

Sustaining improvements in student achievement

Myth or reality?

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KEY POINTS

- This project is one of the few that has been able to show continued acceleration in achievement after the intervention programme has finished.
- This was possible because the schools had embedded a process of inquiry—using student achievement data to adjust teaching practice for maximum effectiveness.
- The process was fully embedded so that it had become “taken for granted” and a part of the schools’ core business.
- Schools had also developed interdependence among teachers within the school and with external experts, so that they could access the expertise they needed to help them learn.

Few studies have ever shown the improved results of an intervention project continuing after that programme has finished. Is it possible to achieve sustainability and what factors would contribute to it? This article looks at one programme that sustained gains and how it was done.

Many schools are involved in initiatives to improve student achievement and have spent considerable time and resources getting these initiatives to work effectively. Recent studies suggest that such initiatives can be very successful in raising student achievement (Lai, McNaughton, Amituanai-Tolosa, Turner, & Hsiao, 2009; McNaughton, Lai, Amituanai-Tolosa, & Farry, 2008). A pressing concern is what happens after these initiatives end. Will schools be able to continue improving achievement without the support and resources that existed during the initiatives? What school practices are critical for ongoing improvements in achievement?

There is very little research where researchers continue to track student achievement after the end of an intervention, and only a handful of studies that have found evidence that achievement gains have lasted. A recent synthesis of research relating to the sustainability of professional learning discovered that only seven international and national studies could show sustainable student outcomes after the end of an intervention (Timperley, Wilson, Barrar, & Fung, 2007). The rest of the studies reviewed did not include a sustainability phase and/or did not show continued improvements in student learning outcomes.

What is sustainability?

There are many different definitions of sustainability (see Timperley et al., 2007, for a discussion of the different definitions). Sustainability, in our view, is a process of organisational learning, where schools use inquiry and knowledge-building cycles to improve valued student outcomes (Lai, McNaughton, Timperley, & Hsiao, 2009). This definition is different from that of other researchers who have focused mainly on how to sustain the school practices (teaching, leadership and management) that have previously been successful. We did not want to look solely at school practices because the previously successful school practices might not continue to improve student achievement, particularly if students' needs change. For example, the school might have implemented a very

successful decoding intervention that raised the literacy achievement of its students. But what if the new cohort of students has fluent and accurate decoding skills and instead what these new students lack is the vocabulary required to understand texts? In that case, continuing the previously successful decoding intervention is unlikely to meet the needs of the new students, and unlikely to sustain improvements in achievement.

What are the important factors for sustainability?

In our view (Lai, Timperley, & McNaughton, in press), there are three important factors for ongoing sustainability:

- The first factor is developing a cycle of inquiry that allows the school to learn, using evidence, the effectiveness of its practices, what it needs to do next and what it needs to stop doing. For example, although much is known about teaching reading comprehension for students in general, there is a variety of learning needs that might result in low progress in reading (Lai, McNaughton, Amituanai-Tolosa et al., 2009). It is important, therefore, for teachers to continually inquire into the needs of their students in order to match teaching practices to students' specific needs. This inquiry approach has been associated with professional learning that improves and sustains student outcomes (Lai, McNaughton, Amituanai-Tolosa et al., 2009; Timperley et al., 2007). Part of developing a cycle of inquiry involves identifying the teaching and leadership practices and processes that are essential to maintaining and creating ongoing improvement, and having in place systems and processes to identify new challenges and how they will be acted on. It is important to remember that engaging in the same practices may not raise achievement if the problem has changed.
- The second factor is embedding practices and processes that are essential to raising student achievement, and embedding a cycle of inquiry in schools' "core business" as part of a coherent instructional programme.

By *embedding* we mean that the practices and processes that raised student achievement and the cycle of inquiry become taken-for-granted features of the school (Datnow, 2005). In other words, these practices and processes become part of the schools' norms, structures, practices and culture. *Coherence* in this context means that schools develop a set of interrelated programmes for students and staff that are guided by a common framework for curriculum, instruction, assessment and learning climate and that are pursued over a sustained period (Newmann, Smith, Allensworth, & Bryk, 2001).

- The third factor is creating interdependence with others (for example, other teachers within a school, other schools). By this, we mean developing partnerships with experts within or outside the school (for example, other schools, researchers, professional developers) to support the school to sustain its improvements in student achievement. This usually involves a vehicle to systematically access and test knowledge that the school needs in order to continue improving outcomes. A possible vehicle is professional learning communities (Seashore-Louis, 2006). Interdependence needs to be managed. Too much dependence on others may create a cycle of dependency for the school, where the school is overly dependent on others to solve its problems; but too little dependence and the school may not have sufficient expertise to address its problems quickly and efficiently.

