Teacher Change and the Intermediate Numeracy Project:
A Narrative Analysis

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Preamble

In this report I have provided an overview of my masters thesis and included the final chapter on the implications for change that emerged from the thesis. I have also included a reduced list of references that focus on the process of change that may be useful. Should anyone wish to read any further parts of my thesis please contact me by e-mail at juliea@queens.school.nz.

I wish to thank Dr Ross Notman and the staff at the University Of Otago College of Education Centre for Educational Leadership and Administration who provided me with office space and the use of the university's facilities during my sabbatical term. I had planned to work at home but after a few days it felt like home detention and I greatly valued the conversations and collegiality of the Education Support Services staff at the College of Education.

Background to the thesis

The research in my master's thesis investigated the professional development journey of the teachers in one Intermediate School as they implemented the Intermediate Numeracy Project (INP). Although numeracy teaching was the context for this school-wide project, the focus in my thesis was on the change process initiated by the professional development programme and how the individual teachers and the school experienced the changes. I was a co-facilitator of the INP professional development programme in the school as well as the researcher. This meant I was regularly engaging with the teachers over the three year period when coordinating and running workshops and working with the teachers in their classrooms.

The professional development programme took place from 2002 to 2004 and I completed this thesis in 2012. I started to write up this thesis in 2005, but unexpectedly I took up a position as the principal of a girls' secondary school during 2005. I was unable to find time to complete this thesis alongside the fulltime role as a principal until 2011 when I was granted a ten week period of sabbatical leave. Some may say the results I reported on are dated, and had I focused on the changes in mathematics teaching brought about by the INP, then questioning the usefulness of my thesis could be justified. But my inquiry into the broader nature of change is relevant despite the gap in time between the data gathering and the final reporting of the results because change is not time dependent, but rather omnipresent in education (Fullan, 2001a; Piggot-Irvine, 2005). Research reports focusing on the changes brought about by the New Zealand Numeracy Development Projects (NZNDP) abound (Higgins & Parsons, 2009; Higgins, Parsons, & Hyland, 2003a; Ministry of Education, 2005b, 2006, 2007a, 2008a, 2009, 2010; Thomas & Tagg, 2004, 2005). However, I did not focus my inquiry specifically around the presented results of the NZNDP, but rather on the process and management of change over time, from the perspective of the teachers in one school. The context for my inquiry happened to sit within the NZNDP, but the process of change for the individual teachers and the school brought about by the professional development programme (as perceived by the teachers) was under the spotlight, rather than the INP as such.

Overview of the thesis

My thesis focuses on the process of change. In particular, how schools and the individual teachers who make them up experience and manage the change process brought about by their involvement in professional development programmes. The context for the study was the Intermediate Numeracy Project (INP); a project initiated by the Ministry of Education that was designed to enhance the teaching of numeracy and improve student achievement in mathematics in New Zealand schools.

The results reported in my thesis focused on the teachers' stories of their experiences of implementing the INP as documented over a three-year period. The teachers' changing confidences and the multiple and diverse realities that existed within the school over time were reported on. Ongoing data from a core group of eight classroom teachers and the principal provided a longitudinal perspective to both the individual and whole school narratives. The participants in this investigation shared their beliefs, teaching practices and

personal journeys, refining, revisiting and reframing their stories during a cycle of four interviews over a three-year period. This longitudinal data was used to address the following research questions:

- What was the process of change for this school over the three year period?
- What was the process of change for individual teachers over the three year period?
- What were the catalysts and barriers to the change process and how were these managed by the teachers and the school?

Models of change for a whole school and individual teachers were outlined and critiqued in the literature review. Following this, key catalysts and barriers to the change process were identified. Qualitative methods of inquiry, including interviews, narrative, change journey graphs and a written survey were used to collect the data. I constructed narratives based on the data; firstly, a whole school story and secondly, five individual teacher narratives. These narratives were subsequently mapped against the change models in the discussions that follow both the school and the individual stories. Barbara Rogoff's (1995) method of three plane analysis relating to processes at the personal, interpersonal and community level was used to explore knowledge that was created through participation in the school setting. The final implications of this research for the management of change were presented within the framework of Rogoff's three planes.

Evidence from the interviews, narratives and the journey graphs, drawn by the teachers to show their perception of the changes in their ability to implement the project in their classrooms over the three years, showed a diversity of individual responses to change and idiosyncratic coping strategies. The roller coaster ride involved and the need to be cognisant of the role of emotions during a period of change emerged strongly from the data. The catalyst and barriers to change that either inhibited or enabled actions are explored and integrated into the discussions of the change paths for both the whole school and specific individuals. The ability to take ownership of the initiative through collegial, school-wide strategies and the motivation to persevere that developed out of student successes were critical to changing teacher practice. The important role of the principal and lead teachers in providing opportunity for, open discussion of progress and collaborative problem solving emerged as crucial to the change process.

