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Effectiveness of Research-Based Teacher Professional Development:

Rebecca Saunders
Murdoch University, r.saunders@murdoch.edu.au

Effectiveness of Research-Based Teacher Professional Development: A Mixed Method Study of a Four-Year Systemic Change Initiative

Rebecca Saunders
Murdoch University

Introduction

Research literature related to identifying the desirable characteristics of professional development for teachers is considerable and has grown steadily over the past 15-20 years. This research includes large and small scale studies that examine pre and in-service programs and different types of professional development such as seminars, workshops, communities of practice and on-line programs. Despite the diverse content of the literature it is possible to draw conclusions about the general characteristics of professional development that facilitate change in teacher practice. For example, broad agreement exists that effective models of professional development should have clear goals and objectives, be aligned with teacher and student needs (Desimone, 2009; Garet, Porter, Desimone, Birman & Suk Yoon, 2001), provide time for teachers to engage with the subject matter over an extended period of time (Birman, Desimone, Porter and Garet, 2000; Garet et al, 2001; Ingvarson, Meiers, & Beavis, 2005), provide teachers with active learning opportunities (Birman et al, 2000; Garet et al, 2001), include opportunities for feedback and reflection and be collaborative in nature (Darling-Hammond & McLaughlin, 1995; Ingvarson et al, 2005; Joyce & Showers, 1995 & Lieberman & Pointer Mace, 2008).

Notwithstanding these generally agreed principles, questions remain about the impact of professional development programs on teacher beliefs and practices (Garet et al., 2001). How effective are programs built on research-based principles in terms of influencing teacher's attitudes and behaviours, and supporting them on their journeys of professional change? Wilson and Berne (1999), for example, argue that there is a notable lack of empirical evidence about what teachers learn or do not learn in professional development, a position supported by numerous researchers (Dede, Ketelhut, Whitehouse, Breit & McCloskey, 2009; Guskey, 2000, 2009; Hill, Beisiegel & Jacob, 2013; Ingvarson et al., 2005 and Piggot-Irvine, 2007) who all call for the development of more sophisticated methods of evaluating professional development programs. Given a shortage of studies which explicitly examine the impact of professional development designed on research based principles, is it enough to know that programs are planned and implemented based on research and theory and then assume that change in teacher behaviours and beliefs will occur?

Teachers implement aspects of their professional learning in complex systems which we know little about. Thus, there remains a strong need to systematically examine the outcomes of professional development programs built on research-based design principles (Bransford, Bransford, Brown & Cocking, 1999; Garet et al., 2001; Hill et al., 2013; Mouza, 2009; Villegas-Reimers, 2003). Further, there is also a professional and moral imperative held by educational researchers to serve the needs of teachers and policy makers by continuing to extend, refine, and disseminate their findings in this area and to act upon them. The purpose of this study, therefore, is to examine a four-year research-led systemic professional development initiative designed to extend and refine teachers' instructional practice in the vocational education and training (VET) sector in Western Australia. The study used a mixed-methods approach to:

1. discover if teachers have changed their instructional practices as a result of the professional development program;

2. identify components of the professional development program that facilitated or hindered teachers' implementation of instructional innovations;
3. identify systemic features (surrounding context) that facilitated or hindered teachers' implementation of instructional innovations; and,
4. contribute to a better understanding of the design and implementation of teacher professional development informed by research.

Examining Teacher Professional Development

Examining professional development programs for teachers is notoriously challenging, a process Joyce and Calhoun, (2010) have described as "technically demanding" (p. 2). Whilst it is possible to draw general conclusions from research about what elements support teacher change as a result of professional development, drawing valid and reliable conclusions from such a diverse literature base about what works is a more complex task.

In his 2003 analysis of the features of effective professional development Guskey examined 13 different lists of the characteristics of effective teacher professional development. He concluded that there appears to be little agreement amongst researchers regarding the criteria for what constitutes effective professional development and contended that the evidence was "inconsistent and often contradictory" (2003, p. 4). There are several reasons for this. First, a wide variety of professional development models exist, with diverse goals and objectives, aimed at different aspects of teaching and designed for teachers working in different contexts. Additionally, programs are implemented at different periods of time in different political circumstances. Given this diversity, comparisons among models, measuring outcomes and making generalisations is challenging.

Second, models come alive in complex systems which are made up of individual schools, communities, districts, government departments and union structures. The literature reminds us that teachers work within a broader contextual framework, which Smith, Dwyer, Prunty and Kleine (1987) have described as a "nested system". Guyton (2000) used a similar metaphor, stating that developing powerful professional development programs based on research theory and practice is like playing with "nested dolls" (p. ix). It is important therefore to take account of the nature and structure of these contexts and to examine any model of professional development in close relation to the systems which influence its design, operation and assessment.

