Mentoring Reflective Practice
In Pre-Service Teachers:
A Reconstruction Through The Voices
Of Australian Science Teachers

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ABSTRACT

This paper explores the formative basis of the professional reflective practice of in-service science teachers through their reconstruction of their pre-service interaction with lecturing staff. It reports through the voice of graduates of the Bachelor of Science/Bachelor of Teaching double degree program of Avondale College, NSW who are currently practising in the classroom setting. Through these narratives the study focuses on mechanisms for the development of professional reflective modalities; and the levels of coherence between lecturers' actual practice of reflective, critical thinking and in-service teacher's conceptualisation of professional reflection that informs the development of their present professional reflective aptitudes, understandings and practices.

Keywords: Reflective Practice, Mentoring, Teacher Education, Student Voice.

INTRODUCTION

*P*rofessions, such as teaching, that involve considerable internship experience as part of the formative training process, focus on skill exploration and enhancement. Students, like the professionals they aspire to be, struggle with questions evaluating their skills development for performing learning activities in their practice of the art of teaching. This process of questioning and evaluating is central to the teaching identity of each student. Teaching identity is a mix of performance-practice skills, theoretical frameworks, personal and professional reflection. Schön (1983, 1987) emphasizes action-reflection pedagogies and the reconstructive function of practice for professionals such as teachers. Schön places at the centre of education of professionals the building of capacity in students to reflect and to develop throughout the professional's life the ability for continued learning and problem solving through reflection-in-action and reflection-on-action.

Early in the teacher empowerment movement linkages were made (Giroux, 1985) between effective changes in schooling practices, critical self-reflection (Shor, 1980) (Sparks-Langer & Colton, 1991) and dialogue (Gitlin, 1990; Gitlin & Price, 1992). Evaluation of the 'relationship between teaching intentions and practices that point to "living contradictions"' (Whitehead & Lomax, 1987, p. 183) by teachers is central to the development of a 'thoughtful, self-directed professional' (Colton & Sparks-Langer, 1992, p. 155). Bright argues that reflective practice is 'the process which underlies all forms of high professional competence' (Bright, 1996, p. 166).

Concurrent with the considerable interest in teaching and learning in the tertiary sector (D'Andrea & Gosling, 2001) in the last two decades the recent literature on teacher education is replete with references to 'reflective professionals' engaging in 'critical reflection'. While ill defined (Hatton & Smith, 1995), the modern literature on reflective professional practice is prolific, commencing with the classic work of Dewey (1933). Dewey and later writers generally saw reflective practice as an active, persistent and careful consideration of the basic assumptions and conclusions one holds in one's direct experiences that inform future action (Whitton, Sinclair, Barker, Nanlohy, & Nosworthy, 2004).

Within the current critical tradition research is validated in practitioners' self-understandings where the conditions of free and open dialogue operate (Carr & Kemmis, 1986). Professional competence is hence directly linked to a capacity to reflect and voice. Baird (1991) and Knights (1985) in reviewing practical and effective stimuli to the development of teacher's reflective practice, both comment on the effectiveness of discussion and dialogue. Osterman and Kottkamp (1993, 2004) place reflective practice, while personal, solidly in a collaborative and developmental setting. Nias (1992) also notes the efficacy of systematic reflection when undertaken in dialogue with others. Reflective practice then involves not just a reflection, it involves the transformation of professional values and actions of the individual professional and those they interact with (Ashcroft, 1992). Qualities such as open-mindedness, responsibility and wholeheartedness (Zeichner & Teitelbaum, 1982) and skills such as the ability to communicate, exchange ideas, engage in self assessment and teamwork (Ashcroft, 1992) appear to be precursors to the development of reflective practice.

Teacher education programs, both pre-service and in-service, often state that they are based on a reflective professional model (Furlong, Whitty, Barrett, Barton, & Miles, 1994). Lynch (2000), a critic of reflective practice, notes the centrality given to reflective practice in teacher education with the comment that reflection has become 'an academic virtue and source of privileged knowledge' (p. 26). Increasingly teacher education programs have given a central role to reflective practice as an important aspect of teacher formation (Griffin, 2000). The complexity of extended, interwoven incidents across multiple contexts along with problematic mentor relationships in teaching adds to the difficulties of exploring the nature of reflection within teaching (Calderhead & Shorrock, 1997). Grossman (1992) suggests that the impact of staff involved in the professional training of pre-service teachers may be more substantial than previously recognised.

It is evident that the most influential factors in shaping a professional teacher's practice are staff involved in professional training, supervising teachers, and peers (Calderhead & Shorrock, 1997). This paper explores the genesis of the issues and trends in influence identified by Grossman (1992), and Calderhead & Sharrock (1997), specifically applied to the effects of staff involved in undergraduate professional training on pre-service science teachers' reflective practices. This paper seeks to identify, through a reconstructed understanding of the formative basis of teachers' professional practice, those elements within the complexity of the tertiary pre-service learning environment (Francis, 1997) that are perceived to impact on the development of in-service science teachers' reflective professional practice. In particular, the study examined from the voice of practising science teachers:

- How professional reflective practices are developed during the pre-service experiences of science teachers? And is that development effective?
- How in-service teachers' subsequent development of reflective professional practice is affected by: Interactions with pre-service lecturing staff? and, the perception of pre-service lecturing staff's practice of reflective critical thinking by science teaching graduates?

These questions have significance due to possible long-term benefits to professional training and practice for teachers and tertiary professional training pedagogy. Significant resources, both in pre-service training and in-service professional development are expended specifically to develop professional reflective understanding. Limited research has occurred on how pre-service teachers view and consider the process of reflective practice formation (Pedro, 2001; DeMulder and Rigsby, 2003). This study adds to this research by its focus on the articulation of voice from participants in teacher training.