What did the schools and researchers want to learn?

We wanted to know whether two clusters with mainly Māori and Pasifika students could sustain student achievement gains after their participation in Teaching and Learning Research Initiative (TLRI) reading comprehension interventions. The TLRI interventions had accelerated reading comprehension achievement by up to one year in addition to expected progress over a three-year period (McNaughton & Lai, 2009). Given the need for continually accelerating the achievement of students who are achieving below average, our criteria for judging sustainability was that student achievement continued to improve at a similar rate to that of the intervention. We also wanted to know whether schools that engaged in organisational inquiry embedded in schools and supported by others would be associated with improvements in achievement after the interventions.

How was the study carried out?

Thirteen decile 1 schools from two clusters participated in the study. Across the clusters and over time, we collected information on 7,950 students, with slightly

more males than females (49.47 percent male, 49.28 percent female, 1.25 percent unknown). The four main ethnicities were Samoan (34.11 percent), New Zealand Māori (19.83 percent), Tongan (19.04 percent) and Cook Island Māori (16.02 percent). Between 12 percent and 25 percent of students were absent or transient at each testing point.

Approximately 120 teachers and 29 school leaders were directly involved in the study. There was high teacher mobility. For example, in one cluster, only around 49 percent of teachers we had information on had taught a class for a full academic year the previous year.

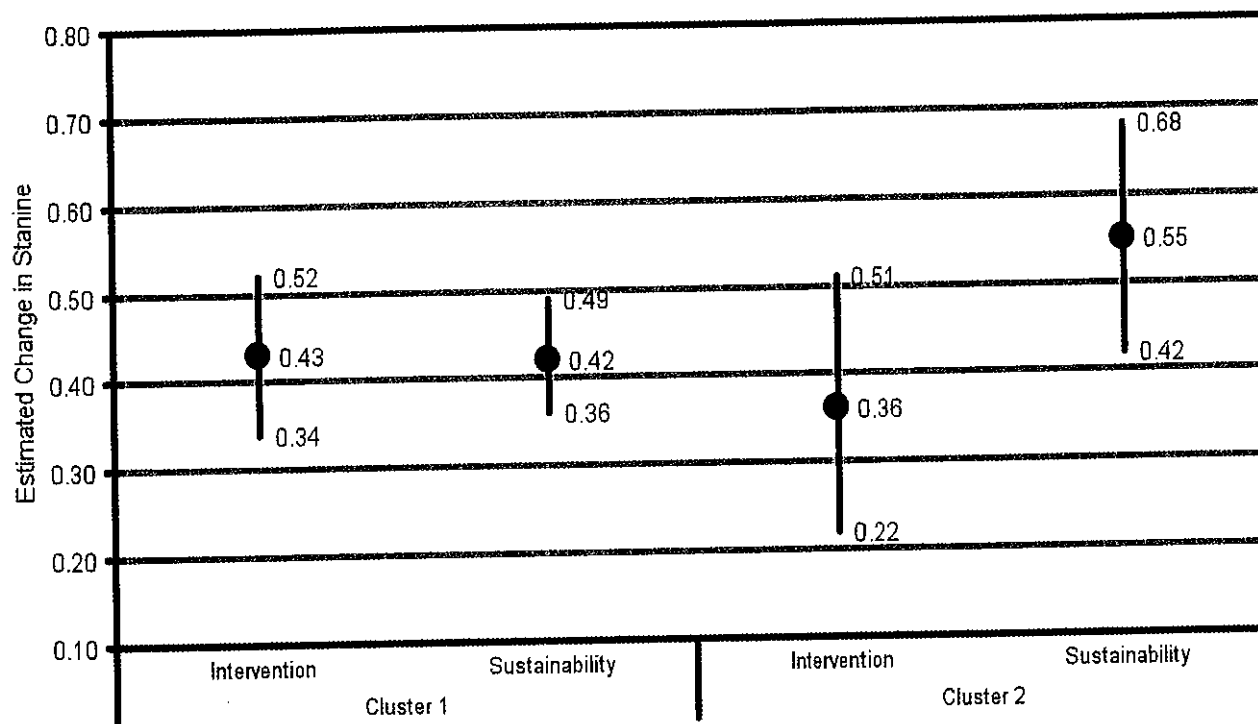
We used a range of data collection measures in this study. After the reading comprehension interventions, achievement data (from the Supplementary Test of Achievement in Reading or STAR) were collected from Years 4–9 students at the beginning and end of the academic year, and the beginning of the following year. Interviews were conducted with all school leaders, the developers of the intervention, external facilitators working in the cluster and Ministry of Education staff. Teachers completed surveys on pedagogical content knowledge (PCK) and leadership; leaders completed the leadership surveys only. We conducted an observation of a school meeting where student achievement data were discussed. Finally, relevant school documents (for example, annual plans) were examined.

