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Elaborating a Model for Teacher Professional Learning to Sustain Improvement in Teaching Practice

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Abstract: Effective professional learning is acknowledged as a key lever to improve teacher practice. However, many studies report significant variation in the effectiveness of the types of programs on offer. Recently, there has been a move from the traditional single-event, passive approach to more collaborative and ongoing forms of professional learning. Interestingly, researchers have paid little attention to understanding the experience of professional learning from the teachers' viewpoint. This research sought to develop this understanding by following the attitudes and behaviours of a group of secondary teachers as they participated in an ongoing professional learning program. This professional learning program tracked teachers as they participated in workshops and then applied the learning to their classrooms. Our results suggest five interacting characteristics that contributed to improvements in teaching practice. These findings underpin the development of a process model of professional learning, that we call the Iterative Model of Professional Learning (IMPL).

Introduction

There is a broad consensus that teaching quality is the most significant factor impacting on student learning outcomes (Hattie, 2012; Wenglinsky, 2000) and that teaching quality varies across classrooms (Hattie, 2015; Wiliam, 2011). The most effective teachers are reported to be more than three times more effective as the least effective (Hanushek, 2011). Resolutions are regularly circulated in the media focussing on entry scores into teaching courses, sacking 'under-performing' teachers, and methods to attract high performing graduates from other professions using financial incentives. However, research on expertise in schools suggests that teachers already in schools could be much more effective than they are at present (Wiliam, 2014).

For most teachers, it has been noted that expertise improves during the first seven years of teaching and after that effectiveness remains stable (Berliner, 2004). The urgent question is how to ensure teachers continue to improve their teaching practice, especially after this seven-year timeframe. Schools have an ongoing challenge to better support teachers to continually improve their practice as an essential expectation of schools. Against a backdrop of advancing knowledge and technological transformations, the role of teachers and schools has changed significantly over the past 30 years (Robertson, 2012). The changing nature of schools and the complexity of preparing students for an ever-changing world of work and society means the skills and knowledge developed through initial teacher education programs are simply a foundation on which to continually build. Effective

professional learning programs are viewed as a key factor to support teachers to continually improve (Darling-Hammond, Hyler & Gardner, 2017; Dinham, 2014).

For most teachers, it has been noted that expertise improves during the first seven years of teaching and after that effectiveness remains stable (Berliner, 2004). The urgent question is how to ensure teachers continue to improve their teaching practice, especially after this seven-year timeframe. Schools have an ongoing challenge to better support teachers to continually improve their practice as an essential expectation of schools. Against a backdrop of advancing knowledge and technological transformations, the role of teachers and schools has changed significantly over the past 30 years (Robertson, 2012). The changing nature of schools and the complexity of preparing students for an ever-changing world of work and society means the skills and knowledge developed through initial teacher education programs are simply a foundation on which to continually build. Effective professional learning programs are viewed as a key factor to support teachers to continually improve (Darling-Hammond, Hyler & Gardner, 2017; Dinham, 2014).

There is resounding agreement that effective professional learning is a key critical factor in enhancing teacher quality by enhancing the quality of teaching in classrooms (Vermunt, Vrikki, van Halem, Warwick, & Mercer, 2019; Darling-Hammond et al., 2017; Kennedy 2016). Although we know that teachers come to professional learning with a range of learning needs and interests (Trotter, 2006), this is often not accounted for as most programs have been offered as one-size-fits-all (Darling-Hammond et al., 2017). This approach has limited impact on long-term improvement in teaching practice (Kennedy, 2016; Garet, Porter, Desimone, Birman, & Yoon, 2001; Timperley, 2011). In traditional professional learning, teachers passively participate in single-event workshops, that are notably detached from their classroom and students, and often disconnected from colleagues in their school (Fullan, 2007; van Driel et al., 2012; Kooy, 2009).

Few studies report evidence of the positive impact of professional learning (Avalos, 2011; Guskey, 2009) despite growth in the number of teachers participating in professional learning and an increase in allocation of resources to this area (Darling-Hammond et al., 2017; Dinham, 2016). Surprisingly, there is evidence that the allocation of time and money has not translated into significant, widespread, long-term improvements in teacher practice (Darling-Hammond et al., 2017; Kennedy, 2016; Garet et al., 2001; Timperley, 2011). Over the past two decades, several important large-scale reviews of research have been conducted into the effectiveness of professional learning. Of particular note is work conducted by Darling-Hammond, Hyler and Gardner (2017); Hawley and Valli (1999); Ingvarson, Meiers and Bevers (2005); van Veen, Zwart and Meirink (2012); Cordingley, Higgins, Greany, Buckler, Coles-Jordan, Crisp, Saunders and Coe (2015). These reviews identified a number of key elements and features that underpin positive changes in teacher practice, which ultimately impact on student learning outcomes. Examples of the elements include the importance of developing relational trust within groups and with leaders of professional learning; the impact of providing teachers with some choice in their learning and the value of teachers working in groups such as professional learning teams.

The overarching research question of this study focussed on identifying the key characteristics that lead to sustained improvements in teaching practice. A key outcome of this study was the development of a model of professional learning which we call the Iterative Model of Professional Learning (IMPL). Many models of professional learning exist in the literature and as noted by Boylan, Coldwell, Maxwell and Jordan (2018) no single model can meet the needs of all teachers. The most widely cited models include the work of Guskey (1986), Desimone (2009) and Clarke and Hollingsworth (2002). These models have been proposed as a way of representing the process of teacher change in response to professional learning. These models have progressively changed, built upon and

developed over the years from the early linear model proposed by (Guskey, 1986) to the non-linear and recursive model of Clarke and Hollingsworth (2002). The key element of later models including Desimone's (2009) model is that they are composed of components which are integrated and dynamic.