Although my study focused on the teachers in one school, the findings should provide useful insights for schools, teachers, school leaders, professional development facilitators and

pre-service educators who grapple with reforms in teaching and learning and curriculum change, not only within numeracy and mathematics but within the broader school curriculum.

Implications for change emerging from the thesis

Rogoff's (1995) three plane lens provided the framework for my final chapter. Implications within each of the personal, interpersonal and community planes were fore-grounded while acknowledging their interconnectedness and inseparability. I focus here on implications that emerged from my research that are less prevalent in the literature in the hope they might provide or confirm new directions in the understanding of the process of change.

The Community Plane

The school as a community needs to acknowledge and take ownership of change processes. Ongoing consideration of school-wide organisation and practices that need to be changed, developed or adjusted to support the change process is required (Le Fevre, 2010). This may include provision for resourcing, group meeting time, peer support in classrooms, classroom organisation and planning professional development (Timperley, et al., 2007) and further than this, the reconsideration of which areas need emphasis as the implementation of any change unfolds. A cyclic process of trial, analysis and adjustment (Cowie, et al., 2009; Piggot-Irvine & Gratton, 2004) with ongoing refinement and input from the community of participants (leaders, teachers and students), can help identify the next steps. Degenhardt & Duignan (2010) attest to the continual reinvention of the 'ways of doing things' that is needed as a school grapples with major change. Many of these decision lie within the leadership domain and thus the role of school leaders in initiating and coordinating a change process is crucial.

Leaders need to understand, articulate and discuss the process of change with the teachers (Fullan, 2006a) and ultimately the wider school community (Degenhardt & Duignan, 2010). The importance of creating spaces where progress can be discussed and challenged was highlighted by the teacher initiated meeting and survey reported on in this research. An implication from this is that the principal and/or professional development facilitators should deliberately allow time for discussion on the change process that is independent of their input and presence. They need to create 'windows in time' where teachers can off-load their

concerns and face up to their progress within a confidential and supported environment; where problem solving and future collaborative action should be an outcome. Professional development providers or lead teachers may need to take a 'hands off' approach at times to help build or return ownership to the teachers. When this is appropriate, or alternatively when the provision of knowledgeable and motivating guidance is needed, is a dilemma for professional development providers to grapple with. I suggest regular, non-judgemental school-wide reality checks are held where progress, enthusiasm for change and specific barriers are identified, reflected upon and acknowledged as an integral part of the change process. The decision on future action and support strategies, which could include: further individual support, new group learning, a period of consolidation of practice so teachers can recharge or a creative shift to new practices, could be an outcome.

Grounding change within the school and the individual teacher's classroom context aligns with Rogoff's (1995) apprenticeship metaphor within the community plane and the process of legitimate peripheral participation (Lave & Wenger, 1991). An example of this was the longer modelling by the facilitator at KIS, where a number of teachers observed the programme over a whole week, together in a single teacher's classroom. This allowed the teachers to talk about a common experience, negotiate and renegotiate meaning with each other and with the professional development facilitator. This peripheral participation became pivotal to their increased confidence. Observation and modelling lessons are still often delivered as one-off experiences, although they may be regular in nature. This study suggested that continuity of modelling within an apprenticeship metaphor may be more valuable than a once a week or regular but disconnected visit. The importance of intensive, authentic modelling by a colleague or facilitator that allows a teacher to see progressions in practice and student learning over a continuous period of time is a key implication of this research. This modelling needs to be delivered at a critical developmental stage to provide new insights into student learning and teacher practice and promote motivation for future change. It may be better to free up a group of teachers together for a number of continuous periods. This would allow them to observe and discuss a colleague or facilitator modelling ongoing practice rather than at separate disconnected times or as individuals. The difficulty here lies in determining the critical moment when a group of teachers will engage with and learn from such an experience. The interpersonal plane (Rogoff, 1995) and the process of guided participation were inherent in the facilitator and lead teacher classroom modelling. Although this plane is backgrounded here, it was integral to the enactment of the apprenticeship metaphor and the community plane in this research study.

The Interpersonal Plane

The nature of the teachers' engagement with others (including the students) and with the workshops, class modelling, activities and the materials associated with the INP both supported and inhibited the change process. Interactions with others and the coordination of people's efforts underpin the interpersonal plane. Three key implications emerge from this study within the interpersonal plane. The first is the need to embrace and encourage challenging discourse and questioning of new practices (Timperley, 2008). Secondly that peer pressure from engaged colleagues (Fullan, 2010) through everyday incidental comments and actions is a major determinant on the direction in which people are encouraged to move. Lastly the powerfulness of inclusive action that engages everyone in common practical goals needs to be acknowledged.

