In the Hands of the Learner: The Impact of Self-Assessment on Teacher Education

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The central focus of the New Zealand Numeracy Development Project (NDP) is to raise student achievement in mathematics by improving the professional capability of teachers. This paper reports on the findings of a contextually responsive evaluation of the NDP professional development guided by Guskeys' critical levels of information and measured through self-assessment.

Adult learners must have their uniqueness acknowledged within the planning and delivery of professional development programmes. Individual differences among people increase with age; therefore, adult education must make optimal provision for differences in style, time, place, and pace of learning (Knowles, 1981). Professional development for teachers-as-learners must be inquiry and experientially based, provide opportunities for autonomous goal setting and direction, and stimulate transformative learning and critical reflection.

The desire and belief in our ability to make a difference can be shaken by indifference, intolerance or incapacity. Many teachers have a negative attitude toward mathematics that can be described as *math anxiety* or *math avoidance* (Tobias, 1994). Math anxiety is a state of such tension or fear that the learning process in mathematics is blocked or interrupted. Math avoidance usually occurs because this fear or tension causes a person to react negatively to mathematical situations and therefore avoid them as much as possible. These feelings are related more to attitude than they are to ability and impact hugely on the teachers' willingness to learn and implement new learning.

Self-assessment has the potential to engage and intrinsically motivate learners in reflective practice, autonomous self-sustained learning and critical thinking by developing capacity, influence and metacognition. It assists students to learn how to learn and establishes a basis for life-long learning by locating the assessment in the hands of the learner. (Boud, 1995; Hall, 2002; Hall, 2004). Research shows that the ability to self-assess the quality of one's own work is a characteristic of top performing professionals and that frequent self-assessment is highly efficacious in enhancing achievement (Boud, 2000; Hall, 2002).

The contextualised nature of self-assessment values the learners' ability to reliably and validly make judgements about their own learning. The view as explained by Leach, Neutze & Zepke (2001) is that assessment is a matter of professional judgement and that elements of subjectivity can be minimised — that a world exists which can be described in terms of universally true statements (p.296). Peterson (2005) believes that *androgogical* (Knowles, 1981) assessment practices must move beyond measuring success against behavioural and procedural objectives and toward measuring performance objectives. Success is then measured by realistically applied measures that complement adult learning.

Background

The Numeracy Development Project

The focus of the New Zealand Numeracy Development Project (NDP) is to improve student performance in mathematics through improving the professional capability (content and pedagogy) of teachers. The underlying philosophy behind the NDP is that teachers are key figures in changing the way in which mathematics is taught and learned in schools. This position is further endorsed by the research of Alton-Lee (2003) who found that effective teaching was the single most important factor affecting educational outcomes. The evidence revealed that up to 59% of variance in student performance was attributable to differences between teachers. It was the teachers' content, pedagogy, and pedagogical content knowledge that impacted most on students' learning opportunities and outcomes.

The social constructivist (Vygotsky, 1978) model of teaching forms the theoretical framework that focuses on the continual reconstruction of knowledge through shaping ideas and meanings rather than behaviours and procedures. Holton (2005) believes that the success of the NDP is due to the soundness of its *Number Framework* (Ministry of Education, 2005a), the strength of the teaching model and the ability of the facilitators. The *Diagnostic Interview* (Ministry of Education, 2005b) is designed to give teachers quality information about the knowledge and operational strategies of their students in relation to the Number Framework. The interview is based on a verbal question and answer format and consists of an individual task-based oral interview with each student to determine their stage on the Number Framework.

As facilitators of the NDP the authors have experienced the dilemma of a mismatch between our words and deeds and our theories and practices where assessment is concerned. Emerson (cited in DuFour & Eaker, 1998) illustrates this beautifully when he says - *What you do thunders above you so loudly all the while; I cannot hear what you say* (p. 110). Whilst we were endorsing and encouraging formative assessment practices we were not modelling this with our learners.

The core assessment practice used in 2004 was a summative self-assessment questionnaire given to teachers at the conclusion of the year long professional development project. It asked them to reflect on their learning but it is debatable whether this invoked a commentary on what they had done as opposed to a measure of what they had learned. Guskey (2001) found that whilst *research-based* was a criterion consistently used to describe effective professional development, the evaluation practices used typically involved surveys of opinions and rarely focussed on the relationships between the noted characteristics and increased student outcomes. What typically resulted were prescriptions of general practices that are described in broad and nebulous terms (Guskey, 1995). Added to this is the dubious reliability of judgements based on hindsight. As Boud (1995, p. 210) describes people often distort or forget what their initial beliefs were: memory is, by its very nature, reconstructive and highly dependent upon contextual factors. The responses were analysed and conclusions were drawn about the quality of the NDP. However for the 2004 learners it was too late by then to make any changes to the delivery of *their* programme or to be contextually responsive (Higgins, 2005) to *their* needs. This assessment practice is done *to* the learners not *with* them.

The 2004 self-assessment tool was *of* learning, *apart* from learning, and an extrinsic judgement on final achievements intended to prove learning. Our challenge was to create a

self-assessment tool that was *for* learning, *a part of* learning, and an intrinsic on-going judgement on the improvement of learning.