Third, professional development is not confined to what occurs in a workshop or on a course, but rather is what happens when teachers attempt new practices and processes in their work. Teachers necessarily negotiate a host of variables as they enact new practices and processes. Some of these include student behaviours and abilities, relationships with colleagues, school climate, availability of resources and competing policy imperatives. These variables result in teachers potentially having quite different experiences, and in part account for what Joyce and Calhoun call "variance of implementation" (2010, p. 2). In other words, teachers mould their practices to suit the needs of their immediate environments. What may work for one teacher in one context may hinder another in a different situation. When considering the effectiveness of any model, examining the variance of implementation and reasons for it, is central to helping better support teachers who encounter challenges enacting professional learning. In addition, understanding variance of implementation can help inform the future design of models in different contexts. Given the importance of context, should questions about program effectiveness centre on what models best suit the specific needs of teachers in a particular context? In other words; does the design of the professional development fit its intended purpose, *within a specific context*?

Finally, there are also diverse approaches to the assessment of professional development making it very difficult to make valid comparisons among data. Guskey (2009) and Duke (2008) also note the proliferation of the use of stories and anecdotes in the evaluation of teacher professional development and whilst these help illuminate evidence they are "no substitute for it" (p. 227).

Method

The purpose of this study is to examine the outcomes of a research-based systemic professional development program for teachers in the VET sector. As suggested above, the professional change process is multifaceted and a research design is needed which recognises the complex nature of change as a personal, emotional, behavioural and dynamic process which occurs over a period of time, enacted within particular contexts or systems. In this circumstance a mixed methods approach was used. Using mixed methods allows varied sources of data to be collected and provides the opportunity for the triangulation of data, which can work to address any potential weaknesses that may be inherent in a single method approach and provides opportunities to test the consistency of research findings (Johnson & Onwuegbuzie, 2004).

The Instructional Intelligence Professional Development Program

The professional development program that provided the context for this study is known as *instructional intelligence* (Bennett, 2010). Instructional intelligence (II) was developed by Bennett (Bennett, 2002 & 2010; Fullan 2002) working towards a theory of instruction, and drawing on thirty-six years of his own teaching, research and work with teachers. Bennett describes II as the point at which the "art" and "science" of instruction meet (2010, p. 68). II is intended to merge curriculum, assessment, knowledge of how students learn, instructional skills, tactics and strategies and theories of change (Bennett & Rolheiser, 2001). In describing the "science" component of II, Bennett refers to it as the way in which teachers pay attention to research on the impact of using different instructional methods on student learning by stacking and integrating different methods to create powerful learning environments for students. "Art" is the creative and individual ways in which each teacher uses different instructional methods to suit different groups of students. By increasing teachers' instructional repertoire Bennett argues; "we are more likely to become artful or creative and more scientific or intentional when differentiating our instruction to meet the diverse needs of students" (2010, p. 69).

Instructional intelligence involves more than teachers simply collecting an extensive assortment of instructional methods in the sense that developing expert behaviour in the use of any new skill takes time and practice. A central tenet of the II concept is helping teachers better understand and work effectively with educational change and this was reflected in the design and implementation of the professional development program in Western Australia. The program was based on research and theory into educational change (Fullan 2001; Hall & Hord, 2006; Huberman, 1983) and effective staff development (Bennett, 1987, Huberman & Miles, 1984; Joyce & Showers, 1995; Joyce & Weil, 1996) which recognises that change occurs over time and occurs when individuals work in teams, have opportunities to practice and reflect on their progress and receive constructive feedback and coaching.

For Western Australia (WA), the II professional development program ran for a period of four years, (2005-2008) and was designed to extend the instructional repertoire and

expertise of tertiary vocational teachers. The system-wide program was initiated in response to a change in state legislation which raised the school leaving age from fifteen to seventeen years of age. In an attempt to widen provision and options for students the vocational education and training (VET) system was required to provide school students with access to existing courses and develop new ones specifically designed to meet students' needs. This policy resulted in an increasing number of young students entering an adult learning environment. Anecdotal feedback from teachers and the State School Teacher Union of WA (SSTUWA) was that teachers required new or upgraded instructional and behaviour management skills to successfully engage and manage this cohort of learners. In response to calls for support, the Western Australian Department of Education and Training (WADET) worked in collaboration with program consultants, the teacher's union, college administrators and VET teachers to establish a four year systemic professional development program. The collaborative way in which the program was designed in direct response to calls for support from teachers and involving numerous stakeholders was unique to the sector and the first time a commitment was given to a single program dedicated to instructional improvement which was supported over time.

The design of this program differed from previous professional development provision in many ways. Firstly, rather than individual teachers attending the program and having to implement changed practice in isolation, II participants attended workshops in college-based teams comprising two to four individuals. The program ran for an extended period of time – four years. Workshops were held two or three times a year with each session spanning three consecutive days. At each session, participants engaged with theory and research on a range of instructional innovations. The steps involved in implementing the innovations were modelled and participants practised them and received feedback and coaching on their progress. Participants then considered the process and impact of integrating innovations across different content domains with different cohorts of students. When they returned to their colleges, teachers were required to trial the instructional methods in their classrooms, reflect on the process and meet in teams to discuss progress and provide support using peer coaching.