LITERATURE

This brief literature review focuses specifically on the literature relating to the interface of reflective practice with teacher education prior to integrating the literature relating to the twin concepts examined within this research: mentoring and reflective practice.

Teacher education programs have over the last three decades given increasing emphasis to reflective teaching. Weshah (2007) links the interest of teacher educators in reflective practice with the changes in cognitive psychology and the increasing dominance of constructivist theory over the last three decades. While teacher education programs espouse a number of aims (Calderhead & Gates, 1993) and use a range of tools such as action

research, reflective journals, coaching etc., there is general concurrence in the field that the placement of the ideas about reflective practice into practice is difficult. Calderhead (1993) identifies the associated issues and dilemmas for teacher educators. These concerns centre about the broader question of how reflection is developed and nurtured within the complex processes (Loughran, 1996) of professional development associated with teaching and learning.

Hatton and Smith's (1994) review of literature on the development of reflective practice in pre-service teachers focuses on written forms of evidence. The study concluded that final year students show clear evidence of reflection in their written work. The majority of evidence involved descriptive reflection, followed by dialogic reflection, with very few documented incidences of critical reflection evident. Hatton and Smith's study of Sydney University pre-service teachers also emphasises the importance of having 'others [peers and academic staff] to facilitate reflection' (p. 15), especially 'the important other' (p. 16).

It is evident that teacher educators have high expectations of reflective practice in pre-service teachers while it appears that some lengthy periods of time are often required for levels of reflection to develop (Calderhead & Gates, 1993). Reflection emphasises understanding by means of learning through questioning and investigation (Smyth, 1992 cited by Loughran, 2002). There does appear in the literature to be a consensus that there is a developmental process in becoming reflective (Loughran, 1996; Pultorak, 1996; Steffy, Wolfe, Pasch, & Enz, 2000).

Lived experiences, vicarious and observed, are powerful influences on the formation of beliefs, values and practice. Mentoring 'provides an informed, experiential foundation on which to advocate and commit to expanding the practice of reflection beyond [ones] self' (York-Barr, et al., 2006, p. 20). We do not learn significantly from experience, but from processing experience (Arin-Krupp, 1982). Significant others, such as mentors, provide hope and optimism for our own practice, through their experience (Block, 2002).

Co-engagement in reflection is highly supportive of the process of reflective practice (York-Barr, et al., 2006). Dewey saw reflection occurring in the context of community (Rodgers, 2002). Quality relationships, connection and associated emotional states are key determinants of the quality of reflective practice (Ellinor & Gerard, 1998). Relational trust is considered a core condition to foster reflective practice (Bryk, Camburn, & Louis, 1999; Osterman & Kottkamp, 1993).

For pre-service teachers, lecturing staff provide key relationships of trust as they commence their professional training. For those new to reflective practices guidance and structure positively support the process, especially in the development of critical reflection (Dinkelman, 2000; Spaulding & Wilson, 2002; Yost, Sentner, & Forlenza-Bailey, 2000). Reiman (1999), drawing on Vygotsky, created a reflective framework that portrayed knowledge construction in reflective practice as a co-creation through interaction with others; particularly a 'capable other' in 'guided reflection'. The mentorship of lecturing staff as the 'capable other' deeply imprints a model of professional practice that has life-long learning and professional development impacts.

The modern literature on mentoring and reflective practice is extensive, reflecting the variability and broadness of meanings and worldviews associated with these concepts. Within the variability and ambiguity relating to these concepts evident in the literature there is strong majority congruence on the utility of the dual concepts in education, especially for the improvement of educational outcomes.

The literature on mentoring arises from disparate origins and has no strong central conceptual focus or individual who has shaped subsequent discussion and debate. In the training and development of professionals, such as teachers, there is agreement that context, community and in particular the influence of significant others, impact greatly on one's developing sense of professional self and in one's concepts and belief structures. For pre-service teachers, academic staff are primary significant others, moulding their emergent professional lives as they are inducted into the teaching profession (Basile, 2006; Basile, Olson, Nathenson-Mejía, 2003; Hurling, 2006; Wang, 2001). In particular mentoring by academic staff, especially teacher educators, is closely related to the underlying precedent conditions necessary for the effective development of reflective practice (Costa, 2006; Wang & Odell, 2002).

Dewey (1910, 1933) and Schön (1983, 1987) dominate the discussion of reflective practice in the modern and post-modern era. Their notions have shaped the debate and development of the literature. Schön's conception has particularly impacted and resonated with teacher education and education in the last 20 years, arising to prominence in conjunction with the educational reform and critical theory movements of the late 1980s and early 1990s.

Schön's writings on mentoring and his emphasis on practice, experience and the tacit, provide a useful co-joining of the two concepts of mentoring and reflective practice in teacher training. The impact of mentor-mentee relationships and an authentic demonstration of reflective practice on the subsequent life cycle of the professional teacher, along with their development of core beliefs about teaching and learning, and their practice of critical reflection are commented upon in the literature, as are discussions of the risks, difficulties and challenges of such modelling and dialogue.

Within the literature there is a preponderance of theoretical and generalised studies of the concepts, illustrated through a strong field of self-studies. There is evidence of a strong consensus emphasis in the literature on the utility and foundational benefits of a proactive, reciprocal, collaborative interaction and meaningful dialogue between academic staff and pre-service teachers within a mentor-mentee relationship. While extensive, the literature of these two concepts: mentoring and reflective practice, especially that subset relating to the education of pre-service teachers, reports very limited qualitative research directly examining the genesis and development of reflective practice in pre-service teachers. Such research is derived from the voices of undergraduate students.

This paper specifically adds to the body of knowledge in this area of education by directly reporting the voice of pre-service teachers through the recollections and re-conceptualisations of recently graduated teachers. The participants' voices are mediated through the lens of reflective and professional practice and experience, providing research data filter that is unique in the reviewed literature.

