either video or audio recorded to ensure accuracy in the transcribing. Each interview took between 30 and 60 minutes. Participants were first asked to talk about the context for why they had participated in the oTPD to understand what motivated them to attend the oTPD. Subsequently, they were asked to recall their oTPD experiences as well as what they felt supported or impeded their learning. The interviews were transcribed within a week after its completion and typed into Microsoft Word documents. After the first transcription, I reviewed the recording to check for accuracy. Thereafter, the transcripts were anonymized before the analysis. The informed consent and interview protocol are included in Appendices D and F respectively.

The fourth source of data collected was responses to the reflection questionnaire that was adapted from Kember et al. (2000). This questionnaire instrument was developed by Kember et al. (2000) to assess the degree of reflective thinking students demonstrate in professional preparation courses. There are four scales with four items on each scale, Habitual Action, Understanding, Reflection and Critical Reflection, and these were based on Mezirow's work on reflection (1991). Kember and his colleagues established the psychometric properties of this instrument by the use of confirmatory factor analysis. For this study, this reflection questionnaire was adapted to reflect an oTPD context and sent to all 106 participants of the oTPD "Disciplinary Literacy," using the contact details that IPL gave me access to. 10 responses were received out of the 106 questionnaire sent, and a response rate of 9% was achieved.

Literature on Data Collection Methods

Each of the data collection methods used in this study has its strengths and weaknesses. The following section presents a discussion of each of the three methods of data collection from current literature.

Archival Data

Archival data refers to secondary data that existed prior to the actions of current researchers but which are gathered for the purpose of the research currently undertaken (Vogt et al., 2012). There are a wide variety of archival data including publicly available census data, organizational records and documents, and visual artifacts available on websites. The collection of teacher reflections as a form of secondary data from IPL was advantageous to this study as it was an authentic artifact produced and posted by teachers during their participation in “Disciplinary Literacy.” Even though it was not collected for the purpose of this study, it aligned fairly well with the research focus and questions that this study set out to address. Another advantage of drawing on archival data is that the data was already collected, thus cutting down the time and potential costs needed in the collection of new data. The disadvantage of using archival data, is that the data was initially collected by IPL as part of their program design and evaluation process. As a result, not all data collected matched the research focus as well as it would have been, if the design of the data collection method has followed the research focus from the start. For this study, this disadvantage presented itself in the use of second set of archival data, the course evaluation responses from IPL. A number of questions from the course evaluation were not useful or relevant for this study.

Interviews

As a form of data collection method for the purpose of research, the act of interviewing involves asking questions pertaining to the research questions and paying attention to answers provided by the respondents (Seidman, 2013; Vogt et al., 2012). The use of interviews has a long history and is particularly useful when the subject of the inquiry involves lived experiences. A key advantage of employing interviews is the control it gives to researcher to ask the questions deemed pertinent to the research study and to clarify or probe aspects of the participants' experience the researcher wishes to understand better (Bloomberg & Volpe, 2012; Creswell, 2013). For this study, the use of interview is beneficial as it allows me to build an understanding of the narratives of oTPD experiences from the interviewees' vantage points (Seidman, 2013). However, this can also be seen as a limitation as the information that was shared during interviews had been consciously or unconsciously filtered through the perspectives of the interviewees (Creswell, 2013). Furthermore, interviews are highly dependent on the skills of the interviewer, susceptible to the presence and influence of the interviewer, and thereby opened to the possibility of researcher's bias (Bloomberg & Volpe, 2012; Creswell, 2013).

Survey

Surveys are popular in qualitative research and especially so in the social and behavioral sciences (Vogt et al., 2012). Defined as "the collection of information from a sample of individuals through their responses to questions" (Check & Schutt, 2012, p. 160), surveys are widely used because a substantial amount of data can be collected efficiently at relatively low or no cost. Surveys can be administered to the entire

population, typically referred to as a census, or to a part of the total population in a sample survey. For this study, a sample survey was adapted from Kember et al. (2008) and sent to 106 participants from “Disciplinary Literacy.” Out of these, 10 responses were received. This highlighted a potential disadvantage of surveys as completion rate varies widely depending on the type and length of the survey, as well as on whether incentives were provided. Secondly, surveys, while unobtrusive and easy to administer, may not always capture the nuances and complexity that the research study aims to address (Bloomberg & Volpe, 2012).

Each of the data collection methods, in and of itself, has strengths and limitations. To mitigate the potential drawbacks, this study employed three data collection methods to obtain an in-depth understanding of teachers’ oTPD experiences and to achieve triangulation.

Data Analysis

Thorne (2000) observes that data analysis is the most complex phase of qualitative research yet it is the one area that that receives the least thoughtful discussion in the literature. To make sense of the data in this study, comprising interview, questionnaire and archival data, the study employed thematic analysis to categorize it and make sense of the emerging themes. Defined by Braun and Clark (2006) as a method for “systematically identifying, organising, and offering insight into, patterns of meaning (themes) across a dataset” (p. 2). Thematic analysis enables salient themes and “collective or shared meanings and experiences” about the research question to be discerned and discovered. Using the conceptual framework presented in Chapter 2 as a guide, a combination of inductive and deductive approach to data coding and analysis

was employed to examine factors that facilitated and/or impeded teachers' learning during their oTPD experiences and the level of reflective thinking observed. The following paragraphs describes how this was carried out.

For the interview data, a more inductive approach was utilized to allow the data to 'drive' the analysis. I took reference from Miles and Huberman's (1994) "fairly classic set of analytic moves" (p. 9) and attached codes to the interview transcripts, writing up my reflections and notes of each interview in the form of a researcher memo. These memos and notes were then reviewed to identify common patterns, themes and phrases across the data set. These patterns and themes were then isolated to provide greater focus and clarity before generalizations were made and developed. For the analysis of teachers' reflection, a more deductive approach was employed. This was because the data to be analyzed was clearly a form of reflection, even if the level of reflective thinking was not known. As there is an existing protocol that had been validated to code such data for the level of reflective thinking (Kember, 1999, 2008), I decided to use it to code and interpret this source of data.

Using this combination of inductive and deductive approach, a coding legend (Appendix B) was derived to code the data collected. Two cycles of coding were carried out. In the first coding cycle, potential codes and themes were assigned systematically to the data set and notes were made to the researcher memo. After coding all the data, data with the same codes were sorted together. During this cycle, a number of code categories based on the conceptual framework, particularly those related to active learning and collaboration started to emerge. A second cycle coding was then undertaken to condense the data further and to analyze the emerging themes more thoroughly. During the

interpretation stage, the notes in the memos helped to establish the findings that addressed the research questions. The findings were synthesized and three analytical categories were developed to guide the discussion of the findings.

Overview of Information Needed

In order to address the research questions in this qualitative case study, four categories of information were needed, namely, contextual, perceptual, demographic, and theoretical (Bloomberg & Volpe, 2012). The first category, contextual information, pertained to information about the TPD landscape in Singapore and contextual information about participant's oTPD experience. This category also included information about this particular oTPD course "Disciplinary Literacy" and how it was designed, implemented and facilitated. This information was collected through a review of the relevant literature and documents, interviews and the researcher's perspectives as a member of IPL.

Perceptual information that was needed pertained to how participants perceived and described their oTPD experiences in relation to the research questions. This was gathered through interviews with the teachers who met the inclusion criteria of having completed an oTPD. The perceptions of teachers regarding their online learning experience and the factors that facilitated and/or impeded their learning were collected through interviews. This included their description of what they did during the oTPD, their general perception of the effectiveness of the oTPD as well as observations of anything that supported or got in the way of their learning. In addition, perceptual

information also included the reflections that were posted during the duration of “Disciplinary Literacy.”

Demographic information refers to information regarding the participants including their gender, age range, subjects taught, teaching level and years of teaching experience. This information helps to construct a profile of the participants and was useful with cross-participant analysis which can uncover underlying factors in perceptions and experiences. For the interview participants, demographic data was collected at the beginning of each interview. Table 2 presents a summary of the demographic information of the 12 teachers interviewed, all of whom were assigned a pseudonym to protect their confidentiality.

Table 2

Demographic Information of Participants Interviewed (Group 1)

Pseudonym	Gender	Age range	Teaching experience (years)	Level	Subjects	Key Personnel**
Sue	F	35-44	16-20	Secondary	Science	Y
Tammy	F	25-34	0-5	Secondary	Literature & Drama	N
May	F	45-54	> 20	Primary	Mathematics	Y
Amy	F	35-44	16-20	Junior College	Project Work*	Y
Karl	M	35-44	11-15	Secondary	Science	Y
Woo	M	45-54	16-20	Secondary	General Paper (GP)*	Y
Ken	M	35-44	16-20	Secondary	English Language (EL)	Y
Lloyd	M	55-64	> 20	Junior College	GP	N
Faye	F	25-34	6-10	Junior College	GP	Y
Andie	F	35-44	6-10	Secondary	Geography	N
Dee	F	35-44	11-15	Primary	Science	Y
Steve	M	45-54	16-20	Junior College	Project Work (PW)	Y

*PW and GP are compulsory skills-based subjects taught at the Junior College level. The former is interdisciplinary and involves proposal writing and presentation while the latter comprising literacy and argumentation skills.

** Key Personnel refers to teachers who are holding areas of responsibility such as Department Heads or School Staff Developer.

For participants in the oTPD “Disciplinary Literacy,” IPL collected their gender and teaching level at the beginning of the course as part of the registration process. In total, 106 participants from 11 different schools signed up for this online course. Of the 11 schools, 9 of primary (elementary) schools while the remaining was secondary (high) schools. 103 participants in the oTPD came from primary schools, forming an overwhelming majority. 79 participants also came from one of the primary schools, suggesting that there was a whole-school participation in this course. The demographic information of the participants was summarized in the Table 3 below.

Table 3

Demographic Information of Participants in “Disciplinary Literacy” (Group 2)

Primary School	103 (97.1%)	Male	28 (26.4%)
Secondary School	3 (2.9%)	Female	78 (73.6%)
Total	106	Total	106

Theoretical information which informed this study was obtained through a review of relevant academic literature. In this study, literature on TPD and oTPD, as well as reflection, was reviewed to guide the inquiry process in an iterative process. As patterns and ideas emerged through the collected data, the literature review was widened to include other relevant themes, thus ensuring that the study was responsive to emergent themes that are observed. Table 4 maps out the overview of information needed for this study and Table 5 outlines the research design.

Table 4

Overview of Information Needed

Type of Information	What is Needed	Method of Collection
Contextual	<ul style="list-style-type: none"> - Information about the TPD landscape in Singapore - Information about the oTPD course “Disciplinary Literacy” - Information about participant’s oTPD experience 	Archival data Interviews Literature Review Researcher’s perspectives
Demographic	<ul style="list-style-type: none"> - Descriptive information about each participant (years of teaching experience, subject(s) taught, year level, age range and gender) 	Archival data Demographic inventory
Perceptual	<ul style="list-style-type: none"> - Information about participants’ oTPD experience - Participants’ reflection in “Disciplinary Literacy” 	Archival data Interviews
Theoretical	<ul style="list-style-type: none"> - Relevant academic literature about TPD, oTPD and reflection with regard to teacher learning 	Literature Review

Table 5

Overview of Research Design

Research Methodology	Exploratory case study of the phenomenon of Singapore teachers learning in an oTPD
Study population	Singapore teachers who are teaching in mainstream schools Singapore teachers who participated in an oTPD
Sample selection	Convenience sample of teachers who took part in an oTPD in 2019 or 2020: <ul style="list-style-type: none"> - Interviewed 12 teachers - Reflections collected from 106 participants of “Disciplinary Literacy” (archival data) - Course evaluation responses collected from 34 participants of “Disciplinary Literacy” (archival data) - Surveyed 10 participants of “Disciplinary Literacy” using a reflection questionnaire
Data collection	Interviews Reflection questionnaire Archival data (Teachers’ reflection and course evaluation results)
Data analysis	Interview and archival data were thematically analyzed. Results of the reflection questionnaire were aggregated and presented

Ethical Considerations

Participating in this study was voluntary whether it be in terms of the interview or questionnaire and posed minimal risk for the participants. Care was taken to protect the confidentiality and privacy of the participants at all times. All interview, questionnaire and archival data were anonymized before they were analyzed. Findings were reported in aggregate and no specific participant was identified with the findings. Given that I hold a position in IPL, I made clear that the research was done as part of my personal dissertation and any information shared with me and the analysis would not be fed back to the participants' school or used in any way for appraisal purposes. Personal information of the participants, if it was communicated was removed if irrelevant to the study, or anonymized to protect the confidentiality of the participants. Reflections that were posted by participants in "Disciplinary Literacy" had been read and commented on by the course facilitators and/or other course participants without any observable adverse effects. These reflections were anonymized before they were made available for analysis in this study. The analysis of these posts posed minimal risks to the participants as they would not be linked to any specific participants. In addition, interviewing the participants via the Zoom conferencing platform reduced the need for them to travel and any physical risks that might arise from the travel. It also removed the time needed for travelling, thereby reducing any economic risks incurred from the opportunity cost of participating in an interview. There was minimal psychological and social risk from participating in a virtual interview as participants were at a location of their choice, and they did not have to experience the possible social and psychological pressure of being

interviewed face-to-face. Participants were also able to terminate the virtual interview at any point should they feel any discomfort although no one did so.

Issues of Trustworthiness

Issues pertaining to the quality of the inquiry process and the trustworthiness of the study is of paramount importance. While quantitative studies look at criteria such as validity, reliability, replicability, and objectivity as measures of trustworthiness, this study, being a qualitative study underpinned by social-constructivism, established trustworthiness using a different set of criteria. Arguing for paradigm-specific criteria for addressing trustworthiness, Lincoln and Guba (1985) propose credibility, transferability, dependability, and confirmability as criteria to ensure trustworthiness in a qualitative study. Bloomberg and Volpe (2012) concur with this, emphasizing the need for qualitative studies “to seek to control for any potential bias that might be present throughout the design, implementation, and analysis of the study” (p. 125).

Credibility

On the criterion of credibility, Bloomberg and Volpe (2012) explain that this points to “whether the findings are accurate and credible from the standpoint of researcher, the participants, and the reader” (p. 125), meaning that the experiences of the participants have been accurately represented in the study. Any conclusions that were reached in the study was therefore the result of sound and valid research methods and designs, and an alignment of the research design components and the kinds of research questions the study aims to elucidate. This necessitated methodological and interpretive validity in the study. Morse et al. (2002) use the term “methodological coherence” (p.

18), to refer to the alignment or congruence between the research question and the various components of the research method. A rigorous qualitative research would therefore ensure that the questions the research study is seeking to answer, match the method, data and analytic procedures employed to answer them. This study aimed for congruence through a careful review of the research questions and the research design, making necessary modifications to it after discussion with colleagues and advisement sessions. To ensure that this study was credible, there were multiple data collection methods and sources to create opportunities for triangulation and corroboration of evidence at different junctures in the study.

Transferability

Issues of transferability in qualitative studies have been compared to the notion of generalizability in quantitative studies. Yet, as the aims of qualitative studies are usually descriptions and/or interpretations of specific contexts and rarely about causality or proofs, thus transferability should be thought of as the extent to which a “particular phenomenon can transfer to another particular context” (Bloomberg & Volpe, 2012, p. 126). In this study, teachers’ experiences of their oTPD were examined, and their experiences came with socially and culturally situated knowledge which cannot and should not be generalized to other contexts. However, as there is an emerging consensus about characteristics of effective TPD, it may be possible for others to extrapolate from the findings made in this study to other contexts.

Dependability

Dependability is used by Lincoln and Guba (1985) to correspond to the notion of “reliability” in quantitative research. Creswell (2013) explains that reliability in qualitative research usually “refers to the stability of responses to multiple coders of data sets” (p. 254). To ensure that the data analysis was dependable and stable, I recruited an ex-colleague who was a seasoned researcher to code two sets of interview data and a sampling of the reflection data (Miles & Huberman, 1994). As an independent coder, she was given the research questions and the coding sample with definitions of the three categories of codes and the descriptions (see Appendix A). She and I both coded the coding sample to locate the emergent themes in relation to the research questions in this study. Thereafter, we met to compare notes and to find out the how aligned we had been. At the first meeting, we had fairly high alignment for factors that facilitated and impeded teacher learning, as well as for two out of the four categories in the coding of the reflections. There was some variance for the other two categories in the coding scheme. We had to discuss and establish shared understanding of the categories of Reflection and Critical Reflection and subsequently coded another sample of teacher reflection. We were able to achieve more than 80% in our second meeting, a standard that Miles and Huberman (1994) recommended to be considered of good qualitative reliability. The coding legend was refined to reflect our coding agreement (Appendix B).

