Investigating the links between teacher professional development and student learning outcomes

Marion Meiers
Lawrence Ingvarson

Volume 2
This project was funded by the Australian Department of Education, Science and Training, through the Quality Teacher Programme over 2001-2003
Contents

Chapter 1
Improving Student Learning with Professional Development  Marion Meiers and Lawrence Ingvarson  1

Chapter 2
Learning Improves in Networking Communities  Wendy Dick  4

Chapter 3
Recognising and Deepening Expertise  Dr Elizabeth Kleinhenz  29

Chapter 4
A Standards-based Professional Learning Program  Anne Semple  50

Chapter 5
SiS School Improvement Model  Anne Semple  70

Chapter 6
A Content-focused Approach to Professional Development  Kathy Nolan  90

Chapter 7
Count Me In Too  Prue Anderson  106

Chapter 8
The Power of Public Presentations  Margaret McGregor  135

Chapter 9
The New Basics: A Curriculum Reform Case Study  Sue Ferguson  160

Chapter 10
Learning Through Action  Megan Ewing  179

Chapter 11
Action Research in the Teaching Futures Project  Alison Jansz-Senn and Marion Meiers  208
Acknowledgements

The project team acknowledges the valuable support from Departments of Education, Catholic Education Offices and Commissions, Associations of Independent Schools, and teacher professional associations who gave valuable advice on the selection of professional development programs for the study, and who provided support throughout the project. They welcomed our presence in their schools and supported our research with their practical experience, questions and advice. In particular, we are grateful to those teachers who contributed extended time in providing data for the case studies, who allowed the link researchers into their classrooms to observe their work, and who shared their teaching curriculum and samples of their students’ learning.

The Commonwealth Department of Education, Science and Training, through the Australian Government Quality Teacher Programme over 2001–03, provided the funding to make this research possible.

ACER Project Team

Dr Lawrence Ingvarson, Research Director, Teaching and Learning Research Program
Marion Meiers, Project Director

Link Researchers

Prue Anderson
Wendy Dick
Alison Jansz-Senn
Dr Elizabeth Kleinhenz
Margaret McGregor
Kathy Nolan
Anne Semple
Megan Ewing, Consultant
Sue Ferguson, Consultant

Survey Analysis

Dr Adrian Beavis

Analysis of Student Achievement Data (ACER Sydney Office)

Professor Jim Tognolini
Chris Freeman
Brooke Smith

ACER Internal Reference Group

Professor Geoff Masters
Dr John Ainley
Dr Ken Rowe
Dr John Cresswell

ACER Project Support Services

Jim Carrigan and staff

Advisory Committee

Stephen Cranby, Cumberwell HS, President Australian Geography Teachers Association
Associate Professor Frank Crowther, University of Southern Queensland
Professor Jennifer Gore, Assistant Dean, Curriculum Teaching and Learning, Faculty of Education and Arts, University of Newcastle
Professor Bill Louden, Associate Dean (Research and Higher Degrees), Faculty of Community Services, Education and Social Sciences, Edith Cowan University

David McaRae, Consultant

Tom Croker, Australian Primary Principals Association, Metella Primary School
Elizabeth Moroney, Vice President, Australian Primary Principals Association, Principal, St John’s Primary School
Garry Everett, Queensland Catholic Education Commission
Andrew Perry, Association of Independent Schools of Victoria
Anne Thomas, Australian Education Senior Officers Council; Director, Human Resources, Department of Education & Community Services, ACT

Dr John Roulston, Executive Director, Association of Independent Schools of Queensland, representing MCEETYA Task Force on Teacher Quality and Educational Leadership
Georgina Webb, Director, Quality Teaching Section, DEST
Paul Hunt, Quality Teaching Section, DEST
A Note to the Reader

This report, in two volumes, of which this volume is the second, describes an investigation of the links between teacher professional development and student learning outcomes. The study, funded by the Australian Government, provides a review of the research literature and of national and international initiatives linking professional development with student outcomes. It provides detailed case studies of the school-based trials of ten professional development programs in a number of different sites. It examines the repeated measures of student achievement from students in the classes of teachers in the school-based trials. Analysis and discussion of a common questionnaire completed by teachers in the school-based trials is provided. Suggestions are made for a method that could be used by the Australian Government to assess the impact of professional development programs.

Please note that pseudonyms are used for locations and named individuals to protect the privacy of all concerned.

This two-volume report comprises:

Executive Summary

Volume 1—Context and background, national and international initiatives, review of research, student achievement data, teacher survey, assessing the impact of teacher professional development, conclusions

Volume 2—Case studies of ten professional programs
Chapter 1

Improving Student Learning with Professional Development

Marion Meiers and Lawrence Ingvarson

Case studies

A major source of data for this investigation of the links between teacher professional development and student learning outcomes was the school-based trials of a number of professional development programs.

The trials provided the context for the investigation, in schools, of the relationships between teacher learning and student learning outcomes. The trials were designed to assess the impact of professional development on teaching practice and improved student outcomes.

Selecting PD approaches for the school-based trials

The selection of professional development programs for the trials was informed by research-based evidence concerning effective features of professional development and teacher quality.

A set of criteria was established for selection of the professional development strategies to be trialled. We looked for professional development programs that:

1. focused on the Australian Government Quality Teacher Programme (AGQTP) priority areas (literacy, numeracy, mathematics, science, information technology and vocational education)
2. implemented in a school context (clusters of associate schools, or a single school), using a whole school approach, and involving teams of teachers
3. were designed to lead to changes in teaching practices that are likely to improve student learning, and to generate measurable outcomes
4. were conducted in a context that provided opportunities for the collection of a range of valid and reliable evidence of improvement in student learning
5. were planned for implementation in schools that had prepared to work with research teams to monitor changes in teaching practices and student learning outcomes over the course of the 2002 school year
6. drew from a variety of approaches to professional development
7. were congruent with the features of teacher PD most likely to have an impact on teacher practices and student learning identified in the first three stages of the project—that is, the research based evidence
8. were robust models of professional development that can be implemented across a range of settings
9. provided a balanced selection drawn from urban, rural and remote schools, across sectors, and from several states and territories.

A broad consultative process was used to identify the professional development strategies. Advice regarding professional development strategies current in the Australian context was sought from government and non-government education authorities, from professional development officers, and from those with responsibility for AGQTP programs. Other groups, such as teacher professional associations, were consulted for further advice on professional development strategies seen to be effective in the Australian context.
The professional development programs

Ten professional development programs that met the above criteria were selected:

1. Using a standards-based index of inclusion for framing whole school professional development and improving outcomes for students with disabilities (Monash University and Catholic Education Commission, Victoria (CECV))
2. The Early Years Numeracy Program (Department of Education and Training, Victoria)
3. The Count Me In Too (CMIT) Early Numeracy Program (Department of Education and Training, NSW)
4. The WA Quality Teacher Program Action Research Projects (Education Department of Western Australia)
5. New Basics Trial, incorporating formal professional programs on Protocols, Rich Task Implementation, Productive Pedagogies and Standards (Education Queensland)
6. Graduate Certificate in Education: Teaching of Literacy (Department of Education Tasmania. Tasmanian Educational Leaders’ Institute Recognition Services)
7. Year 9 Exhibitions Project (ACT Department of Education and Community Services)
8. Teaching Futures Action Research Project (Canberra-Goulburn Archdiocese)
9. Science in Schools (SiS) Strategy (Department of Education and Training, Victoria)
10. Science Standards and Portfolios Professional Development Program (ACER).

Nine of these strategies for professional development activities had already been developed by schools, school authorities, or other agencies and were being implemented in schools. The tenth strategy, the Science Standards and Portfolios Professional Development Program was developed and delivered by ACER. The professional development strategies were selected to include a range of AGQTP priority areas, and a number of Australian states and territories.

Approximately eight schools were selected to trial each strategy. Advice was sought from the professional development providers about schools to participate in the trials. When schools were identified, education authorities were approached for permission to conduct research in these schools, and then schools were invited to participate. The availability of funding to provide teacher relief to enable schools to carry out the tasks involved in the ACER research project was a critical factor in securing the cooperation of schools. A balanced selection of government and non-government schools, and primary and secondary schools was achieved. Schools from all education sectors took part in the trial—70 in all: 42 primary schools and 28 secondary schools.

An important consideration in selecting schools and professional development programs for the trials was the extent to which it was possible to organise the trials so that the central research question could be addressed in a systematic and organised way—that is, what was the impact of the professional development strategy on student learning? This supported the internal validity of the trials.

In effect, the trials were organised into ten clusters. Each cluster constituted a case study of a professional development strategy, and each school within the cluster constituted a specific site study.

The success of the school-based trials was also dependent on the reliability and validity of the measures of student achievement used. The assessments, administered at the beginning and end of the trial, needed to align with the intentions of the professional development and also be rigorous and reliable. Some consistency in the data was gained by focusing a number of the school-based trials around particular areas of learning including science, literacy and numeracy.

The school-based trials were completed at the end of the 2002 school year, when all data gathering was complete. The analysis of the repeated measures of student achievement was then undertaken, and this analysis was then interpreted through the qualitative data gathered from schools.

The team of link researchers worked with a cluster of schools involved in each professional development program. Each link researcher investigated one professional development program, excepting for programs
9 and 10, which were the responsibility of the same researcher. Each link researcher maintained full responsibility for the case study, making contact with schools, collecting data and visiting schools. The link researchers made at least two visits to each of the schools in their cluster. The last round of visits to schools took place late in Term 4. During school visits, the researchers talked with teachers, observed classes, and also interviewed key school personnel, including principals.

The link researchers team met regularly with the project director, and the Head of Division, to discuss the management of the school-based trials, and to report on their work in the schools. These meetings provided an opportunity to share experiences, sort out practical problems and discuss methodological issues. Team members discussed emerging trends and identified common patterns in teachers’ responses. The team used an email discussion list for administrative purposes, as well as for sharing useful references and information.

In most cases, the initial assessment period was in May. The team established a common timetable for the collection of the second round of student achievement data and schools were asked to administer the second round of assessments between 28 October and 14 November. The November assessment period maximised the time between the repeated measures, and thus allowed time for possible changes in student achievement to become apparent. The assessments were completed only by those students who completed the first round of assessments in semester 1.

The main research questions for the team were: What links can be made between the teachers’ undertaking of this professional development program and improved student learning outcomes? What is the nature of these links?

When visiting schools, and through information collected from teachers via logbooks, questionnaires and other means, the researchers sought data to help answer the following specific research questions in relation to the professional development program, which was the focus of their case study:

- What have teachers learned from undertaking this professional development program?
- How has this learning been reflected in their teaching?
- What are the connections between the changes in teaching that have resulted from teachers’ learning and intended learning outcomes of students?
- What student learning outcomes have improved? How? To what extent?
- Have the changes to teachers’ practice that resulted from the professional development created enhanced learning opportunities for students?
- To what extent can improvements in student learning outcomes be attributed to the teachers’ learning from the professional development program?

The link researchers also sought to expand their understanding of the processes and activities of the professional development program by attending some professional development workshops, interviewing personnel from central and district offices who work with schools, or attending special events such as a full-day conference showcasing Action Learning projects.

One of the purposes of the school visits was to establish a full understanding of all of the processes and activities within the professional development programs that provided opportunities for teachers’ professional learning. The professional development programs were complex and multi-layered. One program can be conducted in different ways in different schools. For example, in implementing the Early Years Numeracy Program in one school, professional development activities involved fortnightly meetings of professional learning teams, the viewing of the Schools TV broadcast on Early Years Numeracy, and the training of integration aides. In another school, the professional learning activities supporting the introduction of the Early Years Numeracy Program centred on staff meetings with an Early Years Numeracy Program focus, two two-hour after school sessions, and incidental learning from other teachers.
Chapter 2

Learning Improves in Networking Communities

Using a standards-based index of inclusion for framing whole-school professional development and improving outcomes for students with disabilities

Wendy Dick

Learning Improves in Networking Communities (LINC) is a collaborative project between the Catholic Education Commission of Victoria (CECV) and Monash University that aims to improve the quality and status of inclusive practice and the outcomes of schooling for students who are at risk of being marginalised, including those with disabilities, but not exclusively focused on them. This professional development program involved nine schools. Initially, late in 2001, about 50 teachers enrolled in the program, taking it for university credit either for a Postgraduate Diploma of Education (Special Education) or for a Master of Education degree. The LINC program is conceived as a three-year longitudinal school improvement research program.

The LINC program is provided by Monash University, Faculty of Education, under the leadership of Dr Joanne Deppeler.

What makes LINC distinctive?

The LINC program is not structured according to an input model, where the role of the presenters is primarily to provide expert content knowledge. Rather, a methodology involving collaborative academic enquiry at postgraduate level shapes the program. First of all, objectives are established and then data are collected from assessment tasks and through observation. These data are examined and ‘best guesses’ are refined as hypotheses to be tested. The hypotheses may be at an individual student level or about classroom practices or at a school organisation level. Action within an educational setting follows. This cycle, it is envisaged, will become established within the whole school and will inform future policy-making and curriculum development. In this professional development model, specific issues are likely to emerge. Input from professionals who have expertise in the targeted area will then be accessed.

Context

Some eight or nine years ago, under the Australian Government’s National Equity Program for Schools (NEPS), a partnership was established between the Catholic Education Office (Melbourne) and the Krongold Centre at Monash University. Between 1996 and 2000, the Catholic Education Office and Monash University collaborated to deliver various professional development programs. The programs were designed and then modified to suit particular situations and purposes. They were consistently evaluated by both organisations and

---

1 Within the schools and among the Monash university course participants, this is known as the LINC program., that is, Learning Improves in Networking Communities. For convenience the term ‘LINC’ will be used in the case study report.
2 A summary description is provided in Learning Matters, (2002), vol. 7. no. 1, East Melbourne, Catholic Education Office.
3 Over time, some teachers withdrew, and others joined the program.
4 Ms Kim Eckersley and Ms Patricia Gurry supported Dr Deppeler in the work with teachers and schools.
5 See later for further information on this flexible structure.
6 The National Equity Program for Schools had an interest in disadvantaged schools.
by the Monash Centre for Higher Education and Development as an external assessor. This enterprise provided a solid foundation on which to build the present credentialed course, and it also revealed some issues and aspects that needed to be resolved or developed further.

The Catholic Education Office worked closely with the leader of the Monash team, Dr Joanne Deppeler, to determine the goals of the LINC program and who should participate. Dr Deppeler (Monash) initiated a joint submission with the CECV for an Australian Research Council (ARC) grant under the Strategic Partnerships with Industry, Research and Training (SPIRT) scheme (with the ‘industry’ being education). This was successful for the 2001–03 period. The CECV provided funding support, particularly HECS funding, which was important to the participants. The CECV is committed to partnerships of this kind, where an institution with responsibility for school education teams with a university to establish high quality teacher professional development programs.

The ACER researcher conducted interviews with Dr Deppeler (and her team) from Monash University and with Mr David Huggins from the Catholic Education Commission of Victoria. The collegial working approach of the Monash team and the CECV was very apparent throughout the ACER/DEST investigation of the LINC program.

Features, intentions, theory of action of the LINC program

The LINC program is standards-based, through its use of the *Index for Inclusion*\(^7\).