These models have contributed greatly to an understanding of the elements and processes of professional learning. However, our model takes a more holistic view and considers professional learning from the perspective of the teachers. We specifically investigated the experience whilst they participated in the professional learning process and as they sought to apply the new learning to their own classroom situation. Individual teachers and school leaders can use the IMPL as a guide to empower teachers and colleagues to improve the effectiveness of their teaching, and in turn better support the learning of their students.

This study sought to identify and understand the characteristics that determine the extent to which teachers improve their teaching practice in response to a professional learning program. The study tracked the teaching practice of seven teachers as they participated in ongoing professional learning while undertaking a 'Dialogic Teaching Program' over 12 months. The professional learning program was designed by the facilitator drawing on Dialogic Teaching methods (Alexander, 2008) and using a cycle of inquiry as proposed by Timperley (2011). The teachers participated in four professional learning workshops during the first 10 weeks of the study and were supported to include specific strategies in their classes. Specifically, the program focussed on working with teachers to embed the strategies of a 'no hands up rule' (William, 2011), wait-time (William & Leahy, 2015) and dialogic questioning techniques including cold-calling (Pearsall, 2012). These strategies were explicitly chosen to enhance the dialogue in the lessons and were deemed to be relevant for a range of year levels and subject areas.

The purpose of this professional learning program was for teachers to develop an understanding of The Principles of Dialogic Teaching (Alexander, 2008) and to learn and apply accompanying pedagogical strategies. The Dialogic Teaching program was both evidence-based and aligned to the identified needs of the school. Guided by the school's strategic plan, the Dialogic Teaching program was recognised as a way to strengthen collaborative pedagogy across the school. This feature is supported by Kennedy's research (2016) which states the implementation of any professional learning program must align closely with the overall strategic focus and direction of a school. Another key component of effective professional learning is a strong evidential base (Timperley, 2008; van Veen et al., 2012; van Driel et al., 2012).

Methodology

A qualitative research case study methodology was chosen to generate the data on the teachers' experience of professional learning. In qualitative research, the researcher seeks to establish the meaning of the events from the point of view of the participants (O'Leary, 2013). In this research approach the studies are conducted with the participants rather than the sense that research is being 'done' on them (Merriam, 2009). A case study approach enables a researcher to investigate a phenomenon within a real-life context (Yin, 2015). This approach was appropriate in this context as it was small-scale research in a real setting, with an emphasis on depth rather than breadth (Denscombe, 2003). The high level of detail provided in the study is referred to as a 'thick description' (Yin, 2015). This description then provides a basis for any findings that may be relevant to another setting or situation (Stake, 2010).

Research Site and Participants

The volunteer participants in the study were seven teachers from a large secondary school (1450 students) in metropolitan Melbourne, Australia. It was compulsory at the school for all teachers to participate in some form of professional learning during regular allocated after-school sessions. Following approval from the University of Melbourne Human Research Ethics Committee, the invitation to participate was offered to all 115 teachers at the school to participate in the project via a notice in the weekly staff bulletin. These seven teachers elected to participate in this professional learning program, among a suite of other options. The teachers taught across year levels to students aged 12 up to 18 years of age in a variety of subject areas including mathematics, science, visual and performing arts and humanities. They ranged in teaching experience from seven to 31 years. In qualitative research the aim is not to provide a sample that is representative of a population, the aim is to present, understand and illuminate complex human issues (Marshall, 1996). This sample of seven provided an opportunity for fine-grained analysis of the data sets to provide better quality insights.

Participant	Year Levels taught	Years of teaching
Angela	10 11 12	17
Brian	8	29
Cathy	7 8	16
Carla	7 8 9 10	14
James	7 9 10 11 12	8
Joanne	7 8 9	31
Sarah	8	15

Table 1: Year levels taught and years of teaching experience

The project used Positioning Theory (van Langenhove & Harré, 1999) as a key theory to underpin the research methodology and methods. Positioning Theory proposes that when people engage and interact, they do so from a position (van Langenhove & Harré, 1999). Positions are created by the tacit or assumed roles people are assigned or create (Redman and Fawns, 2010). Positions have inherent rights and duties which influence what individuals perceive to be the expectations of them (van Langenhove & Harré, 1999). Therefore, the Positioning Theory lens provided the scope to track, interpret and better understand the behavior of the teachers as they participated in this professional learning program.

In Positioning Theory, language is regarded as having a social function and power (Harré & van Langenhove, 1991). Therefore, close attention was paid to what the teachers were saying and how they were saying it.

Data Collection Tools

We selected tools for data collection that provided the scope to track the language of the participants over the 12 months of data collection. Four different data collection tools were used to enable a range of data to be collected and collated. This range of data adds depth, rigor and breadth to a study (Creswell, 2009; Denzin, 2000) and means it is more likely to gather accurate and authentic information about the professional learning experiences of the teachers.

Collaborative Interactive Discussions

The project used a Collaborative Interactive Discussion (CID) (Giardiello et al., 2014) in each workshop. To start the process, each teacher received a copy of a CID that included a written prompt and a question. The teachers were asked to read the prompt, write a response and then pass the paper to the person next to them. The teachers then read the same prompt, and their colleague's response. The participants then replied to the prompt and their colleague's comment. The papers are passed around until everyone contributed to each CID prompt. The result is a written discussion where all participants have had an opportunity to express their views. This tool affords the participants the opportunity to share their views on a topic and to also elaborate on their thoughts over time. The inherent strength of this tool lies in the sense of agency held by the participant, who is generating the ideas and not simply anticipating what the facilitator expects (Giardiello et al., 2014). A CID provides a mechanism for understanding the lived experience of people and can enable tacit knowledge to become explicit (Rodrigues, 2014).