I kept an “audit trail” (Lincoln and Guba, 1985, p. 317) of our discussion to keep track of how data was collected and analyzed. Having an audit trail keeps a record of the decisions and the discussion that informed them. This helped to provide a clear rationale for the theoretical and methodological decisions made throughout this study.

Confirmability

The criterion of confirmability in qualitative research corresponds to the idea of objectivity in quantitative designs (Bloomberg & Volpe, 2012) by ensuring that findings from the study are neutral and not distorted by the researcher's biases. While it is not possible to ensure total objectivity in a study that values the subjective experiences and meaning-making of the research participants, confirmability can be achieved by ensuring that there is neutrality in the research methods employed, and that the findings "are the result of the research, rather than an outcome of the biases and subjectivity of the researcher" (Bloomberg & Volpe, 2012, p. 126). This meant that the research methods, as well as the data, and not the researcher's preconceived assumptions or biases, were used in this study to verify the findings and themes. To ensure and test for confirmability in this study, I invited an ex-colleague to code and examine the anonymized interview transcripts, archival data and the audit trail.

Interpretive Validity

Maxwell (2012) notes that "validity is a property of inferences rather than methods and is never something that can be proved or taken for granted on the basis of the methods alone" (p. 121). Bloomberg and Volpe (2012) note that interpretive validity can be enhanced by triangulating data sources as well as data collection methods. Creswell (2013) explained that researchers draw on different sources of data, rely on multiple methods and theories in triangulation, and to find corroborating evidence that provides insights on the focus of the research study. In addition to triangulating information to provide greater interpretive validity in this study, I took care to avoid researcher bias, which is a main threat to the trustworthiness of a study (Maxwell, 2012).

There was on-going reflection of my potential biases, including those influenced by my experience as an educator and provider of TPD, my knowledge of the setting and the participants throughout the research process. I kept a research journal, in addition to research memo and annotated bibliographies, to keep track of my thoughts, ideas and discussions. I reviewed these notes regularly to help me surface any potential blind spots and biases during the research process.

Limitations of the Study

There are several limitations in this study. The first is the threat of researcher bias, which could not be totally removed from this study. As a form of qualitative research underpinned by social constructivism, I played an important role and inevitably would have brought my biases which I might or might not be aware of, to the research process. As an educator who was involved in the design and facilitation of the online course being studied, I am an “inside-researcher” (Adler & Adler, 1994) who was vested in this endeavor and cannot claim an impartial view or an indifferent stance to the topic being studied. I brought with me a certain set of organizational perspectives owing to my being a member of the professional development provider that created and offered this course. As Rubin and Rubin (2012) observe, “constructionists researchers accept that researchers as well as research subjects, make interpretations that is neither possible nor desirable for the researcher to eliminate all biases or expectations” (p. 16). In order to mitigate the effects of possible biases, I have made notes on all known biases and assumptions and reflected on how these may affect the conduct of the study and the analyses and findings I

made in the process. In addition, I had also invited an ex-colleague to review the conduct of the analysis to increase inter-rater reliability.

The second limitation pertained to the use of archival data. Archival data, defined by Jones (2010) as “any sort of information, previously collected by others, [that may be] amenable to systematic study (p. 1009), has limitations in that I had no control over how the data was collected and whether any form of control was implemented to ensure its validity. Furthermore, as the data was been collected, it remains static and may be not able to address the specific research questions raised in this study. To circumvent this, a pilot study involving a small sample of the archival data was conducted to ensure that its relevance and utility to the research questions this study aims to address. Furthermore, the archival data used in this study was triangulated with another source of data, namely, the interview data, to increase the validity of the study and to present a coherent thread of analysis.

A third limitation resulted when I was unable to recruit participants from the oTPD course I was examining. Whilst the outbreak of the COVID-19 pandemic was a likely reason why teachers did not accede to interview requests, another reason could be due to my work in the oTPD course. The teachers might not have felt comfortable talking about their oTPD experiences when they knew that I belonged to the team that designed and facilitated the online course they had attended. They might have felt a form of pressure and thus none of them participated in the interview. Consequently, I had to bound this case study more loosely and to include any Singapore teachers teaching in mainstream schools who participated in the oTPD in 2020 as a bounded case. While these interviews offered rich and unique perspectives, the congruence of the interview data and

the analysis of the reflection was affected. To address this limitation, the research questions and research design were modified to ensure there was alignment in the research questions and sources of data collected and analyzed.

Finally, the small sample size in this study may also mean that the experiences of this group of teachers may not be typical or representative of the experiences that Singapore teachers have during their oTPD participation. As this is an exploratory study, another study of larger scale may be carried out in future to check if the findings from this study is applicable in other contexts.

Chapter Summary

This chapter presented the research methodology undertaken to understand the learning experiences of Singapore teachers who had participated in oTPD – specifically factors that facilitated and/or impeded their learning in oTPD and the level of reflective thinking observed in teachers’ oTPD participation was assessed. It explained why an exploratory case study methodology was chosen for this study, as this methodology allowed the researcher to draw on multiple sources of evidence to examine teachers’ participation in an oTPD, “a contemporary phenomenon” (Yin, 2009) and understand it using the unique perspectives and experiences of the sample population. This was followed by a discussion of the setting (TPD landscape in Singapore) and sample for this study (Singapore teachers teaching in mainstream schools and had attended an oTPD). The data collection methods and sources of data were presented along with a discussion of how the data was analyzed. The chapter ended with a discussion of ethical considerations, issues of trustworthiness and limitations of this study.

Chapter IV

FINDINGS

Overview

The purpose of this exploratory case study was to understand the learning experiences of teachers who had participated in oTPD. Specifically, this study was carried out to examine factors that facilitated and/or impeded teacher learning in oTPD. In addition, the level of reflective thinking observed in oTPD participation was assessed. The research questions that guided this study were:

1. What factors facilitated and/or impeded teacher learning in an oTPD course?
2. What is the level of reflective thinking observed in teachers' participation in oTPD?

This chapter begins with a discussion of the context and a discussion about the two groups of teachers that made up the study participants. An overview of their teaching level, gender as well as other demographics was presented. This is continued with a presentation of the main findings, and each of the findings is presented along with a summary of the results or actual quotes, to bring the descriptive narrative to life with “rich, thick descriptions” (Creswell, 2013, p. 252). The chapter concludes with a summary of how the findings relate to, and addressed the research questions. It is hoped that findings from this study may elucidate the characteristics of oTPD that facilitate teacher learning and inform the work of TPD providers and those designing learning experiences for teachers, helping to fill the gaps in the existing literature on the understudied area of oTPD. Teachers looking to examine their own reflective practices

and school teams hoping to foster conducive conditions for teacher learning can leverage the findings from the study and consider how they may improve their existing practices.

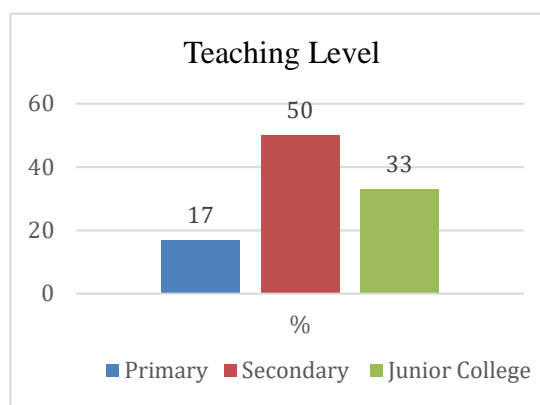
Discussion of the Context

In recent years, online learning has gained momentum as a mode of learning amongst Singapore teachers just as it has elsewhere in the world (Dede et al., 2009; Lieberman & Mace, 2010), appealing to teachers who prefer the convenience of online learning and/or the autonomy of self-paced learning (Koh et al., 2019). In 2020, during the outbreak of the COVID-19 pandemic, all non-essential professional development activities offered by the Academy of Singapore Teachers (AST) and other professional development providers were shifted online to minimize social mixing and contain the spread of the virus. It was against this backdrop that teachers in sample population (Group 1) participated in their respective oTPD courses, some of which were supposed to have been a face-to-face interaction which was shifted online, and others that were online courses to begin with.

Profile of Sample Pool (Group 1)

The sample pool comprises teachers who are all currently teaching in mainstream schools in Singapore. Having participated in an oTPD in 2020, they were interviewed individually, to understand their online learning experiences and the factors that facilitated and/or impeded their learning. Figures 7 to 11 show the breakdown of their demographics.

Figure 7

Participants' Teaching Level (Group 1)

There was a mix of participants teaching at the primary, secondary and junior college level with the majority teaching at the secondary level. In terms of subject(s) taught (Figure 8), there were more participants teaching language-related subjects such as English Language (EL), Project Work (PW) and General Paper (PW) compared to the other disciplines. In addition, there were more participants (67%) who were key personnel such as Head of Department compared to those who do not (33%) (Figure 9).

Figure 8

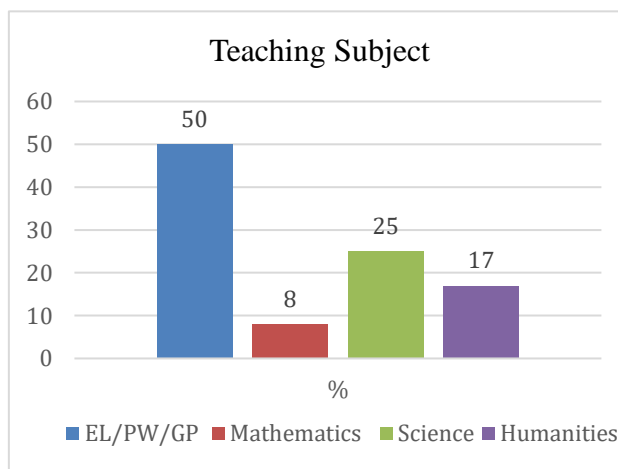
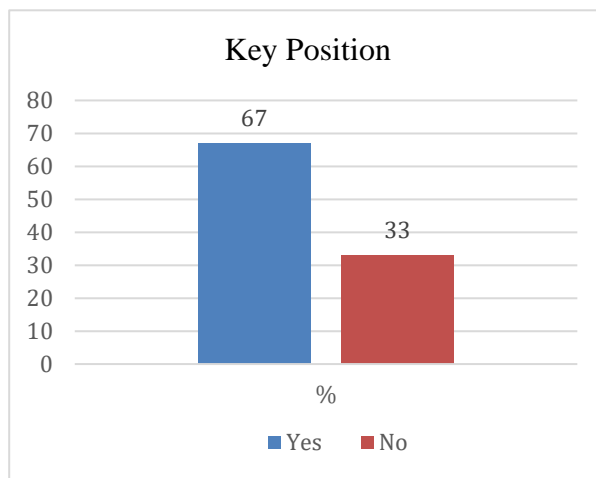
Teaching Subject (Group 1)

Figure 9

Key Personnel (Group 1)

In terms of years of teaching experience (Figure 10), the majority of the participants were experienced teachers with 16 to 20 years of being in the classroom. This also meant that they would have experience participating in different TPD throughout their teaching career.

Figure 10

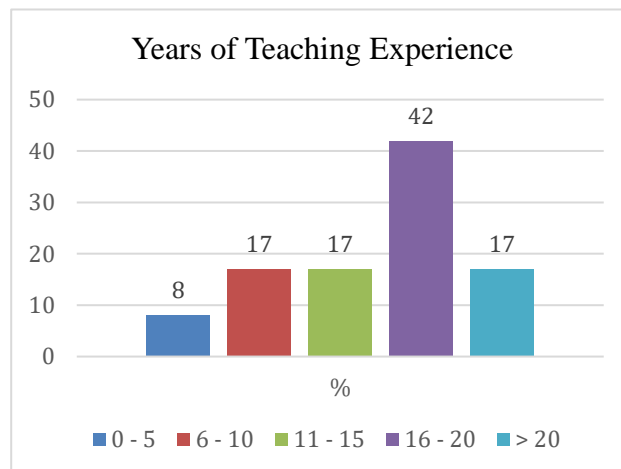
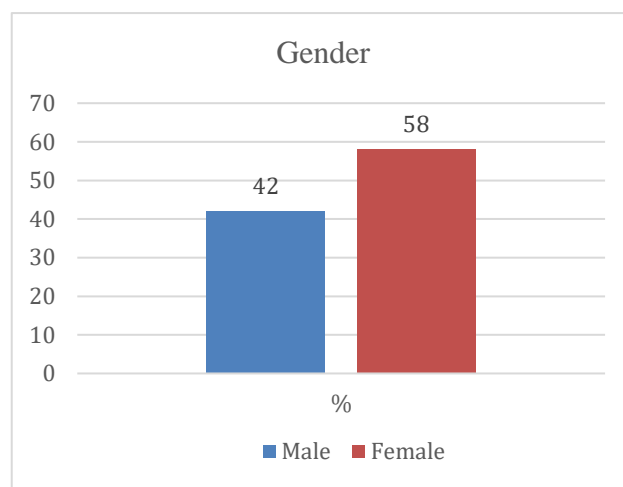
Years of Teaching Experience (Group 1)

Figure 11

Gender (Group 1)

In terms of gender, the participants were fairly evenly spread, with a slightly higher percentage of female participants.

Profile of Sample Pool (Group 2)

The second pool of teachers in the sample population participated in an oTPD in 2019 offered by a Singapore organization referred to using the pseudonym “Institute of Professional Learning” (IPL). As a member of IPL, I had worked with my colleagues to design and facilitate this oTPD. The content for the online course built on the work of Shanahan and Shanahan (2012) in the area of disciplinary literacy. The course introduced participants to the concept of disciplinary literacy, referred in the course as “subject literacy” and encouraged them to examine the academic language that is inherent in the subjects they teach. In the course, participants were introduced to a range of language and literacy scaffolding strategies they could use, to support their student learning. Before the online course was offered in 2019, a version of it was offered as a face-to-face TPD by

the same organization in 2017 and 2018. At the end of 2018, it was decided by IPL’s management to redesign the course for an online modality. My team and I spent six months to refine the content and to design the learning experience, before testing it on the chosen online platform. A pilot test of the course was then carried out with a team of curriculum specialists from different subject areas to ensure the clarity and accuracy of the content presented in the course. The oTPD took place for the first time between July to October 2019, and it was the first time IPL had offered an online course. Table 6 compares the curriculum design features for “Disciplinary Literacy” in a face-to-face and online mode.

Table 6

Comparison of Design Curriculum Design Features

	Face-to-face	Online
Duration	2 full-day (16 contact hours) over a 10-week period	16 hours (recommended guide) over a 10-week period
Course run (class size)	2 runs (24 & 33)	1 run (106)
Orientation to course	Course schedule shown at the beginning of the course	Recommended course schedule provided to participants via email
Content	Presented by facilitator with a set of handouts distributed at the start of each full-day course	Available online for access anytime
Discussion format	Whole-class and small-group	Small-group on online discussion platform Padlet
Level of autonomy	Facilitator-led real-time learning	Self-paced asynchronous access
Application of learning		Personal inquiry task
Cost		Free for MOE teachers

This oTPD course, “Disciplinary Literacy” was part of the TPD offerings available to all teachers employed by the Singapore Ministry of Education. Using an

online catalogue and registration system, 106 teachers signed up for this course after they had received approval from their supervisors to do so. Participation in the course was voluntary and the course was not required in any way for teacher progression or promotion. Teachers did not have to pay to participate in this oTPD course. During the course, teachers had to post their reflections on online discussion walls and submit a personal inquiry task, an application task designed to encourage teachers to think about what they had learned and take time to try out a strategy in their own classes. For more manageable facilitation and monitoring of the discussions, teachers were placed in six discussion walls and each wall was managed by two facilitators. There was no penalty imposed on teachers who did not complete the course.

Teachers' reflection in their online posts and inquiry tasks were analyzed using the reflective thinking coding scheme developed by Kember et al. (2008). In addition, a reflection questionnaire, developed Kember et al. (2000) and adapted for this study, was sent to all 106 participants and 10 responses were received. The teachers' reflection and responses to the reflection questionnaire was triangulated with the post-course evaluation results from IPL. Table 7 presents the demographic information of the teachers in the oTPD, showing that most of them were female and taught in a primary school while Table 8 provides an overview of the course curriculum and the recommended schedule that was presented to participants.