METHODOLOGY

Informed by a critical theory research framework this study utilises qualitative methodologies, with a focus on eliciting understandings of how individual teachers create and interpret their professional world. The research's foundational building blocks are derived through semi-structured dialogues between the participants and the researcher. This interaction, with an emphasis on individualised, idiographic description and explanation, records the teachers' introspection regarding their experiences as an undergraduate teacher in training.

The research is also informed by the methodological framework of symbolic interaction, an approach that is frequently used for studying lived experiences (Prus, 1996). As this research focuses on elements of communication, language and interrelationships, the symbolic interaction framework facilitates the engagement of 'participants' construction of meaning' (Pedro, 2001, p. 13). The voicing of teachers' voice is the primary means by which their meanings and understandings are interpreted. The centrality of participant voice within the interview dialogues reinforces the transformational, emancipatory agenda undergirding critical theory research. The interviews as the primary data collection device drew heavily of the traditions of narrative inquiry and enabled the participating teachers to critically interrogate their own practice.

There are very few studies that give voice to the reflective practice experiences of pre-service teachers or examine through the teachers' lenses the genesis and development of reflective practice during their teacher training.

DATA COLLECTION

This study involved recent graduates from the science teaching programs delivered at Avondale College, New South Wales, Australia. Avondale College as a private higher education provider has been offering tertiary courses oriented towards professional training since 1892. In sampling graduates for interview, preferential selection was given to graduates who are currently practising as science teachers in the Adventist Schools (Australia) system. The sample size was relatively small, with 17 teachers interviewed. A sample of 11 lecturers at Avondale was also interviewed. The participating teachers were almost equally divided on gender lines, with graduates from the last

decade being over-represented in the group. The subject discipline the participant teachers had majored in also was distributed amongst the available majors on offer. The cohort exhibited an over-representation of students who had demonstrated outstanding academic prowess during the course of their studies.

The interviews with available graduates occurred in a face-to-face setting. The research design sought to capture what graduates' voice about their pre-service and subsequent reflective practices and the impacts that the modelling of these practices by their undergraduate lecturers had on the development of their own professional practice. The graduates' voice revealed the conceptions, beliefs and thinking that support their practice. Individual interviews, documentation based on feedback from records of interview, and stimulated recall interviews provided multiple sources for the triangulation of data. While the voice of graduates served as the primary data source, the data were clarified and given additional validity by the interrogation of the voices of lecturers from the Faculties of Science and Mathematics, and Education.

The sequences of interviews served both as a primary data collection device and as a means of permitting teachers to critically interrogate their own practice (Kane, More, & Chimwayange, 2006). As researcher, I sought to understand, and construct meaning out of the experiences and responses shared through the participants' voice. Through their voices I sought to gain an entry and insight 'into their conceptual world of reflection' (Otienoh, 2009, p. 480). In this sense the research sought a dynamic representation that 'explicity locates the author in the text' (Tierney, 2002, p. 385). In the research there was a 'double hermeneutic at work' (Usher, 1996) as participants interpreted their own reflective experiences during the interviews, I interpreted their experiences in the context of the research questions. The research questions were explored through the means of a set of interview questions that were used as a guide in the subsequent semi-structured interviews, ordered into broad themes, as informed by the literature review.

The standard procedures for obtaining consent were reinforced through the processes related to gaining ethical approval from two institutions: Curtin University of Technology; and Avondale College. Pseudonyms were used when citing participants' comments to assist in the preservation of anonymity. Pseudonyms were assigned randomly to participants. The names assigned retained the gender orientation of participants.

As this study focuses on the perceptions, experiences and recollections of teachers on their experiences and understandings of reflective practice and mentoring in an undergraduate teacher education course, subjectivity issues permeate the study. In the use of a symbolic interaction framework to analyse the data, subjectivity is integral in the research process. Ellis (1991) suggests that the introspection regarding the subjective elements of such research has utility for 'understanding the lived experiences of emotions' (p. 23) participants share. As such it can generate interpretative data that otherwise would be neglected. One cannot enter the re-lived experiences of participants without experiencing affective experiences. The research experience has also involved considerable development of me as a reflective practitioner. By acknowledging the subjectivity and attempting to capture it through the interview process, the research processes 'we evoke a conversation through which we come to know others and ourselves and the position from which they speak' (Pedro, 2001, p. 24). As such subjective elements inform the reconstruction of participants lived experiences in this research.

All interviews were transcribed verbatim, and this data was then used and reviewed for patterns and regularities. As patterns and regularities were noted in the initial interviews a set of categories or themes were formulated. Coding of the transcriptions then commenced based on this initial set of thematic categories. The voice of the teachers was given pre-eminence in the analysis of the scripts, with the voice of lecturers providing another lens through which further informed their voice. Descriptive recollections of the participants are blended with the analysis of them, enabling the highlighting of specific elements that are relevant to the development and fostering of reflective practice in the life of the pre-service teacher. Of primary concern has been the valuing and preservation of the participant's voices. The interpretivist paradigm perspective used enabled an appreciation of the richness and variety of the experiences of the participants. The methodology employed involved an exploration of the participants' lived professional experiences and perceptions within the specific context of their undergraduate training at Avondale College (Deaver & McAuliffe, 2009).

INSTITUTIONAL SETTING

Avondale College has a long history of teacher training, primarily to meet the needs of the school system of the Seventh-day Adventist church in Australia and New Zealand. During the last few decades the teacher training intake at Avondale has expanded, with many of its graduates now teaching in public and other private schools. While there has always been a strong emphasis on values transmission, faith development and Christian philosophy within teacher training at Avondale College, graduates for many years were strongly grounded in the social efficiency approach to teaching, with its strong, pragmatic emphasis on 'the development of specific and observable skills' (Pedro, 2001, p. 30).