Contextualised Self-Assessment Practices

A formative self-assessment rubric based on Guskeys' (2002) *critical levels of information* was trialled with teachers during 2005.

Level One: Participants' Reactions
Level Two: Participants' Learning
Level Three: Organisation Support and Change
Level Four: Participants' Use of New Knowledge and Skills
Level Five: Student Learning Outcomes

Guskey (2001) suggests that a more productive approach to evaluating professional development is to start where you want to end and work back. Ultimately the aim of the NDP professional development is increased student outcomes. In planning the professional development this is also the focus. Increased student outcomes are supported by the use of new learning, organisational support for the new learning, the acquisition of new learning, and the attitudes toward new learning and this professional development. When presenting the self-assessment rubric to the teachers this sequence was reversed and began with considering attitudes to learning and the professional development.

The rubric format was selected because it is a non-static scoring guide that requires an act of judgement in relation to the learners' own learning by distinguishing and describing levels of quality. Qualitative performance descriptors and statement criteria that are uniformly differentiated are described to provide a starting point, valid target and reliability within the judgements. Four options were given so as to alleviate the *safe option* or *happy medium* middle choice. In using a rubric method the authors are not assuming a base-line starting point and are aware that teachers will come to the professional development with different levels of information and mastery. The performance criterion of the rubric provides the teachers with a picture of the desired goal. The teachers' placement of themselves on the rubric is the evidence of their present position. The *co-generated dialogue* (Roth & Tobin, 2001) between colleagues about the desired goal and the present position is the beginning of the understanding of how to close the gap. The ultimate goal of feedback should be to teach learners to regulate their own learning (Tanner & Jones, 2003). The feedback to teachers is not about what they should do next but to help them to understand the purpose of their learning and thereby know what they need to achieve

The Self-Assessment Rubric aims to provide teachers with the opportunity to reflect on, and be cognisant of, their own learning. The aim is that this experience will positively influence the degree to which the teachers devolve and sustain their new learning to their mathematical pedagogy and ultimately their students. Black and Wiliam (1998) believe that teachers need to know about their learners' progress and difficulties with learning so that they can adapt their work to meet their needs — needs which are often unpredictable and which vary from one learner to the next. The contextual nature of this self-assessment enabled the authors to provide the individual support that any teacher required during the implementation phase of change.

Method

This research was conducted with 66 teachers in their first year of NDP professional development. Included are 1621 students in Year 0–8 and aged 5–13. During the eight workshops that form the NDP professional development teachers were asked to self-assess themselves against criteria related to each of Guskeys' critical levels of thinking.

Table 1 outlines the NDP professional development workshop focus and the critical level of thinking focus.

Table 1:
Workshop and Critical Thinking Focus

Workshop	Focus	Thinking Focus
One	The Number Framework	Participants' reactions (Level 1)
		Organisation support and change (Level 3)
Two	The Diagnostic Interview	
Three	Getting Started: Knowledge	Participants' reactions (Level 1)
Four	Getting Started: Strategy	
Five	Addition and Subtraction	Participants' learning (Level 2)
		Organisation support and change (Level 3)
		Participants' use of new knowledge and skills (Level 4)
Six	Multiplication and Division	
Seven	Proportions and Ratios	Participants reactions (Level 1)
Eight	Evaluation	Participants learning (Level 2)
		Organisation support and change (Level 3)
		Participants use of new knowledge and skills (Level 4)
		Increased student outcomes (Level 5)

Findings.

By WorkShop Seven 100% of the participants agreed or strongly agreed that the professional development was enjoyable, relevant and rewarding (Level 1). When asked to measure the degree to which participants felt they were acquiring knowledge (Level 2) at WorkShop 5 28% felt they were extending or fully understanding their new knowledge. This had increased to 78% by Workshop 8. 98% of teachers felt that their school would support them and any change that this professional development brought about. (Level 3).

The dilemma experienced with the analysis of this data was the expert/novice paradigm where a differentiated concept of excellence exists.

When initially examining the data for responses at Level 4: Participants' use of new knowledge and skills it appears that at Workshop Seven 13% were successfully integrating new learning, 55% had integrated most new learning, 30% were developing and 1% were beginning. By Workshop 8 these results had changed to 35% feeling successful, 52% most, 12% developing and 2% beginning to integrate new knowledge.

The assumption could be made that there had been a shift toward the descriptors of most and successful. However when talking with teachers it became apparent that initially (Workshop 5) expert teachers gauged their integration of new knowledge into their practice at the *most* and *successful* stages. Novice teachers gauged their level of integration as *beginning* and *developing*. At the conclusion of the professional development the expert teachers had gauged themselves at *developing* and *most* as they realised how far they had to go. Novice teachers were pleased with how far they had come and so placed themselves at the *most* and *successfully* end. Whilst these judgements are contextually real to the teachers further research is required to gauge the potential subjective proxy of truth and accuracy that lies within the teachers' self-assessment of their progression within the critical levels of information.

