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# Multiple 'black boxes': inquiry into learning within a professional development project

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## **Abstract**

This article develops the analogy of the 'black box' in relation to different levels of a professional development project to understand the nature of learning that results in higher student achievement. Principles of formative assessment are used to frame the on-going, evidence-informed inquiry into learning that operated at each level of the system involved: policy, project delivery, including expert facilitators, and school. Data collected throughout the two-year project cycle (of which there were three), included student achievement in reading or writing; student interviews; classroom observations and responses from teachers to scenarios; interviews, and taped examples of facilitator practice. There were considerable effect size gains in student achievement in each of the three, two-year cohorts of schools. To understand these gains the project and its various contexts for learning are examined. Examples of how inquiry into learning at one level impacted on practice at others are discussed.

**Keywords:** literacy, school reform, student achievement, systems

## **Introduction: the issue**

Raising standards of student achievement and altering profiles of achievement that are socio-economically and ethnically stratified is a national priority in many countries (Organization for Economic Co-operation and Development, 2005). With respect to our particular context, recent international studies affirm that New Zealand students typically perform very well in literacy but these studies highlight the wide variation in performance and the underachievement of particular groups (OECD, 2005; Ogle et al., 2003). Internationally, attempts to change these profiles have focused on reforming schools and re-educating the teachers within them. Ongoing professional learning is needed because teaching challenges do not remain static: changing student demographics and an ever-changing knowledge base mean that teachers need access to current evidence about how best to meet the learning needs of their students (Timperley et al., 2007). To maximize their influence, teachers need opportunities to deepen their understandings and refine their skills, while schools need effective facilitation of reform to

enable them to sustain gains made over time. Many professional development efforts to address patterns of achievement, however, have met with relatively small and typically unreliable achievement gains whether teachers are given prescriptions with which to work (Borman, 2005; Datnow et al., 2003), or the time and resources to develop their own solutions (Lipman, 1997; Saxe et al., 2001). Research has typically focused on the inputs in terms of professional development, like the nature of the programme or the activities engaged in. Relatively few studies examine the learning or consider the links between the input, the nature of the learning, what happens subsequently and the impact on students (Timperley et al., 2007). That is, few studies look inside the 'black box' (Black and Wiliam, 1998) in relation to professional learning. In this article we examine a demonstrably successful national school change project involving professional development in literacy. The aim of the article is to illustrate the importance not only of examining the black box of professional learning but also of investigating the fact that there are potentially several contexts for learning and that these are inter-related.

Arguably, in an educational endeavour like teacher professional development designed to raise student achievement, there are multiple contexts in which there is the potential for learning to occur and, correspondingly, there are multiple black boxes. These contexts are likely to be interdependent so that what happens at one level influences another. Inputs to one level may alter as a result of learning and change at another level. In the national Literacy Professional Development Project (2004–9) that was the focus of our research, such contexts involved the learning of those at the policy level who resourced the professional development project; of those planning and guiding the professional development project; of those responsible for the professional development in schools, as well the learning for school leaders, teachers and their students. We argue that the ongoing inquiry and the learning that results from this inquiry are essential to professional development and that this inquiry has to happen in each of the contexts. Such inquiry has close parallels to notions of formative assessment whose purpose is to shape and improve performance (Sadler, 1989). Traditionally, this performance has been that of students but here we extend the idea of inquiry to shape and improve performance to learners at all levels: inquiry into leadership practice, facilitation and teaching practice.

Within any specific context, interactions designed to promote learning have particular characteristics and focus. These include developing a shared understanding of the purpose and focus of the learning, of the desired goals or outcomes of the learning and what it looks like if goals were to be attained. Also included is an evaluative comparison of actual performance, with desired performance, together with a co-constructed plan of the way forward and of how progress towards goals will be monitored, including what will count as evidence and how such evidence will be obtained. Essentially, these are the elements necessary for assessment for learning to operate (after Sadler, 1989). The focus of professional development to hone practice, learning requires the building of certain kinds of knowledge, particularly content knowledge. For teachers (and facilitators), this centrally involves pedagogical content knowledge (after Shulman, 1986, 1987), the knowledge of the subject from the point of view of teaching it. On the part of a facilitator and leader it involves understanding, and being able to provide and to apply, productive ways to inquire into practice and to provide feedback to teachers that enable them to move forward. For teachers such understanding is needed to allow students to move forward. Furthermore, the inquiry and feedback has to be designed to

operate in such a way that learners are empowered to conduct such inquiry into, and evaluate and hone, their own performance. Learning to participate in the management of one's own learning is a key principle of formative assessment (Sadler, 1998).