Semi-structured Interviews

The researcher interviewed each of the seven participants on five separate occasions over a twelve-month period. The purpose of the first interview was to gather a baseline knowledge of each teacher's understanding of dialogic teaching prior to the program. At subsequent interviews, each teacher had the opportunity to discuss their thoughts and insights, and to tell their story as they participated in the professional learning program. Each interview was audio recorded and transcribed verbatim by one researcher to ensure consistency and accuracy prior to analysis (DiCicco-Bloom & Crabtree, 2006). This research used semi-structured interviews as this enabled the focus of each interview to align with the specific story of each participant. In addition, it allowed the interviewer to respond to the participant's conversation (Denscombe, 2003). The transcriptions of the interviews were made available to each teacher to ensure that they were an accurate record of the conversations.

Personal Meaning-making Maps (PMM)

During the one-on-one interviews, the interviewer asked teachers to create a Personal Meaning-making Map (Falk & Dierking, 2000). This document starts with a single word or question in the centre of a large sheet of paper. In this study, the phrase 'Dialogue in the classroom' was the focus of the PMM. The teachers recorded anything that they saw as relevant to the conversation. The PMM was used to generate ideas, clarify thinking and as a focus of conversation over time. As the PMM was written by the participant this ensured that the focus of the interviews was the teachers' understandings and beliefs, rather than any pre-conceived ideas of the interviewer (Dierking, Falk & Storkdieck, 2013).

Video Recording of Lessons

Selected lessons that the participant delivered during the program were video-recorded. The first recording was to establish a baseline of each participant’s teaching practice. A video recording was taken of a lesson during weeks 4, 7 and 10. The whole-lesson video recordings each of approximately 50 minutes performed two separate functions. Firstly, they provided the teacher participants with artefacts of their own teaching practice (Gaudin & Chaliès, 2015). The teachers could view their video privately and to develop new understandings of their own classroom practice, which is difficult to develop through any other means (Leblanc & Sève, 2012). The second function of the video was for the researchers to examine the extent to which the strategies taught in the professional learning program had been implemented in the classroom.

Group Discussions

Each of the four professional learning workshops included a 10 - 15-minute group discussion. The group conversation that was held during the workshop in week 6 was recorded and transcribed. This recording was used to track the dynamics of the group and to provide further individual information on each teacher.

Phases of Data Collection

The study comprised four distinct phases of data collection. Phase 1 collected baseline data immediately prior to the commencement of the professional learning program. This consisted of a video recording of a lesson and an audio-recorded interview with each participant. The video and interview provided a reference point that was used to monitor and identify changes in practice throughout the study. Phase 2 tracked the teaching practice and attitudes of the teachers using interview, video recording of a lesson with each participant and CID and PMM while they participated in the 10-week professional learning program. Phases 3 and 4 comprised follow-up interviews at six months and 12 months after the initial professional learning program to monitor the extent to which the teachers were reporting their ongoing use of dialogic teaching strategies. Table 2 outlines the process and phases of data collection.

<i>Phase</i>	<i>Data collection</i>
1. Baseline data collection	Week 1: Interview with each participant (Interview 1) PMM and audio recording of interview Video of one lesson
2. Professional learning program	Week 2: Professional learning workshop 1 Collaborative Interactive Discussion (CID) Week 3: Professional learning workshop 2 Collaborative Interactive Discussion (CID) Week 4: Video of lesson Week 5: Interview with each participant (Interview 2) Personal Meaning-making Map (PMM) Week 6: Professional Learning workshop 3 Collaborative Interactive Discussion (CID) Group discussion (recorded) Week 7: Video of lesson Week 8: Interview with each participant (Interview 3) Personal Meaning-making Map (PMM) Week 10: Professional Learning workshop 4

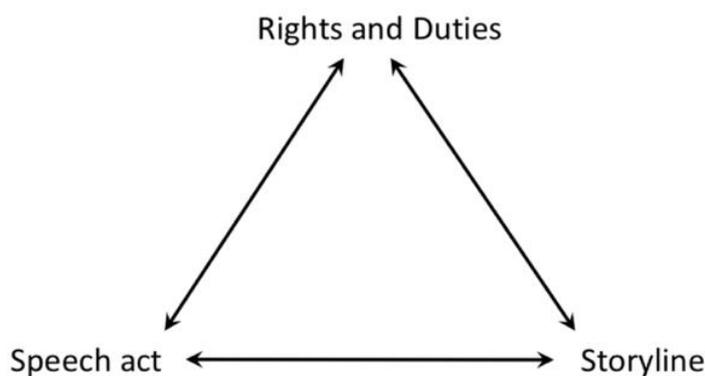
	Collaborative Interactive Discussion (CID) Interview with each participant Personal Meaning-making Map (PMM) Video of lesson
3. Post program interview 1	6 Month: Interview with each participant (Interview 4)
4. Post program interview 2	12 Month: Interview with each participant (Interview 5)

Table 2: Phases of data collection

Data Analysis

The data was analysed using a Positioning Theory lens (van Langenhove & Harré, 1999) in order to determine the key characteristics of the professional learning program which led to a change in teaching practices. This meant that careful consideration was given to not only what the teachers were saying, but how they were saying it. Specifically, we compiled a narrative for each participant framed by three questions which align closely with the Positioning Triangle (Figure 1). This triangle is a schematic representation of the key elements of Positioning Theory; *positions, storylines and speech acts* (van Langenhove & Harré, 1999). The following three questions framed the narratives:

- What are their rights and duties?
- How do their storylines unfold?
- What are they saying and doing?



van Langenhove and Harre, 1999

Figure 1: Positioning Theory Triangle

Once the narratives were written, the language used by the participants was analysed using Pronoun Grammar Analysis (PGA) which is another element of Positioning Theory. PGA is an objective coding tool that supports fine-grained analysis of conversational data. Four specific language features formed the basis of this analysis: pronouns, qualifying words, paraverbals and the use of the phrase ‘you know’. Table 3 outlines the details of each language feature and what might be indicated through their use.