Research Participants

All research participants in this study taught in the public VET system in Western Australia and were recruited from the group of 35 teachers in the II professional development program. Twenty seven teachers volunteered to take part in this study and comprised 8 males and 19 females distributed across 11 colleges in metropolitan, regional and remote locations (see Table 1). Fourteen participants were from regional colleges, four from remote locations and nine from metropolitan colleges. The group was also broadly representative of VET teachers in WA, working across diverse content and vocational areas including adult literacy, business studies, building and construction, community services, graphic design, metal, mining and engineering trades.
Participants varied in their teaching experience and the number of years they had participated in the program. Seventeen had 11 years or more teaching experience; six had been teaching for over 20 years. Of the remaining 10 participants, two had been teaching for between one and four years and eight for between five and ten years. Seventeen of the 27 had participated in all four years of the program, four for three years and six for two years.

Number of years teaching experience	Years of II participation	Male	Female	Metro	Regional	Remote
1–4 (n = 2; 7.5%)	4		2		2	
5–10 (n = 8; 30%)	4	3	2	1	3	1
	3		1	1		
	2		2	1	1	
11–15 (n = 9; 33%)	4		5	2	2	1
	3		2	1		1
	2	1	1	1		1
16–20 (n = 2; 7.5%)	4		1		1	
	2	1			1	
20 or more (n = 6; 22%)	4	3	1	1	3	
	3		1		1	
	2		1	1		

Table 1: Participants by years of teaching experience and years of II program participation

Instruments

The Concerns Based Adoption Model (CBAM) (Hall & Hord, 2006) is a conceptual framework and set of measures specifically designed to monitor and assess teachers' educational change. CBAM has been widely used by those researching and implementing educational change initiatives and is recognised as one of the most empirically grounded and reliable approaches to assessing educational change (Anderson, 1997; George, Hall & Stiegelbauer, 2006; Hall, Dirksen & George, 2006; Hall & Hord, 2006). CBAM was selected for use in this study because it is anchored in change theory and reflects the view that change is implemented by individuals who enact it nested within wider system contexts.

The model comprises a conceptual framework and a set of dimensions which act as lenses through which to view and understand change processes at the individual and system level. These dimensions are *Stages of Concern (SoC)* which focuses on affective aspects of change or how individuals feel about the process; *Levels of Use (LoU)* which focuses on behavioural aspects of change or the ways in which individuals put learning into practice, and *Innovation Configurations (IC)* which identifies and describes various forms of an innovation that educators adopt throughout the change process. Each dimension comprises a framework and a corresponding set of methods designed to measure the implementation of innovations (Hall & Hord, 2006; Hall & Loucks, 1979; Loucks, Newlove & Hall, 1975).

CBAM SoCQ and the LOU interview protocol were used for data collection and analysis procedures for the first phase of this study. The *Innovation Configuration Map (IC Map)* tool was not used in this study. IC Maps are primarily used in a strategic manner to plan and monitor stages of a change process over time. The aims of this study were to better understand teacher's individual use of instructional innovations and to identify factors which facilitated of hindered their implementation of change; in this circumstance IC Maps were not appropriate for use. The SoCQ has good reliability with test re-test coefficients ranging from .65 to .85, and internal consistency (Chronbach's alpha) ranging from .64 to .83 (Hall & Hord, 2006). The LoU instrument has strong internal consistency measured by Chronbach's alpha ranging from .65 to .98 (Hall, Dirksen & George, 2006) and has test-retest reliability estimates ranging from .84 to .87 (Hancock, Knezek, & Christensen, 2007).

Research Design

The design incorporated four sequential phases, employing quantitative methods for the identification of meaningful patterns followed by qualitative methods for gaining insight into

more complex phenomena (Greene & Caracelli, 1997). Analysis involved the application of descriptive statistics for quantitative data, and interpretive analysis for qualitative data. Figure 1 outlines these corpuses of data.

Phase	Data collection	Participant *n*	Analysis
1	Stages of Concern Questionnaire (SoCQ) Levels of Use Interview (LoU)	27	Descriptive statistics Interpretive analysis
	Case analysis / selection		
2	Semi – structured interviews	8	Narrative analysis
3	Classroom observations	8	Interpretive analysis
4	Short semi-structured interviews	8	Interpretive analysis

Figure 1: Phases of data collection and analysis.

Phase One

In order to identify to what extent teachers were implementing new instructional process in their practice, phase one comprised the administration of the Concerns Based Adoption Model (CBAM) instruments, the *Stages of Concern Questionnaire (SoCQ)*, a 35-item questionnaire, and *Levels of Use (LoU)* interview protocol. To ensure consistency in the focus of responses across the two instruments, participants were asked to select a single innovation they had acquired through the professional development program and to respond to both instruments based on their experiences of implementation with that innovation.