Reflective practice has increasingly become a feature of undergraduate teacher education programs in Australia particularly during the last two decades. Under the leadership of a new Dean of Education, action research became introduced into the undergraduate education program from 1995-2005. An integrated emphasis on reflective practice in the undergraduate teacher training courses did not occur until 2005. The emphasis on teacher training then included reflective thought about the 'behaviour and the context in which learning occurs' (Pedro, 2001, p. 30), moving pre-service teachers to be thoughtful and intelligently considerate of their own professional practice, 'rather than followers of prescription or routines' (Pedro, 2001, p. 32).

These changes coincided with the broader growing impacts of constructivism and social reconstructionist traditions within teacher education and increasing debate about the validity of the technical-rational model of teacher education. Avondale's Faculty of Education, reflective of the generally conservative nature of the sponsoring church organisation, took cognizance, adopted and integrated elements of these broader educational movements a little later than some other educational training institutions in Australia who made moves of change in the late 1980's and significantly in the early 1990's.

The 1980's and early 1990's were times of significant and difficult change for the Seventh-day Adventist church and tertiary educational system in Australia, with major theological, sociological and cultural challenges (Patrick, 2008). The ever present tensions between revision, and stability; reform and reaction; change and tradition were evident in all aspects of church institutional and thought environments (Hook, 1998). Avondale College (Chamberlain, 2008), including the Education Faculty, were at the vortex of much of these pressures. Understandably, most changes were slowly and carefully introduced, especially external changes that reflected 'the midst of a revolution in the way they [teacher educators] perceived the nature of teaching and teacher education' (Pedro, 2001, p. 38).

How Professional Reflective Practices are Developed During the Pre-service Experiences of Science Teachers

It is evident from the narratives of the teacher participants that there is a process of gradual development in professional reflective practice during their undergraduate training. Their narratives also explicitly note that the form and nature of this development is not clearly demarcated by discrete stages or pathways. Many teacher participants found it difficult to recollect with any clarity much of their reflective experiences or statuses during their pre-service training. Those teacher participants who could recollect with some clarity concurred that most undergraduates largely reflected at the technical and factual levels. There was also a consensus amongst participants that there was not a clear, linear or staged progression in depth or breadth in the development of their reflective practice. These recollections support Brockbank and McGill's (1998) critique of Schön's 'hierarchical approach to having sequenced stages' (Hughes, 2009, p. 454).

Teacher participants did relate that in their recollections they perceived significant differences in the frequency, scope and level of reflection after their first eighteen months of pre-service training. This change appears to be associated with the second year practicum experience at the end of their third semester of study. Teacher participants also commented on significant differences between their reflective practices as a pre-service teacher and those they currently engage in as practising, experienced, teachers.

For the Avondale graduates the education component of their professional training is often described as being of secondary interest, with the Science related subjects been perceived by the teacher participants as being

intellectually more challenging and closely aligned to the their personal interests. Reflective practice as a professional education activity, then, does not usually register of being of any major import during their training, except of being of relevance to some assessment tasks.

The Centrality of the Practicum Experience in the Development of Reflective Practice

In the context of the education subjects, the teacher participants detailed the teaching practicum experiences as being of special significance in their development as a professional teacher. The Education Faculty places great importance in the early immersion of trainee teachers in a field setting, and invests a significant time component of the course in actual field experiences. An Avondale College graduate typically spends more time on practicum experiences throughout their course than graduates from comparable training institutions. Additionally Avondale lecturing staff are proactive in visiting, supporting, and debriefing their pre-service teachers while they are on practicum placement. The sustained involvement, con brio, of Education Faculty lecturing staff during their undergraduate practicum placements was identified as a key element in the development of reflective practice in the recollections of the participating teachers.

Reconstruction involved the affective as well as the cognitive domains of participants. As practicum placements involved considerable investment by the pre-service teachers emotionally, as well as in terms of the formulation and recasting of their conceptualisation of the art and science of teaching, their concomitant development of emergent professional reflective practice often was associated with the expression of emotional states.

Some participants linked the practicum experience as being critical in the pre-service teacher's conceptualisation of himself or herself as a teacher. The re-orientation, often associated with the first two practicum placements, were also associated with reflections not just on matters associated with professional life and growth, but about the essence of who they were, and were to become, as a person. These observations concur with Norsworthy (2008). The impact of significant academics and others on this consideration and development of 'one's very personhood' is perceived as being important. Norsworthy (2008) also noted that pre-service teachers often have an expectation of certainty, especially if they see knowledge as a commodity, being disconnected from the personhood (Norsworthy, 2008, p. 188). One participant specifically noted the importance of the practicum experience in assisting her move beyond this perspective in her pre-service experience.

Participants' reconstruction also linked the development of depth in reflective practice during the practicum, a co-occurrence also observed by Malderez and Bodóczky (1999) who noted that desirability of the establishment of the 'reflective habit' during the period of the early practicum placement. Klob (1984) associated a 'higher level of learning' with reflection and conceptualisation associated with the end of active experimentation. One can draw a parallel with the association made by teacher participants in this study with developmental shifts in their reflective practice following their intense practical and vicarious experimentation with the practice of teaching during their practicum experiences.

The reported establishment of conscious reflective practices during or consequential to a major practicum experience may be related to the orientation pre-service teachers took during practicums, particularly those practicums during their second and subsequent years of training. Observation of supervising teachers, and the assessments made of their own teaching practices are associated with judgements made relating to the effectiveness of teaching practices. As observed by Diezmann & Watters (2006) a common approach for ascertaining the effectiveness of teaching is reflective practice. Assessment and other structured experiences associated with the practicum placement experience at Avondale College include structured reflective practice activities. These activities, along with the emphasis placed on reflection within the last decade in the pedagogy subjects within education pre-service courses at Avondale College, combined with the nature of the practicum experience provide a rich basis for the practicum experience to be a significant milestone in the development of reflective practice in the recollections of the participants.