In this article we consider how the basic premises of evidence-informed inquiry contributed to the national Literacy Professional Development Project's success. We invoke a broader systems perspective (e.g. Leont'ev, 1981) to think about the project itself as a learning project by examining how learning from formative evidence at one level influenced and enabled learning at another. We aim to show how inquiry and feedback served learning, leading to changes in practice and how the nature and extent of learning at one level of the project affected learning at another. In our discussion of examples of learning at different layers of the project, we highlight three key issues relating to inquiry and feedback within a complex endeavour like a professional development project. The first concerns the need for a shared understanding of the valued outcomes desired and for coherence within and across the levels of the project. As teachers, for example, do not practice independently of the social context in which they work, developing within-school coherence in terms of teaching and learning underpins whole school approaches to improving the quality of instruction (Mada et al., 2007; Newman et al., 2001). The second issue relates to the nature and process of inquiry-focused interactions and the third to the nature of the learning required.

### *Context: the response to the need for professional learning to raise achievement*

The Literacy Professional Development Project, the current focus of discussion, was designed to achieve national strategic goals of raising student achievement and reducing disparity. The project was initially designed to focus on four contracted outcomes concerning evidence of: (i) improved student achievement; (ii) improved teacher content knowledge; (iii) improved transfer of understanding of literacy pedagogy to practice; and (iv) effectively led professional learning communities. The project was a school-based, job-embedded model of professional development involving expert facilitators working with individual schools. Structurally, the project functioned on four levels: Ministry of Education, contracted service provider, facilitators and schools. Research was an integral component of the project, serving a reflexive role; addressing issues likely to influence project outcomes; helping to identify where learning was needed, and often providing the evidence to serve as a catalyst. The authors, key personnel from the provider, together with the regional team leaders of facilitators and a Ministry of Education representative formed a leadership team who reviewed progress, considered evidence, made adjustments and planned. Facilitators each worked with a small number of schools; their sites of learning were within the schools they worked in and their regional and national meetings. Schools appointed literacy leaders who provided the main interface with the facilitator. These leaders were progressively up-skilled to become a resource and leader in an ongoing professional learning community. Thus, within the project, there were various contexts for learning for different participants.

The project aimed to be evidence-informed at all levels, to use evidence to lever change and to monitor the effectiveness of that change. There was ongoing monitoring, feedback and adjustment based on evidence, with efforts to change practice implemented

with support. Evidence was considered for what it showed about current practice and its consequences, relative to that considered efficacious or desirable and evidence was also used to hone practice to achieve outcomes. This cycle of evidence gathering, evaluation against goals and adjustment (learning) arguably comprises a system within which learning could take place at all levels.

## Method

### *Overview of research*

The authors, in the dual roles of researchers and members of the project leadership team, were both observers of and, at times, contributed research data to, the decision making processes. They observed, and sometimes participated in, facilitator development. Additionally, the researchers undertook independent research. Within each two-year cohort, this involved a sample of schools that served as case studies. Multiple methods were used to collect data (the various aspects of this research are detailed in Parr, Timperley et al., 2006 and Timperley and Parr, 2008). In this article, the data presented to illustrate the effect of the project on student achievement are drawn from participating schools in all three cohorts of schools, each cohort spanning two years. Other data derive largely from the case study schools, while the examples that illustrate project learning are drawn from participants in the first cohort of case study schools.

### *Participants*

The student achievement data reported were collected from schools participating in the project ( $N = 91, 127$  and  $84$ , respectively, for each cohort). Schools chose to focus on either reading or writing. All teachers and students in Years 1 to 8 were involved, although achievement data represent only students from Year 3 (reading) and Year 4 (writing) onwards, as these are the levels at which national normative data begins. Reading achievement data from standardized measures were available at all time points for 3787, 3871 and 1692 students for cohorts 1 to 3, respectively. For writing, these data were from 1064 (a sample of students), 3442 and 2897 students.