Data were analysed to identify any relationships between individual LoU and SoC scores and to discover patterns within the overall group profile. Associations between the different LoU and SoC groupings were considered and used to identify cases that could provide rich sources of data, allowing inquiry to focus on the relationships between individuals and the systems in which they work. A total of 8 cases were identified as representative of low, medium and high LoU and different SoC; this group progressed through the remaining phases of data collection.

Phase Two

To discover more about the reasons for individual SoC and LoU profiles and placements and to gain a deeper insight into the teachers' experiences of the professional development program and interactions with the wider system, narrative methods were used in the second phase of data collection. Connelly & Clandinin (1990) and Riessman (1993) have suggested that encouraging individuals to re-tell personal stories and discuss the meaning of these allows for freedom of expression and in-depth, personal disclosure.

Individual in-depth, open-ended interviews were conducted. Each interview typically lasted for about 60 minutes. Participants were invited share *personal experience stories* (Connelly & Clandinin, 2000) in which they focused on episodes they felt best described their experiences associated with professional development. The interviews were audio-recorded, transcribed and re-storied (analysing and reconstructing the original story using a pre-determined framework). The re-storied interviews were returned to the participants for verification and endorsement. Connelly and Clandinin's (2000) three dimensions of

interaction, *continuity* and *situation* were applied, providing a three dimensional framework to the narratives, allowing individual experiences to be tracked during the life of the program.

Phase Three

Data gathered from the remaining phases (three and four) were compared against that of earlier stages to better understand the connections between self reported data and observed levels of classroom implementation. Phase three involved observing the 8 participants in their respective classrooms as they used the innovation reported on in phases one and two of data collection. Field notes were taken and data recorded against rubric descriptors devised for four distinct levels of performance, for each instructional innovation. These consisted of level 0 (*No use*), level 2 (*Mechanical*), level 3 (*Routine*) and level 4 (*Refined*). Rubric descriptors were based on the critical attributes for each innovation aligned with CBAM levels of use profiles. Each participant was observed and ranked at one of these four levels.

Phase Four

One week after the classroom observations a final semi-structured interview was conducted. This provided participants with the opportunity to reflect on their practice during the observation and to share feelings about the process and their level of innovation use on the day. Interview data were transcribed and then analysed using thematic narrative analysis and triangulated with that gathered from the previous phases of collection.

Limitations in Design and Analysis

In order to gain an in-depth understanding of the outcomes of the II professional development (consistency) program this study's design incorporates multiple data collection and analysis methods, involving several phases. It is acknowledged, however, that this study has limitations. First, data collection was conducted at the end of the four year program and therefore provides a cross-sectional 'snapshot' of the study group at a particular point in time. Despite this, the study's results reveal important insights about individual experiences of the II professional development and insights about the research and evaluation of professional development more generally.

Second, this study focuses only on the outcomes of professional development program for teacher participants and not on the potential consequences for students they taught. Despite anecdotal evidence from teachers regarding the impact of their use of new instructional methods on student interaction, engagement and academic performance, data were not directly collected from students and it is therefore not possible to corroborate the teacher's views about student impact across all these areas.

Third, it is also acknowledged that the volunteers who participated in this study were motivated and interested to do so and it is not surprising that most are implementing aspects of the program. However, it was also the case that variations in levels of use, stages of concern and personal experiences were clearly evident amongst the group; the participants, although volunteers, were not monolithic. Therefore, although it is also acknowledged that the number of participants in this study is relatively modest, and that generalisations of the findings must be made with caution, the experiences of research participants nevertheless provide considerable value in helping us better understand educational change initiatives.

Findings

The findings from this study are described in the order in which data were collected and analysed. The SoCQ and LoU data were used to first profile participants' *stages of concern* and *levels of use* and to identify meaningful patterns across the twenty-seven teachers. This is followed by description of findings derived from the narrative analysis of interview data collected in phase 2, followed by a brief explanation of the findings from phases 3 and 4.

Phase One – Stages of Concern Questionnaire and Levels of Use Interview Protocol
First and Second Highest Concerns Group Results

For each participant, individual profiles were generated from the SoCQ that displayed relative intensities of teacher participants' first and second highest stages of concern in combination. Examining participants' first and second highest concerns provides insight into the dynamics of concerns and reveals general developmental patterns for both groups and individuals. Participant's highest and second highest stage of concern are given in Table 2.

Highest Stage of Concern	Second Highest Stage of Concern Score							
	0	1	2	3	4	5	6	Totals
0 Unconcerned	0	0	0	0	0	0	0	0
1 Informational	0	0	0	0	0	0	0	0
2 Personal	0	2	0	0	0	2	0	4
3 Management	0	0	0	0	0	2	0	2
4 Consequence	0	0	0	0	0	0	0	0
5 Collaboration	5	5	2	2	1	0	5	20
6 Refocusing	0	0	1	0	0	0	0	1
								27

Table 2: Distribution of teacher participants' first and second highest stages of concern.