From the CECV perspective\(^8\), the program has the following key objectives or features:

- credentialed training as a framework for professional development
- a course of study extending over time (almost two years), rather than a one-off training day or a short course
- *inclusion*, very broadly interpreted in relation to student participation and engagement (learning styles), assessment practices, relationships of schools with outside authorities, leadership within the school, multi-disciplinary approaches to curriculum and, especially for the teachers involved, a close connection between theory and practice
- links to be developed across psychological assessment, educational assessment and teaching and learning programs
- support of each individual school’s development plan and recognition of the school’s strengths
- enhancement and strengthening of professional community
- evidence-based analysis and consequent development of appropriate learning programs.

Huggins sees the program as establishing ‘a professional learning environment based on evidence’. The professional development program models approaches and philosophies that teachers will endeavour to practise within their school communities. The emphasis on *partnerships, shared vision* and *negotiation* is fundamental to the design, implementation and process of the LINC program.\(^9\)

At the AARE 2001 Conference, Deppeler said:

---

7 Booth, Ainscow et al. (2000). *Index for Inclusion*, Manchester University. For further detail about the index and its use in LINC, see Under Implementation on p. 14.
8 Interview with Mr David Huggins at the CECV office, Melbourne, 8 August 2002.
9 For example, participating teachers negotiated their projects with Monash facilitators each semester.
This longitudinal study ... will investigate the effectiveness and sustainability of a whole-school approach to improving inclusive practice, strengthening transitional networks outside the school, and improving learning for students with disabilities.

Both Huggins and Deppeler argue that this program represents a paradigm shift in Special Needs education.

The focus has moved from disability and exclusion to a holistic experience of educational support, embracing facets of well-being and welfare and having an impact on curriculum development and planning.10

Inclusive practices encourage a different view of marginalised students. In an inclusive classroom, teachers take responsibility for providing meaningful programs for the full range of their students. They cater for disadvantaged students, and gifted students, as well as ‘mainstream’ students, with a variety of activities and learning media or tools. They try to understand the person, as separate from the disability.

Deppeler highlights the need to promote professional development on two levels:

- **Reculturing** of the school to reflect inclusive beliefs and values
- **Enhancement of teacher skills and knowledge** to better address the learning needs of all students.11

LINC teachers are encouraged to use evidence to inform practice. They are likely to find that there is ‘no magic way’ (Deppeler’s words) to work with marginalised students. Rather, it is intended that, as they collect evidence and reflect upon it, they will evolve ‘best practice’ for each individual situation.

The intended outcomes of this program can be summarised as follows:

**a) For teachers**

- to assist teachers to use evidence-gathering tools to document student performance and engagement
- to enhance whole-school understanding of difference in their student population (moving the professional learning beyond the Co-ordinating Group12 to the whole school community and strengthening useful links between primary schools and the local secondary school)
- to promote cooperative professional learning and whole-school efforts towards inclusion of students with disabilities in meaningful learning programs
- to encourage an examination of school structures (including leadership structures) to determine whether changes or modifications might be appropriate to enable the inclusion of all students in the learning community
- to enhance teachers’ critical examination of the effectiveness of their instructional practices.

**b) For students**

- to assist in the inclusion of all students in the school community, especially those marginalised by disabilities
- to enhance the learning of students with a disability, so that they maximise their potential and have positive experiences in mainstream schools

---

11 *Learning Matters*, (2002) vol. 7, no. 1, p. 45. The bold type is Dr Deppeler’s and it indicates the central drive of the LINC PD program as observed by the ACER researcher.

12 For an explanation of this term, see page 7, which describes the structure of the LINC program.
• to promote greater understanding among all students of the diversity of their peers and the individual challenges that some might face
• to enhance students’ literacy skills and social competencies across all curriculum areas.

In setting up the LINC program, Monash and the CECV agreed that it should:
• include members of each school’s leadership team
• be offered to rural schools
• strengthen links with further education
• improve performance and engagement of all students, including those with disabilities but not exclusively focused on them.

The principles and objectives of the LINC program are clearly articulated. The ACER literature review\textsuperscript{13} for this ACER/DEST project notes a number of principles for successful teacher professional development that have been identified in the research literature of the past fifteen years. The features, intentions and theory of action of the LINC program, as described above, exemplify many of these principles.

In summary, key principles and some of the relevant citations in the literature review are:
• It is standards-based (Darling-Hammond L., and Ball, D. L. 1998; Fuhrman, 2001; Supovitz, 2001).
• Its methodology (involving research and experimentation) is based on analysing data as evidence (Elmore, 2000; Supovitz, 2001).
• The professional development is connected to both curriculum and assessment, and assessment is aligned with standards (Cohen and Hill, 2000)
• Teaching of and about literacy skills is a focus (Lankshear et al., 1997; Kennedy, 1998; Cumming and Wyatt-Smith et al., 1998; Supovitz, 2001).
• The professional development program extends over time, with follow-up (Cohen and Hill, 2000).

The LINC program has a sound theoretical base and it evolved from effective strategic and collaborative planning by the Catholic Education Commission of Victoria, Monash University and the participating schools.

\textbf{Structure, span and duration of the LINC program}

\textbf{Structure}

The LINC program has several stages over a three-year period:
• planning and invitation to schools (2000 to 2001)
• introduction and school surveys identification of priorities for school improvement (2001)

\textsuperscript{13} See the References at the end of this chapter for full citations.
• first semester research and assignments (2002)
• second semester research and assignments (2002)
• second year first semester research and assignments (2003)
• ongoing contact with Monash staff, and support as appropriate.

Stages outlined

Late in 2000, in a standard Catholic Education Office mail-out to schools, expressions of interest were sought from schools interested in participating in a professional development program that had as its focus a whole-school approach to the inclusion of students with learning difficulties or disabilities. The professional development program was to have academic status and to lead to a postgraduate qualification.

Within Catholic education, school development plans are reviewed and validated every three years, and for a number of schools the opportunity to be involved in this program was well timed. An intention of the providers of the program was to promote networking between schools, especially between secondary schools and their local primary ‘feeder’ schools, and to build links within schools, for example, among specialists, year level coordinators, teachers and school leaders. This matched priorities that a number of schools themselves had set.

There were several steps in the consultation process. From schools expressing interest in becoming part of the program, nine that matched the criteria were chosen—six primary schools and three secondary schools. The schools were in three geographic clusters, to facilitate the intention of strengthening links between secondary and primary school providers.

In a southern outer Melbourne beachside area, there were four primary schools and one secondary college. In an outer eastern Melbourne area, one primary school and one secondary college joined the program. In northern Victoria, on the Murray River border, another primary school and a secondary college completed the group. All schools were co-educational. The northern secondary college was an old, (c. 1886) congregation-owned school the others were diocesan or parish-owned.

Each school had a team of teachers, called the Co-ordinating Group, who were directly involved in the program. Most of them took the program for credit at Monash for either a Postgraduate Diploma of Education (Special Education) or a Masters degree. School leaders were part of each Co-ordinating Group, or were closely involved in the operation of the program within the school. The design allowed for parent participation in the Co-ordinating Group, though up to the end of the first full year of the program (2002) parent involvement had been limited. A Monash team member was attached to each Co-ordinating Group.

In the introductory phase, the participating teachers closely analysed their school’s practices regarding the inclusion of students with disabilities, and identified their school’s strengths, needs and objectives. They used the *Index for Inclusion* 14 descriptors as standards against which to evaluate their own school’s practices, with reference to inclusion. This occurred in late 2001.

In the first semester of 2002, teachers looked at issues of difference and disability. During the semester, participants also became familiar with a range of assessment instruments and with observation tools.

In the second semester of 2002, each teacher selected a specific project that supported the goals established by the school and the Co-ordinating Group. The LINC program intentionally built on the positives that were already enunciated in statements of the school’s vision and mission. Each participating teacher conducted the appropriate research, wrote a paper for university assessment and contributed to presentations at both school and inter-school gatherings. Further detail about the content of the LINC program will be provided in the Implementation section of this report.

---

14 See the Implementation section on page 14.
At the beginning of the academic year in 2003, all participants met at Monash University for a presentation day, a Conference, when they shared their experiences. Issues were raised for discussion, and planning for the next phase occurred. Input on student acquisition of skills in Reading was included in the Conference program. Beyond the period of the ACER/DEST investigation of LINC, participating teachers were expected to complete another assignment in the first semester of 2003 on a topic related to their own school’s objectives and linked with what they had already done in the course.

It was intended that the support of the Monash staff would be ongoing, with contact maintained between participating teachers and their academic colleagues. This was in keeping with the developmental nature of the LINC program, with its emphasis on teacher professional growth—from the initial school surveys and personal inventories, through the learning experiences inherent in the research model, to the participants’ sense of a deeper understanding of ‘inclusion’ and of strategies to enhance the learning experiences of all of their students.

It should be noted that the ACER/DEST project spanned only the ‘middle’ part of this professional development program. Of the six stages identified above, ACER was engaged in close observation of the third and fourth stages, and of the beginning of the fifth stage. The ACER researcher attended the LINC Conference on 21 February 2003. This proved a very useful exercise for the ACER/DEST project, as a wealth of school and teacher experience from the LINC project was shared.

Significant features of the delivery mode

As the LINC program was an academic course, participants were required to engage in research, and to complete assignments.

There was a mixture of expert delivery of relevant professional knowledge, shared experience and workshop discussion, regular team meetings and action research by teachers in their own classroom situations.

Teachers did not come regularly to Monash University campus for classes and seminars. Rather, Monash University staff visited schools several times each semester to conduct the professional development program sessions and to support the schools in their application of the strategies and approaches identified as most interesting or appropriate for the particular school context.

There was no fixed schedule of visits. This allowed for responses to needs that arose at the school level. Participating teachers and Monash staff used email and telephone for frequent contact.

The CECV established a website (operating from the beginning of 2003) to promote the linking of schools as professional communities. This enabled schools to share understandings about difference, and strategies to support the inclusion of students with disabilities.

Occasionally, schools met in clusters for specific input from experts, or to build transition networks between primary school and nearby secondary school, or to share experiences and learning.

Gathering data

The research questions

The main research questions for this study were:

- What have been the major course components of the LINC program and how has the professional development program’s content related to each school’s objectives and perceived needs?
- What have teachers learned from undertaking the LINC program?

---

15 This information was provided by Claire Acevedo, from the Catholic Education Office.
• How has this learning been reflected in their teaching?
• What are the connections between the changes in teaching that have resulted from teachers’ learning and intended learning outcomes of students?
• What student learning outcomes have improved? How? To what extent?
• Have the changes to teachers’ practice resulting from the LINC program created enhanced learning opportunities for students?
• To what extent can improvements in student learning outcomes be attributed to the teachers’ learning from the professional development program?
Overview of the PD sites (schools)

The ACER investigation involved the full cohort of nine schools in the LINC program. The relationship between ACER and Monash was close in that ACER provided initial training for the nine schools in their use of the DART assessment instruments and in the interpretation of the collected data.

Table 1: The nine schools involved in LINC

<table>
<thead>
<tr>
<th>School (Foundation year)</th>
<th>Description</th>
<th>Student totals for LINC</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 River Gum High School (1886)</td>
<td>Years 7 to 12 approx 650 students. A northern border rural city school, in the town an order-owned school with co-principals, which already had a strong emphasis on inclusion of marginalised students. Significant Aboriginal population.</td>
<td>Initially, Year 9 = 130, but added Year 7 = 118 Five classes at each year level</td>
</tr>
<tr>
<td>#2 Struan High School (1979)</td>
<td>Years 7 to 12 approx 1100 students. Southern bayside city-suburb regional college, with very large grounds.</td>
<td>Year 7 = 200 Seven classes</td>
</tr>
<tr>
<td>#3 Hillside High School (1961)</td>
<td>Years 7 to 12 approx 1560 students. Outer eastern foothills regional college, large grounds with much building in process.</td>
<td>Year 7 = 278 Ten classes</td>
</tr>
<tr>
<td>#4 Billabong Primary School (1887)</td>
<td>Years Prep to 6 approx 350 students. Northern border rural city school, right in town. Linked with #1.</td>
<td>Y5 = 37 Y6 = 46 Total = 83 Three classes</td>
</tr>
<tr>
<td>#5 Seaview Primary School (1980)</td>
<td>Years Prep to 6 approx 320 students. Four km from the bayside city-suburb, pleasantly located in coastal bushland. Linked with #2.</td>
<td>Two Y5 and two Y6 Total =108 Four classes</td>
</tr>
<tr>
<td>#6 Lindsay Primary School (1978)</td>
<td>Years Prep to 6 approx 360 students. In a once rural area inland from the bayside city-suburb, now opening up as a modern, reasonably affluent housing area. Extensive school building in process. Linked with #2.</td>
<td>Y5 and Y6 Total= 89 Three classes</td>
</tr>
<tr>
<td>#7 Ti-tree Primary School (1968)</td>
<td>Years Prep to 6 approx 260 students. Inland from a smaller bayside suburb (near the bayside city-suburb) in a low socio-economic area, with unemployment and single-parent families. Building projects recently completed. Linked with #2</td>
<td>Y5 and Y6 Total = 78 Three classes</td>
</tr>
<tr>
<td>#8 Plover Primary School (1987)</td>
<td>Years Prep to 6 approx 530 students. Inland from smaller bayside suburb in a growth area. Recently completed extensions. Linked with #2. In the same parish as #7.</td>
<td>Y5 and Y6 Total = 145 Five classes</td>
</tr>
<tr>
<td>#9 Apple Orchard Primary School (1979)</td>
<td>Years Prep to 6 approx 360 students. Outer eastern foothills suburban area, generally comfortable standard of living. Linked with #3.</td>
<td>Y5 and Y6 Total =113 Four classes</td>
</tr>
</tbody>
</table>
Data gathering methods

1 Effects on teachers

For LINC, data relating to teachers’ professional growth were gathered from:

- discussions, informal and formal meetings, telephone conversations and emails occurring between the ACER researcher and teachers and between the ACER researcher and the Monash team
- visits to schools, with the ACER researcher meeting each of the three clusters once early in 2002 and then visiting the seven Melbourne schools late in 2002 (and maintaining telephone or email contact with the two country schools)
- school information printed materials
- an extensive teacher questionnaire completed in Nov/Dec 2002 and returned by 28 participating teachers (covering all nine schools)
- attendance at the LINC Conference, Monash University, on 21 February 2003.

2 Effects on student learning outcomes

Since both the professional development program and ACER’s investigation of it had similar objectives, ACER was able to work with Deppeler and the Monash team in devising the data gathering process and in selecting the instruments to be used. Both organisations wanted to look at:

- student growth over time in aspects of literacy
- social competencies and student attitudes to school.

Monash wanted to use valid, reliable and informative instruments that would support the identified school objectives and allow close analysis of tasks. They needed tools that would provide rich descriptive and diagnostic assessments, and tests that would locate students’ current learning outcomes along specified continua and that would suggest the next steps to be taken by those students along their path of educational growth.

ACER’s Developmental Assessment Resource for Teachers (DART) was used at two points in the year—early (around March) and late (November). The kit selected was the Upper Primary/Junior Secondary Danny’s Egg package. The strands assessed were Reading and Writing. LINC teachers could use the other strands—Viewing, Listening and Speaking—with small groups, if appropriate to their research projects. As developmental assessment instruments, DART tests provide estimates of student achievement along learning continua. Reports in the form of progress maps describe typical outcomes at increasingly more sophisticated levels. They indicate what students are likely already to know and to be able to do. They show the level at which students are currently working and they suggest the next steps for their learning path.