In this study it is evident from the narratives of the participating teachers that one of the most significant structures within the Avondale pre-service education experience that aided the development of reflective practices

was the embedding of frequent, extended, field based practicum sessions within the course. The accompaniment of on-site visitations and subsequent debriefs by Education Faculty staff was also identified as a significant and supportive adjunct to the practicum session, as these visits often facilitated the commencement of connectivity of relationship between students and academic staff from the Education Faculty.

The Influence of Personal Traits and Prior Experiences of Reflective Practice

A number of participant teachers self-nominated the influences of some personal trait characteristics, and their previous experiences of reflective practice or critical analysis, as being of importance in the genesis and subsequent development of reflective practice in their professional life. A number of these individuals cited that they could recall always being of a questioning, reflective nature and that their pre-service training subsequently only honed and fostered this into a particular form associated with the educational context. It was suggested by some of these participants that Science students by their very nature were questioning, inquisitive individuals that had exhibited some elements of critical analysis early in their formative years of schooling. Questions related to the connections between personal traits and the practice of reflection were beyond the scope of this study, as were questions relating to a nature or nurture basis for the development of reflective practice. However it is noteworthy that for some participants there was a self-identification of proto-genesis of reflective practises before they embarked on their pre-service teacher training, and is worthy of further investigation in the future.

Changes in the Focus of Reflective Practice during Pre-Service Training

Participant teachers and lecturers both noted that significant changes in the focus of reflective practice occurred during the course of the initial professional teaching degree. Parsons and Stephenson (2005) report the importance of metacognition as an element of reflection. The growth in metacognition, especially during the last two years of the four-year teacher training degree program parallels the changes in focus.

Some teacher participants, in reflecting on their orientation and skill set during the first portion of their professional training at Avondale College, observed that while they believed at the time that they had the necessary armoury of attributes necessary for reflective thinking, that upon reflection they could see that the lecturers were developing, scaffolding and equipping them with these. While Hatton and Smith (1995) observed that 'the common conclusion is that there is little evidence of critical reflection on the part of students' (p. 8), this only resonates with the early semesters of study for the majority of teacher participants in this study. The major factors involved in the evident differentiation appear to relate to the specific emphasis given to reflective activities integrated and embedded in the education courses, and the strong emphasis given within the Science Faculty to the development of modalities of critical thinking in order to support the enculturation of the scientific methodology and worldview that is strongly embedded in the faculty.

Roskos, Vulelich and Risko (2001) differentiated between the depth of reflective practice amongst pre-service teachers in their description of how pre-service teachers 'eagerly describe, report and query some but they do not interpret, evaluate, critique teaching activity in ways that deepen their understandings of the contextual and socio-political dimensions of teaching practice' (p. 598). Norsworthy (2008) found that 59% of pre-service teachers in her New Zealand study 'viewed the approach to learning which they bring to their initial teacher education as a hindrance to their ability to learn in a manner which is reflective' (p. 118) Derived substantially from their high school experiences pre-service teachers in her study identified a number of approaches to learning that were barriers to the development of reflection: a dependence on receiving content; no expectation or requirement to think for themselves; a belief and expectation that they will receive from the teacher educator, and give the teacher educator one 'right' way or answer; and a student's sense of inadequacy, apprehension and boredom (Norsworthy, 2008, p. 124)

One participant teacher in this study, Ella, especially dwelt on her journey in making the transition from her pre-Avondale experiences and worldview to that of a more reflective trainee teacher. Her descriptions find congruence with those reported by Roskos, Vulelich and Risko, as well as those reported by Norsworthy. What differentiates Ella's experience is her development of deep reflective practices subsequent to her first two practicum experiences. Her development is akin to the description of a 'kathartic movement' by White (2002).Other

participants, in less stark, or 'non-Damascus road-like' terms, described a similar growth and re-orientation following their initial practicum experiences. For most participants this transformation was a process of gradual dawning and re-orientation, and recognisable only in retrospect.

The co-incidence of this transformation for many participants in this study with the latter half of the period of their pre-service training may also be reflective of a number of other factors. As many of the participants commenced their pre-service training immediately after the completion of their secondary schooling, the processes of physical, social and emotional maturation continued during their pre-service training. Developments of maturity in these areas, often accelerated by the experiences of semi-independence from home, facilitate a readiness for deeper emotio-cognitive activities such as critical thinking and reflection. Brockbank and MacGill (1998) suggest that 'there is an emotional level needed to reflect on one's actions' (Hughes, 2009, p. 454) and that one's emotion level may be a blockage to deeper reflection.

Also associated with the latter half of the pre-service training at Avondale College is the introduction to more abstract, conceptual frameworks as students engage with the third and fourth year subjects in both their subject specialisations and in their education subjects. For those specialising in the sciences, subjects at this level demand considerable exercise of critical analysis, reinforcing the multitude of reflective practice activities and exercises being concurrently experienced within many of the education subjects being studied. The concomitant impacts of these strands appear to have impacted significantly and positively on most teacher participants' development and expression of reflective practice. No participant attributed causality to any of these strands, however their presence and interactions were noted.

Napper-Owen & McCallister's (2005) study of pre-service physical education students also reported that 'teacher candidates focus initially on their own actions and secondly on the actions of their students' (Uhrich, 2009, p. 502). This study confirmed that the primary orientation of pre-service teachers, as self-reported in their reconstructions, was one of self-focus. Interesting this orientation became weaker, especially in the last year of their training, and for many of the participants had become significantly re-oriented with a strong student focus after a time of in-service experience.