We analysed the achievement data using Hierarchical Linear Modelling (HLM), a statistical technique that enabled the research team to identify the amount of gain made during the interventions, and the amount of gain made one year after the intervention, and to check which demographic factors influenced the achievement trends. To examine which school practices were associated with sustainability, we used standard analysis techniques for qualitative data. We examined all the data sources (interviews, surveys and documents) to search for common themes, using an analyst who was not aware of our theory for sustainability, and then matched the themes to our theory of what would sustain achievement. Details of the methods are reported in Lai, McNaughton, Timperley et al. (2009).

Student achievement after the interventions

Results from the HLM showed that after the intervention, achievement continued to accelerate at the same rate as during the intervention. Before and after the intervention, achievement accelerated by about four months in addition to expected progress. Figure 1 shows the yearly rate of acceleration for the two clusters during

FIGURE 1 ACCELERATIONS IN ACHIEVEMENT MADE EACH YEAR DURING THE INTERVENTION (INTERVENTION) AND AFTER THE INTERVENTION (SUSTAINABILITY), BASED ON HLM



and after the intervention (the dots in Figure 1 represent the mean rate of acceleration and the lines represent the confidence intervals around the mean). The figure shows that in Cluster 1, on average, students gained 0.42 stanine one year after the intervention and 0.43 stanine during the intervention. In Cluster 2, on average, students gained 0.55 stanine one year after the intervention and 0.36 stanine during the intervention. Regardless of ethnic group, students made similar gains during and after the intervention.

Thus, despite the fact the schools were no longer in the reading comprehension intervention, schools continued to progress at the same rate as during the intervention. This suggests that schools have sustained their ability to continue accelerating achievement.

There were some differences in the amount of gain made during the sustainability phase. In both clusters, students who started the year with lower achievement levels (at stanines 1 to 3) made higher rates of gain (up to one year in addition to expected progress in one year level) than students who started the year with higher achievement levels (at stanines 4 to 6). There were gender differences in one cluster only—in that cluster, males made more gains than females during the school year, but had greater losses in achievement between academic years (in other words, had lower scores at the start of the year than they had at the end of the previous year). In the

year following the intervention, far more students made “losses” in achievement between academic years.

Despite the continued gains in achievement, neither cluster was at national expectations nor national averages, although there were some schools in both clusters that had achievement levels close to national expectations.

There were two reasons:

- The majority of students in this study had not participated fully in the previous TLRI interventions and started the academic year, on average, 1.5 years behind national averages. It would require more than the four months’ expected progress to catch up with national norms.
- There was a drop in achievement between academic years (in other words, over the summer holidays). Gains made during the school year were “lost” and students started the new academic year with lower scores than at the end of the previous year.

What school practices were associated with continued achievement gains?

Organisational learning through inquiry and knowledge-building cycles

The main school practice associated with the sustained gains in achievement was ongoing inquiry and knowledge building (solving problems arising from teaching and

TEACHING AND LEARNING

TABLE 1 INQUIRY PROCESS USED IN SCHOOLS

Inquiry components	Description
Analyse and use achievement data to tailor teaching practices to students' needs	<p>Systematically collect achievement data (STAR) at the beginning of the year to identify students' needs. (Triangulate the STAR data with other data, such as Assessment Tools for Teaching and Learning (asTTle) Reading, as appropriate.) Compare data at the start of the year to data at the end of the previous year to see if there are any changes in scores.</p> <p>Identified students' needs used to change teaching practices.</p> <p>At the end of each year, examine any improvements in scores during the year.</p>
Monitor the impact on student achievement	<p>Monitor the impact of the changed teaching practices on student achievement during the year (for example, mid-year informal assessments, observations).</p> <p>Monitor the impact of the changed practice at the end of the year.</p> <p>Adjust teaching practices based on the monitoring.</p>

learning). Table 1 shows the key practices schools used as part of their inquiry.