Data from leaders, teachers and students were collected in case study schools which were selected to represent a range of geographical areas. In the first cohort there were 13 such schools; in the second cohort 32 and in the third 33. Participants (or student caregivers) gave signed consent to be part of the research for which appropriate ethical approval was obtained. From these case study schools, there were 116 professional participants in cohort 1; 339 in cohort 2 and 297 in cohort 3 (maximum Ns). In addition there were between 21 and 23 national facilitators who worked with the schools in each cohort.

### *Procedure and measures*

The project began in each school in each cohort with a needs analysis to ascertain the pattern of strengths and weaknesses at leader, teacher and student levels. Student achievement data were obtained from standardized measures with national normative data. For reading this included either the Supplementary Test of Reading (STAR) or Assessment Tools for Teaching and Learning: Reading (asTTle Reading), the latter a curriculum referenced test. Writing performance data were obtained from a criterion

referenced (to the national curriculum) measure of writing, Assessment Tools for Teaching and Learning Writing ([www.asTTle.org.nz](http://www.asTTle.org.nz)).

Principals and literacy leaders were interviewed to obtain a picture of the available knowledge base in literacy amongst those in the school and of current practices, particularly with respect to the use of evidence in decision making. Teachers responded to scenarios describing effective and less effective aspects of classroom practice in reading or writing that explored their pedagogical content knowledge and to scenarios that examined their knowledge, interpretation, and use of data. Although classroom observations were conducted for all teachers, research data were collected from each case study school from two teachers for whom normative data were available for their students. In each of these classrooms, up to six students, purposely selected to represent a range of ability, were interviewed with respect to their learning in the observed lesson. They were asked what they were working on (by way of introduction), then what they were learning about (writing or reading) to discover if they were aware of the learning aims for the lesson. This was followed by an inquiry as to whether they knew what a 'good' (focus of the lesson) looked like to ascertain if they had a sense of what a quality performance would look like and how they would know if they were successful (success criteria). Finally, students were asked what they thought, from talking with their teacher, they should be working on, to find out their understanding of any feedback or feed-forward. These data from student achievement, interviews with leaders, scenarios and classroom observations initially formed the core of an analysis of needs. These data were to be used to plan professional learning at school and individual levels and, at later points, they contributed to the evidence to consider in terms of progress towards the desired outcomes.

In the first cohort, as this needs analysis process to inform a more targeted approach to school-based professional learning was a new concept, researchers interviewed the observed teachers, together with principals and literacy leaders after the initial process of identifying learning needs (and strengths) of professionals and students in the school had been completed, analysed and feedback given. Specifically, we asked teachers about the usefulness of the feedback they received from the needs analysis process, particularly from their scenario responses and from classroom observations. They were also asked about their understanding of the extent of change asked for and whether they understood how to make any changes discussed. With respect to the visiting facilitators, they provided data about facilitation practice in the research schools and, at the same time, school personnel were interviewed in relation to the facilitator's approach to the professional development.

Data from Lead Team meetings, matters discussed and decisions taken were available from the minutes and the recording of subsequent actions taken.

### *Data analysis*

The present article draws for its argument and illustrative examples on only a portion of the data collected and analysed, namely, student achievement data to establish the success of the project over three cohorts; data from Lead Team meetings in the first year of the project as it took shape; data from the interviews with school personnel and facilitators after the initial needs analysis and data from the classroom observations (cohort 1).

*Student achievement tests:* Reading tests were scored by classroom teachers and accuracy checked by sampling within each class. A measure of gain or progress was calculated for each class and school (its form depended on the test: either using the standardized stanine measure the STAR test produces for different points in the year or the gain score from the asTTle tests which use item response theory and a common scale). For writing, the scoring in all schools was moderated by expert facilitators. As asTTle writing, like reading, is scored on a common scale, gain was calculated from total scores. There were three time points. The magnitude of gain over time in both reading and writing was calculated for each class and school using an effect size measure (Cohen, 1988).