<i>Language feature</i>	<i>Possible indicator of position</i>
Pronoun 'I'	Indication of personal commitment to a statement being made, signal of personal belief, or intention to signal belief
Pronoun 'me' or 'my'	Seeks to locate the speaker intimately to their statement.
Pronoun 'we'	Indication of group opinion/ speaking on behalf of others, this may or may not be shared by those to whom they are representing.
Pronoun 'you'	Indication that the speaker is possibly reflecting on or recalling a past idea or imagining a future scenario.
Phrase 'you know'	Indication of assumed or understood to be agreement with the speaker. Can be used to position others to align with the ideas of the speaker
Paraverbals: e.g. 'um' 'mmm', 'ahh', pauses	Hold a space in a conversation which may allow for thinking time or seeking to control a place in a conversation.
Qualifying words: e.g. possibly, maybe, perhaps, sort of, really, actually	Positions the speaker as uncertain or a weakening or strengthening of commitment, depending on the word used.

Table 3: Language features analysed using Positioning Theory has been adapted from Redman (2013).

We were then able to closely examine what the teachers were saying by identifying themes from their statements and to understand how they were saying it using PGA. This fine-grained analysis enabled us to identify the key characteristics which influenced teachers to make improvements to their practices in response to the professional learning program.

Findings and Discussion

Five key characteristics of effective professional learning that lead to sustained improvements in teaching practice were identified. These characteristics were ascertained from the recurring themes evident across the data of all participants. We contend that bringing these elements together in professional learning programs supports the development of a broader and holistic understanding of the processes and characteristics of effective professional learning.

Effective professional learning programs should:

1. Build trusting, professional relationships
2. Have a foundation of subject matter that is worthy, relevant and accessible
3. Be of sustained duration
4. Provide opportunities for teachers to reflect on their practice
5. Be personalised to support the individual learning needs of teachers

The five characteristics of effective professional learning are described and explained in this section. The excerpts from the data sets which are referenced below are published in the form of text boxes (TB). These brief snippets of conversations represent the key themes emerging from the data across the seven teachers.

Build Trusting Professional Relationship

The study found that trusting, professional relationships were a fundamental element that underpinned the effective implementation of this professional learning program. In our study there were two main types of relationships. Firstly, the relationship within the group between the teachers and secondly, between the leader of the professional learning program, and group members. The activities in the workshops were designed to be collaborative and to support teachers to work together and build a trusting environment.

Pronoun Grammar Analysis was used to track changes in the attitudes of the teachers over the 12 months of the study (see Table 3). In Positioning Theory the use of the pronoun 'I' or 'me' can indicate that someone is trying to share their thoughts on a very personal level (Redman, 2013). Through an analysis of the pronouns evident in the transcripts we were able to analyse the extent to which the teachers were sharing their personal thoughts and beliefs. It is notable that in the early baseline interviews across all teachers, there was little evidence of the use of the pronoun 'I'. The transcripts show an obvious change in the language use from the baseline interviews to those conducted at 12 months. An example of this change is evident in the transcripts of the interviews with Angela (TB1). In the baseline interview Angela predominantly spoke in the third person. In her later interviews, the transcripts showed she had changed to a consistent use of the pronoun 'I' and 'me'. This change in language indicates that she is now sharing her personal thoughts and beliefs. It can therefore be assumed an effective trusting relationship was established. These relationships were significant for Angela; she valued the personal, reflective conversations to support her in her efforts to make a sustained change to her pedagogy.

Angela

if **a teacher** has a safe relationship with **a student** and feels that um there's encouragement and support the student will more likely be more open and more receptive to what **the teacher** has and probably more willing to take on new challenges as opposed to **the student** doesn't feel safe with **the teacher** they are probably going to be a little bit shut down and disengaged (Interview 1)

Things like individual and small group tutorials **I've** stuck with because **I feel** that the kids have grasped the material (Interview 5)

TB1

Brian's responses as shown in TB2 indicate that he was also willing to share his thoughts with the group. He spoke of the personal embarrassment he felt when he watched the videos of his classes. He is unlikely to have spoken in this way if he had not felt the trusting relationship been created with all members of the group and the leader.

Brian

I realised I talked too much (CID 3)

I didn't realise I asked so many obvious questions (CID 3)

Embarrassment is [a] good motivation to change (Group conversation, week 7)

TB2

In the group conversation (TB3) Cathy said she felt uneasy about watching a video of herself teaching. She shared these personal thoughts during the group conversation. Clandinin and Connelly (1995) report that teachers need to feel safe before they reveal their *sacred stories*. If the teachers had felt their colleagues were not supportive, or if they did not feel relational trust had been well established, it is unlikely they would have shared these very personal thoughts.

