Using evidence for systemic improvement: need and opportunity

Section from:
(Using) Evidence for educational improvement

Adrienne Alton-Lee

Iterative Best Evidence Synthesis Programme/ Hei Kete Raukura
Ministry of Education
Wellington
New Zealand

This excerpt from the article, published in 2011, highlights the opportunity to use of evidence to strengthen professional development for teachers to address the challenges of primary mathematics achievement in New Zealand.

Click here to read the full article ‘(Using) Evidence for educational improvement’
inherently a cyclical inquiry process that builds on knowledge of what makes the most difference at the same time as it fosters the responsiveness and adaptive expertise required for ongoing refinement. Taking a sustained inquiry approach to systemic change at a national level is a challenge for policy because of inherent tensions and project discontinuities across political cycles.

**Using evidence for systemic improvement: need and opportunity**

Policy workers need to be using inquiry to answer the improvement questions in Figure 3. What education outcomes are valued for our students and how are our students doing in relation to those outcomes at the national level? How effective has what we have learned and done been in promoting all students' learning and well being at a national level?

Mathematics is a particular challenge for New Zealand primary schooling. It is a curriculum area that has been a government policy priority for more than a decade. In contrast to a relatively high performance at secondary level where the specialist knowledge of mathematics teachers is high, average performance at middle primary level remains below the international mean in the Trends in Mathematics and Science Studies (TIMSS) (Caygill & Kirkham, 2008; Mullis, Martin, & Foy, 2008).

The New Zealand Numeracy Development Project (NDP), progressively scaled-up over the last decade, has been a national professional development provision focused on classroom practice. It reached 97% of schools within a self-managing school system. The NDP oriented teachers to focus on student thinking and strategies using diagnostic tools to track learning. The project significantly influenced classroom practice and lifted student achievement in mathematics in English and Māori medium education. The effect sizes for gains on addition and subtraction at primary level, for example, calculated on a national sample across 2003, 2005 and 2007, were well in excess of $d = 0.40$ (Young-Loveridge, 2010). Students whose teachers participated in the NDP achieved significantly more highly in Trends in International Mathematics and Sciences Studies than those whose teachers had not (Caygill & Kirkham, 2008).

However, despite some reduction in mathematics achievement disparities in New Zealand from 1994 to 2002, the momentum for positive change weakened and the disparities worsened for Māori and Pasifika primary students in good economic times between 2002 and 2006 (see Table 3). There was also a significant increase in the proportion of Māori students (from 18% to 25%) and Pasifika students (from 23% to 38%) not reaching the low international benchmark between 2002 and 2006. The National Education Monitoring Project found disparities persisted for Māori and worsened for Pasifika over the 2005 to 2009 period (Crooks, Smith, & Flockton, 2010). These monitoring alerts indicate that much more is needed to achieve a systemic lift and greater responsiveness to all New Zealand students.

The Numeracy Development Project brought the challenge of connecting teacher professional learning and student outcomes into sharp focus. An early evaluation revealed that who facilitated the professional learning was critical (Higgins, 2005). Facilitators who had the expertise to develop teachers' knowledge and understanding so that they could take an inquiry approach to developing contextually responsive practice were most successful. Those who used a more prescriptive approach created a ‘design adherence’ mindset in teachers that did not equip them with the
provides a model of a teacher inquiry and knowledge-building cycle approach that promotes continuous improvement and teacher self-regulation of professional learning. Halbert, Kaser and Koehn (2011) report that teacher use of the professional inquiry diagram with its focus on valued student outcomes, has resulted in higher student gains within their evolving spiral of inquiry approach across a large and established network of schools in British Columbia.

In Figure 3, the professional inquiry model has been developed further in the light of other BES findings about the potential for more equitable practice when educationally powerful connections are made with students’ lives, identities and families.

Given the potential pitfalls of large scale implementation, such an inquiry approach is needed at every level of change, from school to policy, to ensure ongoing improvement and systemic effectiveness. A cumulative R & D approach is

![Diagram of Professional Inquiry and Knowledge-Building Cycle](image)

Figure 3. Teacher inquiry and knowledge-building cycles to promote valued student outcomes.
Table 3. 1994/5–2006/7 TIMSS mean trend results for New Zealand Year 5 mathematics achievement for all students and for Māori and Pasifika students. (Source: Caygill & Kirkham, 2008).