Forms of Reflective Practices

It is evident from the descriptions provided by lecturers, especially those from the Education Faculty, and from the descriptions given by participant teachers, that there was a range of reflective practice activities and structures in place during their teacher training at Avondale College. It was also evident in the teacher reconstructions of their pre-service training that there was little definitive remembrance of any particular form of reflective practice that was seen to be of any lasting significance, except peer and lecturer induced reflections on the practicum experiences.

For all participants in this study Uhrich's (2009) comment that 'there is ambiguity with regard to the way reflective behaviours are defined and reinforced' (p. 503) is reflective of the overall approach to the development of reflective practice within its pre-service teachers at Avondale College. The lecturers interviewed generally reported a lack of a systematic, unified approach towards the teaching of reflective practice. The self-reported recollections of the reflective activities of the teacher participants also concur with the findings of Holly and McLoughlin (1989) that the practice of reflection through writing, such as by journaling, is sustained by few teachers following the first year after graduation, with only one of the participants maintaining in some form any systematic, written form of reflective practice. It is evident from the recollected narratives of the participating teachers in this study that their experiences outside of the practicum placements in the Education Faculty seldom led them beyond the initial autobiographical form of reflection (Fazio, 2009).

What was evident from the voices of the teacher participants was that reflective practices experienced within the teacher education component of the course were limited in their effectiveness as a pre-service initiation to the embedding of reflective practice. For the majority of activities, assessments and interactions associated with the instillation of reflective practices in pre-service teachers the teacher participants in this study reported that few extended them into the voluntary or reflective quadrants of Smith and Tillema's (2003) model or Roberts (2009)

model. This recollection and consequential approach towards the more formal forms of reflective practice in their professional life may be reflective of the lower status given to meaningful mentor-mentee relationships for the participants in the Education Faculty, compared to the higher proportion of high quality relationships reported with members of the Science and Mathematics Faculty.

Personal Connectedness as Seminal in Fostering the Development of Reflective Practice

The identified importance of the presence and support of a familiar Education lecturer during the critical developmental juncture of the practicum supports Parsons and Stephenson (2005) notation of the importance of collaboration with a critical partner, student or staff, for the enabling of 'deeper thinking about practice in an atmosphere of supportive and constructive but honest feedback' (p. 95). Norsworthy (2008) also emphasises 'the importance of relational connectedness as a key to the development of reflective practitioners' (p. 200). For the pre-service science teachers at Avondale College the practicum experience was often the first major incidence of personal connectedness of any significance they could recall occurring with their Education Faculty lecturers.

Ghaye (2009) notes that connections of high quality have a high emotional carrying capacity, tensility, and demonstrate openness to new ideas and influences. Practicum experiences are professional environments that are predisposed to these three characteristics. The active and vicarious involvement of Education Faculty staff in the practicum visitation and debriefs fosters connectivity between the pre-service teacher and the academic staff member. The evident high level of pastoral care in the emerging professional context assists the development of a higher quality connectedness than there would otherwise be. Similar to the sports world where 'high quality connections (HQC's) are at the heart of improving performance' (Ghaye et al., 2009, p. 385), some academic mentor-mentee relationships at Avondale College between lecturers and pre-service teachers were reported by participants as exhibiting high levels of connectedness.

Of particular importance in fostering the development of reflective practice was the relationship all participants noted with some significant individual lecturers, particularly a number of specific lecturers from the Science and Mathematics Faculty, and a small number of lecturers from the Education Faculty. Interestingly, all but one of the Education Faculty members identified as being of significance in the development of reflective practice by the participating teachers were from a Science or Mathematics teaching or academic background. The one faculty member not from a Science and Mathematics background came from a primary school background. Consequently the participants identified no Education Faculty lecturer from a secondary teaching background, except those from a Science and Mathematics teaching background, as being of significance to them.

It is evident that some factor of co-identification was involved as a basis of the identification of these individual academics. All those academics identified by the participating teachers engaged their pre-service teachers cognitively, emotionally and spiritually. It is evident that the participating teachers held them in high regard as individual persons, as well as academics. There was also evidence of a strong congruence of worldview and of one's personal hierarchy of knowledge between participating teachers and the lecturer(s) they identified as being of significance to them.

The deep respect for them was reinforced by a sense of involvement and engagement in a participative community that engaged in meaningful dialogue. The descriptions of this engagement and dialogue are in many ways analogous to the importance of community in the development of reflective practice that is described by Wong (1999) who was involved in pre-service professional training for ministers.

Meyer (1999) examined conversations with pre-service teachers and supports this notion that when part of a community of learners the pre-service professional is predisposed to 'embrace ambiguities, and … [take a] … reflective stance towards teaching' (Pedro, 2001, p. 42). The participating teachers in this study identified such an approach as a feature of the teaching of, and interactions with, the nominated significant lecturers.

The reported differentiation between the connectedness of pre-service teachers with lecturing staff in the two faculties may be explained partly by the subject orientation and content priorities of the participating teachers at the time of their training, but is deep enough, and commented on enough by the participant teachers to be of significance.

From the voices of the participating teachers the degree of personal connectedness with academic staff appears to be the central significant differentiating factor between the impacts of the respective faculty on the development of reflective practice in their undergraduate years. Paradoxically, the participating lecturers inversely relate the level of reported connectedness to the reported intentionality in teaching reflective practice. While the Science and Mathematics Faculty's participating lecturers deliberatively and intentionally seek to develop critical thinking skills and practices, only one lecturer in the faculty reported that they intentionally sought to assist and facilitate the development of professional reflective practices in pre-service teacher, while all participating Education Faculty academics reported that they had for the last decade sought to proactively develop and foster reflective practices in all pre-service teachers. It is evident that the identified lecturers, predominately in the Science and Mathematics Faculty, have significantly impacted the development of reflective practice through their personal connectedness with their students and through the effective modelling of reflective teaching practices.