Table 7

Breakdown of Demographic Information (Group 2)

	Female		Male		Primary School		Secondary School		Total
	#	%	#	%	#	%	#	%	#
Total	78	73.4	28	26.6	103	97.4	3	2.6	106

Table 8

Disciplinary Literacy Course Curriculum and Recommended Schedule

Date	Overview of Course Materials	Prompts for Online Posts
Jul 9 to 15	Orientation & Unit 1: Introduction to Subject Literacy	<i>Post a short introduction of yourself here. Include your name, school and subject(s) teaching. Do not forget to share what you hope to take away from this course.</i>
Jul 15 to 21	Unit 2: Overview of Subject Language	<i>Now that you have gained a better understanding of the aspects of subject language, what would you do differently in the classroom?</i> <i>Post a short reflection of 50-100 words. Once you have posted, comment on at least one other person's post.</i>
Jul 22 to Aug 4	Unit 3: Scaffolding Strategies for Content Vocabulary Unit 4: Scaffolding Strategies for Functional Language and Text Types	
Aug 5 to 18	Unit 5: Applying Language and Literacy Strategies Unit 6: Planning Language and Literacy Support	
Aug 19 to Sep 8	Implementing language and literacy support	<i>Upload your completed inquiry task here. Read and comment on at least one other person's task.</i>
Sep 9 to 15	Course break	
Sep 16 to 20	Consolidating and sharing learning experience Wrap-up and course evaluation	<i>Reflecting on your learning in this course, what are your biggest takeaways? How do you think developing your learners' subject literacy will enhance their learning?</i> <i>Post a short reflection of 50-100 words.</i>

As seen from Table 8, there were a few “checkpoints” during the online course where teachers had to post reflections on their learning. These checkpoints took place after Unit 2, Unit 6 and at the end of the course. After completing all six self-paced units, teachers also had to carry out their personal inquiry task. To support teachers to enact these strategies and reflect on their own learning, they were asked to download a template to document their enactment. Teachers had to explain what led them to select a particular strategy and reflect on the impact enacting this strategy had on their students. This template can be found in Appendix G.

During the period between July 15 and September 20, 145 posts were made in the discussion space and 36 teachers submitted their personal inquiry tasks, totaling 181 reflections. Table 9 gives an overview of the response rate for the online posts and submission of the personal inquiry tasks, showing participation tapering down as the course progressed.

Table 9

Number and Percentage of Reflection Posts & Personal Inquiry Tasks

	Introduction # (%)	Reflection 1 # (%)	Personal Inquiry Task # (%)	Reflection 2 # (%)	Full Completion # (%)
Start of course	55 (51.9)				
After Unit 2		51(48.1)			
After Unit 6			36 (34)		
End of course				39 (36.8)	27 (25.5)

After the completion of the course, teachers also completed a post-course evaluation to understand their perception of their learning in the online course. In the evaluation, they were asked questions that surfaced their perception of how useful or satisfied they were with the course. They could respond to the evaluation once they had

completed the course and the organization received a total of 34 responses during the period from July 15 to October 12, 2019. Table 10 shows teachers' responses from the course evaluation. The course had an overall rating of 3.23, showing that participants generally perceived the online course to be useful for their learning and that they were largely satisfied with the online space and its affordances. Across all the categories, the highest score of 3.38 given to the statement "The learning objectives of the online course are met" and "Relevant examples were used to support learning" while the lowest score of 3.09 was given in response to the statement "The online course space encourages good interaction between course facilitators and participants" showing that this was the area that the participants found to be least satisfactory.

Table 10

Course Evaluation (Group 2)

No.	Statement	Strongly Disagree	Disagree	Agree	Strongly Agree	Rating
		# (%)	# (%)	# (%)	# (%)	
1	<i>The learning objectives of the online course are met.</i>	0	0	21 (62%)	13 (38%)	3.38
2	<i>The online course is useful for my professional development.</i>	0	0	22 (65%)	12 (35%)	3.35
3	<i>I can easily navigate the online course space for my learning.</i>	0	0	23 (68%)	11 (32%)	3.32
4	<i>The online course space encourages good interaction among participants.</i>	0	3 (9%)	24 (71%)	7 (21%)	3.12
5	<i>The online course space encourages good interaction between course facilitators and participants.</i>	0	4 (12%)	23 (68%)	7 (21%)	3.09
6	<i>Media is used appropriately to facilitate learning.</i>	0	1 (3%)	24 (71%)	9 (26%)	3.24
7	<i>The course provides opportunities for me to share my learning with other participants.</i>	0	2 (6%)	23 (68%)	9 (26%)	3.21
8	<i>Relevant examples were used to support learning.</i>	0	0	21 (62%)	13 (38%)	3.38

9	<i>The online course space points me to useful resources.</i>	0	0	26 (76%)	8 (24%)	3.24
10	<i>The online course allows me to network with colleagues who have similar work interests.</i>	0	3 (9%)	24 (71%)	7 (21%)	3.12
11	<i>The online tools allow me to collaborate with other participants.</i>	0	3 (9%)	24 (71%)	7 (21%)	3.12
Overall course rating						3.23

Presentation of Findings

To address the research questions that this study sets out to answer, this chapter describes four main findings from the data that was collected. For each of the findings actual quotes from the interviews and online posts or a summary of the results from the coding or reflection questionnaire were presented to allow the data, and the voice and the perspectives of the participants to guide the descriptive narrative.

Finding 1: Factors that Facilitate Learning in an oTPD

a. Clarity and Coherence

In the interviews, a number of teachers discussed how clarity and coherence in the design of the online course enabled them to plan their time and commitments, and navigate the online environment on their own so that learning could take place seamlessly. For instance, Sue was impressed with the way the oTPD course she attended had been organized. The learning experience was very smooth for her and she could see that a lot of thought was put into designing a curriculum that enabled participants to move through the materials without being overwhelmed or lost. This included providing

participants with guiding questions and annotating the materials to help participants make sense of it, and keeping the content during synchronous session concise.

I experienced how good online learning course could feel like. I saw what it takes for a facilitator to be able to deliver a curriculum effectively... A lot of guiding questions, a lot of recommended resources...but (there's) clarity in terms of what's important... So even if you miss parts of the synchronous presentation, you could still fall back on the slides. Even if you don't have that you can still look at the unit for yourself and read the teacher notes. So in that sense, [the content] was [not just] taught but presented in different ways.

Another participant, May, participated in an oTPD course to understand how to use Visible Thinking (Ritchhart et al., 2011) to promote student engagement and understanding. She observed that when the course materials were clearly organized and presented in the online platform, it was easy for her to follow through her learning.

I think they (the course designers) have really got a very good thing going with, with ...everything was set up beforehand, so all the technical parts was settled you know. So all the readings are also put on Google Classroom, some articles and stuff so the technical part is clear and all there.

Dee attended an online course to understand how talk in the classroom can support literacy development. As a designer of TPD herself, she got to observe how the learning experience could be structured to facilitate learning, an unintended learning outcome she took away from her participation.

But more than that, it was also about the structure of PD, like how the way that the whole experience was being structured for the participants and how the materials were presented, how they were used in the questions that we were being asked to work on. So I thought that was very interesting learning as well, even though that was not the direct learning outcomes of the course.

It can be seen from these snippets of the participants' experience that clear organization of learning experience and materials is an important factor affecting the oTPD learning experience.

b. Constructive Exchange of Ideas

Another factor that participants reported to have facilitated their learning was the opportunities to engage in professional conversations about what they are learning. In an oTPD course on Differentiated Instruction (Tomlinson, 2006), Karl experienced a constructive exchange of ideas during the discussions which aided his learning.

The interaction we have...there's a, like a free flow of ideas, there's a kind of discussion and synergy among the participants. So I think that is a powerful bit of learning.

Dee had a similar experience attending an oTPD that was also attended by participants from different parts of the world. The opportunity to share how they could use what they were learning to address challenges they were facing in their respective contexts helped her to gather more perspectives and this was helpful to her own learning.

I think one of the more rewarding aspects was getting to hear from other participants who may be facing the same problems and learning from those who may be applying this in a different context.

Likewise for Amy, she was energized and most engaged in her learning when she was able to dialogue with other participants. She also enjoyed sharing thoughts about how the learning could be applied.

In conversations with other people in the same course, we get to ask questions of each other, clarify what are some of our assumptions with each other and I get to learn about their context as well. So I find it very interesting when I can think about how they are applying the course theory and the course learning into their own context. ...the conversations are very great.

May felt that she was able to contribute to the learning of the entire class and this empowered her and aided her learning. She observed how all the participants got to share their ideas with the entire class and how the facilitators were able to weave together the different input to co-create a shared understanding that was owned by the entire class.

[the facilitators] are very good at picking up on things that you say. So ... we each came up with our own definition. So while we were working as a group, ... to do this whole mapping... each one individually, we have to write our own definition. So even within a group, it may be a bit different, right, but we are kind of working [together]. And then when we came back to the big group, what [the facilitator] did [to get all] 60 odd of us, ...[to] type in your definition into the chat. Everyone gets to share their definition. Then they look through, right, and they will pick up [points and say] oh so and so did this, so and so did that, oh I like this and how they draw connections... I thought that was good because they are also sort of including your input into developing the...co-constructing that understanding with the class.

These quotes by the participants show that they felt more engaged and learn better when they were able to discuss what they were learning with the rest of the class and when they could contribute to the learning of the group.

c. Learning Community

Ken had a series of online learning sessions organized by his school to enable teachers to develop online materials for home-based learning during the COVID-19 pandemic in 2020. He found it helpful to learn together with his colleagues in school, as a community, as some of them were more adept at designing online learning experiences for students.

Having the resource team, you can ask questions all the time. I think yeah, it's quite a dynamic learning community,[as] there were the resource people within the department, within the units and team. So whenever we learn something, we will share it with everybody else as well. So I don't think learning was very linear. I think this kind of more organic learning community structure helped a lot.

Amy had to attend an oTPD to prepare her for her role as an instructional mentor. The course was initially designed to have a 10-day duration, to be conducted face-to-face across a year. However, due to the COVID-19 pandemic, only two days were conducted in person and the rest of the course curriculum was moved to an online space. While she felt she didn't have the full experience of the course as a result, she appreciated having colleagues who had attended the course before her as she was able to leverage their prior learning experience and exchange learning points with them. Having a group of colleagues who had learned similar content also meant that they could discuss the learning together and talked about how they could apply their learning in their school contexts.

so I don't know whether this is by design or by accident, ... but in the case of the [mentoring course], I actually have generations of people who have attended it (face-to-face) before so there are some parts where I find that the online version was not clear... [or] I was not able to clarify my doubts as much in the online version and ... because now it's like asynchronous and it's only 2-hour Zoom sessions... I can just go back to my colleagues who had gone for the course before and say like, you know, when they were talking about this, is it this or that... you know, my community now has extended back towards my work area... I found that quite useful because that helps to contextualize a lot of things that we does in the course, through my actual work right. It's the meaning-making, and the fact that, in a sense, I'm also growing the community ...in my school. We are having a conversation and we are developing our common vocabulary, ... So I mean that is a good thing.

Similarly, May signed up for the Visible Thinking online course together with some colleagues in her school and her school cluster. This created a community that could connect face-to-face and remotely, providing support for May and her colleagues to extend and deepen their learning beyond the oTPD.

in addition to all these, the fact that we were attending it ... as a cluster, a group ... so what my VP did was he set up a Facebook group. ... So you have a sensing that you're also attending it as a class, as a group, [with] your fellow

teachers in the cluster and ... we met and introduce ourselves ... talk about why we are attending and hope to get out of the course. So it makes you reflect a bit more right, like why am I attending, what I want. ... [in the] Facebook group, I saw that one of the teachers ... she already applied this one (points to strategy) with her class you know, and she showed us. Oh, I applied this 'Making Meaning' strategy with my P6 [and] P2 class and she showed us artefacts of, you know, what she had done... I think because there's also a community that's doing it...it made me think, okay, when school reopens I'm going to see if I can apply one of two of these strategies.

Lloyd attended a phototherapy course that was supposed to be conducted in-person but was also shifted online due to the COVID-19 pandemic. The course, based on Gestalt therapy, took place over five days of 5-hour sessions and took a graduated approach to teach participants how to use a certain deck of cards and photos to connect clients with what was inside of them, based on the circumstances around them. Even though Lloyd would have preferred for the course to have taken place face-to-face, he was heartened to learn together with a group of people who were similarly committed to emotional counselling as he was.

So initially, when you [go into] breakout [session], you have in that group just a partner and yourself. The nature of the content, there was a lot of emotion and you may not be willing to share with the partner ...unless you feel there's safety in [the] space... we know each other for the last five days learning together. So, I felt I knew them [from] last year and you got to know each other [in the] sessions and you share the secret [of phototherapy]... the depth of knowledge.

This finding shows that having a community of fellow learners with similar learning goals facilitated learning in an online space.

d. Time and Space for Reflection

Another salient point that emerged from the interview is the time and space to reflect on the learning and what this may mean for the teachers in their work. When Singapore closed all schools and instituted home-based learning in April 2020, Faye's school

mounted a series of oTPD to equip the teaching staff with the technological know-how to create online resources. Caught up in the many disruptions caused by the pandemic, she appreciated how the oTPD and the school community provided teachers with opportunities for reflection whilst they were learning to cope with the fast-evolving situation.

When you care a lot about your work..[s]ometimes that's a little bit of tunnel vision which may not be cool. I saw [that] I have to be very self-aware and reflect on my existing practice and areas of discomfort... so it's great that my school gave us that online space for introspection...we were frequently reminded to take time to think through our practice, and not just jump onto the bandwagon.

Ken's experience was similar to Faye's, as the school set aside time for staff to have individual reflection and to share these reflections with one another over the virtual space, synchronously and asynchronously.

The expectations that the school set out was so important... That helped us all frame the need to critically examine our practices... Like there was no need for bells and whistles (in home-based learning). I could take time to reflect, and just focus on what's fundamental in terms of...[my]teaching and... student learning rather than ... the other areas... I usually don't speak up, I'm not that vocal...[but] hearing other teachers encouraged [the sharing] of my own reflection.

Amy's oTPD experience when she got to engage in reflective practice together with the rest of the instructional mentors has also given her pause to think about her own role as a School Staff Developer, leaving her with a firm belief in the need to build intentional structures for reflection.

We need to create time for people to reflect [and] we also need to create time for people to asynchronously discuss and build knowledge with each other so those were things that we would be intentional when designing our online PD modules.

Finding 2: Factors that Impede Learning in an oTPD

a. Limited Interaction

Woo had to attend an oTPD workshop to learn about e-assessment tools but felt that the facilitators were prescriptive and did not give participants much room to ask questions or to understand the rationale why the e-assessment should be carried out in a particular way. Not being able to ask questions and participate actively in the learning process frustrated him.

it was simply a substitute for a briefing, which was, you know, turned into a training workshop, a course, to use the [e-assessment] platform, but actually the manner that it was carried out was ...more of a one-way didactic briefing session that [went], 'this is what you do', 'do not do this, do not do that'. ...The reasons why we should carry out such an act (make use of the e-assessment tool in a particular way), was not discussed or clarified, it was simply. That's how you do it... So, the rationale, the philosophy, the explanation, these were lacking, and it was very much the mechanics of the platform.

Amy also felt hindered in her learning when the voices of the participants were communicated in a linear fashion to the course facilitators without any input or participation from the rest of the class. She would have preferred for the facilitators to share the responses from other participants with the entire class.

I found that a Google form ... is very summative in nature, you know, you're typing and... you don't know what feedback you are getting ... I actually didn't want to type as much. And so as a result of which I don't think my learning is as deep so that the modality of assessment actually got in the way of my learning... The weakness of online learning is when people try to replicate lectures that are happening online because that just bores me, and then I will go onto email which is very easy because it's on the same platform.

For Andie, she was nominated to attend an oTPD workshop to help teachers understand the refinements made in the new syllabus and the course was intended to guide teachers in lesson planning and design. This was a mandated PD course for

teachers teaching the subject and Andie felt that there was insufficient exchanges between the course facilitators and participants, and the lack of participants' voices demotivated her during the session.

Screen time can definitely affect the physical and mental fatigue, and therefore affect my concentration. During the course, there wasn't a willingness (for anyone) to participate, maybe because of motivational issues ... while I'm motivated to participate, I see some other teachers or other people with their cameras turned off... So I feel like I'm just talking to the trainer and a few [participants]. You know, just talking to the trainer. So in a way, it's a little bit demoralized to talk [and] to share as some people are not contributing actively in the discussion.

Finding 4 shows that a factor that impeded teachers' learning in an oTPD course is a lack of interaction between the participants and the facilitators or amongst the participants.

b. Lack of Social and Emotional Connection

Participants have observed that it is more difficult to connect socially and emotionally in an online environment and the resulting lack of social and emotional connectivity hampered their learning.

Andie felt that when participants were not 'required' to connect, at least in the sense of being present in the visual sense, it was difficult to connect with other participants or to feel that they were learning together.