<table>
<thead>
<tr>
<th>Year</th>
<th>International Scaled mean</th>
<th>Mean Score (Standard error) New Zealand students</th>
<th>Range from 5&lt;sup&gt;th&lt;/sup&gt; to 95&lt;sup&gt;th&lt;/sup&gt; percentile</th>
<th>Mean Score (Standard error) Māori students</th>
<th>Mean Score (Standard error) Pasifika students</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>500</td>
<td>492 (2.3)</td>
<td>284</td>
<td>453 (4.4)</td>
<td>427 (5.1)</td>
</tr>
<tr>
<td>2002</td>
<td>500</td>
<td>496 (2.1)</td>
<td>273</td>
<td>479 (4.8)</td>
<td>464 (6.3)</td>
</tr>
<tr>
<td>1998</td>
<td>Only NZ</td>
<td>481 (5.6)</td>
<td>312</td>
<td>445 (7.3)</td>
<td>416 (15.1)</td>
</tr>
<tr>
<td>1994</td>
<td>500</td>
<td>469 (4.4)</td>
<td>316</td>
<td>427 (8.2)</td>
<td>412 (11.0)</td>
</tr>
</tbody>
</table>
adaptive expertise necessary for greater responsiveness to and success with student learning. A further weakness of the ‘design adherence’ approach was that it did not support teachers to develop the self-regulatory skills that would enable them to use assessment for the purposes of professional inquiry and ongoing improvement.

Successive evaluations indicated that there was an issue with the sufficiency of the professional development opportunities. For example, where scaling up was attempted too quickly, there was insufficient time to develop capability in facilitators, and emotional issues around change were not adequately addressed. Under such conditions teachers did not receive responsive, knowledgeable support, sufficient access to the knowledge they needed or the multiple opportunities needed to learn and apply the new information. Wider spread across the schooling system was achieved but at the cost of depth and sufficiency needed for deeper and sustainable change (these findings are apparent in evaluations of the New Zealand Numeracy Development Project, including Young-Loveridge (2010), which are all available online at http://nz.maths.co.nz/annual-research-and-evaluation-reports-and-compendium-papers).

Successive evaluations also revealed the importance of the proactive involvement of school leadership in creating effective conditions for the professional development and, the critical role of lead teachers in the success or otherwise of organisational change. For example, when lead teachers of numeracy also had positional authority in the school, organisational change was more successful (Higgins & Bonne, 2010).

Using and building on the knowledge that has been garnered to date about what did and did not work in the NDP will be critical for lifting achievement in mathematics for New Zealand primary students. But it will not be enough. New evidence from the best evidence synthesis series including that focused on effective mathematics teaching (Anthony & Walshaw, 2007), and the new international literature on highly effective educational reform (Levin, 2008) provide valuable resources and opportunities for informing a systemic lift in achievement, and in the New Zealand context, accelerating progress for Māori and Pasifika students, low achievers and those disadvantaged by socio-economic inequality.

Using what we know about what works and what makes a bigger difference in education

Systemic improvement calls for increased knowledge, understanding and use of teaching strategies that make a bigger difference to a range of valued outcomes in education. Teachers need viable alternatives to practices that do harm or are less effective. To be optimally effective, professional development needs to build upon the findings of research and development about professional knowledge and skills that have a greater positive impact on student outcomes for time invested. While the value of this approach to effectiveness may seem self-evident, Timperley (2008) observes that ‘unproven ideas continue to sweep through educational jurisdictions’ (p. 10). In New Zealand, strategies that research evidence has revealed to be potentially detrimental to student outcomes are reported to be commonly used with our lowest achievers. Even research-based approaches can be harmful if the underpinning research has not attended to impacts on student outcomes. A prominent example in New Zealand is the prevalent use of learning styles matching approaches that can ghettoise Māori and Pasifika students into kinaesthetic activities.