The SoCQ revealed that 74% of the group wanted to collaborate with others about a range of issues. CBAM literature (Hall & Hord, 2006) suggests that if an innovation is appropriate and the change process facilitated wisely over time then implementers will move from early self concerns (*Information* and *Personal*) to task concerns (*Management*) within 3 years. At the 3-5 year point of a change process participants tend to reach impact concerns (*Consequence, Collaboration* and *Refocusing*). For the majority of the group to have developed to the *Collaboration* stage "means that change has truly been treated as a process, that the innovation has been given sufficient time to be implemented" (p. 150).

Examining participants' second highest concern indicates that the reasons individuals want to collaborate range across the full spectrum of concerns, from collaborating about any issue regarding use (Stage 0); wanting more information about the use of innovations (Stage 1); managing time and resources (Stage 2); considering the impact of use for students (Stage 4); to changing the ways the innovation is used (Stage 6).

Levels of Use Interviews

Interview data were transcribed and analysed against LoU categories. Assessment of participants' LoU was made by considering responses to interview questions reflecting decision points for each level of use and by classifying behaviours holistically using the LoU

matrix. These data revealed that all the teacher participants were implementing innovations in their practice as a result of the II professional development program. As shown in Table 3, three distinct groups were identified and their characteristics described using the CBAM user profiles.

	Levels of Use						
0	**1**	**II**	**III**	**IVA**	**IVB**	**V**	**VI**
Non Use	**Orientation**	**Preparation**	**Mechanical**	**Routine**	**Refinement**	**Integration**	**Renewal**
Number of Individuals							
0	0	0	0	**11**	**14**	**2**	0
Percent of Individuals							
0	0	0	0	**41%**	**52%**	**7%**	0

Table 3: Levels of use amongst teacher participants

LoU IVA – Routine - 11 Individuals (41%)

Hall and Hord (2006) have stated that a "lack of change" (p. 13) in the ways an innovation is used is the key to identifying a *Routine* user. Having mastered use, routine users establish a regular pattern of working with the innovation and have no plans to adapt or change. Whilst placement at this level provides information about a participant's level of use it is not clear if use has changed over the four year program period or if he/she has made a recent change and is waiting to see its effects. The relationship between the number of years teachers have participated in the program and their placement in this category provides additional information about progress across LoU and the implementation of professional learning. Five teachers in this group had participated in the program for 4 years, two for 3 years and four for 2 years. This suggests that it is possible for teachers to become routine users of innovation within 2 years; Hall and Hord (2006) suggest that to move to this level of use participants need to "have had appropriate facilitative assistance and time." (p. 172) which in turn is indicative of the change initiative being implemented appropriately.

LoU IVB – Refinement - 14 Individuals (52%)

To be placed at this level of use individuals must have enacted a recent change, be planning a change, or be in the process of changing or evaluating use. A key way to support this group is to provide opportunities for collaboration with others using the same innovation to foster new ideas and reinforce use. This information is particularly valuable in conjunction with the SoCQ data, which revealed the majority of the group were at stage of concern - 5 (*Collaboration*). Most of the group would like to collaborate and therefore providing opportunities for them to work together would be an appropriate support strategy.

LoU V – Integration - 2 Individuals (7%)

Both teachers in this group had participated in the program for the full four years. Placement in this group indicates that they have moved beyond personal use to work with others to coordinate their efforts for the purpose of improving student outcomes. Any changes being made do not relate to merely circulating information about an innovation but instead focus on increasing impact for students. Progression to higher levels of use is not always

possible or desirable for all teachers, however, the participants in this group are in the unique position of being able to influence change efforts and support colleagues on their change journeys (Hord, Rutherford, Huling, & Hall, 2004).

Phase Two – Narrative Interviews

As outlined above, quantitative and qualitative data gathered from phase one were used to initially categorise individuals into different SoC and LoU. Distinct sub-groups were identified representative of different the levels of use and stages of concern. These were used to identify eight individuals representative of each sub-group. These eight teacher participants proceeded to phase two of data collection and analysis.

Clandinin and Connelly's (2000) three dimensional narrative inquiry framework was used in to gain insight into teachers' experiences in relation to participation in the program and interactions with the wider system as they attempted implementation. As its name suggests, the framework comprises three dimensions: 1) personal and social (interaction) – relating to an individual's social exchanges and making sense of the self in relation to others; 2) past, present, and future (continuity) – a chronological framework which can be used to view experiences over time; and (3) the notion of place (situation) – relating to an individual's experiences in different places and contexts. Applying these three lenses to the stories helped disentangle the complex reality of teachers' lives and experiences as they implemented instructional change. The 3-dimensional framework also provided a clear structure for examining how teachers felt as they interacted with different groups including students, colleagues, managers and professional development consultants (interaction), the extent to which feelings and behaviours changed over time (continuity) and how these experiences changed depending on the context (situation). Individual in-depth, open-ended interviews were conducted with each of the 8 participants, each lasting for approximately 60 minutes. Participants were invited to recount personal experience stories (Clandinin and Connelly 2000) in which they focused on stories they felt described their experience of implementing instructional change at different points in time.