Critical discourse and the posing of challenging questions should be embraced by change proponents (Bishop, et al., 2010; Timperley, et al., 2007). If uncomfortable conversations are left unsaid or glossed over, then the justification for, understanding of, or motivation to change, can be less evident. Within the workshops at Kiwi Intermediate School, the teachers who were less confident in their own content knowledge tended to challenge the changes less. For some this led to a lack of real engagement or ownership of the changing practice. Those who openly discussed challenges to the new practices with others and were less accepting of new resources and approaches later became some of the strongest advocates for change. Evidence of improved student performance based on a teacher's deliberate actions helped provide the motivation for change. The challenging discourse appeared to allow the teachers to critically reflect on the merits of any changes and subsequently take action that they could justify. Promoting, and knowingly presenting for critique, alternative views to those presented in any new initiative; to 'play the devil's advocate', although appearing counter to expectation, could provide a key lever for change. There are benefits to be gained through a willingness of change initiators to encourage, accept, explore and address doubt and counter-views in an ongoing iterative way.

Teacher discussions about resource use and classroom events in the staffroom, visiting one another's classes to observe practice and helping each other plan and teach specific activities were the practical everyday things that made a difference to the enactment of the INP in KIS teachers' classrooms. Learning from peers is one of the most powerful catalysts for change (Fullan, 2006a). Common decisions and efforts in syndicate groups and shared

ways of talking about how learning takes place were important (Cowie, et al., 2009) and helped provide positive pressure for change (Fullan, 2010). This included discussing and sharing: planning, student groupings, resource production and the setting of achievement targets. Such actions are consistent with the characteristics of a professional learning community (Bishop, et al., 2010; Parsons, 2005; Timperley, 2003). A sense of unity emerged when all the teachers were involved. Such activities helped generate interdependence, where everyone's input was needed to achieve the desired outcome, and this inclusive approach provided motivation and support to move forward.

I conclude that at this interpersonal level there is an overarching need to place importance on the development of strong inter-personal relationships between teachers. The fostering of school and teacher unity through professional and social activities that build trust and collegiality should provide an environment where together teachers have the resilience to tackle and support the change process. Although not covered in this research study, ideally this would also include unity with the wider parent and school community about the direction and nature of change. This links back to the community plane and confirms the value in considering Rogoff's (1995) different lens simultaneously to add new dimensions to our understanding of participation in an event of activity.

The Personal Plane

The implications as viewed through the lens of the personal plane are interwoven with, and contribute to, the implications within both the interpersonal and community planes. The teaching staff as a whole is made up of the sum of the different individual teachers; their personal experiences and actions influence and are influenced by the actions of others within the inter-personal plane and school-wide institutional practices within the community plane. The progress of the teacher who is least engaged with the changed practices and the progress of his or her students, could be used as a measure of school-wide change, assuming the improved engagement and achievement of all students in the school is the goal. The school was composed of individuals and their change process contributed to, but individually was not the same as, the school-wide process. Hence the need to consider the idiosyncratic change journey of each teacher rather than consider them only as part of a specific group (interpersonal plane) or the whole teaching staff (community plane) is an important outcome of the research study.

My first implication within the personal plane emerged from my stage models analysis of individual change where the need to consider the different progress of individual teachers over time became evident. Each individual is unique; their personal and professional histories, experiences and social interactions all impact on their ability and motivation to internalise new practices (Higgins, 2004) and take on changes. The teacher needs to use new knowledge or information on their own terms adjusting, changing or incorporating approaches so they feel personal ownership of their practice. Because the change process is personal and idiosyncratic, individuals need different types of assistance at different stages (Loucks-Horsley, et al., 2003). No two teachers in my study had the same change journey or experienced the changes precipitated by the INP in the same way. Talking with individual teachers, having them write and share anecdotal notes about their experiences and the specific issues that concern them would help leaders monitor their teachers change journeys and plan targeted assistance. This would be consistent with a "Teaching as Inquiry" (Ministry of Education, 2007b, p. 37) process where change leaders collect evidence, plan action, evaluate progress and make changes to a professional learning programme cognisant of the needs of individual teachers. The principal, or change leaders, plan Individual Educational Programmes (IEP) for teachers that include ongoing reflection with a teacher on how they see their progress and how they feel about the changes they are expected to be making. Discussing and using models of individual change with the teachers such as the FANT scale (D. Carter, 2002; Hughes, 2003; Moody, 2003), the CBAM (Hall & Hord, 2006) or, better still, one developed by the teachers that is specific to their project or initiative, can provide a frameworks for progression and monitoring of individuals over time. Ongoing analysis of individual teacher's change journeys and their readiness for the next steps in changing practice would sit well as an added but complimentary dimension to the process of teacher appraisal. But such analysis needs to be extended to encompass individual emotional responses to change to help determine individual's readiness for future professional growth.