How In-service Teachers' Subsequent Development of Reflective Practice is Affected by Their Interactions with Pre-service Lecturers

Through the narrative of participating teachers this study supports Norsworthy's (2008) findings from her study of pre-service teachers in New Zealand that modelling pedagogy, using authentic teaching approaches, living the questions, and assessment (requiring personal connection and including multiple phases) assists the development of reflective practice.

The direct relevance of questions relating to their interactions with pre-service lecturers was manifest through the animation of teacher participants during this portion of their interviews. It is evident from the voices of the participants that there exists at Avondale College a culture, especially in the Science and Mathematics Faculty, of close and generally positive relationships between academic staff and pre-service teachers.

One could attribute to these relationships an innate contagion of modelling practice; a relatively unintentional and automatic mimicking and convergence of the practices of another. In this sense the pre-service lecturers with whom the pre-service teacher develop a mentor-mentee relationship experiences what Descartes described as the 'impossibil[ity] for the soul to feel a passion without that passion being truly as one feels it' (1984, p. 26). Orland-Barak (2010) uses the concept of 'learning-in-praxis' to highlight the inherent complexities when actions and ideologies interact in a specific context, such as an institution such as Avondale College. Orland-Barak (2010) makes the important observation regarding the role of the praxis in mentoring with the notation that reflective and collaborative approaches move beyond the contents and skills in practice of a course curriculum towards 'the acquisition of professional competence and performance within domains of praxis' (p. 26). Orland-Barak's concept of 'appreciation as a discursive activity' (2010, p. 31) reinforces the discursive and complex nature of mentoring as described by participants in this study, embedding as it does 'a process of typifying' (p. 33) involving the construction of conscious guidelines and rehearsals for future actions (Schutz, 1970).

A range of participants in this study noted the significance of the mentor-mentee relationship in building repertoires of professional practice. It is noteworthy that the majority of teacher-participants in this study specifically noted the impact of particular lecturers on the development of their reflective practice, although the majority did not at the time of their professional training specifically link their interactions with these lecturers with the development of their reflective practice.

From the voices of the participating teachers it is primarily in the context of experience in the professional field, firstly as practice teachers, then as novice and experienced teachers that reflective practice is a conscious element of the individual's professional life. As already noted the conscious awareness of reflective practices by the participating teachers appears to have substantially been contextualised after they have been professional practitioners. It appears from their narratives that both the depth and range of experiences and the quality of positive relationship with specific lecturing staff have a correlation with their own reflective practice.

Significantly, those lecturing staff who were predominantly named as significant mentors also were those who were nominated as those that most openly displayed reflective practices and behaviours to their students. It was these lecturers who also tended to maintain an active, open dialogue with their past students once they entered

professional practice. The reporting of this through the participants' voices reinforces Wenger's (1998) model of professional learning.

The impact of social learning, 'engagement with others in communities of practice' ran deep in the reconstructed narratives. While subsequent interactions with lecturers were not systematic or regular in nature all teacher participants in this study acknowledged the foundational patterns and elements of solid reflective professional practices to some extent. These high quality connections with lecturing staff also support the key elements of mentor-mentee relationships as identified by Ghaye, et. al. (2009).

The complexity of the discursive and mentoring processes along with the idiosyncratic nature of individual's professional journeys makes it difficult to un-entangle those precise elements in the interactions that were critical in the in-service teachers subsequent development of reflective practice. However it is evident from the consistent emphasis on the mentor relationships, and the animation when recounting these relationships, that the modelling impact of these positive relationships accounted substantially for the subsequent development of reflective practices in these science teachers.

From the reconstructed experiences of the teacher participants in this study the reciprocal professional learning that occurred in the mentor-mentee situation provided an alignment that brought about the establishment of a culture that was significantly shaped by the practices and values of the lecturing staff involved. It is evident from the lecturers' voices that while no deliberate, unified pedagogical perspective relating to reflective practice was in place, especially within the Science and Mathematics Faculty, there was a strong pastoral and educational focus on the individual student and their personal, academic and professional development.

Lecturing staff, especially those identified by the teacher participants as being influential in their modelling of reflective practice, all display a clearly thought out and well articulated system of personal and professional values. This clarity of values affirms the proposition that clarity of values and a firm philosophical stance may be required for the effective transmission of reflective practices (Larrivee, 2000). Fundamental beliefs arising from one's worldview regarding development, learning and the nature of humans are core to one's self-reflection.

While Ghaye et. al (2009) refers to the context of high sports performance and winning with integrity and care, it is no coincidence that the lecturers who are highly regarded by the teacher participants in this study are seen to share these same characteristics: integrity, care and high academic performance. Ghaye et. al. (2009) link these concepts to the notion of reflected best-self. Drawing from the work of Glickman (2002) the notion of best-self encapsulates the displayed characteristics of the influential mentors in this study. Their seeking one's 'best-self' through improving outstanding performance while 'acting with integrity and care' (Ghaye, et. al., 2009, p. 385) is not only openly admired by the teacher participants in this study, but is also consciously emulated by them. It is also apparent from the voices of the teacher participants that the enablers (Ghaye, et. al., 2009) required for performance enhancement are abundantly present in their pre-service interactions with these lecturers. The strong esprit de corps evident within the student and lecturer cohorts under study reinforce the effectiveness of these enablers. Of note is the operation of the effective modelling of reflective practice by the nominated lecturers when institutionally the place of reflective practice within the professional education training courses was embryonic and largely non-integrated for the pre-service training of the majority of teacher participants in this study.