Some teachers had their video camera turned off. So, it is difficult to assess whether they are really listening at the facilitators and paying attention to the materials of the workshop. At the same time, when the trainer ask for responses, because there is no physical face-to-face interaction, right, it is. I think it's quite challenging for them to get the participants to participate. Okay. Unless that the trainer, call us [by] names individually.

In discussing impediments to his learning, Lloyd felt that the online modality was not particularly useful to the content and skills he was hoping to learn.

The technology itself. While the tribe itself was sufficiently committed to try the skills, somehow the things that were discussed are pretty tough areas to discuss over technology, the personal lives of people. So, you know that the technology itself... it becomes a barrier for you. You're willing to tell... bare it all you know but it's difficult in a process like this, you know, it's almost like an AA meeting of sorts, it may be an efficient way of attending the session but ...[not with] the nature of the content, the emotion.

This was a sentiment that Amy reflected as well, when it comes to the learning of mentoring skills. While she was glad to still have opportunities for PD, she felt most of what she had learned was theory and not practical skills.

Like the modality of learning makes a difference in your own takeaways...when we were doing this thing online, it is much harder because the whole point behind the [mentoring course] was really to build up skills and competencies as a mentor and get feedback on how you behave... There was actually a point ... in the face-to-face session when someone pointed out, 'She took a deep breath here, that shows frustration', but that's not something that you can pick up in Zoom ...because you are not 'live'. You don't pick up on these non-verbal cues as easily. There is a barrier in the form of the screen...you don't empathize as much with the other person on the other side of the camera. So I feel that the face-to-face learning component helps in developing those skills. When I'm learning it online now, I'm not learning so much skills and competency. I'm learning more facts and theory.

This point shows that the online modality may be a hindrance when it comes to learning skills that are social and emotional in nature.

c. Distractions and Interruptions

Tammy attended an oTPD whilst she was in school and felt that her learning was impeded when she was frequently interrupted by colleagues who were not mindful that she needed to concentrate when she was learning online.

Colleagues, my colleagues frequently (disrupt my learning)... because we're all in the staffroom, ... And so most people don't really know that you're in a meeting although you have your headphones on... And then you just, ... missed something and that was it. ... the presentation might go on very quickly.

Amy also had similar sentiments regarding online learning, observing that a face-to-face context would have provided her with a ‘protected’ space that helped her to concentrate and put aside other commitments. Once learning was moved online, the space wasn’t ‘protected’ anymore.

What got in the way would have been all the distractions... when it became an online learning course (there) was no more protected time and space. The fact that people can barge into your Zoom sessions, they can Whatsapp you and like they can literally stand behind you and talk at you while you're in a Zoom session.

Karl and May also felt that they was more inclined to multi-task when the TPD was conducted online. For Karl, this happened when the content seemed like something he already knew.

I guess there is a certain amount of, there would still be some distraction. I mean, depending on the time of the day because I'm at my workstation, then you know if people walk by, they come and look for you, then you have this tendency (to talk to them). Then if ... (someone) is doing the sharing and ... I already know this, then I'll have a tendency to want to do other things ... that sort of thing that may happen versus if I'm in the venue itself then...it's really...undivided attention.

For May, this tendency to stray from the learning took place when there is a lack of interactivity during the learning.

so anytime that you're not engaged...in interactive like breakout or whatever, you can easily take out your phone and look at... oh I need to buy something... you can just go to your online shopping. So it's up to you right, how focused you want to be. Then of course, (you remind yourself) I should, I can do this later. Right? So you just have to remind yourselves to stay on task. So sometimes...triggers or like you see a WhatsApp message, and you want to reply, you know, then it could take your attention off.

This finding shows that participants were more likely to observe certain social norms and stay focused on the learning when they were attending TPD in-person. However, some of these norms were not so clearly explicated in an online space and

therefore may not be observed in an oTPD. In addition, the embedded nature of the learning process also exposed teachers to a greater likelihood of being interrupted and distracted. Thus the onus falls on the participants to avoid distractions or to take steps to 'protect' their time to learn.

Finding 3: Reflective Thinking in oTPD

The coding scheme that was developed by Kember et al. (2008) was adapted to assess the levels of reflective thinking demonstrated in the online posts and personal inquiry tasks. The coding scheme aligned well with the conceptual framework and address the second research question of this study. There are four categories in the coding scheme, Habitual Action, Understanding, Reflection and Critical Reflection. The study found that 86.5% of the online posts and personal inquiry tasks that were analyzed using this coding scheme shows Reflection, which is level 3 in the scheme. Most participants were able to grasp the content in the course and considered it in relation to the professional contexts they operated in. Less than 5% of the content analyzed was categorized as Habitual Action or Non-reflection, or Critical Reflection, and only 6.34% was categorized as showing only Understanding. Table 11 provides an overview of the four categories in the coding scheme, the description of each category and an example from the data that exemplifies each of the categories. Table 12 provides a summary of the number and percentage of posts and inquiry tasks for each category.

Table 11
Reflective Thinking Coding Scheme
 (adapted from Kember et al., 2008)

Code	Category	Description	Example
HA	Habitual Action	<ul style="list-style-type: none"> - There is little or no evidence of the teacher attempting to reach an understanding of the concept or theory which underpins the topic. - Material was posted without the teacher thinking seriously about it, trying to interpret it, or forming an opinion about it. - Post is largely a reproduction of ideas in the course, with or without adaptation. 	<i>Some students were continuously highlighting the whole passage for no reason /no comprehending. That made me upset as it showed that they were not taking the work seriously. So I had to re-visit annotations just because of this students (sic) who just highlighted the whole passage.</i>
U	Understanding	<ul style="list-style-type: none"> - Evidence of understanding of a concept, topic or strategy. - Material is confined to theory. - Reliance upon what was in the course. - Discussion of concept, topic or strategy is not related to personal experiences, real-life classroom applications. 	<i>Fruyer's Model allows students to deepen their concept learnt about definite shapes in matter while the semantic feature analysis grid enables students to compare and contrast the different properties.</i>
R	Reflection	<ul style="list-style-type: none"> - Concept, topic or strategy is applied to real-life classroom situations - Situations encountered in practice will be considered and successfully discussed in relationship to course content. - There will be personal insights which go beyond book theory. 	<i>After gaining a deeper understanding of the aspects of subject language, I found out the importance of explicitly teaching content vocabulary and functional language to help them read and write texts in each subject effectively. For English, I would get my students to brainstorm and create a content vocabulary word map based on the text type they are working on instead of always spoon-feeding them with helping words.</i>

CR	Critical Reflection	- Evidence of a change in perspective over a fundamental belief of the understanding of the teaching and learning process and/or of students.	<i>I've always assumed students know how to use functional language since one needs to know it in order to "function" (communicate). Upon reflection, I realized lower progress students often omit and/or use incorrect functional language in speaking (especially so for colloquial English) and this impacts their writing because they do not know how to use functional language accurately to achieve their purpose of writing...</i>
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N.B. Intermediate categories are permitted.

Table 12

Level of Reflective Thinking in Online Posts and Personal Inquiry Tasks

Levels of Reflection	Reflection 1		Reflection 2		Personal Inquiry Task		Total		SD
	#	%	#	%	#	%	#	%	
Habitual Action	1	2.0	1	2.6	1	2.8	3	2.5	0.3
Understanding	2	3.9	4	10.3	2	5.6	8	6.6	7.3
Reflection	45	88.2	31	79.5	33	91.7	109	86.5	5.1
Critical Reflection	3	5.9	3	7.7	0	0	6	4.5	3.2
Total	51	100	39	100	36	100	126	100	

Table 12 shows that across the three checkpoints in the oTPD experience, most of the posts and personal inquiry tasks demonstrated Reflection, 88.2%, 79.5% and 91.7%, achieving a mean of 86.5%. The percentage of posts demonstrating Habitual Action, Understanding or Critical Reflection was all lower than 10% each, with only 2.4% of the posts showing Habitual Action. Discussion of each category of the reflective thinking coding scheme is discussed with actual examples in the next section.

a. *Habitual Action*

During the various checkpoints in the online course, most of the participants were able to move beyond the level of Habitual Action, or Non-reflection which is characterized by a superficial compliance to the steps involved in enacting the strategies with no thought to its applicability in the participants' own context. In addition, content categorized as Non-reflection shows only a surface approach to learning, usually presented as brief, vague or irrelevant responses that did not discuss the course materials. Only three posts or personal inquiry tasks fall into this category.

(#33) A teacher cannot be replaced by a robot teacher. The human touch can check for students' understanding using different terms and ways friendly to the student.

(#77) The biggest takeaway will be the various strategies introduced.

(Personal Inquiry Task 16) Some students were continuously highlighting the whole passage for no reason/no comprehending. That made me upset as it showed that they were not taking the work seriously. So I had to re-visit annotations just because of this students (sic) who just highlighted the whole passage.

b. *Understanding*

Content that is categorized as showing Understanding demonstrates a grasp of the concept or strategy but attaches no personal meaning to it or stops short of relating the concept to personal experiences or classroom applications. Eight posts, which is 6.34% of the total content analysed, fall into this category. Posts in this include

(#9) I am clearer about the distinction between content language, functional language and text types. I am aware of the content language for Science (ie. scientific keywords like evaporation, condensation, etc, and I learned how to differentiate it with functional language which can be words like make or to carry.

(#83) My biggest takeaway is the different strategies for content vocabulary. I will create more worksheets ... with the different template.

(Personal Inquiry Task 12) Frayer's Model allows students to deepen their concept learnt about definite shapes in matter while the semantic feature analysis grid enables students to compare and contrast the different properties.

c. Reflection

To differentiate Reflection from that of Understanding, Kember et al. (2008) explain that "reflection can be delineated from the understanding category because the process of reflection takes a concept and considers it in relation to personal experiences" (p. 373). In this category, posts and personal inquiry tasks show participants discussing the application of concepts and strategies discussed in the course and situate their discussion in their classroom practice. Posts are also likely to move beyond book learning to express some form of personal insights. As the majority of the content analyzed (86.51%) falls into this category, posts and personal inquiry tasks that show the following sub-categories of reflective thinking are quoted. It is possible for the same quote to reflect more than one sub-category so a best-fit principle is applied holistically to the entire post to guide the categorization.

- i. Considers or interprets concept/topic/strategy in relation to personal experiences or attaches personal meaning to it

(#64) The summary of strategies help to consolidate my learning and allows me to have a holistic picture of how each strategy complements one another. It is important to know the purpose of each strategy as I need to select the appropriate teaching tool. In the case of Concept Circle and Frayer Model, [our] group decided on Concept Circle because it appeared to be 'easier for lower block students to understand and pick up the skill'. I realised that the decision was made wrongly as each strategy has its own purpose. Well, mistakes are stepping stones to learning.

- ii. Discusses how a concept/topic/strategy is/can be applied to practical applications
 (#7) In order to help pupils master content vocabulary, I need to ensure these words and terms are gradually introduced with increasing degrees of complexity. As such, it is important to select the appropriate types of text at different junctures. This also promotes memory retention as pupils are able to build on their schema. In the classroom, I need to make a conscious effort to introduce the appropriate subject language and get pupils to re-voice and articulate them. This helps me to check for understanding and allows me to correct any misconception, if any. Promoting the use of subject language in class also promotes pupils' confidence in communicating effectively in the subject.
- iii. Relates concept/topic/strategy to subject area(s)
 (#78) After gaining a deeper understanding of the aspects of subject language, I found out the importance of explicitly teaching content vocabulary and functional language to help them read and write texts in each subject effectively. For English, I would get my students to brainstorm and create a content vocabulary word map based on the text type they are working on instead of always spoon-feeding them with helping words. For Math, I would continue to use word wall to build up their math vocabulary. However, instead of just displaying the words, I would explicitly teach them the content vocabulary at the start of the chapter.
- iv. Discusses situations encountered in practice after applying concept/topic/strategy
 (#76) Now that I am more aware, I would make the conscious effort to highlight them during my lesson. Especially content vocabulary such as polysemy as well as precision of meaning. This is particularly important in the understanding of science. E.g. properties, force, attract etc. Also, I would incorporate the use of the Freyer (sic) Model to identify and address misconceptions for both science and English. Currently, I am using Freyer's (sic) Model to dissect a composition topic and getting the students to identify examples of a helpful friend and non-example of helpful friend. This would allow them to keep on point when writing their composition.

d. Critical Reflection

Compared to Reflection, Kember et al. (2008) consider Critical Reflection to be the higher level of reflection and different from less considered reflection. The authors drew from the works of Dewey (1933) and Mezirow (1991, 1992, 1998) to produce a synthesized definition where Critical Reflection involved “a transformation of

perspective” resulting from “a critical review of presuppositions from conscious and unconscious prior learning and their consequences” (Kember et al., 2008, p. 314). The authors note that Critical Reflection is unlikely to be common, given the need to first uncover deep-seated beliefs which lead to cognitive dissonance and a process of forming new beliefs.

In the content that was analyzed, six posts (4.8%) demonstrate some elements of Critical Reflection. For instance, post 14 shows an awareness of an assumption that he/she held, and espouses a desired change to better support students’ learning.

(#14) I've always assumed students know how to use functional language since one needs to know it in order to "function" (communicate). Upon reflection, I realized lower progress students often omit and/or use incorrect functional language in speaking (especially so for colloquial English) and this impacts their writing because they do not know how to use functional language accurately to achieve their purpose of writing. I would do explicit teaching, modelling and guided practice with my students to help scaffold their learning.

Post 57 articulates an understanding of the purpose of scaffolds in learning and suggests a reconsideration of participant’s prior beliefs regarding how to support students’ learning and self-esteem.

(#57) My key take away is that these scaffolds are temporal. They are not meant to be there forever. One day, when the students get really good at whatever they are doing, then perhaps they will not require these scaffolds anymore. Is it a bad thing when certain learners require more scaffolding than others? No, it is normal for beginning learners to require extra help. I should not make them feel bad for requiring the extra help to succeed. Where is the bar to reach? Should I lower my bar for those struggling learners? Answer: no! I have to look at the standards and provide the necessary help such that they can hit the bar. In summary, I have to look at my LOs, my material, my learners, existing resources and work out a unique configuration of appropriate scaffolds for my learners! These scaffolds can target content vocab, functional language and/or text types depending on what the learners require.

This finding shows that the majority of the online posts and personal inquiry tasks (86.5%) demonstrated Reflection, the third level of reflective thinking in Kember et al.'s (2008) coding scheme.

Finding 4: Self-reports of Reflective Thinking

Developed by Kember et al. (2000), the reflection questionnaire has been field-tested and is shown to be a reliable instrument that assess self-reports of reflective thinking (Leung & Kember 2003; Lethbridge et al., 2013). Like the coding scheme developed by Kember et al. (2008), it has the same four categories, Habitual Action, Understanding, Reflection and Critical Reflection with four items for each category. The items were measured using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). As it was likely for participants to use different types of thinking throughout their oTPD, they were asked to indicate their agreement with all items on the Likert scale. A score for each scale was first calculated before the mean scale score for each category was calculated. The Reflection Questionnaire was sent to all participants of the oTPD “Disciplinary Literacy” between September and October 2020, and 10 returns were received, achieving a response rate of 9.4%.