Cathy

I thought I wouldn't like it, wouldn't like watching myself on video I felt really self-conscious (Group conversation, week 7)

TB3

The relationship with the leader of professional learning also constitutes a key element of effective professional learning. Kennedy (2016) affirms that the most effective professional learning programs are conducted by individuals or groups who had a long history of working with teachers and who can base the programs on their experience and expertise. In this study, the professional learning was facilitated by an experienced teacher, who was a long-term employee of the school, and a member of the senior leadership team. Robinson, Lloyd and Rowe (2008) contend that when school leaders promote and participate in professional learning, this, too, can have a significant impact on student learning outcomes. In this study, the teachers and the facilitator of their learning professional learning program demonstrate that they had established a positive relationship. Their transcripts indicated they were comfortable having open and honest conversations during interviews and in workshops. Opportunities for sincere ongoing conversations appeared to be a significant component that can support teachers as they sought to make long-term improvements to their teaching practice.

Analysis of the qualifying words evident in the interview also revealed the changing level of trust developing within the group. Qualifying words can indicate the strength of commitment to a particular idea or stance (Table 3). Redman (2013) reports the terms *sort of*, *kind of*, *I guess*, *maybe*, *probably*, and *perhaps* can be regarded low-strength as they tend to indicate weakening in commitment to a statement. Words such as *definitely* and *really* can be considered high-strength and therefore indicative of a strengthening commitment to a stance or position. Cathy's and Joanne's data demonstrated their willingness to be part of the program, as evidenced by the high-strength qualifying words (TB4 and TB5). James' transcripts contained several low-strength qualifying words (TB7). This suggests James felt unwilling to state a firm commitment to these ideas which may indicate that he was not yet ready to commit to the program and this was an impediment to his learning.

Joanne

Definitely, I'm glad that I'm participating in this (Interview 2)

I'm really glad that I am part of the process – thank you (Interview 3)

TB4

Cathy

It was a **really good**, positive experience (Interview 3)

TB5

Cathy

I thought I wouldn't like it, wouldn't like watching yourself on video as well because I felt really self-conscious but it was **actually** really helpful looking back and **actually** seeing how you taught and you know even like I was saying to you, facial expressions so something that I didn't look forward to hasn't been that bad at all and **actually** it's been really productive because I can **sort of** see how I did something and how I think of myself rather than have someone critiquing me does that make sense? (Group Conversation week 7)

TB6

James

Yeah sure uuum it **probably** meaning um **I guess** an exchange of ideas um **sort of** thrashing out concepts so that students get a good understanding (Interview 1)

um um **I guess** so..... some **sort of** saying that I read somewhere err .. that students don't know or care about you unless you know they care about you or something like that (Interview 2)

Yeah I'd still like to, I haven't tried the cold-calling yet, I'd like to **really** give that a go um (Interview 3)

TB7

Timperley (2008) states a trusting environment is vital to support teachers to open themselves up to the possibility of changing their practice. Developing and fostering relationships is at the heart of developing a trusting environment (Evans, 2014). Our data certainly supports these points, the teachers became more willing to engage with the new learning once these relationships were established. This ultimately led to improvements in teaching practices.

Have a Foundation of Subject Matter that is Worthy, Relevant and Accessible

The second key finding of our study is that the professional learning activity needed to be designed using a solid base of well-researched, theory-based methods and practices. The Principles of Dialogic Teaching (Alexander, 2008) formed the basis of this professional learning program and this provided a strong evidence base (Mercer & Hodgkinson, 2008). The teachers in this program were supported to further develop their theoretical understanding of dialogic teaching and also the practical strategies to implement the new learning into their classes. Working with teachers to use the strategies of *cold-calling*, *wait-time* and *dialogic questioning techniques* was central to the program and designed to enhance dialogue in lessons.

Angela

The strategies worked well with Year 12 revision. Students were attentive. (CID 2)

They may grasp it a little slower but grasp it better. (Interview 5)

TB8

The relevance of the strategies was evident across our observations of all of the teachers. Angela implemented the strategies with her senior students in the visual arts area and reported that the change led to improvements in the learning and engagement levels of the students (TB8). Joanne, Brian, Carla, and Sarah used the same strategies with junior students across a range of learning areas including mathematics, science, and humanities, and also commented that their use improved the effectiveness of lessons (TB9).

The relevance of these strategies was also highlighted through the teachers' responses to trying out their new learning with their own students in an authentic context. In this case study, the teachers were able to gather, analyse and reflect on the reactions and responses of their own students to the changes they had made to their teaching practice. Darling-Hammond et al. (2017) reports that when professional learning includes processes that are situated in the teachers' classrooms with their students, there is an increased likelihood that the new learning will be transferred. We found this to be an important factor, as these teachers valued the opportunity to implement the strategies in a relevant and authentic context. For example, in TB9 James commented on the improved depth of responses of the students when he used the wait-time strategy. Cathy (TB9) stated that when using dialogic strategies, the students were able to work out answers themselves rather than be told, and Carla (TB9) noticed improved engagement levels when she used cold-calling. Rather than speculating how new strategies might apply in their setting; these teachers were able to gauge students' responses in a real situation in their own context, and this was powerful information that fuelled changes in their teaching approaches.

James

I found it (wait-time) really increased the depth of the sort of response that you get from the kids and I didn't think that would happen (Interview 2)

Cathy

I think at the start it was a little bit challenging for me to get them set up and get it but once they were getting into it and answering some of those questions (um) it was good to be able to see that development and then help them find the answer themselves because they had it in them anyway (Interview 2)

Carla

Students were more motivated, sometimes a little overexcited, but were engaged in the answering of the questions (CID2)

TB9

Ease of implementation is also an important aspect. Sarah (TB10) remarked that this was an important factor for her to try out and continue with new approaches that she learned in the program. In this study, the teachers did not have to make any significant changes to their curriculum programs nor did they need to source extra resources to implement the strategies. However, professional development that is more challenging to implement may require greater support.