These inquiry skills were learnt through professional learning opportunities during the TLRI interventions and in the Schooling Improvement Initiatives that schools were involved in prior to the TLRI interventions. As such, developing inquiry in teachers and leaders was planned for from the beginning of the interventions.

Embedding inquiry in the school's core business

The inquiry practices undertaken collaboratively at all levels of the school (for example, inquiry between teachers, inquiry by senior managers and inquiry as a whole staff) were embedded into what the school normally did. All schools used their staff, syndicate and/or team meetings to analyse and use the data, and the changed practices became part of the normal school/teaching programme. Some schools put the inquiry process into their teacher appraisals (in other words, the appraisal goal was to demonstrate teachers' inquiry skills). The following is an example of how one school embedded inquiry practices into the school's core business.

School Y set up target folders where each teacher had to identify a target group of students whose achievement they wanted to improve based on the beginning-of-year tests. The folder contained a graph of student achievement, which teachers plotted for themselves, and the data from the STAR subtests. In addition, teachers had to identify what they wanted to teach based on the students' learning needs from the STAR results. In subsequent syndicate and staff meetings, teachers had to share with the other teachers their progress towards achieving their targets, what was working to raise achievement and what had not worked. At the end of Term 3 when students were retested, they plotted the results on the same graph, so that teachers could see the movement from Term 1 to Term 3 and could analyse what worked well, and what they needed to work on.

The lead teacher of School Y talked about the changes in their staff as a result of this approach:

At morning tea or lunchtime, we'll actually hear people talking about their kids. I hear people talking about, 'Have you tried this strategy?' Or they're actually flicking work around and sharing things at morning tea. The way it's structured now, there's nothing hidden. It's a good culture of learning ... you're not too scared to bring out the target children to the table ... There's one teacher that—[in] this year's data—her children haven't moved but she's not down on herself. She's actually said, 'Well, who can help me? How can the school help me to grow?' So teachers are quite open to ideas, and that's because we (leaders) do a [inquiry] model that is across teams, staff, and share targets.

It is also important to note that when schools embedded the learning from the interventions, they were conscious of making the practices instructionally coherent. By this we mean the school leaders tried to minimise other projects that might detract from their core literacy goals. Potential initiatives were not taken on board if they were perceived to be in conflict with the previous literacy interventions, and in general few professional development opportunities outside the cluster were undertaken. All schools involved in additional professional learning opportunities attempted to make these opportunities coherent with their reading comprehension focus. For example, a school that took on a physical education initiative chose to focus that initiative on "learning intentions" to make it consistent with its focus on learning intentions in reading comprehension.

As the inquiry processes embedded in the school were undertaken collaboratively, it is important to examine the conversations around inquiry. As part of the project, we recorded meetings where schools discussed achievement data. A "prerequisite" to a good inquiry discussion about data is robust achievement information that supports schools to identify student learning needs. Achievement data at a school and cluster level for STAR were provided by the external experts, although schools also analysed

their own school STAR data and other data (for example, asTTle) that they collected.

The STAR analyses that were discussed in the meetings typically contained the following information:

1. comparisons of achievement against an agreed standard (for example, national norms) and a comparison of the amount of progress made by schools with the expected rate of progress
2. achievement information differentiated by subgroups (for example, gender, ethnicity, year level) to examine any differences in achievement between subgroups
3. examination of drops in achievement between academic years (in other words, over summer).

Table 2 shows an abbreviated excerpt from a data-discussion-meeting transcript that illustrates how the clusters were discussing their data:

Interdependence with other experts

After the intervention, schools continued to be interdependent with other schools in the cluster and with other experts through school and cluster professional learning communities, where teachers learnt from each other and from school leaders and external experts involved in these communities.

There were many formal opportunities for teachers to learn from other teachers and leaders in other schools, and from external experts such as researchers. The clusters organised interschool teacher conferences where teachers inquired into an aspect of teaching and shared the findings with other teachers. Researchers and professional developers were part of those sessions. Examples of topics included increasing students' positive attitudes towards reading and examining the impact of vocabulary on children's ability to successfully read and understand paragraphs. Researchers and professional developers further supported the schools in collecting, analysing and discussing cluster data, and all schools used some form of external expertise for professional development of their teachers. In this sense, sustainability was not about "schools doing it alone", but schools being strategic about whom they needed to call to support them and when such support was needed.

What might schools do better?