Early in 2002, each of the three school clusters had a professional development meeting where the ACER researcher introduced the Reading assessment and trained the teachers in marking it. She also introduced the Writing tasks—narrative and exposition/argument—which teachers administered and which were returned to ACER for marking in March. Writing was assessed for Content/Context and Language separately for each task, using a descriptive marking guide that allows reporting along national profile continua. Content/Context and

---

16 See References at the end of this study.
17 See References at the end of this study.
Language pairs of scores were totalled for reporting along each continuum. The writing was also assessed for Spelling in Writing.\footnote{18}

In Phase 1, Monash staff assisted teachers to administer ACER’s Quality of School Life questionnaires (primary school or secondary school version). As these questionnaires were to provide measures of students’ attitudes to school life, students were encouraged to complete them with a degree of privacy.

The DART Reading and Writing scripts were retained by or returned to the schools and ACER and the Monash team exchanged data files. All involved—researchers from each institution and the schools—valued the economy of sharing this data collection and then using the data for their varying purposes.

Some teachers used DART Danny’s Egg Viewing and Listening strands to provide additional data for one of their university assignments. At that stage, they were investigating whether some students were able to comprehend viewed or heard text with a greater level of competency than demonstrated in their responses to printed text.

The second measures of student achievement were administered in November 2002, to allow as extended an intervening period as possible. Students completed an alternative Danny’s Egg Reading form and a different Writing form, with ‘matching’ narrative and argument tasks. The Quality of School Life questionnaire (either primary or secondary) was given a second time. For Phase 2, ACER marked both of the DART strands, following the matching marking guides to those used for Phase 1.

Even though the ACER/DEST project was completed early in 2003, Monash staff and participating teachers planned to use the second round scripts and scores for further academic research. Some schools intended using other DART assessments in 2003 because of the useful diagnostic information they provide. They would maintain contact with ACER for this purpose.

\footnote{18 The separate Spelling in Writing is a single score and is designed to ensure that the Spelling component does not dominate judgements about a student’s Language achievement.}
Table 2: The participating classes and the forms they used

<table>
<thead>
<tr>
<th>School</th>
<th>Year levels and approximate numbers</th>
<th>March used</th>
<th>November used</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 River Gum High School</td>
<td>Year 7 = 118 Year 9 = 130 Five classes at each year level</td>
<td>DART Danny’s Egg Reading B Writing A Quality of School Life Questionnaire (Secondary)</td>
<td>DART Danny’s Egg Reading C Writing B Quality of School Life Questionnaire (Secondary)</td>
</tr>
<tr>
<td>#2 Struan High School</td>
<td>Year 7 = 200 Seven classes</td>
<td>DART Danny’s Egg Reading A Writing A QSL (Secondary)</td>
<td>DART Danny’s Egg Reading B Writing B QSL (Secondary)</td>
</tr>
<tr>
<td>#3 Hillside High School</td>
<td>Year 7 = 278 Ten classes</td>
<td>DART Danny’s Egg Reading A Writing A QSL (Secondary)</td>
<td>DART Danny’s Egg Reading B Writing B QSL (Secondary)</td>
</tr>
<tr>
<td>#4 Billabong Primary School</td>
<td>Y5 = 37 Y6 = 46 Total = 83 Three classes</td>
<td>DART Danny’s Egg Reading A Writing A Quality of School Life Questionnaire (Primary)</td>
<td>DART Danny’s Egg Reading B Writing B Quality of School Life Questionnaire (Primary)</td>
</tr>
<tr>
<td>#5 Seaview Primary School</td>
<td>Two Y5 and two Y6 Total =108 Four classes</td>
<td>DART Danny’s Egg Reading A Writing A QSL (Primary)</td>
<td>DART Danny’s Egg Reading B Writing B QSL (Primary)</td>
</tr>
<tr>
<td>#6 Lindsay Primary School</td>
<td>Y5 and Y6 Total= 89 Three classes</td>
<td>DART Danny’s Egg Reading A Writing A QSL (Primary)</td>
<td>DART Danny’s Egg Reading B Writing B QSL (Primary)</td>
</tr>
<tr>
<td>#7 Ti-tree Primary School</td>
<td>Y5 and Y6 Total = 78 Three classes</td>
<td>DART Danny’s Egg Reading A Writing A QSL (Primary)</td>
<td>DART Danny’s Egg Reading B Writing B QSL (Primary)</td>
</tr>
<tr>
<td>#8 Plover Primary School</td>
<td>Y5 and Y6 Total = 145 Five classes</td>
<td>DART Danny’s Egg Reading A Writing A QSL (Primary)</td>
<td>DART Danny’s Egg Reading B Writing B QSL (Primary)</td>
</tr>
<tr>
<td>#9 Apple Orchard Primary School</td>
<td>Y5 and Y6 Total =113 Four classes</td>
<td>DART Danny’s Egg Reading A Writing A QSL (Primary)</td>
<td>DART Danny’s Egg Reading B Writing B QSL (Primary)</td>
</tr>
</tbody>
</table>
Implementation

Participants’ motivation, experience and prior knowledge

Participants were likely to enrol in this program for several reasons:

- School leaders and staff identified the program as being very appropriate to school improvement goals that they had already identified in whole-school reviews. For example, one deputy principal reported that up to 25 per cent of their students could not participate fully in the life of the school. The very fact that the LINC program required whole-school involvement made it especially relevant to their circumstances.

- For some teachers, the attachment of a formal qualification from Monash University to the considerable workload that would be required of them was an incentive.

- For some teachers and schools, the exposure to new approaches to the education of students with special needs was very welcome. They valued a program that promoted a whole-school approach to a major educational issue—how to enhance the prospects of all students, especially those likely to be marginalised.

Teachers undertaking this course brought a range of backgrounds and experience. Some had been teaching for many years, held positions of responsibility and were well known and respected in their local education community. Others were still new to teaching. Some teachers held other postgraduate qualifications or were currently engaged in other postgraduate courses. It would appear that they were a group with a very keen and professional approach to their calling.

All of the schools were familiar with the concept of a just education for all. They had developed mission statements and had done much professional development work within their own schools towards the articulation of vision statements. They had philosophies of valuing the ‘uniqueness’ of each student and of striving to educate the ‘whole person’. However, they were aware of the need to bring their ideals into actuality in the daily experience of their students and had considerable uncertainty about how best to do this. This suggests that professional development might be more meaningful to schools and teachers when it takes them to the next stage from a point that they have already reached on their own, but where they are uncertain about a way forward.

Resourcing

The Monash facilitators were the principal resource for the program. In their questionnaire responses, teachers recorded their appreciation of the expertise, commitment to ideals of inclusion, and academic support of the Monash staff. One teacher noted with approval that the Monash facilitator had ‘real world expectations’ and that it had been good ‘to have someone refocus us’. The success of a professional development program of this type (practical and school-based, yet at the same time, academic) may well depend on the quality of its facilitators. An important issue is whether the program could be reproduced by other presenters and whether its strategies are independent of the facilitators.

Financially, the program was supported by the ARC SPIRT grant and by the CECV. The CECV paid the teachers’ HECS fees, which, for some, meant the difference between being able to participate or not.

However, funding for time release was not available and the participating teachers were dependent on their school for this support. If this could not be provided, then they tended to use their preparation time or, if applicable, coordination time as well as out-of-hours time, which then squeezed their time for their other responsibilities.

In the first semester, participants were given a set of workshop modules (in the form of a ‘train the trainer’ manual) to support their learning. This manual included copies of overheads and notes from the group sessions, for example, those on the Disability Discrimination Act.
Support and follow-up

The strong support offered by Monash staff members, Joanne Deppeler, Tricia Gurry and Kim Eckersley, took several forms. They were in regular contact with teachers by telephone and email. They visited all schools fortnightly for course input and they made extra visits where necessary to deal with the types of problems that, as would be expected, arise in long-term, site-based, action research.

One early challenge requiring particular support from the Monash facilitators was the fact that many of the participating teachers were returning to postgraduate work after an interval away from tertiary study, or were taking up postgraduate studies for the first time. Such areas as critical thinking, investigative research, referencing, literature reviews, locating resources and submitting assignments by due dates could and did loom as hurdles requiring scaffolded learning support. Monash staff planned to continue their support of teachers as long as required, with gradual withdrawal as schools became more confident in their ‘inclusive’ practices.

Inevitably, given the long duration and the demands of the program, some teachers withdrew. 19

Leadership

One of the main design features of this particular professional development program is the involvement of the school leadership. It is premised on a whole-school approach and such a direction is impossible without the active involvement of the leadership team. In a very large secondary school, this might mean that the principal, in consultation with other school leaders, includes the program in the conceptualising of school improvement and in the annual schedule of professional development activities. He or she might ensure that other teachers, even the full staff, engage in some sessions of the program. Apart from that, the principal might participate to only a limited extent, due to other demands and responsibilities. In other cases, and perhaps this is more likely in a smaller primary school, the principal might be one of the teachers participating for academic credit.

In the LINC program under investigation, none of the secondary school principals was enrolled in the university program, though each of these three schools had a deputy principal or other significant team leader (for example, a department or section co-ordinator) in the Co-ordinating Group. Three of the six primary schools had a participating principal and one included the deputy principal. In the other two primary schools, some staff left the program and one teacher became the sole participant 20. In the three primary schools where principals were participating, they appeared to be exercising a critical driving force, to the benefit of the program. After more than a year, their teachers were still enthusiastically involved. One of these principals transferred away from the school and the program, but the new principal was a continuing staff member who was already a LINC leader. The realities of teacher mobility emphasise the need for such a program to be taken up by the whole school and supported by a leadership team, to ensure continuity of professional learning and enhanced student opportunity.

The principals of all nine schools were supportive of the program in their discussions with the ACER researcher (though one was less enthusiastic than the others). All were well-informed about the progress of the course and all saw its relevance to their school goals, mission and philosophy. Many teachers expressed their appreciation of the involvement of the school leaders, though in at least one instance (a large secondary school) the LINC teachers felt frustrated at the end of 2002 because they were not able to have a LINC meeting scheduled in the 2003 timetable 21.

19 Approximately 19 participants had to withdraw from the course, for reasons such as transfers, maternity leave, ill health other commitments or personal circumstances. Some completed one semester and so earned credits. Only one, a Special Education teacher, cited unsuitability of the course as the reason for a withdrawal.

20 As of the beginning of 2003, one of these teachers, and thus her school, was unlikely to be continuing. The school was less able to support her. At the other school with a lone teacher participant, the principal was very supportive and, herself, attended the 21 February 2003 Conference.

21 For 2003, the teachers negotiated a common class-free period when they should not be given extras.
The course of study

One of the characteristics of this professional development program was that it did not have a tightly structured course outline that set a rigid framework of session content. Rather, because it was based on a principle of collaborative enquiry, the content was determined by the school’s priorities for improvement and by the action research in which the teachers were engaged. This enabled the Monash staff and the Co-ordinating Group in a school to respond to identified needs and specific objectives of the particular school. It allowed scope for response to situations arising, as teachers worked with individual students and as changes occurred in how the school viewed the staffing and other resources that it had available to target to the benefit of marginalised students. However, for some participating teachers such flexibility involved an uncertainty that they found somewhat stressful. This is not to suggest that the Monash course did not have a clearly conceived content. As outlined earlier in this case study, the introductory phase involved many teachers (163 in all) providing responses to the British Index for Inclusion in a shorter form, as adapted by Deppeler and other researchers to suit Australian circumstances and legislation. This Index is, in effect, a set of standards for good practice in schools in relation to inclusion. It looks at school organisation and teacher efficacy in the following sections:

- **Dimension A**
  - Section A.1: Building community
  - Section A.2: Establishing inclusive values
- **Dimension B**
  - Section B.1: Developing a school for all
  - Section B.2: Organising support for diversity
- **Dimension C**
  - Section C.1: Orchestrating learning
  - Section C.2: Mobilising resources

Each section has a number of indicators and each indicator a number of questions.

This is an exhaustive survey underpinned by a broad set of standards. Deppeler reported that the data took six months to analyse, with 163 usable sets of teacher data, each covering some 300+ questions from the original Index that were found to be relevant to the Australian (Victorian) context. Teachers (in discussions with the Monash facilitators and with the ACER researcher) supported the view that this had been a very time-consuming process. However, they felt that, by working in such a concentrated way on these issues, they had come to understand their school much better.

The Co-ordinating Group in each school worked with the data and summarised descriptively the strengths and the perceived needs of their school. These findings were presented at formal school staff gatherings, with the Monash facilitators, late in 2001. Monash provided the ACER researcher with an integrated summary of each school’s presentation and consequent assignment priorities. This was most helpful in the ACER/DEST investigation of the LINC program, as the sets of school objectives from the initial stage could be borne in mind in the ACER interviews conducted late in 2002. The needs, concerns and areas of interest of the nine schools were collated at ACER for the purpose of this study. Issues that commonly arose were:

- affirmation of inclusive policy
- catering for diversity with appropriate school organisation, curriculum, support services and skillling of staff
- suitable induction of staff
- supporting gifted and talented students, not just students with disabilities

---

22 Deppeler adaptation for Australian schools of Booth, Ainscow et al. (2000). *Index for Inclusion*, Manchester
• building a culture of staff mutual support, communication and collaboration
• strengthening links with neighbouring schools
• improving transition from primary schooling to Year 7
• linking with the community and better use of community resources
• literacy
• social competencies
• numeracy
• discipline
• assessment and reporting.

The course of study in 2002

The professional development program throughout 2002 included, as intended, some input sessions led by the Monash facilitators, and a number of assignments.

Early in the year, staff groups met in clusters to look at values and at attitudes to difference and ‘disability’. Additional (non-LINC) teachers shared in some sessions, to support the whole-school focus of the work. The ACER researcher attended all three clusters. These workshops included coverage of the *Disabilities Discrimination Act* and related documents (*Australian of Australia*, 1992, 1994 and 1995). They called for active involvement of those present in some very challenging exercises designed to help teachers to understand their own attitudes and to appreciate difference and individual learning styles. Deppeler argued that ‘inclusion’ is a right, and compared it with ‘integration’, where the attitude is one of ‘fitting in’ disadvantaged students, rather than actively providing suitable programs for them.

The professional development program provided direct guidance in the use of certain strategies. One was the collection and use of data of several types—both test and questionnaire data and observational data. The ACER researcher presented the session on DART referred to earlier, so that teachers could understand its principles, and then administer Reading and Writing and mark Reading.

The Co-ordinating Group in each school then used these data to identify students who appeared to be at a disadvantage. They looked at literacy achievement and also at social competencies, as revealed in the Quality of School Life questionnaires and from observation schedules. They used both types of data (written responses and observations) to hypothesise about why certain things were occurring, such as marginalised students’ underachievement in literacy, and their social difficulties (for example, absenteeism, aggression or the inability to work productively in the classroom). They tried to identify barriers to student achievement, ‘barriers’ being a word teachers were using readily by the end of 2002 and at the 2003 February Conference. They were shown how to ask questions such as:

- What motivates this student?
- What are their capabilities?
- What is the prerequisite knowledge for this activity?
- Can the student access both the task and the information required to complete it?

The use of schedules and procedures for collecting observational data was new to many of the participating teachers. Teachers made observations of individual students or of groups of students, in several settings and at different time periods. This helped them to know students better, to review priorities and to plan next steps. Observations could be repeated at intervals for recognition of change and improvement.