*Classroom observations:* These were recorded and transcribed. The level of analysis relevant to this article focused on identifying the nature of the learning aim and the criteria for success; the extent to which these were explicitly shared with students, and the nature of feedback and feed-forward. Student interview data were analysed on a three point scale according to the extent to which students understood the learning intention of the lesson; had an understanding of what successful attainment looked like and with respect to the type of feedback they reported receiving from their teacher and how it related to intended learning.

*Post need analysis interviews:* Interviews after the needs analysis feedback were coded according to the identified challenges and the extent to which the learning process and practice described were consistent with a co-constructed needs analysis approach. The interviews with teachers and school leadership asked respondents to nominate a category that described their reactions to information from the classroom observations, student achievement information and questionnaires for the staff that were undertaken as part of the needs analysis process. The response category options were 'Major new insights', 'Minor new insights', 'Confirmed what I knew' and 'Not useful'. As the research interviews proceeded, an additional category was added, namely, 'Can't remember'. The accuracy of these analyses was cross-checked with each facilitator.

## **Findings: achievement outcomes and exploration of the black boxes**

### *Student achievement gains*

The Literacy Professional Development Project has raised student achievement in writing and in reading (Ministry of Education, 2006, 2008). The average effect size gain (Cohen's *d*) was calculated to show gain over and above the expected average gain in the two-year period. In writing these effect sizes for each of the three cohorts were 0.79, 0.62, and 0.88, respectively. The gain for the lowest 20 per cent of students (identified at the first time point) in each of the three cohorts was five to six times the expected gain (effect size gains of 1.81, 1.93 and 2.07). In reading the effect size gains, over and above expected, were 0.28, 0.28 and 0.44 for the cohorts. Again, gains for the students in the lowest 20 per cent were greater, around two to three times the expected gain.

While these data may present the best possible picture and, in the case of the lowest 20 per cent, are subject to regression to the mean, they need to be viewed in light of the findings provided by a recent review of the impact of professional development on reading and writing which indicates that such gains are at the high end for literacy interventions, particularly for populations that have traditionally been underserved by the

education system (Timperley et al., 2007). Borman (2005) calculates average effect sizes for comprehensive school reform to be less than 0.2 for interventions running for under five years and rising to 0.5 after eight years.

### *Exploring the black boxes: a learning project*

The notion of how the project functioned as a learning project is now exemplified through examples that provide descriptions of the central characteristics that influenced learning. We describe the coherence that led to shared understanding. We show how learning at one level provided the conditions for learning at another. The specific examples illustrate the significance of the characteristics of interactions in bringing about change and of the nature of knowledge required to promote learning.

### *Learning with regard to shared outcomes*

At the outset, the Ministry of Education and Learning Media, the agency contracted to deliver the project, drew partly on what they had learnt from the immediately prior national literacy professional development project, in designing and implementing the current project. The research and evaluation work contracted towards the end of the previous project had uncovered several problematic features, particularly regarding shared outcomes. It showed that there was limited shared understanding amongst key participants about the focus and outcomes of the initiative (Timperley, Parr and Higginson, 2004) and that there had been a possible over-estimation both of the capacity of schools to engage in evidence-based decision making (Parr and Timperley, 2008) and of the extent to which the use of student achievement data to judge effectiveness of initiatives was part of school's professional canon, in particular their theories about how to judge effectiveness (Timperley and Parr, 2005). What the Ministry and the contractors for the professional development had learnt from the evaluation of the previous literacy professional development project was reflected in design features of the subsequent project. For example, in the current project, the outcomes were clearly specified (each prefaced by 'evidence of') and they were specifically contracted for. The project leaders worked to ensure the conditions necessary to understand and to achieve the contracted outcomes. The facilitators knew the target outcomes; their half-yearly milestone reporting to the project leaders was designed to be against each of them (as was the project contractor's reporting to the Ministry of Education). At the school level, determining from the evidence the extent of progress towards each outcome was envisaged as a co-operative endeavour (designed to function as a learning process for schools) where facilitators worked with school leaders to draw inferences from the collected evidence. School leaders were therefore positioned to understand (some did so more latterly than others) the desired outcomes, together with their interdependence and, importantly, the idea that the literacy professional development project in their school involved a whole school improvement focus.