Table 13

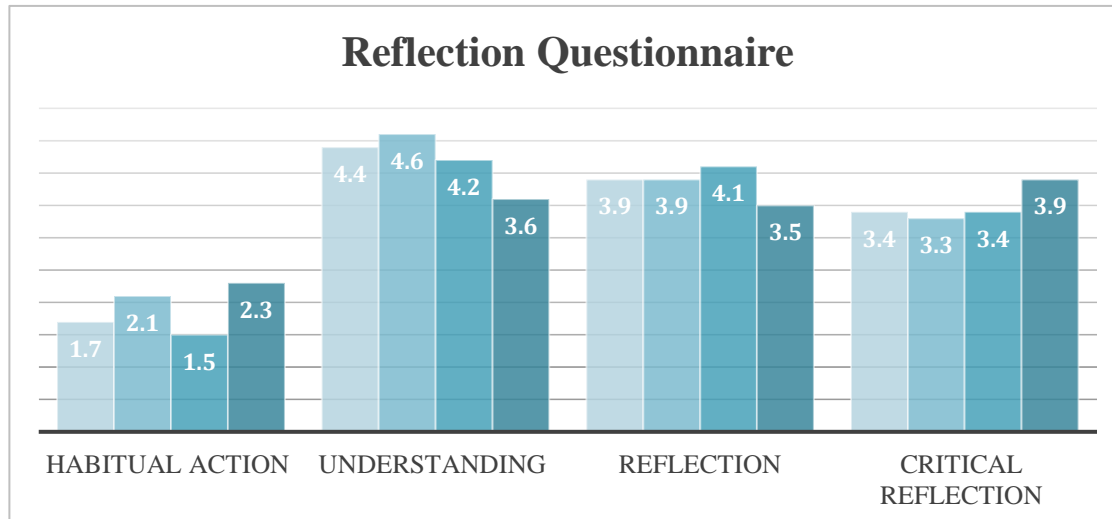
Responses to Reflection Questionnaire (Group 2)

Category	Question	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	Score	SD
Habitual Action	1	5	4	0	1	0	1.7	0.9
	5	2	6	1	1	0	2.1	0.8
	9	7	2	0	1	0	1.5	0.9
	13	3	4	1	1	1	2.3	1.2
						Mean	1.1	

Understanding	2	0	0	0	6	4	4.4	0.24
	6	0	0	1	2	7	4.6	0.6
	10	0	0	2	4	4	4.2	0.7
	14	0	1	1	7	1	3.6	0.7
							Mean	4.2
Reflection	3	0	0	4	3	3	3.9	0.8
	7	0	1	1	6	2	3.9	0.8
	11	0	0	3	3	4	4.1	0.8
	15	0	2	3	3	2	3.5	1.0
							Mean	3.9
Critical Reflection	4	0	2	3	4	1	3.4	0.9
	8	1	1	3	5	0	3.3	1.1
	12	0	2	4	2	2	3.4	1.0
	16	0	1	2	4	3	3.9	0.9
							Mean	3.5

Figure 12

Responses to Reflection Questionnaire (Group 2)



Self-reported results from the reflection questionnaire show that participants perceived themselves to have high levels of Understanding, Reflection and Critical Reflection in terms of their oTPD experience. The high level of Reflection, and the low level of Habitual Action, are also consistent with the online posts and inquiry tasks

analyzed. However, the self-reported data show much higher levels of Understanding and Critical Reflection as compared to the posts.

Summary of Findings

From the discussion above, factors that supported and/or impeded teachers' learning in an oTPD course were presented. The level of reflective thinking observed in an oTPD course, from a thematic analysis of the online posts or self-reported by teachers was also presented. Table 14 provides a summary of these findings.

Table 14

Summary of Research Questions and Findings

Research Questions	Findings										
1. What factors facilitated and/or impeded teacher learning in an oTPD course?	<p><i>Finding 1: Factors facilitated teacher learning in an oTPD course</i></p> <ul style="list-style-type: none"> a. <i>Clarity and coherence</i> b. <i>Constructive exchange of ideas</i> c. <i>Learning community</i> d. <i>Time and space for reflection</i> 										
	<p><i>Finding 2: Factors impeded teacher learning in an oTPD course</i></p> <ul style="list-style-type: none"> a. <i>Limited Interaction</i> b. <i>Lack of Social & Emotional Connection</i> c. <i>Distractions and Interruptions</i> 										
2. What is the level of reflective thinking observed in teachers' participation in an oTPD course?	<p><i>Finding 3: Reflective Thinking in oTPD</i></p> <table border="1"> <thead> <tr> <th>Levels of Reflection</th> <th>%</th> </tr> </thead> <tbody> <tr> <td>Habitual Action</td> <td>2.5</td> </tr> <tr> <td>Understanding</td> <td>6.6</td> </tr> <tr> <td>Reflection</td> <td>86.5</td> </tr> <tr> <td>Critical Reflection</td> <td>4.5</td> </tr> </tbody> </table>	Levels of Reflection	%	Habitual Action	2.5	Understanding	6.6	Reflection	86.5	Critical Reflection	4.5
	Levels of Reflection	%									
Habitual Action	2.5										
Understanding	6.6										
Reflection	86.5										
Critical Reflection	4.5										
<p><i>Finding 4: Self-reports of Reflective Thinking</i></p> <table border="1"> <thead> <tr> <th>Levels of Reflection</th> <th>Mean Scale Score</th> </tr> </thead> <tbody> <tr> <td>Habitual Action</td> <td>1.1</td> </tr> <tr> <td>Understanding</td> <td>4.2</td> </tr> <tr> <td>Reflection</td> <td>3.9</td> </tr> <tr> <td>Critical Reflection</td> <td>3.5</td> </tr> </tbody> </table>	Levels of Reflection	Mean Scale Score	Habitual Action	1.1	Understanding	4.2	Reflection	3.9	Critical Reflection	3.5	
Levels of Reflection	Mean Scale Score										
Habitual Action	1.1										
Understanding	4.2										
Reflection	3.9										
Critical Reflection	3.5										

Chapter V

ANALYSIS, INTERPRETATION, AND SYNTHESIS

Overview

The purpose of this exploratory case study was to understand the learning experiences of teachers who had participated in oTPD. Specifically, this study was carried out to examine factors that facilitated and/or impeded teacher learning in oTPD. In addition, the level of reflective thinking observed in oTPD participation was assessed. Despite a growing body of literature on TPD, current research does not sufficiently address the emerging setting of teachers learning via an online modality. This study hopes to contribute to understanding about the design elements that support teacher learning and reflection in oTPD and determine further practices that would be helpful in the context of TPD. The study addressed the following research questions:

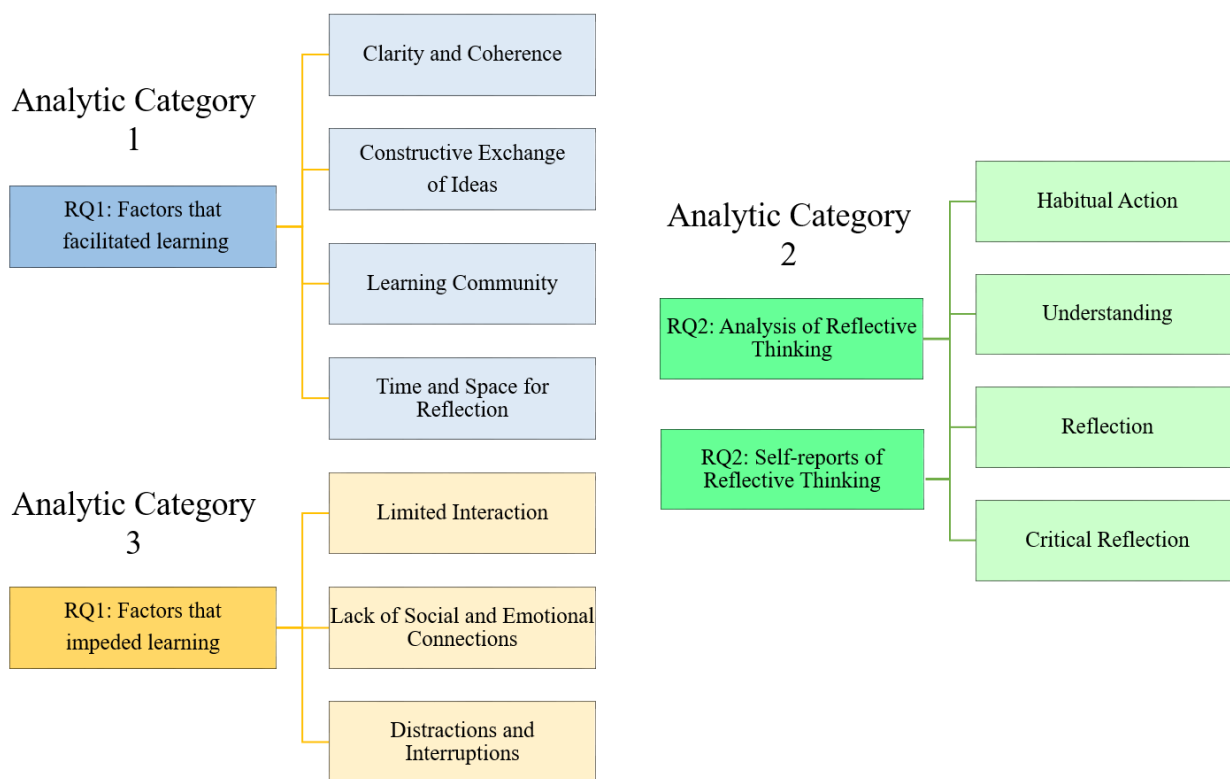
1. What factors facilitated and/or impeded teacher learning in an oTPD course?
2. What is the level of reflective thinking observed in teachers' participation in oTPD?

This chapter begins with the discussion of three analytic categories derived from the main findings discussed in Chapter IV and summarized in Table 14. The first analytic category presents factors that were reported to have supported teachers in their learning during their oTPD experience. The second pertains to the relationship between learning and reflection as seen from the analysis and self-reports on reflective thinking while the third analytic category presents factors that were deemed to have impeded teacher learning. Together these categories help to frame the interpretations of the findings to

address the research problem. The chapter concludes with a synthesis of what has emerged from the discussion and how this compares to existing literature. Figure 13 presents the three analytic categories and shows how they align with the research questions and the main findings in this study.

Figure 13

Relationship between Research Questions, Findings and Analytic Categories



Analysis and Interpretation

Analytic Category 1: Factors that Facilitated Learning

Clarity and Coherence

In the interviews with the 12 teachers in sample population Group 1 (Amy, Andie, Dee, Faye, Karl, Ken, Llyod, May, Steve, Sue, Tammy, Woo), a recurring theme that was reported to have facilitated their learning in oTPD is the clarity of the course content and coherence of the learning experience. As the teachers were themselves creating home-based learning experiences for their students due to school closure brought about by the COVID-19 pandemic, many were particularly observant about how their own online learning experiences were designed and implemented by TPD providers. Unlike a face-to-face TPD where learning takes place in real-time often with directions from at least one facilitator, oTPD can take more varied forms, including self-paced and self-directed learning experiences that may or may not include any form of synchronous interaction. As many in the field have pointed out, this ease of autonomous access is one reason why oTPD has become so popular in recent years (Dede et al. 2009; Kim et al., 2011; Parsons et al., 2019). Summerville and Johnson (2006) also observed that autonomous access to online learning experiences is especially beneficial to teachers who are self-directed and motivated at managing their own learning. Self-paced oTPD gives these teachers the freedom to move ahead in their learning as well as the ability to revisit materials they feel needed reviewing (McNamara, 2010). This makes the clarity of content and organization a critical enabler of teacher learning in such a context as teachers need to be able to navigate and gain access to learning resources largely on their own. This is one theme

that came up repeatedly during the interviews and is encapsulated by Sue's observation of oTPD having "clarity in terms of what's important."

Constructive Exchange of Ideas

Another theme that emerged strongly as a factor that facilitated learning, amongst the teachers interviewed in this study, was being able to exchange ideas about their learning and practice with fellow educators. Opportunities to co-construct their learning and understanding during the online learning experience help to deepen their learning. For the participants in this study, this could be in the form of synchronous discussions in Zoom breakout rooms, or asynchronously on dedicated online discussion space. The finding is not surprising given as the opportunity for teachers to be "actively engaged in meaningful discussion" (Garet et al., 2001, p. 925) or exchanging ideas and resources (Darling Hammond, 2017) has been frequently cited as a prime example of learning actively, and active learning is one of the key features of effective TPD that has a strong consensus (Garet et al., 2001; Darling Hammond, 2017; Desimone, 2009). Many of the interviews conducted for this study confirmed this, with Karl expressing this thought that the "free flow of ideas" created "a kind of ... synergy" which he thought was "a powerful bit of learning."

In their study on TPD for Mathematics teachers, Borko et al. (2008) found that professional conversations amongst the teachers facilitated their learning and provided a source of motivation for them to reflect on and enhance their classroom practice. Lynch et al. (2014) observed that there has been a trend towards the use of the term "professional dialogue" in TPD, to signal the growing practice of reflective conversations involving other teaching colleagues. The authors argue that such dialogues are intended

to encourage teachers to critically examine their classroom practice and is an effective way of supporting the professional development of teachers, a view that was made by Cochran-Smith and Lytle (2009) when they called for teachers to investigate and reflect on their own teaching vis-à-vis the practices of other teachers. Along the same vein, Prestridge and Tondeur (2015) proposed that constructive dialogue, defined as “a process that teachers engage in collaboratively to stimulate new ideas” (p. 215) points to the need to create room for two types of discussion in oTPD, one to foster criticality around classroom practice, and the other to foster community which supports learning. These observations were in tandem with Amy’s experience that dialogues allowed her to “ask questions of each other, clarify what are some of our assumptions,” allowing her to “learn about their context as well.”

Learning Community

The earlier theme of having a constructive exchange of ideas is framed by the presence of a community comprising other teachers coming together to address similar learning needs or to learn how to overcome common challenges. This was evident in many of the interviews, and expressed by Ken in this way, “whenever we learn something, we will share it with everybody else as well... this kind of more organic learning community structure helped a lot.” This thought underscores the importance of oTPD as a platform that allows teachers to come together as a community, transcending geographical boundaries, allowing them to connect both in real-time as well as in their own time asynchronously. Discussing the importance of collective participation by “teachers from the same school, grade, or department” Desimone (2009) contends that these opportunities for teachers to learn together “set up potential interaction and

discourse, which can be a powerful form of teacher learning” (p. 184). Surette and Johnson’s (2015) meta-analysis of 20 peer-reviewed studies provides support for Desimone’s point about collective participation, albeit in oTPD contexts. The author found that when teachers participate in online learning endeavors collectively, there is a greater sense of “mutual engagement, reciprocity, social interaction, and accountability among the participants” (p. 265), making the oTPD a more effective learning experience for teachers.

Teacher learning is also enabled if this community of teachers as learners extends back to real-life work contexts, helping teachers to consolidate their learning, and collaborate to apply their learning. McNamara (2010) proposes that there could be additional gains to teacher learning if there is an overlap between the online and face-to-face learning communities since the exchange of ideas and interactions between teachers in job-alike situations is likely to be deeper and richer. Darling-Hammond et al. (2017) suggest that if trust is built in these environments, they can allow teachers to inquire and reflect into their practices, “allowing teachers to take risks, solve problems, and attend to dilemmas in their practice” (p. 10). This sentiment was reflected by May who reported that she was more likely to apply her learning “because there’s also a community that’s doing it...it made me think...I’m going to see if I can apply one of two of these strategies.”

Time and Space for Reflection

Reflection is often cited as a key factor that facilitates teacher learning, whether it be as a form of active learning or collaborative activity carried out by the community (Borko et al. 2008; Darling-Hammond et al., 2017; Desimone, 2009; Garet et al., 2001).

Dede et al. (2009) suggested that oTPD offered unique advantages in that asynchronous discussions allowed teachers “who tend to be silent in face-to-face settings [to] ‘find their voice’ in mediated interaction” (p. 9). This view resonated in the interview with Ken who shared this: “I usually don’t speak up, I’m not that vocal...[but] hearing other teachers encouraged [the sharing] my own reflection.” This suggests that for some, speaking up in an online space may be less threatening as they can have more time to think through and compose their ideas at their own pace before sharing their reflections. This points to the observation about “social access” that Brown and Green (2003) made with regard to online learning. Yang and Liu (2014) made a similar point, observing that online learning communities allow for non-threatening discourse amongst teachers.

Analytic Category 2: Reflection and Learning

There is some concurrence in existing literature and the data from this study of the importance of reflection as a factor that facilitates teacher learning in oTPD. This section examines in greater depth the relationship between reflection and learning, through a discussion of the findings from the analysis of reflective thinking observed in teachers’ posts and their perception of the level of reflective thinking through the reflection questionnaire.

Schön’s influential work (1983, 1987) on reflective practice provides two useful perspectives for discussing the findings on reflective thinking, namely reflection-in-action and reflection-on-action. Throughout teachers’ participation in the oTPD “Disciplinary Literacy,” reflection was built in as a core feature of the course design. Teachers were encouraged to reflect whilst applying the strategies introduced in the

oTPD, as well as reflect on their actions after their application. Dedicated discussion walls were also created for teachers to post their reflection-on-action. Together with teachers' enactment and submission of their Personal Inquiry Task, these posts were analyzed using the four-category coding scheme developed by Kember et al. (2008), and each of these posts was coded at the highest level of reflective thinking observed.

Consistently across the three learning checkpoints in the oTPD, the majority of teachers' reflection (88.2%, 79.5% and 91.7%) was coded at the Reflection level, the third level out of the four-category scheme. This level of reflection suggests that the teachers had moved beyond "book learning" and non-reflective thinking (Kember et al (1999, 2000, 2008) to begin the process of critically evaluating their assumptions about the content or process of problem solving (Cranton, 2006). It also suggests that the teachers had moved beyond a theoretical understanding of concepts and strategies they had learned in the course when they applied their learning to their own classroom contexts and experiences (Kember et al., 2008). The high level of reflective thinking observed both during reflection-in-action and reflection-in-action suggests a likelihood of these teachers being able to think about how they could modify their application of the strategies in future to achieve the desired student outcomes they hope for. From this, it can be seen that reflection has a central place in oTPD given its embedded nature that connects teacher learning in the online environment to their classroom practice (Prestridge & Tondeur, 2015).