The data gathered in phase 2 revealed that the features of professional development design that built the capacity of teachers to implement change in their instructional practices included: (1) the extended duration of the program which provided time to build skills and knowledge; (2) sharing of resources and ideas and being part of a college based team and larger community; (3) program structure which included modelling, demonstration, practice and feedback; and, (4) working in peer coaching relationships. Paradoxically, participants reported that peer coaching relationships were a hindrance to their progress when relationships in the teams broke down.

Despite implementing the program on research-based principles; several obstacles emerged for teachers as they began to change their practices, these included: (1) lack of support, negativity and the withholding of resources by college based administration, specifically middle management; (2) competing demands on teacher time due to increased workloads, meeting system compliance requirements and changing job roles; (3) impact of individual emotional responses to change – feelings of fear and insecurity had a significant impact on teachers' choice to implement new instructional processes as they negotiated wider system expectations embedded in their job role and workload allocation. Teachers didn't report any aspects of their interactions with the wider system which helped them implement new instructional practices.

Phase Three – Classroom Observations

The data gathered in phase 3 were used to compare LoU findings from phase 1. This phase involved observing the 8 participants in their classrooms whilst they used the instructional innovation they reported on in phase one and two of data collection. Field notes were taken and data were recorded against rubrics. Rubric descriptors were devised for four distinct levels of performance for each instructional innovation, these levels consisted of – level 0 (*No use*), level 2 (*Mechanical*), level 3 (*Routine*) or level 4 (*Refined*). The descriptors were developed based on the critical attributes for each innovation and aligned with the CBAM levels of use profile descriptions. Participants were observed using their selected innovation in their classrooms and their use was ranked at one of the four levels. In general, findings from classroom observations supported the LoU classifications and revealed that all participants were implementing instructional innovations at *Routine* and *Refined* levels.

Routine Use (2 Participants)

Two participants were classified as *Routine* users of their selected innovation. These teachers explained the use of the innovation to students clearly, implementation was smooth and they were able to clarify any issues raised. Skilled at re-directing students and keeping them on task, these teachers were able to successfully implement the innovation to support the learning outcomes they had targeted.

Refined Use (6 Participants)

The difference between *Routine* and *Refined* users is that in addition to displaying instructional practices outlined for *Routine* use, *Refined* users demonstrated their capacity to stack and integrate other instructional processes with their chosen innovation. This was a positive but unintended outcome of the professional development program and indicates that these teachers were developing instructional intelligence.

Phase Four – Short Semi-Structured Interviews

Short semi-structured interviews were conducted one week after classroom observations took place and provided participants the opportunity to reflect on their instructional practice during the observation, and to share their thoughts on the level of innovation use during the observation. Two teachers said that they were worried about *doing it wrong* and felt that their concerns directly impacted their use during observation; reporting that they missed steps or felt that the students didn't engage in the way in which they had hoped or had done in the past. Interestingly, both of these participants had been classified as *Refined* users and in fact hadn't missed any steps, displaying smooth and sophisticated use. The remaining 6 participants reported that they felt their use on the day was typical and that their students responded in ways they expected. These findings reveal that despite some participants experiencing a range of negative emotional responses all were able to overcome these and implement their innovation successfully.

Discussion

The aims of this study were to: (1) discover the extent to which teachers changed their instructional practices as a result of a 4-year II professional development program; (2) identify components of the II professional development that facilitated or hindered teachers' implementation of instructional innovations; (3) identify systemic features that facilitated or hindered teachers' implementation of instructional innovations; and, (4) contribute to a better understanding of the design and implementation of teacher professional development informed by research.

Extent to which teachers changed their instructional practices

The study's findings reveal that participating teachers changed their instructional practices as a result of the professional development program and are implementing innovations at *Routine, Refined* and *Integrated* levels of use. In this sense the program has been effective at changing teacher practices. The fact that teachers have changed aspects of their instructional practice and demonstrated high levels of use indicates that the content was relevant and the design and implementation of the program was appropriate for their needs and the context in which they worked.