Another strategy was modelling, where a Monash facilitator taught a class while the teacher observed the behaviour and responses of students. This was designed to assist the teacher to understand the experiences of particular lessons from the perspective of the student. For example, either the instructional rubric or the wording
of the text being used might not have been clear to the student. These vocabulary problems could have led to non-completion of a task, inattention or behaviour problems. Teachers were then alerted to strategies, such as ‘word splash’ (which some teachers refer to as ‘splash words’), where specialised vocabulary is introduced to students, preparatory to their work on a topic. This is an instance of a strategy, designed to help students with learning difficulties, which would benefit all students in the class. It is good teaching practice.

A third strategy related specifically to literacy learning. Teachers were shown how to undertake a literacy audit at their school and this was conducted at each of the nine sites. The purposes of the audit were to examine the range of literacy tasks teachers assigned to students and to critique the criteria used in the teaching and assessment of literacy tasks across various key learning areas. This led to a focus on genre in writing. Certain genres or text types, such as report writing and argument formulation, were identified as spanning several key learning areas, for example, Science, Social Studies and English. Students might well benefit from specific teaching in the structures and features of the genre, so that they could apply them to tasks in different curriculum areas. Students were given a scaffolding strategy, for example, for an argument. They could use this framework whenever that genre was called for. The input of Claire Acevedo, a literacy expert from the Catholic Education Office, Melbourne, was important in this component of the program. This scaffolding strategy was taken up enthusiastically in all nine schools and was felt by the participating teachers to be a valuable concrete learning from the LINC program.

Task analysis was a related strategy discussed in the LINC course. Teachers were shown how to examine a task in detail, and this close investigation guided their setting of short-term and long-term goals. They found that they might need to apply what is referred to in task analysis literature as ‘curriculum adaptation’. This might involve modifying the physical environment, changing and adding to the resources used or varying the instructional strategies employed.

As an overarching component of the course of study, teachers were asked to examine the prevailing discourse for ways in which language itself can discriminate unfairly and thus disempower people. It was agreed that people should not be defined by their disability. Language, such as ‘a person who uses a wheelchair’ was preferable to negative terms, such as ‘a cripple’. Deppeler described the shift in language use as moving from punitive to descriptive. Through discussion and reflection, participating teachers reached an understanding that appropriate terminology could assist communication and could promote the achievement of an inclusive learning community.

**Effects on teachers’ knowledge and practices**

All nine schools recognised and valued the professional learning that this program afforded. The ACER researcher was able to gather a strong body of qualitative evidence from the teacher questionnaires and from school visits and interviews or discussions with participating teachers. She was also able to speak on one or more occasions with the principal or co-principals from eight of the nine schools and with the deputy principal at the other school.

Of the twenty-eight participants who completed the questionnaire, eleven had been teaching for twenty years or more. This suggests that very experienced teachers saw the professional development program as relevant. Twelve teachers had between five and nineteen years’ experience and five had less than five years’ experience (though of these five, some had come from other professions into teaching).

Teachers’ perceptions of the time they had spent on the program provided interesting reading. Twenty-three of the twenty-eight participants reported spending more than fifty hours on the course, and this was well supported in the discussions the ACER researcher had with the Monash facilitators and with the participants themselves. Three suggested they had spent twenty+ hours in work on the LINC program and only two thought they had spent ten to twenty hours in total on this work.

---

23 It appeared, however, as of the beginning of 2003, that school #7 Ti-tree Primary School would not be continuing its involvement in the program.
Some participating teachers were teachers of younger primary classes and several were not classroom teachers at all. The assessment instruments used to collect evidence of student achievement in literacy (the DART materials at Years 5 and 6 or at Year 7 or Year 9) were therefore sometimes being used with students and classes whom the participating teacher did not teach. This necessitated special arrangements in some schools so that, for example, a Prep teacher or a Year 2/3 teacher could access a Year 5/6 class for the testing. Where the LINC participant was a Special Education teacher (for example, at Hillside High School), he or she had to take a full class, in order to carry out the assessments, instead of working with just a few students at a time. The need to access an unfamiliar class at a different year level had obvious disadvantages but it had one unintended advantage. It led to greater communication between teachers than might otherwise have occurred. It gave a practical reality to the whole-school approach.

Teachers were asked to identify features of the program that supported their professional learning and that resulted in changes to their teaching practice. The philosophy and intention of the LINC program to establish connections—to promote inclusiveness in many areas of school life and to help teachers to see links between theory and practice—was evident in the teacher reflection that was taking place.

Teacher questionnaire responses, interviews, the 21 February 2003 Conference and school websites all indicated this growth. Teachers saw the benefit they derived from the longitudinal aspect of this program. The stimulation to reflective practice was something that they felt would bear fruit in the succeeding years of their teaching. Several participants and principals spoke enthusiastically in December 2002 of what they would be doing or trying ‘next year’. One teacher told the Monash facilitators that her participation in the program ‘had changed the way [she would] teach forever’, even though, for personal reasons, she was able to complete only one section of the course.

Features of the program that supported teacher learning

Earlier in this report, reference was made to some key features of effective professional development that have been identified in recent literature and that were among the principles that guided the design of the LINC program. The underpinning provided by these principles was evident when participants identified features of the professional development program that supported their learning. These features were in four broad categories.

Discussion

The LINC program used discussion as a medium for learning. The Monash facilitators engaged regularly with the teachers in discussion about the data they were gathering, hypotheses they were formulating and possible strategies that they might adopt to enhance the learning opportunities of their students. The Coordinating Group feature was integral to how the program worked, with teachers meeting regularly within their school. Their discussions usually had a specific focus, for example on how to use students’ literacy achievement data to identify those students needing greater direction and individual support, or on how text types are used across various key-learning areas. Through discussion, teachers could seek clarification from their colleagues, could draw on others’ expertise and could develop potential whole-school proposals to take to their colleagues. Within a program that uses this model, team discussion is of considerable importance, so that those teachers who became solo LINC participants in their schools were at a disadvantage.

Expertise

The program provided teachers with access to outside expertise. One school leader commented: ‘Access to Monash University staff—Dr Joanne Deppeler—has become more regular as the LINC project has developed. Her broad knowledge and up-to-date research on ‘inclusion’ practices for junior secondary/middle years is inspirational.’ Other expertise, such as that offered by Claire Acevedo, contributed significantly to the program. Within the schools, some staff became more aware of the value of linking to the expertise of their colleagues, for example, the librarian.

Professional reading

Within a normal, busy school day, teachers are often unable to find time for professional reading. However, for participants in the LINC program, current literature outlining evidence-based theory and

---

24 One 2002 Year 2/3 teacher moved to a senior primary class for 2003.
Learning Improves In Networking Communities

research on standards relating to inclusion was an essential component. As a postgraduate academic course, the LINC program provided participants with relevant and up-to-date reading lists on both the theory of approaches to inclusion and strategies that might be employed to engage marginalised students. These supported the emphasis on teacher as researcher and were mentioned by some teachers as very helpful. Teachers were encouraged to use refereed journals among these sources. One said: ‘We did the reading and studied the theory of what we were doing. Another reported, I did a lot of reading in relation to literacy and technology.’

Modelling of teaching strategies and skills

The LINC program included specific training in and modelling of skills and strategies, such as the observational surveys, the literacy audit, task analysis and genre scaffolding, referred to earlier, which teachers could then apply within their own school contexts.

What the teachers learned

LINC participants readily identified aspects of their professional learning in this program. Oral and written responses to questions about the value and contribution of the program revealed teacher learning of three types—about specifically practical issues, in relationships with other practitioners, and in deeper understanding and reflection on their calling. But teachers also described the challenges that they had faced in trying to complete the coursework at a satisfactory level and to their own satisfaction, without designated time release and amid all their other responsibilities. Several declared that, for all the pressure and pain, it had been the best professional development they had ever undertaken, and others gave the same impression, even if they did not use those words. What, then, did the teachers feel that they had learned?

The LINC program had as its focus careful consideration of individual differences and learning styles, particularly for students who were in danger of being marginalised or who would not formerly have been included in so-called mainstream schooling. Many participants spoke of their gains in pedagogical skills for the benefit of all their students, those disadvantaged by any of a range of difficulties and also the gifted. They felt, also, that they better understood ‘difference’. They spoke of appreciation. They had built on their repertoire of ‘early intervention skills and had an increased awareness of inclusive practices’. In the words of another LINC teacher, they felt they could ‘manage individual student needs within the classroom’.

Support for students who had been diagnosed with disabilities and those who were considered to have learning difficulties or to be ‘at risk’ was critically re-examined in most of the schools. Schools such as Hillside High School and Apple Orchard Primary School evaluated how best to allocate Special Education support—either for time in the classroom or for individual support through withdrawal. They were trying to find a suitable balance, bearing in mind that principles of inclusion would support having Special Education teachers working in the mainstream classroom. One Special Education teacher moved into the classroom (for the first time), to take responsibility for teaching, to work with regular teacher and to observe how students designated as needing special support actually handled ‘normal’ classroom activities. The intention was that both teachers would then adapt tasks and identify particular support needs for the benefit of those students.

One challenge associated with inclusive practices was the education of parents. Some participants reported that parents also needed educating in contemporary ways of assisting students with special needs. Some parents still felt that their child was missing an entitlement, if he or she were not withdrawn for special support. Deppeler reported that LINC program participants hoped to involve parents in the program to a greater extent in 2003.

The building and experience of professional community was an outstanding gain for many. One principal said that the best thing for the school had been the scheduled, fortnightly Co-ordinating Group meetings, which they had prioritised throughout the year. This principal was a dynamic leader who wanted to take the study further in the strengthening of the school culture for the whole school community. The staff interviewed there were equally as keen to use what they were learning to the benefit of their students. At another school, the deputy principal, a LINC participant, spoke of liaising with other teachers before setting up specific projects, though this required some breaking down of conservative attitudes. One LINC teacher happily reported: ‘I have helped

---

25 See later in this section of the case study, for examples of teachers’ learning and application of strategies.
Investigating the Links between Teacher Professional Learning and Student Learning Outcomes

... colleagues with under-achieving students—they take me seriously’. In general, LINC teachers ‘valued talking more with colleagues’, with the collaborative nature of the program giving ‘purpose, support and reassurance’.

The development of professional community was evident in all three clusters in valued collaboration with other schools. One example of this was found in schools in the bayside area in a science-mentoring program. This originated separately from LINC and included non-LINC local schools. However, the LINC schools used it as another practical way of trying to achieve their goal of building links between the primary schools and the large regional secondary college. A science teacher at the secondary college had the role of science mentor for several local primary schools. He worked with primary school staff in visits and through use of electronic communication. In this program, primary students teamed up with Year 7 and Year 8 students via email as ‘E-Buddies’, to discuss science-related matters. This helped primary students in their transition to secondary schooling as well as in their knowledge of science. It also benefited the junior secondary mentors by giving them responsibility and by requiring them to clarify their own science concepts and scientific language, so that they could communicate effectively with the younger students.

In several schools, benefits were recognised in the ethos or ‘culture’ of the school. ‘The learning culture around Year 7 is more philosophical and the LINC program is having an influence on others, who might not have encountered some of these ideas’, reported one participant. Principals at two schools explicitly referred to the goal of working to enhance an inclusive ‘culture’ within their schools. The emphasis on school culture was one of the two main goals identified by Deppeler. It was apparent that the LINC participants were advancing along a continuum of reflective practice as shown Figure 1.

![Figure 1: A developmental continuum describing growth in how teachers conceptualise their own change processes](image)

The literacy audit process that some participants selected as a focus for their second semester project supported the literacy priority of the LINC schools. ‘That was the most beneficial thing’ [for our school] said one teacher. It was in keeping with school improvement goals set out in the introductory stage of the program.

Eight of the nine schools had specified literacy as an area of concern and the other school included it in a general statement about curriculum. ‘We thought there were things lacking but we didn’t know how to find them.’ The teachers who elected to do the literacy audit looked across their own school at text types being used in reading and writing in all curriculum areas. Careful observation and talk with colleagues helped LINC members build a picture of the elements of literacy to which students were being exposed. One secondary teacher said, ‘We thought we were using eleven text types, but the literacy audit showed we were teaching only three’. The LINC teacher undertaking the literacy audit in each school then identified gaps or areas requiring further work. As one teacher said: ‘My major project—a literacy audit—will have major implications for our programs now and in the future’. This process was an example of how LINC participants used analysis of

---

\[26\] ACER, 2003, reflection of a researcher  
\[27\] According to the summary provided by Monash University.
school-wide performance, goal setting, observational and test data, discussion and hypothesising as tools in educational research.

Teachers also identified the work they had done, to date, on text type or genre as most helpful. This related closely to the literacy audit. Again, their school review of needs and objectives, their analysis of the first round of DART literacy assessments and their observations and other data gathering on student achievement provided sets of evidence to be weighed and pondered.

Citing the input of Claire Acevedo and of the Monash facilitators, who pointed them to some useful resource materials, teachers now felt they had much greater knowledge of the linguistic structures and features of various text types and could therefore make their teaching of them more explicit. At all nine schools, the use of writing frameworks or scaffolds was recognised as a way of assisting student writers. They appreciated the use of scaffolds to help students to overcome their literacy difficulties. One teacher said, ‘It was amazing at that stage to see students suddenly focus’. The support provided by the scaffold had empowered them. Teachers saw this learning as extending beyond the year level with which they were concerned in 2002 and being used across all curriculum areas.

At one school, the LINC teacher spoke of a school plan to help a lower-achieving group of Year 3 students to use text scaffolds and genre support in an ongoing and systematic way as they proceed through their primary school years. Again, a whole-school approach was in evidence. Students also recognised the value of scaffolds. ‘It gives me an outline of my essay. [It] helps and reminds me,’ said one (as reported at the conference). Another student had moved on to greater independence: ‘I find it easier to do the scaffolding in my head.’ The linking of teaching approaches and strategies across curriculum areas proved to be a beneficial outcome of the LINC program for the schools involved, particularly the secondary schools, where the curriculum is organised in separate subject or key learning areas.

Professional learning in action for a whole school

The ACER researcher was able to attend a full staff meeting at one secondary school (held semi-informally in the staff room) in December 2002, when each faculty gave a presentation relating to the use of scaffolding to support students’ writing in different genres. This practice had grown out of school-wide application of experiences and learnings from the LINC program. LINC participants at this school had introduced their curriculum team colleagues to some literacy strategies that could be used across the learning areas. Each curriculum (or key learning area—KLA) team had worked to relate the concept of scaffolding specifically to their subject content and procedures. The LINC team held a short meeting before the presentations, in the course of which a leader commented to the ACER researcher: What is going to happen in the next hour or so, wouldn’t have happened a year ago. They were in a state of excited anticipation about what they called a monumental shift.

The deputy principal, one of the Co-ordinating Group, chaired the afternoon presentations, introducing proceedings by reminding staff of the ongoing nature of school professional development: ‘It’s important that we continue our journey and that, at the end of the year, we have fresh in our minds some of the new things we’ve learned.’ One staff member described and demonstrated the Writing home page that he was setting up on the school intranet. This would be a resource that students could use, for example, whenever they had to write a report for any subject. The site would provide scaffolds that break a writing task down into manageable segments, it would supply user-friendly definitions and it would also contain links to explanations of grammar terminology and to resources that students could draw upon. Computer technology was being used effectively to assist students in their writing.