While active mentoring has long been a core element of the culture of Avondale College and Adventist Education for the transmission of ethical values and lifestyle standards, it has not been explicitly valued as a pedagogical tool for the transmission of educational traits and skills such as those associated with professional reflective practice. It is noteworthy that the teacher participants so closely identify their predisposition and development of reflective practice to the reflective practices they saw displayed, especially by the pure scientists, during their training.

It is evident from the reconstructed recollections of the science teachers that significant transformation occurred in their critical thinking and reflective practices as a result of their initial tertiary training. The power of transformation and evolution of beliefs about teaching due to their training, especially in practicums, and in relationship with significant academic mentor relationships, allied with the transformative realities experienced

during their early full-time teaching year were all identified by the teacher participants as occurring.

The role of the participating teachers' perception of pre-service lecturer's practice of reflective critical thinking in this transition between stages is uncertain. What is certain is that the majority of participating students clearly perceived positively a demonstrated practice of reflective practice by those lecturers they identified as being significant in their development as a person and a professional at Avondale College. The converse is also true with those lecturers they held in a lower professional esteem. The core characteristics that differentiated these two groups of lecturers were associated with Glickman's (2002) and Ghaye et. al.'s (2009) 'best self' in terms of academic performance, relationships, and integrity.

SUMMARY

The subjects in this study displayed some difficulty recollecting with clarity their development of reflective practice in their pre-service training. Their recollections do however note that their development was not one of discrete stages, with a focus on the technical and factual elements of reflection, predominately descriptive in nature recording actions, observations, and were autobiographical in nature. Reflective practice activities were often narrowly associated with the completion of assessment tasks. Participants generally noted the centrality of the second year practicum as a watershed in their understanding and development of reflective practice. This development was also congruent with their maturation in their understanding of their own identity as a person and their professional self. Consequently reflective practice deeply impacted many participants' affective as well as cognitive domain.

The linkage between frequent, extended, field based practicum sessions within the professional training course and the commencement of connectivity of relationship between students and academic staff with the development of deeper reflective practices by the pre-service teacher was noted through the voices in this study.

A number of teacher participants noted that they had pre-existing personal predispositions to reflection and that the critical thinking skills associated with the scientific worldview assisted the expression of these predispositions.

There was general ambiguity for the participants in this study regarding the institutional portrayal of reflective practice. This may result from reflective practice only recently receiving a strong emphasis in the professional education courses, or may be the result of the lack of a systematic, unified approach towards the teaching of reflective practice in the institution.

Only one participant maintained any form of systematic, formal reflective practice after graduating from the course. This disjuncture correlates with the notation by most teacher participants in this study that there was a marked differentiation between the nature and forms of reflection during teacher training and during full-time teaching. One conclusion of this study is that for the teacher participants the reflective practices experienced within the teacher education component of the course were limited in their effectiveness as a pre-service initiation to the embedding of reflective practice.

Personal connectedness with lecturing staff and peers through high quality relationships was of particular importance for the teacher participants in this study in the development of their reflective practice. Such relationships fostered a culture of supportive collaboration and constructive critical thinking. It was evident in this study that the high levels of pastoral care exhibited by specific lecturing staff was of significant importance. For all participants in this study those lecturing staff whom they formed such relationships with all came from a Science or Mathematics background, except one staff member from a Primary teaching background. While some factor of co-identification associated with common subject interests and worldviews was evident the seminal basis for these positive mentor-mentee relationships included: integrity; care; and high academic performance. The characteristics of the learning culture associated with these lecturers' conform with Ghaye et. al. (2009) mutually supportive enablers of a positive atmosphere, relationships, communications, and positive meaning.

This study also supported Norsworthy's (2008) findings that modelling pedagogy, using authentic teaching approaches, living the questions, and assessment assists the development of reflective practice. This study also noted that a deep respect for lecturing staff is reinforced by a sense of involvement and engagement in a participative community that engaged in meaningful dialogue.

It was observed in this study that pre-service teachers' positive perception of a lecturers own practices of reflection correlates with the positive significance of that individual in that pre-service teachers' development as a professional, including the development of reflective practices. The authentic lecturer-student relationships voiced in this study were an innate contagion of modelling practice, embedding a complex process of typifying in a culture of strong values and deep, discursive activity. For the teacher participants this provided a basis for the construction of conscious guidelines and rehearsals for future actions, building repertoires for future professional practice. The depth and range of experiences and the quality of positive relationship with specific lecturing staff voiced in this study displayed a correlation with subsequent reflective practice by the teacher participants

The current reflective practice by the participants in this study was generally unstructured within a context of an individual's community of collegiality. Few frameworks were reported that deliberatively fostered professional reflective practice. This reflected the status of reflective practice for the lecturer participants at Avondale College who also articulated a strong commitment to reflective practice while their practice was exhibited idiosyncratically rather than systematically, and informally rather than in more formal, written modalities.

Relationship with lecturers and spirituality were key elements in the Avondale learning context of importance to the teacher participants. Of particular importance in the development and expression of reflective practice were the interactions pre-service teachers had with lecturing staff, often on an informal basis. Staff from the Science and Mathematics faculty particularly impacted pre-service science teachers in the development of their critical thinking skills, with education subjects, skills and content not being a priority for many science pre-service teachers. The support, passion, dedication and accessibility of some lecturing staff impacted students deeply. Many students noted the impact of contagious learning by inspiring lecturers.

Teacher participants found difficulty recalling specific pre-service reflective practice activities outside of the teaching practicum. Written assessment tasks were perceived as being artefacts of the course with oral practicum debriefings, especially those involving peers, being identified as the most meaningful activity in developing and fostering reflective practice.

Specific mentors relationships were identified as having significant impact on the development of pre-service teachers as reflective practitioners, with the relationships typified by deep respect by the students and genuine caring by the lecturers.

AUTHOR INFORMATION

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<u>NOTES</u>