The area of Guskeys' critical levels of information that may be most difficult to provide evidence of is Level Five: Increased student outcomes. By Workshop Eight 100% of the participants' agreed or strongly agreed that there had been increased outcomes and cognitive performance and increased positive attitudes for their students. This is further evidenced by the results achieved by the students. It must be noted that the authors are not assuming that this evaluative process or professional development is responsible for all the changes in student outcomes. As Guskey (2002) describes "the relationship between professional development and improvements in student learning in these real world settings is far too complex and includes too many intervening variables to permit simple casual inferences".

Figure One shows the strategy stage movement in addition and subtraction, multiplication and division and proportions and ratios.

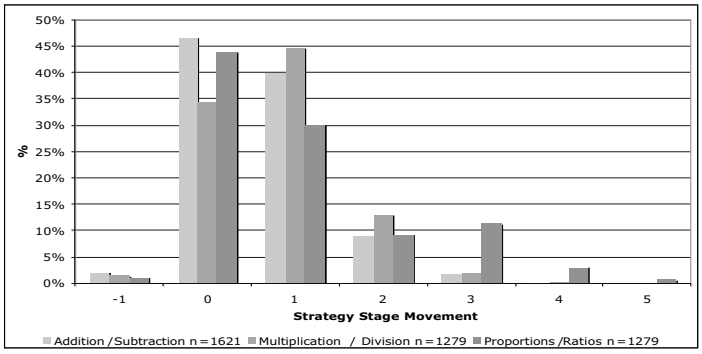

Figure 1. Strategy stage movement.

Proportions and rations was the last strategy taught before the second diagnostic interview and as shown was the strategy stage that showed the greatest movement. The authors suggest their may be a strong link between the last strategy taught and the recall of that learning. It must also be noted that as the strategy stages increase so too does the body of knowledge within the higher stages. Working at the same stage for a year is not uncommon within the higher strategy stages.

Figure Two represents the Number Knowledge Stage movement for forward number word sequence, backward number word sequence and numeral identification. Figure Three represents the Number Knowledge Stage movement for fractions, place value and basic facts.

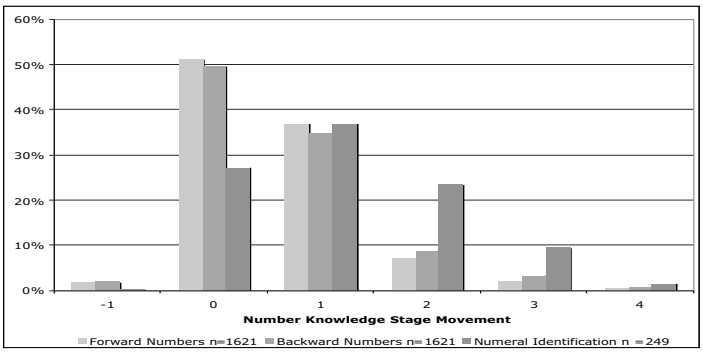

Figure 2. Number knowledge stage movement

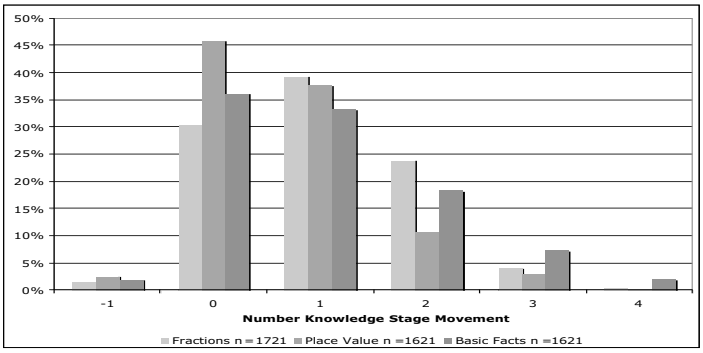

Figure 3. Number knowledge stage movement.

Closer analysis of the data showed that it was the same students who had regressed. This could indicate that the student was diagnosed at an incorrect higher stage at the time of the first interview. However students that had moved three or four stages were identified as different individuals.

Discussion

Teachers' reported that by self-regulating (monitoring and reflecting) on their own learning they felt more motivated to take increased personal responsibility for their understanding of this professional development. They became synthesizers of their own learning. By focussing on increased student outcomes this assessment practice made the link between teacher learning and student learning explicit and critical. This may be evidence of the theory of what gets monitored gets done … and it notifies all members that the outcome is considered important (DuFour et al., 1998).

The authors agreed that by under-taking the formative self-assessment systematically through-out the year the teachers were scaffolded in their learning and able to govern their own learning in smaller manageable chunks. We believe this led to an improved attitude toward this professional development and that this resulted in a greater willingness to challenge and change their beliefs and practices. The authors' awareness of the need to develop reflective practice in all learners (teachers and facilitators) increased the value we held for flexible practice that met individual needs. This was matched by an enhanced and strengthened belief in contextually responsive facilitation that guides self-reflected learning

(Higgins, 2005).

Further research is required to examine if there is evidence of connections between increased student outcomes, formative self-assessment, teacher beliefs, attitudes and efficacy (personal and pedagogical) and future approaches to new or continuing professional development and sustainability of new pedagogies.

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