A representative from each KLA then succinctly and entertainingly reported on what they had developed for their specific learning area. Teachers of English, Art, Drama, Science, Studies of Society and the Environment, Mathematics, Physical Education, Materials and Technology and Religious Education had all found value in the use of common genre scaffolds for writing, and in the use of such strategies as ‘splash words’ (topic-specific vocabulary) and data charts to help students with specific subject vocabulary and with the organisation of their research. Each presentation showed a different and creative approach to strategies and concepts that they were exploring in common as a whole school.

There was a strong sense of continuity in the references to what they would be continuing to do in the year ahead and a real sense that these pedagogical developments would assist students to access all areas of the
curriculum more successfully. One LINC teacher said that the students found the writing scaffolds really empowering. Several teachers also commented later in conversation that this would never have happened in the past. The deputy principal closed the session by thanking the faculties and encouraging all to continue working together in the year to come. The principal, who had been present for the whole session, also expressed his positive endorsement of this whole-school enterprise. Teachers from other schools heard about this sharing of strategies at the LINC Conference in February 2003. For a very large secondary school, this event was a clear indication that the professional development program had had a significant effect on the level of professional communication and community.

LINC introduced other specific skills or strategies. Teachers were given practice in the use of ‘graphic organisers’, or ‘mind mapping’. These could help students to organise their research efforts and also to move towards higher order critical thinking. This supported several of the key intentions of the LINC program, including catering for diversity and improving literacy outcomes for all students, including those with learning difficulties.

Scaffolding through the use of graphic organisers

‘Lyn’ recounted the experience of helping the second-lowest performing group in a class (about five students, who might otherwise have escaped notice as needing extra assistance) to improve their research skills through a carefully designed sequence of experiences. Lyn looked at projects on a topic in which they were interested, the planets, and analysed what they had produced. They were able to brainstorm and to research information. They had produced reports but, as Lyn expressed it, ‘I felt they needed a step in between’. She used graphic organisers to help them to structure their reports more effectively and to recognise and fill gaps in the topic content. Using the planetarium website (one student was ‘very good on the computer’), Lyn assisted the students to use colour highlighting for ‘bundling’ information. They learned to structure their reports, using subheadings. Their final drafts, presented attractively, were now more comprehensive and better organised and were very satisfying to themselves and to their teachers.

In the next few weeks, these students had the confidence and skills to work on another project without the supervision of Lyn (who was occupied elsewhere). ‘They said to me, “Oh, yes, we can do it.” They did not need me at that stage.’ They were very happy to work on their own, with the encouragement of a supportive librarian. When Lyn came back to them, they were demonstrating much greater competence in this transferable skill—‘That’s a sub-subheading!’ Their self-confidence had increased. ‘Don’t cover up my name!’ said one, as he watched Lyn preparing her LINC assignment for university.

Evidence from observation supports the use of graphic organisers

At another school, ‘Jean’, a lone LINC teacher, recounted some of her experiences in trying out new strategies. Jean was a classroom teacher at Year 2/3 and also a Reading Recovery teacher and literacy co-ordinator. She described how she had developed the idea of using ‘post-it’ notes as tools in graphic organising. They were found to be of great help in students’ thinking, particularly for children at risk. ‘Their heads are full of ideas.’ It was interesting to the ACER researcher to learn that this teacher (like the one referred to above who introduced students to colour highlighting) had ‘invented’ this technique, stimulated by her reflections on her LINC learning. ‘We thought of that ourselves.’ Students whom Jean assisted sometimes used individual magnetic whiteboards instead of paper. Such application of practical tools made planning and revising easier for younger students.

LINC participants had learned how to collect observational data in a ‘scientific’ or valid way. They could then gather such data as when a student was on-task or off-task and use this to ascertain the needs of individual students. This was a fresh approach, even for experienced teachers—‘having luxury to simply watch’, as one put it. Jean reported that when she accessed Year 5/6 for her LINC assignment work, she observed a particular student who was having learning problems, which were accentuated by auditory processing difficulties. She found this student habitually jumps up, sharpens pencils, helps the teacher, looks around and in general does not take in the instructions for the work to be done. This behaviour pattern affected her ability to complete set learning tasks. The student was given strategies to help her towards more effective organisation and task focus. In February 2003, the teacher reported that the student had improved in her personal organisation skills, but that her parents had moved her to another school for Year 6 as a condition of entry there for secondary education.
Jean’s colleagues learned from her about such strategies as the use of graphic organisers and about the collection of observational data. One result was that this school added a highlighter, white board markers and post-it notes to the booklists of all students for 2003.

Using data to inform school programs

LINC participants reported that familiarisation with a range of data collection instruments, including observational data schedules, was a valuable addition to their understanding of assessment. A number of them felt that they were able to focus more on outcomes, having examined closely the demands and purpose of a task and observed closely the way students tackled it. As more reflective practitioners than formerly, they could see that data collection can be of several different types (not just written tests) and that there should be a clear purpose behind data gathering endeavours. Teachers at one of the secondary schools were now committed to using DART instruments again, in pre-testing and post-testing, because they would be able to use the descriptive information provided in the reports for diagnostic and curriculum planning purposes.

Teachers at another secondary school emphasised at the February 2003 Conference that they had identified their goals—to enhance student literacy and to promote an integrated approach to student learning across all key learning areas—and then had gathered an extensive collection of teacher and student data as the basis for their planning. Their understanding of the value of collecting relevant data preparatory to the development of school programs was evident. They saw this as something they would not have done so systematically in the past.

Teacher learning in the second semester of the LINC program

In the second semester of 2002, participating teachers worked on major assignments related to needs and objectives identified at their schools in the preliminary review work. Some of the significant work on inclusion of all students, especially marginalised students, and on literacy reviews and strategies was developed in depth in this stage of the LINC program.

Other issues were also explored. The induction of new staff was the focus of one teacher who examined the experiences of new staff in his school, including through interviews and questionnaires. He queried whether enough support was being given to ensuring that new staff understood the culture of the school, as well as the procedures and policies. He introduced mentoring and documents setting out school procedures, and developed a booklet for emergency teachers, so that they could feel comfortable with the everyday routine of the school.

In another pair of schools (a primary/secondary cluster) one teacher from each school worked together on the transition of students from Year 6 to Year 7. There had already been some changeover of staff between the two schools, and their existing link as local schools supported the move to a stronger connection. During the ACER researcher’s visits to these two sites, teachers from each school raised the issue of transition support for students. They felt that, although they had been aware of difficulties for students in moving from a smaller primary school to a very large secondary school, they had not analysed it sufficiently as an issue and had not developed adequate support procedures. They were now working on relevant policies.

Integrating special education support with student welfare was the special project of one primary school Principal, who was interested in developing, in conjunction with his school community, a welfare policy. This was in keeping with the intention, expressed in the Learning Matters editorial, of connecting student welfare and curriculum development. The principal followed the LINC model in the development of this policy, as it was to be negotiated with staff and trialled before full implementation.

A teacher at another school, speaking of her studies in another professional development program, referred to crossovers between the two and an intention that she saw as being shared by each program of ‘catering for all children’. Several LINC participants looked at social competencies in the context of student welfare and the intention of including all students in productive experiences of schooling. They believed that students’ well being and their academic achievement would both be enhanced when students’ social interactions at school were more successful.

LINC participants, as postgraduate students, also appreciated their exposure to the strong theoretical and research foundation of their studies, feeling that they were empowered in their understanding of their profession by working with contemporary pedagogical discourse. Some commented that they found that they could use
theoretical language effectively to communicate their understandings to their colleagues. The research literature that they reviewed was important. ‘I found the lit review one of the most important things I did,’ reported one teacher. A teacher emailed the ACER researcher to share that she had felt ready at a job interview to speak of the theory behind her teaching and that she felt part of ‘an innovative and skilled research team’. Another teacher commented: ‘I’d noticed [a specialised phrase] but never used the term.’

Teacher feedback on the LINC program provided evidence that this professional development program had produced a group of reflective practitioners who were better able to link many aspects of their work—their educational philosophy, planning and review processes, teaching programs, assessment, personal and professional relationships and academic knowledge. One very experienced primary school principal, having opened her discussion with the ACER researcher by recounting some of the practical challenges of participation, concluded the interview with the strong comment that the LINC program was: ‘the best professional development [she] had ever done.’ A secondary school participant reiterated this judgment, saying: ‘It’s one of the best things I’ve been involved with.’

Effects on student outcomes

Many of the beneficial effects for students deriving from the LINC program have already been described in the previous section, as they relate so closely to the outcomes in teachers’ professional learning. Because of the investigative nature of the LINC program, teachers tested their research questions and applied their learning in their work with students.

Phase 2 Writing assessments provided evidence of growth in an area of strong LINC focus. The literacy analysis and the scaffolding strategy developed to support writing in various genres bore fruit in students’ argument writing, in particular. A team of experienced ACER markers, assessing student tasks in December 2002, spontaneously commented on the high level of understanding of argument that students had demonstrated. Unusually, they found classes, from Year 5 to Year 9, where almost all students knew how to structure an argument. Even where the substance of the argument was weak, students had understood the purposes of argument and could use a framework for setting out a case.

Monash University facilitators reported that their own analysis of Phase 2 literacy data recorded what they considered to be a significant improvement in Writing performance on the DART tests, with the lowest quartile from Phase 1 making greater gains than those of the higher achieving students. This suggested that the intention of LINC, to improve the learning outcomes for marginalised students, was succeeding. The facilitators and LINC teachers were keen to see whether these gains could be maintained, and were considering another round of DART testing in the middle of 2003, towards the conclusion of their course.

Conclusion

There are several features of the LINC program that appear to be contributing to its effectiveness. In many ways, the program exemplifies qualities of successful professional development that have been identified in recent research. There is also one aspect that is problematic and two questions still to be resolved.

The strongest features of the LINC program are characterised by planning, negotiation and collaboration. A common sense of purpose among people from the CECV, Monash University and the schools has proved very beneficial. Further, where a school has a team of teachers participating, a team including committed school leaders, it appears that the program will have more impact on the whole school. The LINC program has a strong theoretical and philosophical underpinning that is effectively conveyed to the participants. This gives their study depth and meaning. Many teachers are keen to explore the theory of their practice.

The LINC program is proving successful, partly because of its inherent expectation that marginalised students can have enjoyment and academic success at school. When their individual strengths and ways of working are valued, such students, their families and their peers all benefit. The focus on the student as an individual and the shaping of curricula and learning approaches to suit different members of a class is likely to be transferred to the advantage of all the students in the class.

Another strength of the LINC program is the way it uses data collection and data analysis, task analysis, hypothesising about alternative approaches, and experimentation with the application of specific (sometimes new) strategies. A number of LINC participants have demonstrated creative use of technology. This might not
Learning Improves In Networking Communities

have been an explicit intention of the program at its outset, but it has developed as a response by the participating teachers from their observations and their greater consciousness of the value of pushing and strengthening links in learning. This has ranged from the use of tools, such as post-it notes, to the development of internet programs for a network of schools. Teachers have taken up these technologies to assist their students to achieve particular learning outcomes.

One problem identified by many LINC participants was that of time release. Lack of time is a general problem that teachers face when trying to manage their daily class responsibilities and their need or desire to enhance their own professional learning. One principal felt that teachers should be prepared to devote their own time to postgraduate study, but this was a lone voice among those commenting on this issue. The program had to rely, to an extent, on the goodwill of the participants and the facilitators. There are limits to how much teachers can do in non-classroom time and some had to leave the program because of that factor.

Two questions seem apparent at this stage of the LINC program. Firstly, there is the issue of staff mobility. Will a school be able to keep up the momentum of the program when some of its members depart? Schools with a strong team and a strong leader might do better in such a situation. The second question concerns the students. Will the gains that they have made be maintained and extended?

In conclusion, the LINC program would seem to be making a strong contribution to the goal of schools to bring their ideals of inclusive practices into reality. Beyond doubt, in the process, it is extending teachers beyond their previous practice and understanding and is encouraging them to be reflective practitioners.

References


Recognising and Deepening Expertise

Graduate Certificate in Education: Teaching of Literacy

Dr Elizabeth Kleinhenz

Introduction

This case study describes the professional learning experiences of seven teachers who completed, or attempted to complete, the Graduate Certificate in Education: Teaching of Literacy (GCETL). The overarching purpose of the research was to identify and explore the links between the teachers’ experience of this professional development activity and the learning outcomes of their students. The study aimed to:

- probe the nature and extent of the teachers’ learning in the GCETL professional development
- identify the effects of teachers’ learning on their teaching practice
- investigate the links between the teachers’ learning, subsequent changes in their practice, and the learning outcomes of their students.

The focus was on investigating or attempting to find out the characteristics, as well as the extent, of the links between this professional development, teachers’ learning, consequent changes in teachers’ practice and student learning outcomes.

Graduate Certificate in Education: Teaching of Literacy

The Graduate Certificate in Education: Teaching of Literacy (GCETL) was developed by the Department of Education, Tasmania (Tasmanian Educational Leaders’ Institute, Recognition Services). It is accredited through the Australian Recognition Framework.

Special features of the certificate

The GCETL was developed at a best practice level to provide a framework to support the professional learning of all teachers. The GCETL is specifically directed towards teachers who are highly skilled in the teaching of literacy. Its intention is to assess and recognise competencies teachers have acquired through a variety of experiences, including practical teaching experience, and formal and informal professional learning. The certificate represents a model of teacher learning in which teachers demonstrate that they have achieved a high level of expertise in the teaching of literacy against standards developed and articulated by ‘expert peers’. To attain the certificate, they are required to gather and present evidence to show that they meet the standards. This means that teachers go through processes of reflecting on their existing knowledge and practice against the articulated standards. In the sense that reflection leads to deeper awareness and understanding of what teachers are doing, and why, the learning may be described as standards guided.

Recognition of competence is a major motivation for teachers who decide to complete the certificate. The theory behind the certificate is that:

- recognising teacher expertise in the teaching of literacy is useful, in a variety of practical ways, for teachers, students, the education system, and the wider community
teachers will learn from the processes of reflection and evidence gathering, which are necessary to demonstrate competence against the standards.

The framework can be used in a number of ways to support professional learning without teachers necessarily gaining the qualification.

Development of standards for the certificate

In 1998, a steering committee selected from nominations a group of sixteen exemplary teachers of literacy. This group was representative of Tasmanian school sectors, systems and geographical areas. Over two days, the group articulated standards (units and elements) of competence that, in their agreed professional opinion, reflected what good teachers of literacy could be expected to know and be able to do to qualify for the certificate. A working party then refined the documents and developed more information, including performance criteria and an evidence guide.

Setting up the certificate involved an extensive process of consultation. This included representations from teacher professional associations, the University of Tasmania, Catholic and Independent schools and systems, the Australian Education Union, the Australian Council for Adult Literacy and Tasmanian Department of Education and Principals’ Associations. The units of competency were accredited through the Australian Recognition Framework as the Graduate Certificate in Education, Teaching of Literacy.

Requirements for successful completion

Gaining the Graduate Certificate in Education: Teaching of Literacy involves demonstrating competence against the Teaching of Literacy professional standards, which are written as five units of competence. These units describe how effective literacy teachers plan and create a supportive literacy learning environment, use a variety of literacy strategies, and are committed to the teaching of literacy.