Sarah

I think I'm still going okay but here are some very practical, immediately applicable, manageable things that I can do to think about my teaching and make adjustments and I can pretty much do straight away (Group conversation, week 7)

TB10

To support improvements in teaching practices, effective professional learning needs to be relevant to the local context (Kennedy, 2016) and linked to the teachers' own students' work (Greenleaf, et al., 2011). This was the case with the teachers in our study. Seeing the impact of trying out the new learning with their students appeared to be a significant factor leading to improvement in practice (TB18, TB20, TB21).

Be of Sustained Duration

All the teachers in the program made some improvement to their teaching practice over the 12 months of the study. The 10-week program provided an opportunity to learn new material, to try out the strategies and to work with colleagues. The interviews held at six months and 12 months were part of the data collection process to understand the extent to which the teachers had continued to use the strategies, however they were also an important part of the professional learning program. These follow-up interviews served as a mechanism for teachers to reflect upon their practice, which is recognised as a key component to support a change in practice. The interviews at six and 12 months also functioned as a means to remind teachers of the strategies and the possibilities of making changes to their practice. The teachers had agency to implement the strategies in ways that met the needs of their classes, however they were also expected to try out the strategies. Ciafalo and Leahy (2006) refer to this process as supportive accountability. This means that while teachers are held accountable for developing their practice, they are also well-supported to do so (Wiliam, 2014).

Angela

Going back and solidifying stuff is actually really helpful

Smaller manageable bite-sized chunks, as opposed to information overwhelm without a lot of support, there was a lot of support in this. It was also **because it was continuous and on-going** and a skill, I'm going to practise every day (Interview 5)

TB11

Our results are consistent with the results of previous studies, which also report that professional learning must be sustained to have an impact (Knapp, 2003; Garet, Porter, Desimone, Birman, & Yoon, 2001). The teachers in this study specifically referred to the ongoing nature of the professional learning program as a key feature that supported them to implement changes to their practice. This was particularly notable in the findings of Angela (TB11). During the 10-week workshop stage of the program, there were no significant observable changes in her practice evident in the video recordings of her classes. Angela experimented with the strategies in small increments, and during the interviews, at six months and 12 months, she reported that her practice had significantly improved in response to implementing strategies that she learned in the professional learning program.

Cathy

It's good I think that one-on-one time with us as teachers. Not to be spoken at but actually participate and discuss and the **constant reference back makes us shift** (Interview 5)

TB12

The videos indicated Joanne immediately tried out the strategies in her classes and in her interviews she noted improvements in the responses of the students in her classes, which drove her to adopt the strategies. Like Angela, she stated the ongoing nature of the program was an important factor in supporting her to alter her teaching practice. Cathy also specifically noted the ongoing element of this professional learning program (constant reference back) as being significant to support the change of practice (TB12).

We found that the ongoing aspect of this professional learning program was a key characteristic which underpinned the success of the program. This factor enabled other key elements to be realised, namely to build relationships, try out new learning, reflect on practice and to collaborate with colleagues.

Provide Opportunities for Teachers to Reflect on their Practice

The teachers in this study all made improvements to their teaching practice. We found that the opportunities to reflect on their practice appeared to be important to support this change. Teachers' ability to make enduring improvements in practice rests upon changing their beliefs. Reflection has been identified as a fundamental component underpinning any change in beliefs that is needed to support a sustained change in pedagogy (Gallagher, et al., 2017; Greenleaf et al., 2011).

Making a long-term change in teaching practice is recognised as difficult and can require challenging long-held assumptions about how things should be. These assumptions are not often contested or explicitly discussed and, as reported by Redman and James (2016), are part of a shared understanding that this is 'how it is done around here'. The school where this study was conducted was established over 75 years ago, and has many long-serving staff, many practices and routines that are well established.

Throughout the professional learning program, we identified three factors as being the impetus for the teachers to rethink and significantly change their teaching practice. These factors are conversations with colleagues, examining a video of their teaching, and noticing stronger engagement levels of the students.

Conversations with Colleagues

In this professional learning program, the regular conversations that were integrated into the design appeared to be a vehicle through which the teachers were able to develop and increase their awareness of their practice (TB12, TB14). These conversations occurred individually in interviews with the researcher and in group conversations in the workshops.

Joanne

bridging, clarifying information, connection, pathway to understanding (PMM1)

Brian

Oh, you know I mean I'd be thinking about ... engaging the students in um ... in er ... in some conversations about the concepts, asking them questions prompting them f.. for answers and their thoughts on it (Interview 1)

asking students questions, redirecting questions, group work in pairs, comparing responses with partners (PMM1)

TB13

A recognised impediment to teachers engaging in meaningful dialogue about pedagogy is an underdeveloped language to discuss teaching practice (Gore, Smith, Bowe, Ellis, Lloyd, & Lubans, 2015). Notably, the interviewer's initial conversations with all teachers were short and quite narrow in focus. Examples of this can be seen in the transcripts of the baseline interviews with Joanne, Cathy, Brian, and Carla. Their initial contributions were limited and tentative (TB9). Earl and Katz (2006) state that it may take teachers significant time and concerted effort to develop the skills to effectively discuss their teaching practice. This improvement over time was evident across all teachers in this study. The interviews became steadily longer throughout the professional learning program, and the teachers' comments probed ideas more deeply. The language they used became more precise and focussed positively on what they might need to do next to improve their teaching practice. The teachers demonstrated enhanced dialogic skills that Stoll (2010) notes as essential for meaningful conversations about teaching practice.