This notion of a whole school focus was an important aspect of coherence, coherence within a level of the project. The establishment of a community of practice was one of the key structures and processes aimed at ensuring not only coherent messages, particularly with respect to target outcomes, but also supporting the implementation of practices to bring about those outcomes. Coherence with respect to shared outcomes was



also aided by the fact that there was planned overlap with some members of one level of community also belonging to another. For example, the lead facilitators were on the leadership team as was the Ministry of Education, while facilitators were closely linked to the school community. In addition, there was an extensive set of common written artefacts to reference. The tools (e.g. needs analysis tools like the classroom observation schedule, leadership interview, milestone reporting format) utilized by facilitators and schools were designed to carry key messages about both outcomes and processes (Timperley & Parr, 2009a).

In the present professional development project, the level of support for both facilitators and schools was greater than in the previous project, particularly in terms of gathering and interpreting evidence of student achievement and of teacher practice. Considerable input at national seminars, held three times yearly, focused on these aspects. Facilitator's contact with schools was also more frequent allowing for the cycle of evidence-based decision making to be carried through. Learning from the previous project was arguably influential also in the deliberate decision of the Ministry and the providers to promote project learning by including research as an integral part of the project. This was a recognition that those who were responsible for the implementation needed to be prepared to make changes in their own thinking and to engage relevant expertise as needed. Previously, the Ministry had contracted evaluations of work either completed or nearing completion. Thus, the project was not viewed as a programme or package; it always had the potential for learning and change. As research findings became available, they were discussed in ways that helped to identify problems of design, understanding and implementation with project leaders, policy makers and, where appropriate, with the facilitators who worked in schools. The findings were able to be utilized as feedback in an ongoing way in decision making.

An early example of this use of research data came in the initial year of the project when the first set of milestones from facilitators, coupled with an interim research report, showed that a needs analysis approach to professional learning required considerable time to undertake and also to build the necessary expertise to institute. This convinced the Ministry and the contractor responsible for delivery of the project that the intended funding timeframe of a year was insufficient to get traction to meet the outcomes desired. The Ministry representative on the Lead Team made strong representations to the Minister for Education and the project was subsequently funded for two years for each cohort.

Two detailed and inter-related examples that arose from the research are offered as further instances where systematic evidence and feedback prompted learning. The examples that arose from the research essentially concern inquiry into classroom practice. However, what was learnt and what needed to happen had implications for other levels of the project.

*Inquiry into teacher knowledge and practice: Implications for facilitator learning regarding interactions:* Research early in the project uncovered a lack of understanding, at more than one level, of how inputs, particularly regarding the nature of teacher professional learning, would be determined. Despite efforts of the contractors, there was not a widely shared understanding of a key tenet of the project, the idea that practice, in this case the nature of the facilitation of professional learning of teachers and leaders, would be informed by an analysis of need. Initial work by facilitators in each

school had focused on gathering data to determine the learning needs of students, teachers and senior management. It was intended that facilitators collate and analyse this information with the school professionals and that together they construct each school's professional development programme. Again collaboratively, every six months, they would ascertain their progress in achieving the contracted outcomes, employing a reporting and analysis framework that assisted them to inquire in evidence-informed ways and to identify the evidence to substantiate judgements of progress.

Initially, most schools and a number of facilitators viewed the needs analysis as an exercise to get 'over and done with' expeditiously. School senior managers, who had generally worked in a relatively fixed delivery, input-focused professional development environment, at first conceived the project to be simply about updating teachers regarding effective literacy practices and were anxious to start the PD sessions for their teachers. The evidence for this lack of understanding of the function of a needs analysis came around six months into the project from responses to questions put by us as researchers, to teachers, leaders and facilitators. Teachers, for example, were asked about their recollection of feedback after being observed in their classroom. Thirty per cent of teachers interviewed did not remember receiving any feedback from the observations. The rest indicated that the feedback had confirmed what they already knew or had led to some minor new insight. In a project designed to bring about enhancements in literacy knowledge and practice in order to raise student achievement, this was a salutary finding. Some teachers remembered feedback from an analysis of the responses to the questionnaires and scenarios, mostly recalling generalized findings. They did not see, however, how their own responses had been analysed or used. They did not perceive the link in terms of determining their own learning needs in relation to those of their students. Feedback in relation to the gap between their current knowledge and practice and that desired had not been perceived.