The certificate is available to all teachers, both primary and secondary, who have several years experience in literacy teaching. The entry requirements are:

- a Bachelor’s degree, or higher
- completion of an approved teacher-training course (which may be included in the degree)
- a teaching and classroom management expertise, endorsed in writing by the principal.

All five units of competence must be completed to attain the whole certificate, although they may be worked through in any order. A Certificate of Attainment is awarded for each individual unit achieved. The units of competence reflect a broad and deep view of the teaching of literacy and draw on a range of established work in the area.

The standards

The standards follow a professional competency-based model. They include:

- a unit title—the title of an area of competence
- a unit descriptor—assisted to clarify the unit title
- elements of competence—describe the outcomes that contribute to each unit
- performance criteria—specify the required level of competence
- range—range of contexts and conditions to which the performance criteria applied
- evidence guide—assisted with interpretation and assessment of each unit.

The standards are as follows.
1 Plan for literacy learning

Elements of competence:

- Use literacy and learning theories, current curriculum documents, policies and guidelines to inform planning
- Plan for all students’ needs and interests
- Structure a coherent and sequential program
- Plan for continuity in the development of students’ literacy skills.

2 Implement appropriate literacy teaching strategies

Elements of competence:

- Recognise and value diversity
- Establish and maintain an effective learning environment for all students
- Use appropriate teaching strategies
- Intervene to improve student outcomes
- Evaluate the effectiveness of programs.

3 Monitor, assess and report literacy learning

Elements of competence:

- Use appropriate assessment processes and tasks to gather information on student learning
- Monitor and record student progress to inform practice
- Report student literacy development and link to future planning and teaching
- Moderate assessment.

4 Work collaboratively with stakeholders

Elements of competence:

- Use appropriate communication strategies and skills
- Involve stakeholders in the decision-making
- Establish and maintain relationships
- Work as a member of a team.

5 Implement intervention strategies

Elements of competence:

- Implement relevant policies on equity and inclusion
- Use diagnostic assessment for identified students
- Implement and coordinate intervention strategies to meet identified individual needs.

Demonstrating satisfactory performance against the standards

Applicants for the certificate are required to present evidence to show that they meet the standards. Teachers have considerable freedom to choose the kind and amount of evidence they present. An evidence guide has been
developed for each unit. Suggested ways of showing and demonstrating evidence for Unit 1 (Plan for Literacy Learning) are provided in the examples below.

Evidence of satisfactory performance may be shown in:

- clear and cohesive views about the meanings of literacy
- rationale for the selection and use of teaching and learning strategies, resources and materials
- planning documents that show the elements of competence and explicit teaching intentions
- teaching and learning practices that reflect planning and preparation
- the work products and processes of individual learners
- records of development and achievement
- preparation, production and delivery of resources relating to literacies
- use of learning technologies relating to literacy learning
- working as a team to plan.

Evidence may be demonstrated through:

- planning documents
- performance
- records of reporting
- workplace observations.
- testimonies
- personal portfolios
- workplace papers
- assessment tools and tasks
- products.

Performance criteria are used to describe the level of performance that meets the standard. These have been developed at the level of the elements of competence, and there are performance criteria for each element, for example:

**Table 1: Performance criteria**

<table>
<thead>
<tr>
<th>Unit of Competence 1: Plan for literacy learning</th>
<th>Performance criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Use literacy and learning theories, current curriculum documents, policies and guidelines to inform planning.</td>
<td></td>
</tr>
<tr>
<td>1.1.1 Planning decisions are justified in terms of literacy and learning theories and practices.</td>
<td></td>
</tr>
<tr>
<td>1.1.2 Planning reflects individual, school, organisation, system and industry requirements.</td>
<td></td>
</tr>
<tr>
<td>1.1.3 Materials and resources are analysed and selected against current curriculum documents.</td>
<td></td>
</tr>
<tr>
<td>1.1.4 Student outcomes reflect and interpret guidelines and curriculum documents.</td>
<td></td>
</tr>
</tbody>
</table>

**Assessors**

A panel of two to five professional colleagues carry out an assessment (not from the applicant’s school). One assessor is also the mentor. Assessors observe classroom teaching and provide support throughout the program. These people are teachers who have demonstrated expertise in literacy—usually Curriculum Officers who are
responsible for the learning area and who have been trained in providing feedback and gathering and presenting workplace evidence.

This model is typical of that used in Tasmania to assess a range of Graduate Certificate programs. On the basis of feedback received, the project developers at the Tasmanian Leaders’ Institute maintain that the strength of the model is the ongoing relationship that develops between assessors/mentors and teacher–participants in the program. The intention is for the assessors/mentors who are on the panels to consider contextual factors and encourage evidence to be gathered over time, and to avoid a snap shot or one-off event.

Upon completion of a portfolio that includes evidence of competence in the units and elements of competence, each applicant is required to attend an interview with the assessors. The assessors make a summative assessment on the evidence of the portfolio, the interview and classroom observations.

Assessors were trained to judge the evidence as:

- Valid—relating clearly to and demonstrating the element of competence in which the applicant was seeking credit.
- Reliable—sound enough to enable different assessors to reach similar conclusions.
- Current—relatively recent.

Most teachers who participated in this case study had chosen to use the units of competence as section headings in a folder or folders. That is, they divided folders into sections under (unit of competence) headings and included, in each section, a wide variety of selected information, including, for example, samples of students’ work, unit plans, photos, references, letters from parents and certificates for PD courses they had completed.

**The GCETL as professional development**

**Intentions**

The Graduate Certificate in Education: Teaching of Literacy (GCETL) was not designed to be a professional development program. It is, essentially, in accordance with its status within the Australian Recognition Framework, a set of professional teaching standards that can be used in a variety of ways, one of which is to recognise competence.

In 2002, when this case study was undertaken, most of the teachers enrolled in the certificate were from Tasmania. Five teachers from South Australia were also enrolled. Three of the five South Australian teachers and four teachers from Tasmanian schools participated in the case study. The program organisers clearly intended that, as a result of satisfying the requirements for the certificate, these teachers would experience significant professional learning and, consequently, improve their practice. In this sense, the GCETL was seen by the Tasmanian Department of Education as an effective strategy for promoting teacher professional development.

A major professional development intention of the certificate is that, as a result of the experiences of selecting and collating evidence to demonstrate that they meet the standards, teachers will reflect and focus on the elements of their own work that embrace the standards. The competencies should thus become signposts for teachers’ learning, and an effective means of self-evaluation and development that will cause them to improve their practice. The expectations of the Tasmanian Leaders’ Institute are that student learning outcomes will improve as teachers improve their practice. The intentions of the Graduate Certificate: Teaching of Literacy, in relation to student learning outcomes, are that, as teachers reach and demonstrate the standards of the certificate, the literacy levels of their students will improve.

**Mode of delivery**

This professional development was not delivered in the traditional sense. Teachers were required to prepare evidence to demonstrate to the panel of trained assessors that they met the requirements of the five units of competence. Suggestions for evidence included direct evidence—for example, observation and commentary by assessors of an applicant carrying out normal work tasks and work-based projects, as well as indirect
evidence—for example, testimonials, examples of assignments, student assessment records and evidence of planning.

Evidence was not task based, in the sense of, for example, the portfolio entries of the US National Board for Professional Teaching Standards (NBPTS). It was largely left to individual teachers, with assessor/mentor support, to decide how to choose and present their evidence. The chief requirement was that the performance criteria had to be met, in order to ensure satisfactory completion of each unit. These criteria were a major influence on the amount and quality of the evidence chosen by the applicants.

Timeline

Individual teachers negotiated their own timelines, as there was none specified for gaining the qualification.

Resources and support

Teachers who enrolled in the certificate program received information about the certificate and copies of the five developed units of competence with performance criteria. They were referred to materials and resources from the Curriculum Corporation and professional subject associations. It was also suggested that teachers use human resources such as parent tutors, volunteers and teacher assistants to provide references and testimonials when gathering evidence for their portfolios.

Teachers presented the indirect evidence in a portfolio. For the teachers who participated in our study, portfolio simply meant a collection of documents, as described in the examples given above, divided under headings and presented in a folder. At this indirect evidence stage, they could request the advice of the assessors/mentors whose support was available for the entire period of teachers’ enrolment in the certificate.

In 2002, it was only possible to gain the qualification through Recognition of Current Competence (RCC), a process of assessing competencies acquired by teachers in various ways, including practical experience and formal and informal learning experiences. In later years, coursework may be available.

Professional development experienced by participants

The professional development experiences of the Tasmanian and South Australian case study participants differed in significant ways.

Teachers interviewed as part of the case study in Tasmania had attended a three-day seminar conducted by Jeff Wilhelm, Associate Professor of Education at the University of Maine, who was a keynote speaker at the 2001 national English teachers' conference in Hobart. The seminar was held after the conference. It was not originally intended to be part of the program for the Graduate Certificate, but because Wilhelm's writings and seminar materials reflected the views of literacy teaching that underpin the certificate competencies, the Tasmanian Leaders Institute saw his visit as serendipitous for teachers who wished to complete the certificate.

The four case study participants in Tasmania attempted only Unit 1. Of these teachers, two did not successfully complete the Unit. All three teachers in South Australia successfully completed the full five units.

All four Tasmanian teachers who participated in the case study saw their attendance at the Wilhelm seminar as professional development that significantly helped them to satisfy the requirements of the Certificate, saying that it had greatly influenced their views on how to teach literacy, and had subsequently caused them to make changes in their practice. They said that their professional learning from the seminar had been reinforced as they prepared their portfolios and reflected on their teaching of literacy in relation to the first competency (Plan for Literacy Learning). The learnings from the seminar had thus become part of their learnings for the Graduate Certificate. Additionally, a seminar workshop activity—starting to plan a unit of work for literacy teaching— subsequently became the basis for the unit of work that was their major piece of evidence for competency 1.

The teachers interviewed in South Australia did not participate in any formal professional development programs. Their professional learning for the certificate occurred mainly through individual reflection on their practice and professional reading associated with the standards, as they prepared evidence for their portfolios and interviews.
Because the Graduate Certificate: Teacher of Literacy is a recognition of professional learning and excellence, it is important for this case study to distinguish between teachers' prior learning and the new learning that resulted from work for the Graduate Certificate. All seven case study participants in Tasmania and South Australia had completed extensive professional development in literacy teaching over a number of years before they enrolled in the certificate. All of these teachers were recognised in their school communities as people with outstanding expertise in the literacy area. The Jeff Wilhelm seminar was the only formal professional development activity—as distinct from teachers' own efforts that related to completion of certificate requirements—that was taken to be part of the professional development undertaken for the certificate. In this respect, the professional development experiences of the Tasmanian teachers varied from those of the South Australian teachers.

**Professional development within the school and broader contexts**

Literacy is a priority in the Tasmanian and South Australian Departments of Education. Representatives of the respective state education departments who were interviewed for the case study saw the certificate as an important and valuable initiative. They were strongly supportive of the standards-based nature of the certificate. They saw the process of qualifying for the certificate as a powerful professional learning activity as well as a means of providing professional recognition.

In five of the six case study schools, the teacher interviewed was the only teacher who was undertaking the certificate. These five teachers all regretted that there was little opportunity to share their learning with other teachers in their schools. In the school where two teachers were undertaking the certificate, they said that they had found the collaboration and sharing involved in completing their portfolios very useful and productive.

All teachers had the strong support of their principals. Literacy was a priority area for all seven schools. One school, (the school where two teachers were completing the certificate), had won a prestigious national award for literacy teaching. Teachers in this school believed that literacy was a major strength of the school’s program.

**Research questions**

The following research questions guided the study. Data was collected and analysed as it related to each question.

- What have teachers learned from undertaking this professional development program?
- How has this learning been reflected in their teaching?
- What are the connections between the changes in teaching that have resulted from teachers' learning and intended learning outcomes of students?
- What student learning outcomes have improved? To what extent?
- Have the changes to teachers’ practice resulted from the professional development created enhanced learning opportunities for students?
- To what extent can improvements in student learning outcomes be attributed to the teachers' learning from the professional development program?

**Participants**

Seven teachers participated in the case study. (Pseudonyms have been used to preserve anonymity.)

Anna (Tasmania) was a primary school teacher who specialised in the teaching of literacy. She was also the deputy principal of her school and had a heavy administrative load. Her literacy class, which she taught four times a week, in two-hour blocks, was her only teaching commitment in the school. Before taking up her current appointment Anna had worked as a secondary school teacher.

Annette (Tasmania), and Tammie and Jan (South Australia) were junior primary generalist teachers who were recognised in their schools and communities as having special expertise in literacy. Tammie and Jan worked...
collaboratively in the same school and their work had been largely instrumental in winning a prestigious national teaching of literacy award for the school.

Paula (South Australia) taught a class of Grade 6/7 students. In 2002, she was also working as one a state-wide team of expert teachers of literacy who were revising South Australian curriculum framework documents. Pamela and Eliza were secondary school English teachers who were currently teaching classes at both upper and lower levels of their schools. Both of these teachers were recognised in their schools and in the wider education community as teachers with expertise in literacy. Eliza had refused opportunities to work at a system level in the literacy area because she preferred to remain in the classroom.

All seven teachers had undertaken extra professional development and study in the teaching of literacy.

Gathering data

The teachers’ learnings from their work for the GCETL were investigated by means of data obtained through:

- studying the Competencies and related documents
- interviewing teachers
- interviewing a manager from the Tasmanian Leaders’ Institute (Recognition Services) who had responsibility for the Graduate Certificate programs
- interviewing two South Australian Education Department Managers who had responsibility for the Graduate Certificate program in their state
- interviewing a university-based mentor for the teachers in the South Australian program
- reading the teachers’ completed portfolios.

The effects of teachers’ learning on their practice were investigated by collecting and analysing data obtained through:

- studying the Competencies and related documents
- interviewing teachers
- interviewing a university-based mentor for the teachers in the South Australian program
- reading the teachers’ completed portfolios
- observing teachers’ classroom practice
- completion of a background teacher questionnaire.

The nature and extent of improvements in students’ learning outcomes that occurred as a result of the teachers’ learning and its reflection in their practice were investigated by collecting and analysing data obtained through:

- studying the Competencies and related documents
- interviewing teachers
- interviewing a university-based mentor for the teachers in the South Australian program
- reading the teachers’ completed portfolios
- observing teachers classroom practice
- observing students in literacy classes
- conversing with students
- administering DART and LLANS tests to students in February/March and November
• administering the Rowe Behavioural Rating Inventory
• teachers’ completing the Student Information Survey
• perusing samples of students’ work.