The reflection questionnaire (Kember et al., 2000) was sent to teachers who attended the oTPD "Disciplinary Literacy" about a year after the completion of the course. Gathering self-reported data from this subset of teachers, this questionnaire has

the same four categories as the coding scheme. The mean scale score was the highest at 4.2 for Understanding, followed by 3.9 for Reflection and 3.5 for Critical Reflection. The category for Habitual Action was lowest at 1.1.

There was some consistency across the two instruments used to assess the level of reflective thinking in that Reflection was rated high in both, with 86.5% of all posts coded at this level and a score of 3.9 out of a maximum of 5 in the reflection questionnaire. Likewise, Habitual Action was only coded for 2.5% of the posts and reported at a score of 1.1 in the questionnaire. Where the instruments differ were in the findings for Understanding and Reflection. Teachers' self-reports of Understanding and Critical Reflection were higher than what the posts suggested. This was likely due to a few reasons. Firstly, unlike the coding scheme that was used to assess only the highest level of reflective thinking observed in the posts, in the questionnaire, teachers could indicate their agreement with any of the 16 items on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). This was based on the assumption that it was likely for participants to use different types of reflective thinking throughout their oTPD. As a result, the scores were high for three out of the four categories. Secondly, it was likely that the responses in the questionnaire were espousing critical reflection instead of actually demonstrating this high level of reflective thinking. This is because critical reflection involves what Mezirow (1991) termed as premise reflection, the examination and reassessment of existing beliefs, values, assumptions and presuppositions from prior experiences and are often so deeply ingrained they are hard to change. Thus critical reflection is unlikely to take place frequently (Kember et al., 2008). Thirdly, even though the survey was sent to all the participants in the oTPD, the response rate was low (9.4%),

possibly due to the fact that it was administered about a year after the oTPD course had ended, and also because of the heavier workload for teachers due to COVID-19 pandemic. The small number of responses may not be representative of all the teachers who participated in the oTPD, and it was also possible that teachers who responded could come from the small group of teachers who posted reflections (4.5%) that demonstrated Critical Reflection.

The high level of reflective thinking observed in the posts, and the self-reported levels of reflection in the reflection questionnaire suggests that the teachers had experience learning that was useful for their growth. This is supported by data from the course evaluation conducted at the end of the oTPD, with 65% of the respondents agreeing, and 35% strongly agreeing that the online course was useful for their professional development.

Analytic Category 3: Factors that Impeded Learning

Limited Interaction

Whilst opportunities for active learning and collaboration support teacher learning, the lack of opportunities for teachers to interact with one another and the facilitators during the oTPD was found to be an impediment to learning in this study. The lack of interaction was often the result of a uni-directional flow of ideas, observed by Woo, as a “one-way didactic briefing session.” Such prescriptive TPD approach often focuses only on “training teachers in new techniques and behaviors,” or what Darling-Hammond and Richardson (2009) termed “the old paradigm” (p. 6) as this does not support teacher learning and development. This suggests that the characteristics of active

learning and collaboration, which are features of effective face-to-face TPD similarly apply to oTPD.

In Andie's experience, she did not feel motivated to participate in the discussions as she felt as if she was "just talking to the trainer and a few [participants]" as the rest of the participants were reluctant to join in the discussions and had their cameras turned off during synchronous online discussions. Andie did not elaborate when asked if this was due to the facilitation or because participants were not used to online learning. Even though oTPD that is designed for asynchronous access can offer teachers time to compose their thoughts, this affordance is not present if the online session takes place in real-time, making it doubly hard for those who may not speak up in group setting and are at the same time, not comfortable with the technological set-up of the oTPD platform.

Bowers (2000), in Brown and Green (2003), observes that

computers reinforces or marginalize culturally specific patterns of thought and communications in how the technology encodes the cultural assumptions of those who design them. Unfortunately, users who share with creators the same cultural assumptions do not see this inherent bias. (p. 150)

This suggests that while oTPD can offer access to many teachers because it transcends physical boundaries, the online space may not be that easy to navigate for some teachers, especially those who are not as technologically-savvy. For these teachers then, the online modality could pose a barrier for their learning.

Lack of Social and Emotional Connections

In discussing the limitations of online learning, Brown and Green (2003) contend that "important connections among people are forged during live, face-to-face learning

activities” (p. 150). The authors cited Brown and Duguid (2002), who offer this thought that “the Web can give the appearance of membership or access that it does not provide in any meaningful way” (p. 226, in Brown and Green, 2003, p. 150). While this may not apply across all oTPD, the online modality does allow some teachers who may not wish to connect, to turn off their cameras during synchronous online meetings, as Andie experienced. When that happened, it was difficult for her to feel connected to the rest of the participants as they were simply a black screen to her. For a collaborative community to exist in oTPD, Brooks and Gibson (2012) point to the importance of establishing high-quality connections as the online space itself does not necessarily engender that.

Lloyd and Amy also felt that the online space hindered emotional connections that are important for the acquisition of practical skills. Amy recounted a moment in her face-to-face mentoring course where someone’s body language was picked up and discussed as part of the learning. However, she realized that the online modality created a barrier for learning such practical skills as “[t]here is a barrier in the form of the screen...you don't empathize as much with the other person on the other side of the camera.” Fishman et al. (2013) suggested that while oTPD may be advantageous in providing teachers with more autonomy “to take their time and focus on what is most important to them...face-to-face TPD might better support the exchange of practical experience among teachers” (p. 428).

Distractions and Interruptions

The last theme that emerged strongly from the interviews is the ever presence of distractions and interruptions, due to the embedded nature of oTPD in the teachers’ home and/or professional lives. For some teachers such as May, their oTPD experiences

coincided with school closure which meant that their children were at home with them when they were learning. For others, like Tammy and Amy, these experiences took place right after classes in their shared staffroom, which made them prone to interruptions from colleagues who dropped by to ask them questions or to talk to them. A few others, like Karl and May, were inclined to multi-task by checking their email or surfing the internet especially when they felt that they were not learning anything new or were not required to interact.

In the literature review that was carried out for this study, this point has not been well established. However, in a study on e-learning amongst graduate students, Winter et al. (2010) researched the potentially important area of developing e-learners' ability to manage learning and non-learning activities whilst online. The authors found that many of their study participants frequently carried out non-learning activities when they were in their online learning environment and "were concerned about the potential impact of 'social' distractions on their academic work" (p. 81). While this study was not situated in TPD literature, it examined learning via an online modality. Furthermore, there were similarities between the experiences of the graduate students and those of teachers interviewed for this study with regard to multi-tasking and distractions, offering useful thoughts for how teachers could manage their own learning in the context of oTPD.

Synthesis and Contributions to Existing Literature

The emergence of oTPD opens up a wide range of exciting learning possibilities for teachers while "tools and resources generated on the internet network provide great opportunities for enabling and energizing PD" (Yang & Liu, 2014, pp. 734-735). By

offering teachers access, autonomy, flexibility and a variety of learning opportunities that are more easily embedded in teachers' own contexts (Dede et al., 2009; McNamara, 2010; Parsons et al., 2019; Yang & Liu, 2004), oTPD has certain advantages over traditional forms of TPD. When quality oTPD is combined with in-person professional learning communities and networks, this approach to teacher learning was found to have “the greatest success for increasing teaching quality and student learning” (Killion & Williams, 2009, p. 8).

Even though the move to online modality has afforded design features that are beneficial to teacher learning, there appears to be a lack of research about whether the characteristics of effective TPD would apply when the learning is moved online, especially in the Singapore context. This study thus set out to examine factors that facilitated and/or impeded the learning of 12 Singapore teachers in their oTPD experience, and drew on archival data from an oTPD course conducted in Singapore to assess the level of reflective thinking observed. This study found that this move to oTPD has not made obsolete the characteristics of effective TPD that have been established in TPD literature (Garet et al., 2001; Desimone, 2009; Darling-Hammond et al., 2017).

Comparing this synthesis of factors that facilitated teacher learning with the conceptual framework (Figure 4, p. 49) drawn from literature on characteristics of TPD best practices, this study concurred on several points, namely, the need to incorporate active learning, collaboration and opportunities for reflection in TPD design, so as to support the learning of teachers. For the participants in this study, active learning involved having sufficient opportunities to talk through their ideas and concepts with other participants and the oTPD facilitators, leading to more robust discussions, greater

engagement during the learning experience and ultimately more learning for them.

This idea of active learning is also closely related to the idea of collaboration, as engagement in their learning depended greatly on being able to work with other participants, another characteristic of effective TPD included in the conceptual framework. Beyond the act of being together in a learning experience, participants appreciated the camaraderie of learning together as members of a fraternity of teachers. The sense of community gave greater purpose to the learning experience, and encouraged the teachers to go further in their learning.

Another alignment in the characteristic of effective TPD in the conceptual framework and this study is reflection. Intentionally designing reflection as part of the oTPD experience and providing space and structure for participants to reflect on their learning can facilitate teacher learning. Learning is both facilitated as participants reflect-in-action or on-action, and when they think about the application of their learning and re-examined their existing beliefs and assumptions

On the other hand, this study found a few factors that impeded teacher learning that were not as common in TPD literature. Among the barriers to learning, this study also found that teacher learning in oTPD is more likely to be interrupted or disrupted by distractions, something that is rarely, if at all discussed in literature about TPD effectiveness studies. This is because, unlike face-to-face TPD, oTPD is a lot more susceptible to such interruptions that hamper teacher learning. In-person TPD rarely encounters such barriers to learning, as face-to-face learning usually takes place in a more protected setting. This is a pertinent point, and an area that warrants further research,

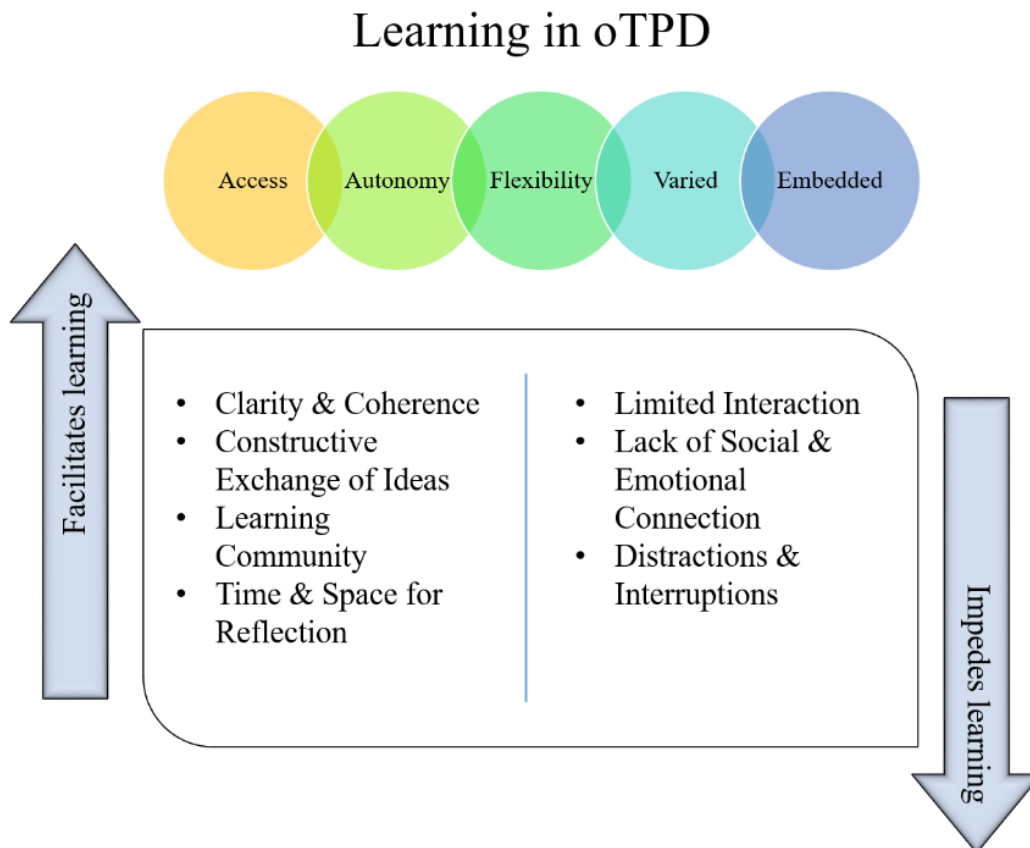
especially into how teachers manage their learning in an online environment, and how their learning can be better supported in such a setting.

Secondly, this study found that there is a need to address how participants can connect socially and/or emotionally in a digital space. Connecting via an online modality is found to alter the quality of social and emotional connections made which can be a form of impediment to teacher learning. Again, this point was not prominent in TPD literature, suggesting that it is an area for further discussion and examination.

In conclusion, oTPD is not a panacea for ineffective TPD. Given the unique opportunities afforded by an online modality, it is an exciting time for researchers in TPD and providers of TPD. To fully utilize the online modality and maximize teacher learning, more research needs to be carried out in the area of oTPD to understand teachers' experiences.

Figure 1293

Learning in oTPD: Factors that Facilitate and/or Impede Learning



Chapter VI

CONCLUSION AND RECOMMENDATIONS

Overview

The purpose of this exploratory case study was to understand the learning experiences of teachers who had participated in oTPD. Specifically, this study was carried out to examine factors that facilitated and/or impeded teacher learning in oTPD. In addition, the level of reflective thinking observed in oTPD participation was assessed. The study addressed the following research questions:

1. What factors facilitated and/or impeded teacher learning in an oTPD course?
2. What is the level of reflective thinking observed in teachers' participation in oTPD?

Ongoing TPD is an important platform for teachers to learn new knowledge and skills or sharpen existing ones so that they are sufficiently equipped to deal with the complex realities in their school and classroom contexts (Darling-Hammond, 2000; Darling-Hammond & Richardson, 2009; Guskey, 2000; Guskey & Yoon, 2009; Killion & Hirsh, 2001; Reeves, 2009). oTPD has emerged as a popular choice of TPD for teachers because of its ease of access and the convenience it affords (Dede et al., 2009). However, participation in TPD or oTPD does not mean that teacher learning has taken place. There has been much criticism in the past two decades of TPD being ad-hoc and/or fragmentary; disconnected from the realities and contexts that teachers operate in; and/or prescriptive and passive (Beavers, 2009; Borko, 2004; Bolt 2012; Brookfield, 1990; Guskey, 2002; Stein et al., 1999; Wilson & Berne, 1999). While shifting teachers'

learning online affords certain benefits, particularly in terms of access, autonomy and flexibility, it is not a panacea for the problems pertaining to poor quality TPD. As there is insufficient research regarding factors that facilitate and/or impede teacher learning in oTPD courses, an exploratory case study situated within the Singapore context was undertaken to address this gap.

This chapter presents the conclusions from this study which follow the two research questions and the interpretations of the main findings. This is continued with a discussion of recommendations and my reflections on this study.

Conclusion 1

When there is clarity and coherence in the content and learning experiences, learning in oTPD is facilitated. Learning is also supported when teachers can exchange ideas constructively with a learning community and when they have time and space for reflections.

Effective TPD helps teachers cope with the “concrete, everyday challenges involved in teaching and learning specific academic subject matter” (Darling-Hammond et al., 2009). In TPD literature, there is an emerging consensus about the characteristics or design features of effective TPD that are most helpful to teacher learning. One key characteristic identified is the need for TPD to have a content focus (Darling-Hammond et al., 2017; Desimone, 2009; Garet et al., 2001). When learning is self-paced and accessed asynchronously in an oTPD, the need to present this content in a clear and coherent manner is increased. Clear organization of content facilitates the ease of access to learning resources and experiences thereby supporting teacher learning. In addition,

sufficient opportunities need to be created in oTPD so teachers can exchange ideas constructively with one another, and learn and reflect collaboratively with an online and/or in-person community. This supports and reflects a social constructivist view of learning (Vygotsky, 1978) that emphasizes the importance of social interaction and community in the learning process.

Conclusion 2

When there is limited interaction during the learning experience and when teachers are unable to connect at a social and/or emotional level, teacher learning in oTPD is impeded. Failure to keep distractions and interruptions at bay also hinders teachers' learning.