Joanne

It's good it's got me thinking um more you know. It's just I stop and reflect and think deeper (Interview 2)
TB 14

Examining a Video of Their Teaching Practice

The teachers in this study sought to improve their practice in response to the awareness gained from watching a video recording of themselves in the classroom.

Carla

I felt quite comfortable and I was happy, you know, that I was directing [questions] at all the students it was hard to see all the students at once and I know that students were not doing exactly what they should have been doing, you know, at times but, you know, when you're projecting a question on to a student and they are trying to answer it, it is hard you know to see what exactly what is going on. (Interview 2)

James

Oh yes um I think I was conscious after the first watching those videos is to move around a bit more. I did a lot of up-the-front teaching. (Interview 2)
TB15

Our analysis of the transcripts from the interviews and CIDs confirmed that the teachers watched the videos of themselves teaching and were then able to reflect deeply on their observations. Carla provided an example when she noted she became aware of her movements around the classroom and her interaction with students (TB15). James said that by examining the video of himself, he became cognisant he spent most of his class time instructing students from the front of the classroom reducing his scope to interact individually with his students. This awareness led to James making a conscious effort to move to interact with the students on a one-to-one basis. James and Carla both identified the need to increase instructional emphasis by moving among students in the classroom to monitor and facilitate discussion between the students and with the teacher. Japanese educators have a specific term for describing this practice, *kikan shido*, which translates as 'between-desk instruction' (Clarke, Emanuelsson, Jablonka, & Mok., 2006). This approach requires less time teaching in front of class and more time actively roving among desks to monitor and facilitate students' collaborative work and problem-solving. This approach has been reported as being fundamental to support deep learning (Evans, 2014). By watching a video of their classes, both Carla and James articulated awareness of the need to modify their practice to increase between-desk instruction, as they realised this would lead to improved learning outcomes for their students.

Cathy

I thought I wouldn't like it, wouldn't like watching yourself on video as well because I felt really self-conscious but it was **actually** really helpful looking back and **actually** seeing how you taught and you know even like I was saying to you, facial expressions so something that I didn't look forward to hasn't been that bad at all and **actually** it's been really productive because I can **sort of** see how I did something and how I think of myself rather than have someone critiquing me – does that make sense? (Group Conversation, week 7)
TB16

Video viewing engages the social practice of seeing by eliciting ‘dispositions to notice’ and ‘capacities to reason’ (Lefstein & Snell, 2013). An analysis of the transcripts of the interviews with Cathy demonstrates she was able to describe and, interpret the videos and then suggest what might be the next step to improve (TB16). She stated that she had noticed her tendency to quickly give students the answer to a question rather than support them to work it out for themselves. Cathy stated she felt she needed to carefully plan her lessons to improve her questioning techniques. Had she not watched herself teaching on video, it is unlikely she would have become aware of this by any other means. Cathy found the video to be a more useful method of feedback than having an in-class observation where the feedback is from an external source (TB16).

An Observed Change in Student Engagement with Learning

Teachers in this study were motivated by changes in engagement levels of their students in response to the changes in teaching practice. An example of this was apparent in Angela's teaching practice. The early videos and interviews indicated that she was tentative about trying the strategies and did not immediately implement any strategies. Instead, she made small incremental changes, and when she decided this new approach was beneficial it then became embedded into her practice. In the interview at six months, Angela stated she had changed her pedagogy and practice in response to the new learning (TB1). She specifically noted that she had consistently implemented strategies that would facilitate a dialogic approach in her classes. Angela also reported both the learning outcomes and engagement levels had shown improvement and attributed this improvement in student learning to her adoption of dialogic teaching approaches. In the interview at 12 months, Angela reported that she had continued these dialogic teaching practices as described at six months (TB7). It appeared the key motivator for Angela's behaviour was the impact of the changes in pedagogy on her students.

Joanne

It forces them to be more independent and I've had one or two students who've really struggled with that like in terms of being that way but now that if I sit back and analyse them at the end of the year they've grown a lot. They don't realise how much they've grown and how much more independent than when I got them you know as 'babies'. (Interview 5)
TB17

The teachers reported there was more active student participation in their lessons through the use of the cold-calling strategy (TB18). The teachers also stated they were now more inclined to encourage the students to take more responsibility for their learning. An example of this can be seen in Joanne's response (TB17). Carla, Brian, and James also noticed how the students responded when they tried out the dialogic teaching strategies. Carla indicated the students were more engaged in the activities (TB9). James also believed the depth of student response was enhanced when he used wait-time strategy (TB9). Brian, too, said that use of the questioning techniques led to a higher level of student engagement in his classroom (TB21).

Cathy

.. the incorporation of the cold calling I actually think that that's a really really really good idea and that's something that I'm going to continue to use and I like it because it allows all kids to be involved in that conversation and to be actively involved so they don't know when they are going to be asked and there's no way to, you know, to escape. (Interview 2)
TB18

The findings of this study show that when teachers tried the dialogic teaching strategies and noted an improvement in the engagement levels of the students in the classroom, this was an impetus for them to embed these practices in their teaching.

Be Personalised to Support the Individual Learning Needs of Teachers

Whilst the strategies taught in this study were generic, the type and level of support was individualised to the participants. The teachers noted different aspects of the program as being the most powerful to support them in improving their practice as noted in the interviews with Joanne and Cathy (TB19). There was also wide variation in the rate at which the individual teachers in this study responded to the new learning from the professional learning program. Cathy responded immediately and enthusiastically in response to trying out the strategies. Similarly, Carla implemented the strategies in her classes immediately (TB4). This was also evident in the videos of their classes. Harnessing the energy of early adopters is beneficial in supporting the implementation of professional learning (Whitcomb, Borko, & Liston, 2009). Other teachers engaged with the new learning in a more judicious and gradual manner. Angela made incremental changes to her classes and in the six months and 12 months interviews she described significant changes in which her pedagogy was more dialogically-rich in response to the professional learning (TB6).