Table 2: Summary of data collection in relation to the research questions

<table>
<thead>
<tr>
<th>Data Collection Focus</th>
<th>Collection of Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System</strong></td>
<td></td>
</tr>
<tr>
<td>Identify the broader context and purposes of the PD—Graduate Certificate in Education: Teaching in Literacy</td>
<td>Collection and perusal of documentation Discussions, email, telephone contact with (Teaching of Literacy) system managers with responsibility for the program in Tasmania and South Australia Interview with system managers</td>
</tr>
<tr>
<td>Identify the main features, delivery mode, program in Tasmania and South Australia structure and span of the PD</td>
<td>Interview with university based mentor for the program</td>
</tr>
<tr>
<td>Identify the materials and resources that were made available for participating teachers</td>
<td></td>
</tr>
<tr>
<td><strong>Schools</strong></td>
<td></td>
</tr>
<tr>
<td>Identify school characteristics, for example, enrolment, socio-economic status, number of students of non-English-speaking backgrounds in order to fully understand developments in teaching and learning</td>
<td>Collection and perusal of (school-produced) of published information about the schools Interviews with teachers within context Questionnaire for teachers Discussions with students</td>
</tr>
<tr>
<td><strong>Teachers</strong></td>
<td></td>
</tr>
<tr>
<td>Identify changes to teachers’ professional knowledge. What do they now know that they did not know before undertaking/completing the professional development program? Identify changes to teachers’ practice. What are teachers now doing they were not doing before undertaking/completing the professional development program?</td>
<td>Perusal of teachers’ curriculum planning documents and examples of (written) student work Perusal of student work samples collected in March and November Perusal of the portfolios completed by the teachers for the Graduate Certificate assessment Interviews with teachers Telephone conversations and email exchanges with teachers Teacher questionnaires</td>
</tr>
<tr>
<td><strong>Students</strong></td>
<td></td>
</tr>
<tr>
<td>Changes to student learning outcomes, broadly defined to include student engagement as well as developments in literacy (reading, writing, listening and speaking) Students’ level of achievement in literacy</td>
<td>DART tests (Reading and Writing) administered in March and November LLANS test administered in March and November Samples of students’ writing collected in March and November Interviews with teachers Observation of teacher practice and participation in classroom activities Rowe Behavioural Rating Inventory Conversations with students</td>
</tr>
</tbody>
</table>

School visits

Schools were visited and teachers interviewed three times in 2002—in April/May, June/July and November.

The main purposes of the first round of visits were to:

• meet the teachers and explain the project to them
• explain the procedures and purposes of the DART and LLANS assessment instruments
• gather basic information about the schools, teachers and students.

The main purposes of the second round of visits were to gather information from teachers about:

• their experiences of completing the Graduate Certificate tasks of portfolio and interview
• the DART and LLANS assessments
• the teachers’ perceptions of the extent to which completing the Graduate Certificate had improved their professional knowledge of teaching literacy
• changes to their practice that occurred as a result of completing the Graduate Certificate
• their perceptions of changes in students’ learning outcomes which may have occurred as a result of changes in teaching practice that could be traced to the teachers’ completion of the Graduate Certificate.

The main purposes of the third round of visits were to:

• probe more deeply the teachers’ perceptions of changes to their professional knowledge, changes in practice and changes to student learning outcomes that may be traceable to their completion of the Graduate Certificate: Teaching of Literacy.
• observe teacher and student interactions in classrooms, with the specific purpose of ascertaining whether features of the professional learning teachers had gained as a result of undertaking the certificate were apparent in their teaching and in the learning activities of the students.

Research sites

The research was carried out at six schools, four in Tasmania, two in South Australia. (Pseudonyms have been used to preserve anonymity.) One teacher from each of the four Tasmanian schools participated in the study. There was one teacher participant from one South Australian school and two from the other. The two teachers at Camden Primary School were the only teachers in their school who had undertaken the Graduate Certificate: Teaching of Literacy. The remaining five teachers who participated in the case study were the only teachers in their schools who had undertaken this PD program.

Table 3: Characteristics of case study schools

<table>
<thead>
<tr>
<th>School</th>
<th>Size</th>
<th>Location</th>
<th>SES</th>
<th>NESB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple Tree Primary School (Tas.)</td>
<td>540</td>
<td>Rural: Mid to low</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Stella Maris Primary school PS (Tas.)</td>
<td>520</td>
<td>Rural: Mid to low</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Osborne High School (Tas,)</td>
<td>730</td>
<td>Suburban: Mid to low</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Orchid Grove High School (Tas.)</td>
<td>420</td>
<td>Suburban: Mid to low</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Wexford Primary School (SA)</td>
<td>850</td>
<td>Suburban: Mid to low</td>
<td>Mid to high</td>
<td></td>
</tr>
<tr>
<td>Camden Primary School (SA)</td>
<td>373</td>
<td>Rural/industrial: Mid to low</td>
<td>Low to mid</td>
<td></td>
</tr>
</tbody>
</table>

The schools selected for the study were situated in rural and urban areas. All schools had students from a range of socio economic backgrounds, but most were in the mid to low range. Only Wexford Primary School had large numbers of students who were from a non-English-speaking-background. Approximately 50 per cent of the students in Paula’s Year 6/7 class were in this category.

Appletree Primary School

Appletree Primary School is in a small town in Tasmania. The school has been recently renovated. A feature is a large library, adjacent to which are dedicated literacy classrooms. Children can move relatively freely between the classrooms and the library and computer areas. Most students at Appletree Primary School are of Anglo-Celtic background. Their parents work in a variety of occupations in the local area or commute to the nearest major city.
Stella Maris Primary School

Stella Maris Primary School is in the small Tasmanian town of Stella. Most students are of Anglo-Celtic background. Most parents work in the town or commute to the nearest major city. School buildings are old, but well kept. Renovations were in progress for most of 2002.

Osborne High School and Orchid Grove High School

Osborne High School and Orchid Grove High School are situated in attractive suburbs of a major Tasmanian city. The buildings of both schools are old, with additions, completed over time, that represent various architectural styles. Students who attend these schools are of predominantly Anglo-Celtic background.

Wexford Primary School

Wexford Primary School is in a suburb of Adelaide. The buildings are two-storey red brick and occupy a large site. The school goes from Reception to Year 7. Paula, the teacher interviewed, said that, in some ways, she felt she was working in a secondary environment. The school had adopted some customs of secondary schools, for example, having specialist teachers for some individual subjects, including mathematics. Paula, as a specialist teacher of literacy, did not take her children for mathematics. The school had many students of non-English-speaking-background.

Camden Primary School

Camden Primary School is situated in a well-established outer suburb of Adelaide. Most of the parents work in local industry. The school buildings are old and wooden, with some modern renovations.

Staffrooms

The physical characteristics of the staffrooms in all schools in the study were fairly typical of the great majority of state government schools in Australia. All were comfortable, with adequate provision for seating, coffee and dishwashing facilities. Teachers were observed giving each other support and encouragement, but evidence of collaborative professional work was not observed in the staffroom interactions between teachers. In the primary schools, however, the teachers interviewed said that they planned in team’ and spent more than one hour a week jointly planning curriculum programs. The absence of male teachers was noticeable in primary school staffrooms.

Classrooms

The classrooms of the primary schools, with the exception of Appletree, were architecturally similar. Although built at an earlier period, when whole-class instruction was the norm, they had been successfully re-arranged to suit small group work. Students worked at tables in groups of four to six. The rooms were attractively decorated with examples of students’ work. All classrooms had an abundance of resources, especially of books and games, which were neatly stored and clearly and attractively labelled. Felt boards were used by students and teachers to communicate messages and to indicate group tasks.

Anna's classroom, (Grade 5/6) at Appletree Primary School was a dedicated literacy classroom on the mezzanine floor of a modern building whose ground floor was a library. Literacy classes were held in two-hour blocks and children were free to leave the classroom to use the computers and other resources in the library at appropriate times. There were also many books in the classroom. On arrival, children either read a book they had brought or selected a book from the shelves for the quiet reading period, which began each literacy block before the roll was called. Children were observed to enter this room quietly and settle quickly to their reading.

At Camden Primary School the walls between two classrooms had been removed to allow team teaching between Tammie, the teacher interviewed in the case study, and another junior primary teacher. In these classrooms, other adults, mainly volunteer parents, were helping the teachers and students with activities. The atmosphere was busy and purposeful. The noise was not excessive, although there were over fifty children and eight adults in the space. Both Tammie and Jan, the two teachers interviewed at Camden, were observed to be highly skilled in ensuring good order. While working with an individual small group they were constantly vigilant in seeing that children in other groups were working on their allotted tasks. Any untoward behaviour was quickly checked with a reprimand.
Excellent order was a feature of all classrooms observed in the case study. Students were seen to be purposefully engaged and well behaved. This was certainly primarily due to the skills of the teachers. No class was selective.

In Jan’s classroom (Grade 2/3) at Camden, where individual student’s literacy levels varied greatly, Billy, an eight-year-old boy who was working at a table with one other boy, cheerfully informed the researcher: ‘Bradley and I are ADHD. He’s ADHD and I’m ADHD. We can be very disruptive. I was sent home yesterday’. The teacher confirmed this, saying that Billy was new and having some trouble settling in. The two boys were working well together at that point.

There were three or four computers in the classrooms of the teachers interviewed at Camden Primary School, Osborne and Orchid Grove High Schools, and Wexford Primary School.

Annette’s classroom at Stella Maris Primary School, although old, was very well resourced especially with computers. Adjoining Annette’s classroom was a room, shared with the room next door, which had twelve computers. Not all were new, but all were functional. The classroom itself was large and of an irregular shape, which lent itself to the provision of dedicated spaces for various activities. Rotating groups of children spent time in the designated free reading, guided reading, writing, listening post, and computer spaces. The reading spaces were very well stocked with books.

Paula and Eliza, the teachers interviewed at Orchid Grove and Osborne High Schools had their own literacy classrooms which, although not as comfortable and well-resourced as the primary school classrooms, were pleasant, well maintained learning spaces, with flexible arrangements of furniture, displays of students’ work, three/four computers and some books.

**Participants’ motivation, experience and prior knowledge**

All seven participants in the case study were highly experienced teachers of literacy. They were recognised in their school communities and by their principals as excellent classroom teachers. (The principal’s recommendation was a prerequisite for enrolling in the Graduate Certificate program.) They were, without exception, enthusiastic about teaching and learning; their pedagogical expertise was evident in their observed relationships with their students, their comments in the interviews, written and other evidence of curriculum planning and their smoothly running, effective classroom programs.

Most of the teachers were involved in professional activities beyond their school settings. Paula, (Wexford Primary School) was a member of a team of teachers that was working on the revision of South Australian state curriculum frameworks documents. Annette, (Stella Maris) was a member of an active local literacy teachers’ networking group that met regularly to share ideas. Jan and Tammie, (Camden Primary School) had been instrumental in winning a national award for the school in the teaching of literacy and their expertise was, in consequence, often called upon by teachers from other South Australian schools and education authorities. Eliza (Orchid Grove High School) was similarly involved in out-of-school activities connected with the teaching of literacy, but she said that she was limiting her involvement in such activities in order to conserve energy for her classroom teaching, which she saw as her first priority. Eliza said that she had been invited to apply for several literacy positions at the system level, but was determined to remain in the classroom. Anna (Appletree Primary School) said that she was usually called upon for advice and assistance when a new system-wide literacy initiative was being planned.

All teachers in our project said that their original motivation for undertaking the certificate was to gain recognition for the skills they knew they possessed. The certificate was not linked to any form of promotion or career advancement. Only one of the teachers interviewed said that she was interested in career advancement. This was Anna from Appletree Primary School. Interestingly, Anna had dropped out of the Graduate Certificate program partly because it was taking up time that she preferred to spend developing her leadership role. (She was deputy principal in her school.) Of the other teachers, at least two had refused promotion positions because they wished to remain in the classroom. Using the Graduate Certificate for possible career advancement was the last thing on these teachers’ minds, but they felt that they deserved some formal recognition of their skills.

The teachers said that they did not think of the Graduate Certificate as a professional development program. The four Tasmanian teachers in this study had attended the Wilhelm seminar. On the last day of the seminar,
teachers had planned a unit of work. The teachers were told that the completed unit would be a substantial part of evidence for gaining the first ‘competency’ and a Certificate of Attainment. They said that it seemed sensible to use the work already done in the seminar to gain recognition.

Case study teachers’ experiences of undertaking the GCETL

As noted above, the experiences of the Tasmanian and South Australian case study teachers who undertook the Graduate Certificate in Education: Teaching of Literacy, were different. The four Tasmanian teachers attended the three-day seminar conducted by Jeff Wilhelm. This is significant, in light of the comments of the teachers who attended the seminar—for example, ‘It changed my teaching forever’.

Another difference was that the Tasmanian teachers undertook to complete only the first unit of competency, ‘Plan for literacy learning’. Two teachers of the four, Anna and Pamela, did not complete even this first unit and were not awarded a Certificate of Attainment. Annette and Eliza, who successfully completed the first unit, now planned to complete all units, not primarily because of the recognition factor, but because they had found the experience of completing the first unit so rewarding in terms of their professional development. All three case study teachers from the South Australian schools completed all five units and were awarded the certificate. A further difference was that the South Australian teachers appeared to have asked for and received more support from mentors than the Tasmanian teachers, none of whom had had mentoring.

Anna, who was her school’s deputy principal, did not submit a portfolio. She said that this was mainly because she ‘just ran out of time’. She also said that gathering a portfolio of evidence was not a preferred mode of learning for her.

Well, no, I didn’t finish it. I don’t know—I’m not really the kind of person who likes to divide things up neatly into sections in folders and present it all looking nice. Doing all that [developing a portfolio] doesn’t really suit my learning style. I like to do things, not so much collecting evidence and reflecting. I’m not sure that that does much—not for me anyway. But I’m really glad I did the workshop, it was great.

Anna said that her teaching been strongly influenced by the Jeff Wilhelm seminar.

I can see the point of doing the certificate, but I don’t need it for anything and quite frankly I don’t have the time. I consider the workshop to have been the PD. I would recommend it to anyone. Any changes in my work, and there have been changes, will be because of the Workshop, not because of the certificate.

Pamela (Osborne High School), submitted a portfolio, but aspects of it were not considered sufficient for the awarding of a Certificate of Attainment. She said that she was disappointed and also surprised by this, since her expertise in teaching literacy was recognised within and outside the school. She had been invited to attend a meeting with the assessors to find out what she would need to do for the needed extra requirements, but said that this was not ‘worth it’.

I thought I might as well get my competence officially recognised, but when they rang me and said I should come in to talk about it I just didn’t see that it was worth it. I don’t think I’ll bother finishing it now.

Eliza, who successfully completed the first unit of competency and gained a Certificate of Attainment, said that her experience of completing the certificate had caused her to reassess many of her ideas about the teaching of literacy.

I realised how important it is to have mutual respectful learning relationships between teacher and students. Every lesson, students should understand something new about themselves and the world.

Annette, who also successfully completed the unit and gained a Certificate of Attainment, said that the certificate, and, especially, the Wilhelm seminar, had ‘changed my teaching forever’. She saw the reflection and organisation involved in the gathering of evidence as a powerful learning experience:
Preparing the portfolio helped me to organise my thoughts from the seminar sessions. Helped me to put together what I needed for teaching the unit. It kept the learnings from the seminar tied down and forced me to put them into practice. And I learnt a lot from doing that. Completing the unit was definitely professional development for me and I plan to do the other units.

All three teachers from South Australia agreed that completing the requirements for the Graduate Certificate had been valuable professional development. The South Australian teachers had not had the benefit of a seminar, but had more contact with their assessors. They also had contact with a mentor from a university who had indirect involvement with the PD through the Quality Teacher Project. This person had observed their teaching and given constructive feedback. The assessors had also observed their teaching and given feedback.

The South Australian teachers had completed all five units. Their portfolios were voluminous and reflected an impressive amount of work in gathering evidence:

> My lounge room floor was just covered in piles of paper. I really didn’t know what to put in, so I put in everything I thought was relevant for the units. It made me think just how much work I have done in literacy over the years. You realise you have more skills than you think (Tammie, Camden Primary School).