Conversely, when there are insufficient opportunities for teachers to interact with the content and with other learners in the oTPD, this creates a hindrance for their learning. Teachers are less likely to offer their perspectives when they perceive a lack of participation from other teachers (Smith & Sivo, 2012), or when they do not receive feedback for their input. When learning takes place virtually, the quality of interactions and connections is affected and there is often a barrier to social and emotional connection, especially for those who are not as comfortable in a technologically-mediated environment (Brown & Green, 2006). Barriers preventing teachers to connect meaningfully with other learners can obstruct their learning and inhibit the formation of a learning community. Finally, learning in an online environment exposes teachers to more distractions and non-learning activities that can be done online. While teachers are more likely to observe certain social norms and stay on task during a face-to-face TPD,

learning via an online modality creates a distance from the learning process and/or the facilitator, thereby removing or reducing the need to observe these norms. In addition, the ‘anytime, anywhere’ embedded nature of oTPD also exposes teachers to a greater likelihood of being interrupted by others if they are not in a ‘protected’ space for learning.

Conclusion 3

oTPD environments can be leveraged to provide teachers with opportunities for on-going reflections during their learning experiences.

This study found a high level of reflective thinking demonstrated in teachers’ online reflection, and concludes that oTPD environments can be leveraged to build in design elements that facilitate reflection to support teacher learning. Reflective practice is seen as “a professional imperative” for teachers (Finlay, 2008, p. 3) and described as “an indispensable methodology of professional development” (Roessger, 2014, p. 18). It is important that oTPD designs provide sufficient opportunities for reflection-in-action and reflection-on-action (Schön, 1987) so that reflection can take place whilst teachers are learning, and retrospectively after the learning is completed. This allows teachers to look back on their learning in light of the new situations they are in. Creating on-going opportunities for deep reflection in oTPD enables teacher learning.

Recommendations for Design of oTPD and oTPD Implementation

This study offers some thoughts on the implications of learning in oTPD and proposes several recommendations based on the findings, analysis, and conclusions

presented in earlier sections. Despite the limitations of the small sample of this study, it is hoped that this study, along with these recommendations, can add to understanding of how teachers learn in an online space and help to foster the learning, growth, and development of teachers.

To enhance the effectiveness of oTPD, it is important for designers of oTPD to design oTPD with characteristics of effective TPD that have been established, albeit recently, in TPD literature (Darling-Hammond et al., 2017; Desimone, 2009; Garet et al., 2001). Firstly, oTPD designers need to ensure that there is a coherent structure in the presentation of course content that is relevant to teachers' learning needs, as this enables teachers to have easy access to their learning. In addition, course information and content should be presented clearly so that the online platform does not become an impediment to learning. Secondly, oTPD designers should build in adequate space and time within the course duration for teachers to engage in dialogues and conversations about what they are learning and what this means for their classroom contexts. This not only allows teachers to engage more actively in the learning process, it also fosters a sense of community amongst teachers, engendering a greater sense of social and emotional connection and a more supportive environment for teacher learning. Thirdly, it is also critical that oTPD learning experiences incorporate reflections as a means for teachers to learn, individually and together, in-action and on-action. Building reflection into the learning process helps to ensure that teachers go beyond book learning and take time to examine the content more closely, review their learning process and perhaps even start to question the basis that undergirds what they are learning (Cranton, 2006). Finally, to ensure that oTPD is

well-designed, regular and timely evaluation should be carried out so that its quality can be continually improved (Darling-Hammond et al., 2017).

As learning in oTPD is a fairly recent phenomenon, TPD providers and schools should provide more support to help teachers to manage their learning online. TPD providers should consider establishing clear communication with regard to nature of the learning activities and expectations before teachers begin their oTPD experience (Cho & Rathbun, 2013). This helps teachers gauge the commitment needed to complete their learning in a fruitful manner and help them estimate and set aside sufficient time for their learning experience. One way this can be done is to make available a course overview with estimated duration needed to complete the oTPD, or “a syllabus with a detailed timeline” (Kim et al., 2011, p. 49) which teachers can review prior to starting their oTPD experience. TPD providers can also consider the use of post-course questionnaire to track other possible supports or barriers to teacher learning and use this to inform the design and implementation process.

Teachers can be also encouraged to take part in oTPD with colleagues from their schools (Curtis, 2018) so that they can have discussions about their learning and collaborate, instead of learning in isolation. Schools can also provide platforms for teachers to connect their learning from their oTPD to the work contexts thereby supporting the links between theory and classroom practice (Parsons et al., 2019). To ensure that teachers can concentrate on their learning and not be interrupted during their learning, school can dedicate time during the workday for teachers to come together to learn (Surette & Johnson, 2015) and create platforms for teachers to share useful

practices that can be employed to manage distractions and interruptions during online learning.

Reflections on Teacher Learning in Singapore

Singapore is a small and young nation. Since gaining independence in 1965, it has managed to transform its education system and achieve gains in student outcomes that has put it on the world map (Kosnik et al., 2016). The ability to reform its education system successfully was in no small part due to strong political support and the collective will within the teaching fraternity to carry out the mission of the Singapore MOE to “mold the future of the nation (MOE, 2012). This national effort to improve the quality of teaching and learning in Singapore was undergirded by a deep belief in education as the “prime engine of economy, nation and identity” (Luke et al., 2005, p. 8, in Goodwin et al., 2013).

With the government providing strong support for the 33,000 teachers within the MOE teaching fraternity, both in terms of financial support as well as the trust and regard given to teachers for their key role in educational improvement and reform, (Goodwin et al., 2013), Singapore teachers have largely embraced the dictum for them to keep learning and upskilling, so that they can perform their best in the classroom. This willingness to learn and openness to different TPD experiences were in many ways reflected in this study, seen in the way participants took to an online modality to continue learning, when face-to-face TPD was cancelled, and in the way participants in “Disciplinary Literacy” carried out the tasks and adhered to instructions to reflect on their learning. This commitment to fulfilling course expectations might have influenced

participants' actions and led to the high levels of reflections observed in this particular oTPD.

However, questions remain as to why critical reflection was not more apparent in the online posts in "Disciplinary Literacy." To what extent are teachers comfortable with engaging in critical reflection, which involve questioning implicit and deeply-held values and assumptions? To what extent do prevailing cultural habits and societal norms in Singapore and in Singapore schools inhibit teachers from questioning underlying assumptions and values in their classroom practices which are necessarily a part of the larger school ecosystem? Finally, to what extent do oTPD environments, with their limitations for social and emotional connections, offer opportunities for critical reflection? Future work in oTPD research in Singapore can take these questions into consideration and the next sections proposes some thoughts on this.

Recommendations for Future Work

This exploratory case study carried out a thematic analysis of teachers' online posts in an oTPD designed with specific instructions for reflection-in-action and reflection-on action. To examine more closely the affordances of oTPD for reflection and critical reflection, future work can look at a wider spectrum of oTPD courses, including those with both synchronous and asynchronous experiences, opportunities for more sustained reflective conversations, and different modes of demonstrating reflection. In addition, future research can examine the extent to which culture, both at national and at school level, affects teachers' reflective mindsets and behavior in oTPD environments.

Furthermore, this study employed a convenience sampling of volunteer participants in Singapore. It is possible that teachers who responded voluntarily to invitations for interviews and surveys have different motivation or orientation to learning from teachers who did not (Desimone, 2009). One recommendation for future study is to consider using non-volunteers. Another recommendation is to explore the links between teacher learning in oTPD and impact on classroom practices and student achievement, using field data of teacher practice to complement the use of self-reported data. Lastly, there is a need to examine more rigorously if reflective capability is a prerequisite of teacher learning and test this assumption across different kinds of oTPD courses and conditions.

Revisiting Assumptions of this Study

When I first began this study, I made several assumptions that were presented in Chapter I. The first involved the assumption that learning is a conscious, active and often collaborative process (Dewey, 1933; Vygotsky, 1978). This assumption was evidenced in teachers' oTPD experiences in Findings 1 and 2. Teachers were keenly aware of what facilitated and/or impeded their learning and what was needed to enable them to have an active learning experience. When they had the opportunities to collaborate meaningfully, this was found to support their learning.

The second assumption that characteristics of effective TPD would also apply to oTPD was also seen, to some extent in Findings 1 and 2. This study found that characteristics such as the need to incorporate active learning, collaboration and opportunities for reflection in TPD design also held true for teacher learning in oTPD,

although the greater flexibility and variety in oTPD offerings also meant that there were other characteristics that were different from face-to-face TPD.

The third assumption that reflection is an integral aspect of teacher learning (Finlay, 2008; Roessger, 2014), and the fourth assumption that reflective thinking can be assessed (Kember et al., 1999, 2000, 2008) were evidenced in some way in Findings 3 and 4 as the high level of reflective thinking shown in the teachers' online posts and their self-reports of reflective thinking demonstrated are artefacts of their learning.

Researcher Reflections

For me, this journey as a researcher, whilst meandering and frustrating at times, has also been hugely rewarding one. For one, I have come to a deeper appreciation that research is deeply personal. Even when there are consensus and dominant themes within a certain field, it will still be worthwhile to investigate the smaller stories within these broad narratives, as there is power and resonance in the voices of every individual. The rich and layered perspectives shared by the research participants during the interviews, and the subsequent analysis and interpretation of the interview transcripts remained my favorite part of this research process.

I also came to realize that the road blocks that I met and the dead ends that I ended up at so often during the initial stages of research was more than an exercise in training my intellectual ability and resolve; these obstacles to an easy completion were necessary to bring out the truth about life not having easy answers and the need to constantly examine and re-examine our incomplete understanding, our assumptions and blind spots. I believe what I have gained from this exercise has helped me become a

better learner, and as I continue to reflect on my learning, to design more thoughtful learning experiences, both for students and for teachers.

Closing Thoughts

A robust, well-designed and implemented TPD policy is a critical dimension to a high-quality educational system. Development and research in oTPD is opening up exciting possibilities and environments for teachers to learn and improve their practice, and more research is needed in this area to understand teachers' experiences. "[W]hen teachers are ... afforded the time to develop and grow in ways that align with the goals and aspirations of and for students, schools can become places of deep learning for everyone" (Low et al., 2017, p. 53). I started this journey firmly committed to supporting the work of teachers through TPD. As this study comes to a close, another chapter will soon begin where I continue to contribute to the growth and development of teachers, as a fellow educator, as a TPD designer, and as a researcher.

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Appendix A – Original Conceptual Framework

1a. Factors that facilitated learning

- The content was clear.
- The content was relevant.
- Ideas and strategies shared were useful.
- The facilitators were skilful in engaging me.
- The facilitators gave me helpful feedback.
- I could reach out to the facilitators easily.
- I was given feedback by the facilitators.
- There was a supportive online community.
- The course gave me sufficient time to learn.
- I can access the course materials anytime and anywhere I want.
- I can post my ideas anytime in an online environment.
- I share my ideas more easily in an online environment compared to a face-to-face context.
- The online environment was easy to navigate.

1b. Factors that impeded learning

- The content was not relevant.
- The facilitators were not present.
- I was not comfortable making posts online.
- I prefer to share my ideas face-to-face.
- I lack the technological know-how to navigate the online learning environment.
- I encountered technical issues (eg. I couldn't access online platform).
- I didn't have sufficient time to complete the course.
- I was given too much time and lost interest.
- I lack the motivation to direct my own learning.

2. Levels of reflective thinking (adapted from Kember et al., 2008)

Habitual action

- follows a strategy described in the course
- rigidly follows the steps of strategy learned
- shows no thought to application
- plagiarises ideas from other posts without showing personal understanding

Understanding

- shows some understanding of a concept/topic/strategy
- understands concept/topic/strategy as theory without relating it to personal experiences or real-life applications

- demonstrates understanding of concept/topic/strategy but attaches no personal meaning to it
- shows heavy reliance to what was said in the course without evidence of examination or application

Reflection

- considers concept/topic/strategy in relation to personal experiences
- discusses application of concept/topic/strategy
- relates concept/topic/strategy to subject area(s)

Critical reflection

- shows premise reflection
- recognizes and changes existing assumptions and beliefs
- demonstrates a critical review of presuppositions

Appendix B – Coding Legend

RQ1: Factors that facilitated and/or impeded learning	
Code	a. Factors that facilitated learning
FFL1	The content was clear and/or well-organized.
FFL2	The content was relevant to my learning.
FFL3	Ideas and strategies shared were useful.
FFL4	I was learning actively in the course.
FFL5	The facilitators were skilful in engaging me.
FFL6	The facilitators gave me helpful feedback/ I receive useful feedback in the course.
FFL7	I could reach out to the facilitators easily/I know that facilitators were present and could address my questions.
FFL 8	I had opportunities to reflect and think about my learning.
FFL 9	I was given feedback or offered thoughts that helped me reflect and learn.
FFL10	There was a supportive online community.
FFL11	The course gave me sufficient time to learn.
FFL12	I can learn at my preferred pace
FFL13	I can decide how much I want to learn at each juncture.
FFL14	I can revisit the content in the earlier units.
FFL15	I can access the course materials anytime I want.
FFL16	I can access the course materials anywhere I want.
FFL17	I can post my ideas anytime in an online environment.
FFL18	I share my ideas more easily in an online environment compared to a face-to-face context.
Code	b. Factors that impeded learning
FIL1	The content was not relevant or useful.
FIL2	The facilitators were not present or helpful.
FIL3	I was not comfortable making posts online.
FIL4	I prefer to share my ideas face-to-face.
FIL5	I find it difficult to connect in an online environment.
FIL6	I lack the technological know-how to navigate the online learning environment.
FIL7	I encountered technical issues (eg. I couldn't access online platform).
FIL 8	I didn't have sufficient time.
FIL 9	I was given too much time and lost interest.
FIL 10	I didn't find the content relevant.
Fil 11	I was frequently interrupted during my learning.
FIL 12	I lack the motivation to direct my own learning.

RQ2. Levels of reflective thinking (adapted from Kember et al., 2008)		
	Codes	Description
		<i>In the post, the participant</i>
Habitual action	HA1	<ul style="list-style-type: none"> follows a strategy without demonstrating significant thought about it
	HA2	<ul style="list-style-type: none"> rigidly follows the steps of strategy
	HA3	<ul style="list-style-type: none"> shows no thought to the applicability of the concept/topic/strategy
	HA4	<ul style="list-style-type: none"> shows a surface approach to learning
	HA5	<ul style="list-style-type: none"> plagiarises or echoes ideas from other posts without showing personal understanding
Understanding	U1	<ul style="list-style-type: none"> shows some attempt to reach an understanding of a concept/topic/strategy
	U2	<ul style="list-style-type: none"> searches for underlying meaning in the concept/topic/strategy
	U3	<ul style="list-style-type: none"> moves beyond a surface approach to learning by asking questions or seeking clarification
	U4	<ul style="list-style-type: none"> understands concept/topic/strategy as theory without relating it to personal experiences or real-life applications
	U5	<ul style="list-style-type: none"> demonstrates understanding of concept/topic/strategy but attaches no personal meaning to it
	U6	<ul style="list-style-type: none"> shows heavy reliance to what was said in the course without evidence of examination or application
	U7	<ul style="list-style-type: none"> does not provide examples of how the concept/topic/strategy are/can be applied to practical situation
	U8	<ul style="list-style-type: none"> does not show consideration to how the concept/topic/strategy relates to personal experiences
Reflection	R1	<ul style="list-style-type: none"> considers concept/topic/strategy in relation to personal experiences or attaches personal meaning to it
	R2	<ul style="list-style-type: none"> discusses how a concept/topic/strategy is/can be applied to practical applications (eg. when talking about T&L, or students)
	R3	<ul style="list-style-type: none"> relates concept/topic/strategy to subject area(s)
	R5	<ul style="list-style-type: none"> discusses situations encountered in practice after applying concept/topic/strategy (after-action)
	R6	<ul style="list-style-type: none"> shows personal insights that go beyond book theory

<i>Critical reflection</i>	CR1	<ul style="list-style-type: none">• shows a transformation of perspective (premise reflection)
	CR2	<ul style="list-style-type: none">• recognizes and changes existing assumptions and beliefs
	CR3	<ul style="list-style-type: none">• demonstrates a critical review of presuppositions
	CR4	<ul style="list-style-type: none">• shows evidence of a change in perspective over a fundamental belief

Appendix C – Recruitment Email

Dear [name of potential participant],

I hope this email finds you well.

I'm Florence, a fellow teacher within the teaching fraternity. I'd like to invite you to participate in a research study I'm undertaking as part of my doctoral dissertation. This study is undertaken in my personal capacity and will support the requirements of a Doctor of Education degree in Adult Learning and Leadership from Teachers College, Columbia University.

From my literature review, I notice that there are very few studies undertaken in Singapore to understand teachers' experiences in online courses. As you have participated in the online course "Disciplinary Literacy" in 2019, I hope to interview you to understand how teachers can be better supported in their professional development endeavors. I believe that this can lead to better understanding of how online professional development for teachers is designed, managed and facilitated.