At Kiwi Intermediate School, emotional responses to change were key determinants of a teacher's perception of their ability to implement changing practices. My second implication within the personal plane is the need for change managers to engage with teachers' emotions and personalities. The use of models such as the Change Grief Cycle (Piggot-Irvine, 2005) and frameworks of emotional change (Claxton & Carr, 1991; Edwards, 2008; James, 2010) in this study shed light on the different nature and level of intensity of emotional responses to change. Guilt, tension and a lack of confidence were clearly evident in David, Jan and Campbell's stories as they struggled with their emotions, which were often hidden from others. Greater exploration of models of emotional change with teachers throughout the

implementation of a change agenda could help teachers see emotions, both positive and negative, as a normal part of the change process. Emotional responses need to be openly discussed, expected and engaged with as part of the change process.

Those associated with change management in schools need to be aware of, and accommodate individual differences right from the start of the implementation process of any change agenda. A 'one size fits one' approach with attention to individual progress, context-based classroom practice (Bishop, et al., 2010; Higgins, 2004, 2006) and personal emotional responses (James, 2010) will be needed in order to assist the professional growth of teachers that has, at its heart, improving educational outcomes for all students.

Conclusion and Recommendations

In my study I started with the whole-school change journey and unpeeled layers of collaborative interactions and individual stories, and discovered the difficulty in isolating one from the other. Multiple change factors were interconnected as they emerge and re-emerge in the change process (Higgins, 2004) and I showed this in the way I presented the narratives and the discussions that followed. A socio-cultural approach embraced these connections and highlighted the importance of seeing things through the eyes of different groups and individuals. This includes alertness to individuals, while also seeing them as part of a collegial group and the wider school community. Rather than being overwhelmed by the complexity of change, facilitators and leaders need to focus on smaller parts while still being cognisant of their connection to the wider picture. Attention to the detail of everyday conversations, individual teachers' emotional responses to change and the collective energy and motivation of groups of teachers is required in order that the whole school change process maintains its momentum.

The role of collegiality in within school-generated change (Bishop, et al., 2010) and the pressure exerted by highly motivated peers (Fullan, 2010) are vital to engaging individuals and supporting ownership of the changes by the teachers and the school. A combined focus on meeting the achievement targets for all students and acknowledging and celebrating student successes helps provide the motivation to maintain a change process.

The complexity of change and the interconnectedness between the personal, interpersonal and community aspects of the school environment demand a multifaceted

approach to managing the change process (Cowie, et al., 2011). No one model of school-wide or personal change will map the process of change or give specific direction to the ongoing needs of a particular school or person. Change managers should draw upon a range of models in planning for and managing change and be open to considering aspects of different models at different times. Change needs to be viewed as part of life in a school and it should be discussed, supported and planned for (Le Fevre, 2010; Piggot-Irvine, 2005). Taking time to map and reflect upon the change process while engaged in it is crucial to identifying and overcoming barriers to implementation. The challenging and often tumultuous nature of the change journey needs to be acknowledged, discussed and seen as an inevitable part of doing things differently in order to maximise the achievement and life choices of the students we teach.

Recommendations for further study.

The study of school change "gets murky indeed" (Anderson, 2010, p. 70) and further longitudinal studies that focus on the change process would help add to the detail if not the clarify, of the overall tapestry of change. I make the following recommendations for further research.

1. Research on how schools sustain change and reinvent themselves over longer periods of time (3-5 years) and what structures can support a focus on ongoing improvement.
2. Consideration of how teachers inquire into their own practice as part of a Teaching as Inquiry process (Ministry of Education, 2007b) that is linked with ongoing school-wide change.
3. Investigation of ways to collaborate with students in initiating and sustaining change.
4. Exploration of the wider parental or community engagement with change and the development of strategies to include these groups in decision-making around the nature of the changes that should occur.

When drawn together, research in the final three areas above would acknowledge the key aspects of a school community; teachers, students and their parents and caregivers and these should all contribute to any forward path for school improvement. However to move forward we need to reflect on where we have come from.

My research started nearly ten years ago, but this or any future studies on the process of change will never be out of date. Studies on the nature and impact of change on individuals, organisations and systems will always provide insights from which we can increase our understanding of this complex, multifaceted and timeless process. Change and the expectation of change are central to improving our schools and ultimately the lives of our students. As educationalists, it is imperative that we continue to read and talk about the process of change!

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