Components that facilitated or hindered teachers' implementation of instructional innovations

Teachers in this study identified several features of the II program design which supported them in enacting change in their instructional practice. The first was, having an extended period of time (four years) to learn, trial and reflect upon their practice. This finding aligns with the literature (Birman et al, 2000; Garet et al, 2001: Hall and Hord, 2006; Little, 1988). Providing teachers with an extended amount of time to adequately engage with the program content, to be able to trial and reflect on their practice is crucial for effective teacher learning to occur. However, as Guskey (2009) reminds us simply adding more time to professional development activities does not automatically equate to making them more effective. Rather, it is the nature of what is done during that time that makes it effective. In this study teachers reported that having time allowed them to reflect and discuss their experiences and ideas – it provided them with a space to examine their beliefs and values in relation to new ways of teaching and also to share resources. Sufficient time also allowed teachers to engage in the second successful feature of program design, sharing contextualised resources, strategies and materials. This finding is also supported by the literature (Darling-Hammond & McLaughlin, 1995; Garet, et al., 2001; Kennedy, 1998) in that when teachers are given opportunities to work with the relevant application grounded in their day to day work, the resulting learning "enables teachers to make the leap from theory to accomplished practice" (Darling-Hammond and McLaughlin, 1995, p. 598). Program designers therefore need to not only consider how much time they allocate for teachers to learn and engage with material but also provide guidance on the nature and structure of the activities teachers take part in. Consideration should be given to how time is allocated and used in teacher professional development and this needs to be built explicitly into program design.

The third positive aspect teachers noted was the structure of the program. Participants reported that the cyclical, iterative nature of theory, demonstration, practice and reflection helped them embed new instructional practices into their repertoires. Despite criticisms of training models of teacher professional development which suggest that they are inadequate

for the current complex nature of educational reform agendas (Little, 1993 & Rhine, 1998), and the emergence of more transformative models which allow teachers to develop a sense of personal agency in the process (Collinson, Kozina, Lin, Ling, Matheson, Newcombe and Zogla, 2009). In this study the Skill Training Model (Joyce and Showers, 1995) was appropriate for the needs of the participants and was instrumental in helping teachers change their practice. This reminds us that professional development takes place in real-world contexts and whilst similarities exist, the complexities of these worlds, like the teachers that work in them are diverse, complex and unique. It is important to consider a range of factors such as, the scale, type and nature of the change required, the numbers of participants involved, their prior knowledge and experience, their degree of commitment to the process, funding available and the intended outcomes of the program. These variables need to taken into account in the design of the program and the most appropriate model selected to meet the unique profile of the context and participants.

The fourth design feature viewed positively by participants was peer coaching (Joyce & Showers, 1995; Sparks & Loucks-Horsley, 1990). Teacher participants stated that peer coaching relationships helped reduce feelings of isolation and provided opportunities to exchange ideas and problem solve. Early research by Showers and Joyce (1996) showed that "teachers who had a coaching relationship—that is, who shared aspects of teaching, planned together, and pooled their experiences—practiced new skills and strategies more frequently and applied them more appropriately than did their counterparts who worked alone to expand their repertoires" (p. 14).

In this study peer coaching was considered overall by participants a favourable component of program design. However, some also spoke of the negative impact of these relationships. Two key issues emerged; (1) some team members failed to attend scheduled meetings and complete the allocated team tasks, resulting in a single team member taking responsibility for the team and its outputs and, (2) interpersonal relationship breakdowns. Conflict is not uncommon to any group process and something Achinstein (2002) identifies as a central and necessary part of the micro politics of teacher change in communities. In all cases, however, participants were able to overcome these breakdowns and completed the program and requirements successfully. Nevertheless, in terms of program design there are important implications to consider regarding the use and role of peer coaching. When teachers work collaboratively to make change the space inevitably becomes a site for potential conflict as different beliefs, values and practices collide. Asking teachers to negotiate and mange this process without providing support and guidance can create unanticipated negative consequences, which could in turn impede individual teacher change; a design feature initially created to support can actually hinder progress. Interestingly, Guskey and Yoon (2009) call for stronger, "valid and scientifically defensible evidence" (p. 496) on the role of peer coaching in professional development programs, whilst Little (1993) claims that peer coaching only suits specific types of content and contexts and it is important to be mindful of the wise application of peer coaching and the need to support teachers throughout the process.

Systemic features that facilitated or hindered teachers' implementation of instructional innovations

Whilst participants identified a number of features of the program design which supported or hindered their implementation of change, when asked to comment on features of the system or the surrounding context which had the same impact, participants reported only negative aspects and were critical of several broader systemic issues they negotiated. These included, (1) lack of support for teams from managers in the colleges, resulting from a lack of

understanding of the program requirements and prioritising other system compliance and reporting requirements, (2) securing time and space to meet in peer coaching teams at their respective colleges, and; (3) dealing with wider system expectations and requirements when these conflicted with their own emotional responses to change.

Despite gaining administrative support and allocating appropriate funds to ensure release time for participants to take part in professional development activities (including peer coaching meetings) related to the program, many reported that competing demands in their workplaces resulted in these often being postponed or cancelled. Further, as new priorities and initiatives arrived in their workplaces; new demands were placed on teacher participants who then had to re-negotiate their time previously allocated to meeting the professional learning program requirements. Many participants also commented on the pressure from managers to use their professional learning time to complete documentation required for auditing purposes and meeting system compliance requirements as contrasted with spending it on professional learning. The misalignment of priorities between academic and administration staff resulted in a lack of systemic support from management and compounded an already pressured space for participants.