The interview will be conducted via the Zoom conferencing platform at a date and time of your convenience and will take between 30 and 45 minutes. With your approval, the interview will be video-recorded to allow for a more accurate analysis of findings. Your participation in this study is voluntary and you can decline to participate at any time with no consequence.

As part of my commitment to confidentiality, your name, the name of your school and any other names you mention will be omitted from the report. None of the data from interview will be shared in a way that can lead to the identification of any participants. Themes from the interviews will be reported and any direct quotes used will have all identifiers removed. In addition, no one at the Ministry of Education will see the interview data, and these

interviews will be stored on a password-protected personal computer and destroyed after a de-identified transcript has been made of the interview.

Please let me know if you will be interested in this study. Should you have any questions, please email me or call me at +65 97732463.

Thank you in advance.

Warm regards,

Florence Lee

Doctoral student

Teachers College, Columbia University

Appendix D – Informed Consent

INFORMED CONSENT

Protocol Title: A Case Study of Perceived Effectiveness and Impact of an Online Teacher Professional Development Course in Singapore
Principal Researcher: Florence Lee, +65 97732463,
florence.lee@tc.edu

INTRODUCTION

You are invited to participate in this research study called “A Case Study of Perceived Effectiveness and Impact of an Online Teacher Professional Development Course in Singapore.”

You may qualify to take part in this research study because you meet the following criteria:

1. You are currently teaching in a school
2. You completed an online teacher professional development in 2019 or 2020

Approximately twenty people will participate in this study and it will take about 30 – 45 minutes of your time over the Zoom conferencing platform.

WHY IS THIS STUDY BEING DONE?

This study is being done to understand the experiences of teachers who have participated in an online professional development course. It is hoped that the research findings and recommendations can contribute to deeper understanding of how online professional development for teachers can be better designed, managed and facilitated and support the learning of other teachers.

WHAT WILL I BE ASKED TO DO IF I AGREE TO TAKE PART IN THIS STUDY?

If you decide to participate, the primary researcher will carry out a virtual interview with you for 30 – 45 minutes via the Zoom conferencing platform, at a time of your convenience.

During the interview, the researcher will ask you questions to understand about your experience of learning in an online course. You will be asked to discuss what you have learned in the course, how you think the course has impacted you and what factors supported or hindered you when learning about online.

This interview will be video recorded. If you do not wish to be video recorded, the researcher will audio record you instead. The researcher will tell you when she plans to start and stop the recording. After the video or audio recording is written down (transcribed), the video or audio recording will be deleted. **If you do not wish to be video or audio recorded, you will not be able to participate.** You will be given a pseudonym or false name in order to keep your identity confidential.

WHAT POSSIBLE RISKS OR DISCOMFORTS CAN I EXPECT FROM TAKING PART IN THIS STUDY?

This is a minimal risk study, which means the harm or discomfort that you may experience are no greater than you would ordinarily encounter in daily life. There are some risks to consider. You might feel some discomfort in recalling and discussing some past experiences or current challenges in the workplace.

You do not have to answer any questions or share anything you do not want to talk about. You can stop participating in the study at any time without penalty. You might feel concerned that things you say might get back to your supervisor. Your information will be kept confidential. You will not be required to reveal confidential or proprietary information. There is a small risk of confidentiality breach if it becomes known that you are participating in this study. This is unlikely to result in any negative association with being known to be participating in this study because teachers who signed up for and completed the course are assumed to be motivated to learn. Secondly, the study is carried out to understand how to better support teachers from the angle of online course development. In addition, all data will be de-identified and findings will be reported in aggregate.

Finally, the primary researcher is taking precautions to keep your information confidential. To prevent anyone from discovering or guessing your identity, a pseudonym instead of your name will be used. The master list identifying you with your pseudonym is saved in a password-protected personal computer and locked in a file drawer at home.

WHAT POSSIBLE BENEFITS CAN I EXPECT FROM TAKING PART IN THIS STUDY?

There is no direct benefit to you for participating in this study. Participation may benefit the field of teacher education to better understand the design, implementation and facilitation of online professional development.

WILL I BE PAID FOR BEING IN THIS STUDY?

No, you will not be paid for the study.

WHEN IS THE STUDY OVER? CAN I LEAVE THE STUDY BEFORE IT ENDS?

The study is over when you have completed the interview.

PROTECTION OF YOUR CONFIDENTIALITY

The primary researcher will keep all written materials locked in a desk drawer at home. Any electronic or digital information (including audio recordings) will be stored on a personal computer that is password-protected. What is on the audio recording will be written down and the audio recording will then be deleted.

For quality assurance, the study team, the study sponsor (grant agency), and/or members of the Teachers College Institutional Review Board (IRB) may review the data collected from you as part of this study. Otherwise, all information obtained from your participation in this study will be held strictly confidential and will be disclosed only with your permission or as required by U.S. or State law.

HOW WILL THE RESULTS BE USED?

The results of this study may be published in journals and presented at academic conferences. Your identity will be removed from any data you provide before publication or use for educational purposes. Your name or any identifying information about you will not be published. This study is being conducted as part of the dissertation of the primary researcher.

CONSENT FOR VIDEO OR AUDIO RECORDING

Check and initial if you consent to be video recorded:

- Yes
 No

Check and initial if you consent to be audio recorded:

- Yes
 No

Check and initial if you consent to allow audio-recorded materials to be viewed at an educational setting or at a conference outside of Teachers College, Columbia University.

I DO consent to allow video-recorded or audio-recorded materials to be viewed at an educational setting or at a conference outside of Teachers College, Columbia University.

I DO NOT consent to allow audio-recorded materials to be viewed at an educational setting or at a conference outside of Teachers College, Columbia University.

WHO CAN ANSWER MY QUESTIONS ABOUT THIS STUDY?

If you have any questions about taking part in this research study, you should contact the primary researcher, Florence Lee, at +65 97732463 or at florence.lee@tc.edu

If you have questions or concerns about your rights as a research subject, you should contact the Institutional Review Board (IRB) (the human research ethics committee) at 212-678-4105 or email IRB@tc.edu or you can write to the IRB at Teachers College, Columbia University, 525 W. 120th Street, New York, NY 10027, Box 151. The IRB is the committee that oversees human research protection for Teachers College, Columbia University.

PARTICIPANT'S RIGHTS

- I have read the Informed Consent Form and have been offered the opportunity to discuss the form with the researcher.
- I have had ample opportunity to ask questions about the purposes, procedures, risks and benefits regarding this research study.
- I understand that my participation is voluntary. I may refuse to participate or withdraw participation at any time without penalty.
- The researcher may withdraw me from the research at their professional discretion. This will only happen if the interview goes and remains off topic.
- If, during the course of the study, significant new information that has been developed becomes available which may relate to my willingness to continue my participation, the researcher will provide this information to me.
- Any information derived from the research study that personally identifies me will not be voluntarily released or disclosed without my separate consent, except as specifically required by law.
- Identifiers may be removed from the data. De-identified data may be used for future research studies, or distributed to another researcher for future research without additional informed consent from you (the research participant or the research participant's representative).
- I should receive a copy of the Informed Consent Form document.

By checking this box and typing your name below, you are electronically signing this consent form to participate in this study. You affirm that an electronic signature has the same effect as a written signature. You also confirm you are 21 years or older.

First and last name

Date

Appendix E – Site Permission Form

Dear [name of authorized official],

I am writing to seek your permission to use data from an online course conducted in 2019 as part of my doctoral studies with Teachers College, Columbia University. I hope to carry out an exploratory case study to understand how teachers perceive the impact of learning in an online course. I was part of the team who designed and facilitated this course “Disciplinary Literacy” last year. Therefore, I think that there was a lot we might learn from teachers’ perception of their experience. I also believe that the research findings and recommendations from this study could contribute to better design and facilitation of online teacher professional development, thereby supporting teachers’ learning.

I seek your approval to have access to the following data:

1. Aggregated post-course survey results with anonymized individual comments;
2. Individual teacher reflections on their learning posted in asynchronous online discussions and inquiry task submissions in which individual teachers discussed how they applied their learning. This data will be anonymized and converted to PDF format.

The data described above will be anonymized so that teachers and their schools will not be identifiable in any way and no student information is included in this data set.

In addition, I seek approval to obtain:

3. The names and school email addresses of a sample of the course participants, in order that I can contact them about interviews I wish to conduct to understand their learning experiences.

I will seek their informed consent before I carry out the interview and the teachers will be assigned pseudonyms to protect their identities.

I will take every care to protect the integrity and reputation the organization and any findings and recommendations made in my dissertation and any publications that may arise from this study will be shared with the organization.

Thank you.

Warm regards,

Florence Lee

Doctoral student,

Teachers College, Columbia University

Appendix F – Interview Protocol

Title of Research Study:

Learning and Reflection: An Exploratory Case Study of Singapore Teachers Learning in an Online Professional Development Course

SECTION I: FRAME THE CONTEXT OF THE STUDY

1. Introduction & Appreciation

Thank you very much for taking time to participate in my study. Before we start the interview, I'll like to introduce myself and my research interest. *[Researcher shares her background and research interests briefly.]*

2. Context

I believe that what teachers do is very important and I want to understand how teachers can be better supported in their learning endeavors. I notice in my literature review that there are very few studies undertaken in Singapore, to understand teachers' experiences in online courses. This prompted me to carry out a study to learn more about online learning. By participating in this interview, you will be contributing to better understanding of online learning and this may support other teachers in their professional development.

3. Risks and Benefits

The risks and possible benefits associated with this study are minimal. You may experience boredom during our conversation and can ask to stop at any time. This interview has the same amount of risk individuals will encounter during a conversation or interview. There are no benefits associated with this study although our interview might help you become more aware of what you learned and how you put it into practice.

4. Confidentiality

To protect your confidentiality, I will not use your real name when writing about your experience. While I may quote what you say, I will use a pseudonym instead of your name to protect your identity.

5. Transcripts and Recordings

To ensure that I understand you accurately and help me review what you have said, I would like to seek your permission to record our conversation. This recording will be saved in a secured location in my personal computer and protected by a password that is only known to me. No one else will see this recording. This recording will be transcribed and then securely deleted from my computer upon the completion of my dissertation. If you would like to see the transcript of our conversation, please let me know and I will send you a copy of it. Your participation is voluntary and should you wish to stop the recording at any point, please let me know. Do I have your permission to record our conversation?

6. Payments

There will be no payment associated with participation in this study.

7. Questions

Do you have any questions before we begin? If you have questions during our conversation, or if you don't understand something I've said, please let me know.

SECTION II: INTERVIEW QUESTIONS FOR TEACHERS

1. Getting to know the participants

- i. Could you share a bit about your background as an educator? (eg. how did you become an educator?)
- ii. Could I find out the following from you?

a. Gender	
b. Ethnicity	
c. Age range	<input type="checkbox"/> 25-34 years old <input type="checkbox"/> 35-44 years old <input type="checkbox"/> 45-54 years old <input type="checkbox"/> 55-64 years old
d. Years of teaching experience	<input type="checkbox"/> 0-5 <input type="checkbox"/> 6-10 <input type="checkbox"/> 11-15 <input type="checkbox"/> 16-20 <input type="checkbox"/> 21-25 <input type="checkbox"/> 26 and above
e. What year level do you currently teach?	
f. What subject(s) do you currently teach?	

2. Context of the online learning

- i. Could you describe what this online course was about?
- ii. What led you to sign up for it?

3. How do teachers perceive the impact of learning in an online course?

- i. Could you describe, with as many details as you can, what you did during the online course?

Explore:

- Was the course easy to follow?
- Was the pace was right?
- Were you clear about what the content that was presented

- Did you skip any activities or did you do them all?
- ii. How was this experience like for you?
Explore:
 - Was the learning experience generally positive or negative?
 - Would you consider the time well spent?
 - iii. What are some opportunities for reflections you had? How useful was it?
 - iv. What did you learn from this course? Could you walk me through a time when you used what you got from the online course?
Explore:
 - What did you learn?
 - How did you apply your learning?
 - Was it planned or spontaneous?
 - How long did it take to do it?
 - How did the students respond?
 - Did you notice any change in the way the students responded, i.e. did students grasp the content differently, was the approach more lively or fun or thorough etc.?
 - v. What are some things, if any, from the course, that you are still using? Why do you think this is so?
 - vi. After attending this online course, what changes, if any, did you notice about the way you teach?
Explore:
 - What do these changes look like?
 - Why do you think you made these changes?
 - How did other (students/colleagues/department/school) respond to these changes?
 - How does your department/school respond to these changes?
 - vii. If given a choice, would you have preferred to attend this course face-to-face? Why do you say so?
Explore:
 - How does learning online compare to more traditional modes of learning face-to-face?
 - What adjustments, if any, do you have to make because this was an online course?
 - Why do you think you made these changes?
 - If someone asks you for advice to do well in this online course, what would you tell him or her?
 - viii. What would you say is most and least rewarding about participating in this online course?

4. What factors facilitated and/or impeded teachers' learning?

- i. Could you share a specific moment when you felt most engaged during the course?
What does it look like? What makes it so?
- ii. Could you recall what the facilitator did in the course?
Explore:
 - Were there unique qualities about the facilitator that helped you learn?
 - Could you have learned equally well without any facilitator?
- iii. What would you say supported your learning the most during the online course?
- iv. What are some things that got in the way of your learning during the course? Can you give me a specific example?
- v. Suppose you were to design an online course for your colleagues. Could you talk me through some ideas you would include? What would you avoid? Why do you say so?
- vi. Would you have liked some form of follow-up from the facilitator after the course? What would you have liked them to do and why?
- vii. Is there anything else you feel I need to know regarding your experience of this online course?

SECTION III: CLOSING AND THANK YOU

We have come to the end of our conversation. I would like to thank you again for taking time to share your experiences with me today. If you have any questions pertaining to this study, please feel free to contact me.

Appendix G – Template for Personal Inquiry Task

Name	
School	
Subject Topic /	E.g. Mathematics/Properties of Parallelogram, Rhombus and Trapezium
Level	P5
Student Profile	E.g. Level of readiness, language challenges
Strategy used	Word Wall
Reason(s) for choosing this strategy	My students often struggle to remember the different types of quadrilaterals and their corresponding properties, after I have taught and gone through them in class. Having a word wall with the name of each figure, an image of how it looks like, as well as the properties, will help my students remember the different types of quadrilaterals and their corresponding properties better and will aid retrieval when they need to attempt questions on this topic.
Briefly describe how you implemented this strategy	I introduced the class to the different types of quadrilaterals (parallelogram, rhombus and trapezium) and the properties each of these quadrilaterals have. I then created word cards for each of the terms, together with the image and their corresponding properties and put them up on the word wall to serve as a visual reminder to students and reinforce what they had been taught. Subsequently, when I got students to work on problems in which they had to recall properties of these quadrilaterals in order to find unknown angles or sides, I made regular reference to the words I had put on the word wall. For example, if students forgot the properties of a rhombus, I would direct their attention to the word on the word wall. I plan to add more words to the word wall when I go on to other topics/chapters and to get my students involved in selecting words that should go up on the word wall.
Reflection	1. What went well during your lesson? How did your students benefit from the strategy?
	2. What challenges did you face when implementing the strategy? Why do you think these arose?

	3. How would you implement the strategy differently?

Examples of students' work (E.g. screenshots, photos)

(Ensure that students' names are removed)

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Appendix H – Reflection Questionnaire

No.	Items	Strongly disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1.	When I am working on some of the activities in the online course, I can do them without thinking about what I am doing.					
2.	This online course requires me to understand the content (e.g. ideas, concepts, strategies) presented in it.					
3.	I sometimes question the way I or other participants do something and try to think of a better way.					
4.	As a result of this course, I have changed the way I view myself as a teacher.					
5.	In this online course, I can carry out what I have learned without thinking about it.					
6.	To complete this course, I need to understand the content.					
7.	I like to think over what I have been doing and consider alternative ways of doing it.					
8.	This course has challenged some of my firmly held ideas.					
9.	The online course doesn't require me to learn anything new or think too much in order to complete the assigned tasks.					
10.	I need to understand the content presented in the online course in order to perform the personal inquiry task.					
11.	I often reflect on my actions to see whether I could have improved on what I did.					
12.	As a result of this online course, I have changed my normal way of teaching.					

13.	If I follow the content presented in the online course, I do not have to think too much about it.					
14.	In this online course, I have to continually think about the material being presented in it.					
15.	I often re-examined my classroom experience so I can learn from it and improve my next lesson					
16.	From this online course, I discovered areas in my classroom practice that could be improved.					