Joanne

It's good (yeah) that one on one time with us as teachers, not be spoken at but actually participate and discuss and the constant reference back makes us shift, a permanent shift (Interview 5)

Cathy

Coming together as a group listening to what other people had to say and how they did stuff as well, and also talking about that, I found that useful (Interview 5)
TB19

Notably for one participant, James, this program did not appear to provide the necessary conditions to support him to make a significant, observable improvements in teaching practice during the 12 months of the study. When each of the other teachers in the study noticed a change in the engagement levels of the students in their classes, they reported this as a significant motivating factor to continue to incorporate the dialogic teaching strategies into their regular teaching practice (TB19, TB20, TB21). Whilst James always appeared positive about participating in the professional learning program, it is not clear from his data sets if there were other factors impacting his ability to engage fully and try to implement the strategies in his classes. It is possible as a relatively new teacher to the school, there were too many other competing demands on his time for him to change his practice at that time. It also may be that James is a late adopter of change (Rogers, 2010) and that he may implement the new learning at later time.

Carla

I think communication has improved in terms of the students being able to discuss some of the terms that we've been learning in class together so there's more sort of student interaction (Interview 2)
TB20

Brian

"No hands up rule" created a different atmosphere in my class last week. The students hung off every syllable of the question (CID2)
TB21

There is no single approach to professional learning that can meet the needs of all teachers (Guskey, 1996). Similar to the needs of younger learners, individual teachers have specific learning needs that should be addressed through a range of professional learning activities (Day & Gu, 2007). However, the specific manner in which these individual needs should be approached is not yet well-researched (Kennedy, 2016). Rodgers (2010) stated that people adopt new approaches at different stages, times and for different reasons. Our research reinforces these points and stresses the importance of having different strategies and supports in place to accommodate the variation in teachers' learning needs.

Conclusion

The five characteristics of effective professional learning are integrated into a process-oriented model of professional learning which we call The Iterative Model of Professional Learning (IMPL) (Fig 2).

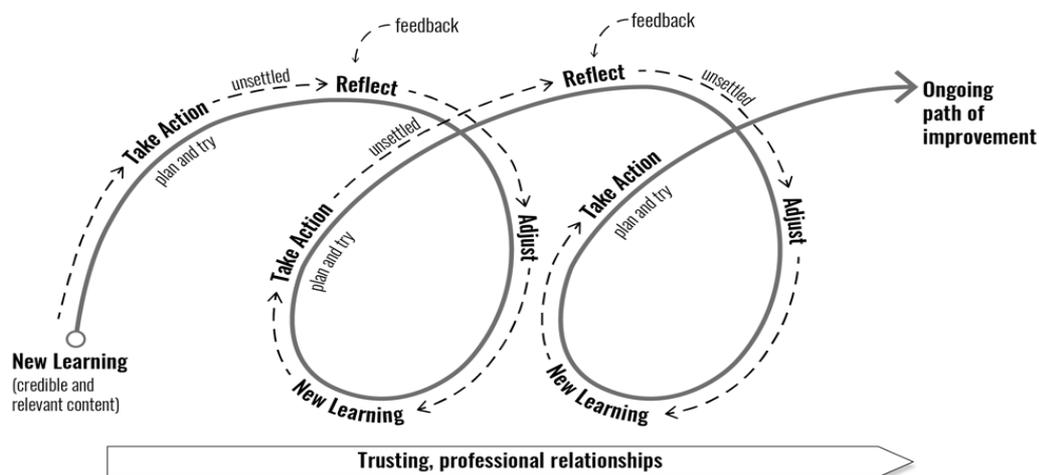


Figure 2: Iterative Model of Professional Learning (IMPL)

This model, unlike other earlier professional learning models describes professional learning from the point of view of the teachers. We looked closely at the personal and social aspects of teacher learning. Our insights based are on the lived experiences of seven secondary teachers not only as they participated in the professional learning workshops but also their experiences as they applied the new learning to their classrooms. We captured a holistic view of teacher professional learning.

This research has identified five characteristics which are highlighted by teachers as key to improving their teacher practice. Trusting, professional relationships are deemed a fundamental component, creating the conditions for teachers to try out new learning, to be open to feedback, and notably to support teachers as they work through their feelings associated with making a change to their practice. The iterative ongoing process provides the opportunity for trusting relationships to be enhanced and for the individual learning needs of teachers to be known and continually supported over time. A second key characteristic is that there is a focus on credible and relevant content, mindful of and responsive to the learning needs of individual teachers. We have also found that teachers need to work collaboratively, over time and have the opportunity to reflect on their practice to improve. This research also highlights that the learning needs of teachers are not homogenous. Teachers come to professional learning with a range of learning needs and experiences which need to be supported and addressed if any program is going to lead to long-term improvement in teaching practices.

This research has both theoretical and practical significance. At a school or system level, this theoretical understanding can support planning of priorities and enable targeted and strategic allocation of resources. These understandings can act as a fundamental tool when planning and considering any professional learning program. The findings can also support teachers to better develop and sustain agency in their learning. An improved understanding of professional learning can support targeted conversations that teachers can have with school leaders and subsequently, facilitate the development of more effective programs that enhance pedagogy in schools. The practical significance of this study is that it provides insights into the many factors that can be deemed essential components of professional learning. These factors can be used by stakeholders as reference points when planning and evaluating programs to maximise the impact of any professional learning program, with the ultimate aim of improving learning outcomes for students of all ages.

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