Comparable interviews with facilitators established that many felt insufficiently clear themselves, as this was a new approach, to explain the purpose and, more importantly, to illustrate (and then execute) how the data gained in the needs analysis, would inform closely what followed in terms of professional development. Both facilitators and their schools, while familiar with the notion of the use of achievement data for diagnostic purposes in classrooms, seemed not similarly familiar with utilizing data relating to other levels, like teacher, leader or school-wide levels in ways that might inform school-wide action. It was also evident that the half-yearly milestone reports were often being completed largely by facilitators, rather than, as envisaged, in concert with the school, based on a collaborative discussion of evidence in relation to progress criteria.

These findings from the researchers were shared and considered at a Lead Team meeting. The major implication concerned facilitation. The project leaders and the Ministry realized that the extent of facilitator skill needed to utilize the corpus of data from the needs analysis, in order to challenge current practice that was not leading to mutually agreed outcomes and then to support the putting in place of a more productive alternative, had been underestimated. The issue was not simply one of the currency and depth of facilitator literacy knowledge or knowledge regarding data interpretation and application. The issue centrally involved facilitator expertise as change managers. A change manager has to possess the skills to evaluate what is currently happening and to challenge those practices that may be impeding progress towards goals, then scaffold the introduction of more efficacious practice.

This finding led to an analysis of the black box of facilitator learning. It led to the question of what learning experiences and knowledge and skills were needed to co-construct tailored input to professionals with whom they worked in order to effect change. What did a quality performance with respect to facilitation look like? Five core acts of facilitation (Bareta et al., 2006) were identified and subsequent professional development of facilitators undertaken. The policy makers as well as project leaders came to realize that a greater emphasis was needed on facilitation and the Ministry, for the subsequent years of the project, contracted a new fifth outcome, namely, evidence of effective facilitator practice. With guidance from the leadership team, in regional teams and at national seminars, facilitators were helped to build requisite knowledge and skills (note: facilitators received, as part of their contract, more than 20 days for professional learning each year). They set personal and specific learning goals and received feedback and support to monitor progress against them. As part of achieving these goals, facilitators engaged in guided practice with respect to conducting effective learning conversations (Robinson and Lai, 2006). They taped and, with scaffolded support from the researchers, analysed in detail their feedback conversations with teachers. This facilitator learning through guided, detailed analysis of their own practice is discussed elsewhere (e.g. Timperley, Parr and Holbosch, 2008). In addition, the appreciation of the complexity of what was involved led the project leadership team to engage in a similar process of analysing their leadership practice and the nature of the feedback they gave when observing the facilitators at work.

*Inquiry into student learning: Implications for changed teacher practice:* There were several ways in which direct inquiry into student learning (and, by implication, inquiry into what teachers needed to know to address those learning needs) took place. At the teacher and classroom practice level of the project, there was evidence of learning about teaching from such inquiry. For the first time, many teachers and their leaders learned to interpret student achievement data in formative ways, namely, in terms of the implications for teaching and for reflecting on the effectiveness of teaching. In particular, the data from the curriculum referenced measures operated like a planned formative assessment tool (Cowie and Bell, 1999). Data from the research showed that teachers improved significantly in terms of their ability to interpret achievement data. However, this knowledge on the part of individual teachers did not account for significant variance in the progress of students in their class. Knowledge of how to make sense of assessment data was necessary but not sufficient. What was important was teacher's level of pedagogical content knowledge, knowledge that is, arguably, necessary to utilize the interpretation of data and apply it to classroom practice (Parr and Timperley, 2008; Parr, 2009). Combining student data with classroom observations and data about teacher knowledge from responses to scenarios gave facilitators and the individual teachers with whom they were working evidence from which to draw inferences about required learning in relation to practice.

It was from the classroom observations that a key lever for change and a significant instance of the power of inquiry into practice came. It came, serendipitously, from questions we, as researchers, employed to gather information about the impact of the lessons we observed. Research data from 15 classrooms, including detailed follow-up from two of them, showed how considering the responses to simple questions enquiring into student

learning became a lever for change in teacher practice. This learning, like the policy learning and the learning regarding the nature of facilitation discussed above, had implications for learning at other levels of the project.