In addition to the system barriers identified by participants, individual emotional responses to the change process also proved to be barriers to implementation. As participants interacted with the processes and systems that construct their day to day lives as teachers conflicts arose as they found aspects of implementation were in opposition to wider expectations and normative social practices. Teacher emotional responses to this can be categorised into two distinct areas, (1) emotional responses to their personal use of new instructional process and (2) emotional responses when faced with system blockages (perceived or actual) to their implementation of aspects of the professional development program.

Many teachers reported feeling *anxious*, *nervous* or *stressed* when initially trying out new instructional methods. These emotional responses arose from; (1) teacher concerns regarding what their colleagues would think of them whilst they were trying new instructional practices, (2) teacher concerns about whether trying something new would hinder her students' learning and, (3) teacher concerns over their personal competence in using new practices (remembering the steps and the process, and overall task design). Whilst many reported overcoming these negative emotions with support from colleagues and program consultants, one participant noted that these fears prevented her using new practices with certain groups of students – this emotional dimension of the change process should not be ignored by designers of professional development programs. It is not only important to inform teachers that the feelings they encounter are a natural part of any change process (Schmidt and Datnow 2005) but time and space also needs to be built into professional development processes to allow teachers to discuss their emotional experiences and support one and other (Saunders, 2013).

Exploring the emotional dimension of professional development change process remains a largely neglected area of inquiry findings from this study support growing calls from researchers to develop our understanding in this important area (Hargreaves, 2000, 2001, 2005; Harris, 2004; Nias, 1996; Lee and Yin, 2010; Saunders, 2013; Sutton and Wheatley, 2003 and Zembylas, 2002).

Conclusion
Towards a better understanding of the design and implementation of teacher professional development informed by research

So what can be taken from this study to help better inform the design and implementation of teacher professional development programs informed by research? Although the findings reveal that we still have much to learn, specifically in relation to meeting the individual needs of teachers in different contexts within complex systems. We can conclude that when it comes to professional development one size definitely doesn't fit all. Each change landscape is characterised by multiple relationships, places and contexts mediated over time by competing priorities and personalities. Two programs may be designed and implemented in similar ways but provide very different results; context then must be taken into account. Despite the endless lists of desirable characteristics of professional development Guskey reminds us to pay attention to the "nuances of context" (2003, p. 16) and suggests that instead of trying to compile a definitive list of professional development "best practices" (2009, p.231) designers would be better working with "collection of core elements" (p.231) based on the research. Programs need to be adapted and contextualised for specific purposes and situations (Penuel, Fishman, Cheng & Sabelli, 2009) and designers need to be able to combine the "core elements" of good design with a solid understanding of the context.

Findings from this study indicate that the program was successful in supporting teachers to change their instructional practices and beliefs. However, we can also conclude that there is a continued need to research programs built on research-based principles and this study provides evidence to support this claim. For example, the II professional development program was structured in accordance with research based principles, for example; (1) stakeholder support was sought and won, which included – the state education and training department, the teachers union and all 11 publically funded colleges in the state; (2) the program was implemented over a prolonged period of time to give teachers time to practice and embed new skills (in this case, four years), (3) the program's design incorporated theory, demonstration, practice and feedback and follow up and participants attended in teams and engaged in peer coaching, and (4) content was contextualised, work related and integrated into teachers' learning areas. However, it is clear that it is not as simple as putting structures in place (providing funding and signing formal agreements) and assuming implementation will automatically occur, as several unforseen issues arose. 'Set and forget' is not the answer, there is still much to learn about the individual experience of change nested within complex systems. Lessons learnt from this study are that middle management needs to be fully informed, involved and held accountable for ensuring agreements made at the beginning of the outset are followed (kept) for the duration of the professional development program. There is also need to better understand the dynamics of implementing professional learning 'back at the ranch', the barriers teachers most commonly experience, the reasons they occur and what strategies we can use to support teachers.

Participants who took part in the II professional development program would also have benefited from guidance on managing peer coaching relationships including for example, developing team conflict management and negotiation skills and creating shared team expectations and accountability strategies. Additionally, developing participants' understanding of the affective aspects of a change process could be beneficial. Helping teachers develop an understanding of their emotional responses to change and providing opportunities for them to share these with others may assist them to better manage their emotions and negotiate the process (Saunders, 2012). As discussed, these issues are largely neglected by educational change researchers in favour of a focus on the mechanistic nature of

the change process. More research is needed of the personal, individual experience of the system change experience.

To simply implement professional development programs that have been designed based on research and theory is not enough. There is a need to extend and build upon our empirical knowledge based on evidence of what works (Fishman, Marx, Best & Tal, 2003 & Hill et al. 2013) and to use this knowledge wisely in specific contexts. It is important therefore to continue to explore, refine and develop our understanding to enable educational reformers, policy makers, and those directly involved in the design and implementation of professional development to better support the needs of teachers.

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