From our analysis, we identified two key areas that could help schools increase student achievement further:

- Schools need to identify specific student learning needs from the data, rather than discuss the data in a generic

TABLE 2 TRANSCRIPT FROM A DATA-DISCUSSION MEETING

Transcript		Annotated comments
Team leader	We continually talk about this every year—there's the kids who fall through after the holidays ... It's all of our Year 7s. It's right across the board. How do we make learning constructive over the holidays to ensure that the kids gain maximum mileage out of what they do in the holidays and not just simply read more?	The leader identifies the problem in achievement as student learning over summer and suggests a strategy for addressing the problem—reading mileage, a strategy that has been linked to improvements over summer.
Teacher	Maybe we should have a trip to the library ... Invite the parents to come along as well. They [libraries] have lots of holiday programmes ...	Teacher suggests a way of increasing reading mileage through partnerships with parents and the community (library).
Team leader	I've also got some stuff from Newspapers in Education. I will actually email [librarian] and find out if they have ... features that we could alert parents to while they are on holiday. The Treaty of Waitangi is coming up when we come back [to school] and then there's only a week before the treaty and we do a massive burst within a week. Really it should start over the holidays, possibly tracking down with <i>The Herald</i> the Treaty of Waitangi. Ok, talk to the kids that these are the articles coming in <i>The Herald</i> ... It's walking distance to the library and we get the parents to come down.	Team leader suggests a way of maximising the library visits by linking back to the school curriculum (Treaty of Waitangi).
Teacher	Yes, absolutely. You need to get them on board because the children cannot do it alone. You need that partnership between the school and home.	Teacher reiterates the importance of the home-school partnerships.

“show and tell” manner (for example, number of students at stanine 3). Identifying specific student learning needs increases the likelihood of sustaining achievement because the teachers would know precisely what the students’ learning needs are, and would be able to tailor their teaching practices to address the identified needs. By contrast, if the data are only described in a general way, then teachers are less likely to know what the needs are and how to solve them. For example, knowing that boys scored lower than girls without knowing what the boys’ specific learning needs were would make it harder for teachers to choose an appropriate teaching practice to support boys’ achievement.

- Schools can enhance the effectiveness of their inquiry by developing greater PCK. PCK is the day-to-day knowledge of how students understand and misunderstand their subjects, how to diagnose and anticipate such misunderstandings and how to deal with them when they arise (Darling-Hammond & Bransford, 2005). PCK requires deep knowledge of the domain or the content that is being examined—for example, the knowledge of how texts work. Effective inquiry relies on having the appropriate PCK to understand student learning needs and to determine the most effective strategies to address those needs. The surveys and observations indicated that there was variation between teachers, with some teachers having high PCK and other teachers being less able to identify teaching and learning needs, and less able to identify what strategies might be most effective to address the needs. These teachers need further support in developing their PCK to maximise their learning from inquiry.

How have the schools and clusters learnt from the information?

The information was fed back to cluster leaders and leaders in each school in regular meetings throughout the project. The clusters have used the information to improve their practices. The following measures were undertaken in the clusters (we have only described some key changes here):

1. Cluster 1

- a. This cluster has made changes in their professional development focus to concentrate on the knowledge and skills (for example, teacher PCK) to inquire more effectively. This focus has been embedded into leadership training for middle managers (through ongoing workshops) and inductions for new teachers. Observation tools have also been developed to provide feedback on teaching practices. External expertise has been brought in to support middle managers and new teachers to develop appropriate PCK, and to support middle managers to observe in classrooms. The focus

on middle managers is because of the need to develop a wider pool of leaders to draw on, given the rates of teacher transience within the cluster.

- b. They have ensured that the process of inquiry is embedded into all teachers’ and middle managers’ work programmes. Inquiry was the basis of the middle managers’ professional development, and formed the basis of their work throughout the year. One key way of embedding inquiry for teachers was through the ongoing annual interschool teacher conference.

2. Cluster 2

- a. Cluster 2 has made changes in the work programme to include the key findings of the study, in particular a focus on improving the gains made by higher achieving students and retaining student learning over summer. The focus of each cluster meeting in 2009 includes discussing an aspect of sustainability that has arisen out of the study.
- b. The leadership structure in the cluster has changed from a primarily administrative and financial function with three principals, to a management group comprising all principals, whose function is to co-ordinate the planning of the cluster work programme.

The schools in this article demonstrate that sustaining improvements in student achievement after an intervention is possible. This is a remarkable feat considering their reduced resources and support and the challenges that the schools faced. However, sustaining achievement is hard work that requires schools to remain interdependent with other experts and to regularly use cycles of inquiry to inform teaching and learning. These school practices are a promising approach to sustaining interventions that can address the longstanding achievement issues in culturally and linguistically diverse schools.

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