We were interested in the extent to which classroom instruction conveyed challenging learning goals (in this case in writing) through a range of teaching activities and how well the participating students understood these goals and their outcomes. Six students, representing the range of ability in each class observed, were interviewed by one of the authors, usually in groups of three. We asked them questions about their learning (detailed earlier). Both the transcripts of the lessons and the students' responses were viewed in terms of the extent to which the lesson aims and mastery criteria were shared with and understood by the students and in terms of the type of feedback given and students' understanding of it, together with how well it aligned to those lesson aims. The feedback referred to any evaluative statement related to something the student had written, while feed-forward referred to something the student needed to do in relation to his or her subsequent writing.

In brief, an analysis of the transcripts in concert with the student interview responses showed, not unsurprisingly, that, in most classes, students' interview responses reflected the extent to which teachers were explicit in these aspects of instructional practice. The results are detailed elsewhere (Timperley and Parr, 2009b). What is of interest here is the outcome of our informal discussion with the teachers after an observation. As it was not our role to give feedback regarding practice, we most often talked with the teacher about student understandings, using their words, which were fresh in our minds and on our notepads (as well as tape-recorders). A number of the teachers found this a salutary experience; they regarded their explanations of learning aims to be clear and thought their students had understood. The data from our simple inquiry were a powerful catalyst for learning, however, as illustrated by the case of two teachers.

These two teachers, whose students had exhibited some of the least clear understandings, asked for assistance from their facilitator to change their practice. The process of the facilitated learning is described in Timperley, Parr and Berantees (2009c). We returned after four months to observe in their classrooms and to look at their recent planned formative assessment results. The latter student achievement data in writing showed significant improvement in the relatively short period (a gain of around a standard deviation in total score).

What is important to note in terms of the argument we have developed here is that learning from our inquiry, as researchers, had implications for learning at several other levels of the project. Not only did the student pattern of responses to the questions influence the practice of the teachers concerned but the method of inquiry was appropriated by the project, by facilitators and by teachers. The questions for students were incorporated into the observation tool used by the project. Facilitators used student responses as evidence in their learning conversations with teachers after observation. They also used them to help gauge the effect their feedback or support to teachers, regarding aspects of teaching practice, was having on students. Numbers of teachers reportedly employed this notion of asking simple questions of students about their learning and used this feedback to reflect on the effectiveness of their teaching.

## Conclusion

The professional development project discussed in this article could be considered a 'learning project'. This is the crux of our explanation for its success in raising student achievement in literacy, particularly for those difficult to move students in the lowest percentiles of achievement. While there has been a failure of professional learning projects to inquire into the nature of learning or to consider the inputs in relation to the learning outputs of both teachers and their students, this article has illustrated the necessity to consider the black box of professional learning at several levels in order to understand how best to achieve enhanced outcomes for student learning.

Theoretically, the interlocking levels of this professional learning project provide, within activities, the potential for the development of systems for learning and development. The activity settings in this project were structured to support such learning with shared goals and understandings. The systems for learning operated within every level of the project through planning for, obtaining and then utilizing evidence in an ongoing way to monitor achievement towards outcomes and to decide on and make necessary adjustments to practice in order to progress. And, the article has shown that it is important that this learning not be confined to the classroom. The policy and project leadership level in this project utilized previous learning and put in place structures to maximize and support inquiry processes both for themselves and others. The implication is that policy makers and professional development providers have to be prepared to learn and to adjust their policies and practices based on evidence of outcomes. There are implications also for the positioning of research and its potential development role within such endeavours. Evidence from research showed clearly the key role that facilitators played and the necessity to inquire into the nature of their inputs in order to ensure that the desired outcomes regarding school-wide learning and change were addressed. As this article makes clear, enhanced student learning is dependent on the nature of the inputs from all levels in an endeavour like professional development. Evidence-based inquiry into effective practice, together with coherence in terms of goals, is the key paradigm that connects the different contexts for learning. Inquiry in the current project was conceptualized as a set of interactions within and between communities of practice and represents a dynamic model, one that uses, in an ongoing fashion, evidence to develop and to change practices, working from established learning needs at all levels.

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