The differences in the teachers’ experience of professional development through their involvement with the Graduate Certificate make it difficult to draw general conclusions about the effect of the professional development on their work and on student learning outcomes. The only experience common to all of the teachers in our study was in the gathering of evidence to demonstrate that they met the standards of Unit 1. And even in completing this part of the PD, teachers had taken individual approaches in terms of the amount and kind of evidence gathered.

**Effects on teachers’ knowledge**

**Knowledge of students and how to engage them in learning**

All participants in the case study said that since completing their portfolio tasks and participating in the interview for the GCETL, they had become much more aware of the importance of student engagement and classroom relationships.

Teachers in South Australia, who had not attended the Wilhelm seminar, said that their learning in this area was the result, mainly, of professional reading associated with preparing their portfolios, and of reflection on their practice. The teachers who attended the Wilhelm seminar reported that they had learnt some invaluable principles and practices in relation to student engagement.

One example given was a deeper knowledge and appreciation of the importance of ‘respectful learning relationships’ between teachers and students. This was no empty motherhood statement, but was felt deeply by the teachers, in ways that were reflected in their teaching. Eliza (Orchid Bay High School), for example, said that she became especially alert to the notion of mutual respect after attending the seminar and following up with professional reading and reflection on her own practice. She had taken this notion very seriously and was now putting it into practice in her classroom every day. Her classroom interactions with her students, observed for the case study were characterised by respectful attitudes on her part and on the part of students. In one class, for example, observed in November, the lesson was constructed around returning assignments to individual students. The 25 student members of her Year 9 class, an even mix of girls and boys, were, in appearance, typical of secondary school teenagers at this level in a non-selective school setting. However, their behaviour was exemplary. They listened respectfully and made constructive comments as Eliza gave general feedback about each assignment, reading out examples of how individual students had met the learning criteria. Any negative comments were couched in positive terms: ‘I was so glad you did that, Justin, because it shows how easy it is for all of us to make such a simple error. This is one we can all really learn from.’

By respecting her students—for example ensuring that activities were relevant and meaningful rather than time fillers, she believed that she would earn the respect and trust of her students. This would increase their engagement in the learning tasks and improve their capacity to learn.

In one interview, Eliza gave the negative example of the class of her own (primary-school-aged) daughter, whose teacher had required the children to draw endless pictures of ducks in mathematics lessons as an obvious
time filler. Her daughter had become bored and disengaged, not only from that particular task (which involved adding and subtracting the ducks!) but from other activities provided by that teacher. Eliza's own learning from undertaking the certificate had enabled her to see that such disengagement on the part of a student (in this case, her own daughter), was the result not just of boredom, but of lack of trust and respect that was likely to end in dislike of the teacher, further disengagement and failure to learn.

Forcing the children to do such boring work—a hundred-and-fifty ducks, for goodness sake—showed a real lack of respect for them. How can she expect the children to respect her and trust her when she does things like that? She obviously doesn't care if they learn or not and they know it. So how will they learn?

All teachers who had attended the Wilhelm seminar said that they had gained from the workshop a deep sense of the importance of knowing and respecting their students. They had also learnt some ways of developing this respect and knowledge through a process described by Wilhelm as 'front loading'. Front loading, in Wilhelm's terms, is specifically connected to the teaching of literacy. In summary, it means that before a text is introduced to students, there should be extensive time spent in preparing them and motivating them to respond to it. An issue (several teachers used the (William) term 'big idea') should be identified that students can engage in and feel strongly about. The next step is to pose some provocative questions about the issue and to build students' knowledge about it.

The Tasmanian teachers said that, since the seminar, they had realised that more time needed to be allocated to these 'frontloading' activities. They also said that they realised that they needed to spend more time in finding resources to inform students and to arouse and maintain their interest.

The South Australian teachers, who had not attended the Wilhelm seminar, also showed a high level of awareness that respectful, trusting relationships are fundamental to student engagement. The teachers reported that this aspect of their work had developed as a result of their reading and especially from the reflective processes involved in their undertaking the certificate. The following conversation with Paula (Wexford Primary School) illustrates the point and is typical of conversations with the other teachers.

I asked myself: what do I do? What are the most important aspects of a literacy program? And I realised that it's not only about paragraphing and commas and full stops. Real literacy is about communicating. You can't have communication without healthy relationships. So I do a lot of work at the start—talk about cooperation, games, stuff that causes the kids to feel comfortable and to like each other.

Interviewer: But you were doing this before you started the certificate? Did the certificate change your ideas about relationships and communication?

Paula: Yes, but reflecting on it—I realised how important it is and I worked out ways to make it happen. There is an autistic boy in my class and the others are really great carers with him. So I thought of ways they could help him in the literacy classes. They do group work and he's good with drawing, so they allocate the drawing tasks to him. Working out how to help him gets them more engaged and involved in the tasks.

Paula believed that the issue of choice was essential to the building of healthy, respectful relationships necessary to effective communication and engagement.

It's not respectful of students to demand that they learn about things they have no interest in. I try to develop their interest in the topics and give them choice. I spend time presenting them with a variety of topics. I put time into the presentation—and giving them a variety of choice.

Teachers' knowledge of subject content and how to teach it

All teachers in the case study said that their knowledge of the elements of literacy had increased as a result of their participation in the professional development program. All said, for example, that, when preparing their portfolios, they had considered it necessary to:
• refer to a variety of texts about literacy theory and the teaching of literacy
• refer to state and other curriculum documents
• reflect on their current knowledge in relation to the literature and their own practice
• ensure that their own teaching reflected an understanding of the concepts of literacy teaching found in relevant literature and documents.

This was, in part, in order to satisfy the criteria—for example: Planning decisions are justified in terms of literacy and learning theories and practices.

All the teachers in the study said that professional reading and reflection on practice were the most significant elements of their completion of GCETL, (or part of it) in terms of their professional learning. More learning had occurred as they refined their expertise and gained more control and deeper awareness of what they were doing and why.

The teachers from the schools in South Australia said that they had learnt from interactions with their mentors, especially from classroom observations. The mentors had discussed with the teachers the lessons observed, giving feedback which the teachers found useful. The Tasmanian teachers appeared to have received less support from mentors.

Specific areas of learning development mentioned by all teachers were:

• growth of clear, shared understandings of the meaning of literacy
• increased knowledge of how to develop a rationale for their teaching of literacy and how to explain it to students
• increased knowledge of how to plan curriculum programs for effective literacy learning with due regard for the explicit teaching of reading and viewing, writing, spelling, speaking and listening skills
• increased knowledge of how to model and demonstrate elements of literacy to students
• increased knowledge of how to develop strategies for the teaching of literacy to students from diverse backgrounds
• increased knowledge of the importance of suitable resources and materials and how to discover these. (Some teachers were making their own materials. The two teachers at Williamsburg South had made a storeroom full of materials for literacy teaching.)
• increased knowledge of how to encourage students to produce and take pride in their own texts of various kinds
• increased understanding of issues relating to genre in literacy teaching
• development of more effective strategies for student assessment and record keeping
• awareness of the development of individual student’s learning.

This is an extensive list, but it is important to remember that the teachers were referring to improvement of their knowledge in these areas. No area was new to these accomplished teachers of literacy.

All teachers, especially those who attended the Wilhelm seminar, stressed, in particular, the importance of effective communication, between teacher and students, and among the students themselves, to the teaching and learning of literacy. As one teacher said: ‘Literacy and communication are sort of the same thing. Once you get the communication going, the literacy starts to happen because that’s what literacy is.’

The evidence of improvement in their professional knowledge given by the Tasmanian teachers was mainly in the areas that were directly concerned with the first unit of competence: ‘Plan for literacy learning’. This was unsurprising, given that they had completed or attempted only this unit. The teachers from South Australia, who had completed all five Competencies gave more substantial evidence (their portfolios being the most powerful
demonstration) of knowledge in relation to the other four Competencies. However, within the time and resources available to the case study, it was not possible to infer the extent to which the professional knowledge of the teachers who had completed all five units of competence exceeded that of the teachers who had completed or attempted only the first unit of competence. All case study participants were exemplary teachers of literacy to begin with. This was a feature of the program. All believed that their professional knowledge had increased as a direct result of their participation in the professional development program and all were able to discuss and provide evidence of how these improvements had occurred.

Effects on teachers' practice

All teachers said that they had made changes to their classroom practices as a result of participating in or completing the program. However they saw these changes as more of a shift in emphasis than a radical departure from former habits. The most significant changes appeared to be grounded in the insights and understandings they had gained, especially about such aspects as establishing mutual respect between teacher and students, knowing about students personal characteristics and experiences of learning, establishing cooperative, caring classroom relationships, and allowing students as much choice and freedom as the practical constraints of the classroom situation allowed. These changes were characteristic of all teachers in the case study.

Paula, as part of evidence presented in her portfolio, put it this way:

We all know literacy does not happen in isolation from other learning. Nor does it occur when students have negative mindsets. We also know that students come to us with some kind of literacy base and that in each case the base is quite different, depending on experiences.

The first priority when commencing a school year (or for new students, when joining an established class) is to assist them to feel that they will be successful. They will be successful because they have a valued base from which to work from and develop; they will be welcomed as individuals with particular interests and experiences; they understand they will contribute to everyone's learning; there is an atmosphere of safety where risks can be taken.

How does this work in practice?

There are, of course, the usual social activities we as teachers are used to doing to encourage social interaction and a feeling of teamship. However, the ones I want to share here are the activities that I specifically program in order to assist Literacy. This involves a combination of speaking, listening, writing and reading as students share, observe, think, problem solve and interact. Some examples of these include:

- Sharing achievements so far
- Sharing interesting experiences
- Showing or telling what they are good at
- Quick activities in pairs, small groups then larger groups

Setting up a 'buddy system' (one or two students become buddies in terms of looking after each other if one of them is out of the room or absent, by filling them in on what happened whilst they were away, collecting materials handed out in that time etc. So that when they return they do not feel as though they have missed out or have a whole lot of things to catch up on without support.

In the very first days of coming together, I encourage the students to share as much as they can about themselves. For example:

- What they like about reading, writing and speaking
- What they don't like about them
- What they find easy
- What they find difficult
- What they believe they are good at. How they know this.
- What they remember about last year, the positives and the negatives.

And I do likewise, sharing my experiences as a student as an adult. (They are usually very humoured by my revelations.)

(Extract from Paula’s portfolio, submitted for assessment for the GCETL)
The principles and practices described by Paula in her portfolio are not new. However, a major component of the learning experienced by Paula and the other GCETL candidates was that they were able to develop a clear rationale, based on the standards, for what they had previously done partly intuitively. They were then able to build on this rationale to develop more effective programs for students.

A major result of gathering evidence to demonstrate that they met the standards was a deepening awareness of why they were choosing certain teaching and learning activities over others. This led them to ensure that activities like those in the examples above were rationally and systematically built into their programs and used consciously and constructively to improve the literacy learning outcomes of students. This adds up to real change in practice, as teachers consciously and confidently build upon a clear rationale, based on articulated standards of practice, to construct sound learning experiences for their students.

An example of a more specific change that was observed in the classrooms of all of the teachers who had attended the Wilhelm seminar was the emphasis on ‘the big idea’—ensuring that the texts studied related to a broader issue. This emphasis stressed and facilitated an enquiry learning approach. In Annette's classroom at Stella Maris, the children were reading a variety of texts about environmental conservation, (the ‘big idea’ in this instance). They were reading and writing about the destruction of trees and forests in their state of Tasmania, an environmental issue that these children had come to feel passionately about. Annette was encouraging the students to write letters and stories about their feelings. They had written to members of parliament and received responses. The children had been greatly encouraged by these responses. They had even written to their own principal when some trees in front of the school had to be removed for safety reasons. The principal had replied and some lively debate ensued which Annette saw as

really using their literacy skills, making them see why it’s important to be able to make up a good argument, not just talk off the top of your head. They were so excited when people sat up and took notice of what they had to say.

Annette said that last year, before she had undertaken the certificate, her class may have been doing similar things, but she would have spent much less time preparing them for the big idea, or to use Wilhelm’s term: ‘front loading’. As a result of the PD, she said, ‘she was much more aware of how to arouse students’ interest and channel activities to improve their literacy’.

Effects on student learning outcomes

The units of competence for the GCETL reflect a holistic view of literacy teaching that emphasises active and purposeful language use. The evidence obtained in the case study showed that, in accordance with the elements of competence of the GCETL standards, teachers were planning carefully thought out programs that started with respect between classroom members, and progressed through the establishment of sound relationships to communicative learning activities in the literacy skills of speaking, listening, viewing, reading and writing.

Student engagement was a crucial element in the success of the literacy classes observed. Evidence of student engagement was seen in the high level of self-directed, self-managed student activity. For example, one interview with Annette took place in the glass-walled computer space that adjoined her classroom. The interview took about one hour. There was no adult in the main classroom area for much of this time, although a teacher’s aide was on hand. The children remained supervised by Annette, since they were clearly visible through the glass and the door into the classroom remained open. The children knew what they had to do. For the whole hour, they remained engaged in their activities, with minimal direction from Annette. They were observed to move freely around the classroom, accessing books and other resources. There were no incidents of disruption and the noise level was low. The only interruption came from children who were anxious for the computer room to be freed up so that they could access the computers.

This was an excellent example of how the teacher’s skilled planning, combined with established trust and respect between teachers and children, resulted in well sequenced learning activities that helped students to take responsibility for their own learning within a productive, well resourced learning environment. These enabling conditions of learning empowered the students, who were already motivated to develop their literacy knowledge and skills.

In Anna’s classroom at Appletree Primary School (observed in November 2002), groups of students were absorbed in discovering ‘the big idea’ in shared texts (a different text for each group). Their task, after
identifying the idea, was to articulate their own ideas and beliefs about the issue. In some groups there was heated debate, as students discovered that they had conflicting beliefs. In other groups, where there was consensus about ‘the big idea’, the students were quietly putting their ideas on paper. One group decided that more information was needed. Another group took up that idea, and students were dispatched in their groups to find more resources. The teacher divided her time skillfully between the groups, posing challenging questions helping them over the conceptual hurdles. By the end of the lesson, (a learning session of two hours), each group had written and presented to the class an articulate response to the challenges posed by the ‘big idea’ in their text.

The ‘big idea’ concept was directly traceable to the Wilhelm segment of the professional development, and was a major part of the observed success of Anna’s lesson, in terms of students learning and practising a repertoire of literacy skills. The broader principle of enquiry learning to which this idea is closely related was also fundamental to the reflective processes that all the teachers engaged in as part of their completion of the certificate.

Evidence from the interview data, from observed classroom behaviours, and from students’ writing samples, strongly suggested connections between the GCETL and student learning outcomes. The teachers’ focused on such elements as: enquiry learning selection of appropriate resources that matched the needs and interests of students; the setting and achievement of clear learning goals; and using assessment data to inform planning. All of these elements of their practice, they said, had been strengthened and clarified as they assembled evidence to meet the GCETL requirements. This was affecting student learning outcomes in literacy in several major ways.

- In all classes observed, students were seen to be working purposefully towards the achievement of specific outcomes. Activities appeared to be carefully planned and sequenced to maintain a focus on outcomes. This was particularly noticeable in the primary school classrooms, in the teachers’ skilful monitoring of group and individual activities. The teachers knew their students, and had a clear understanding of what they intended each student to achieve. This understanding was informed by assessment. All primary teachers, for example, knew the reading levels of each student and had planned activities accordingly. The result was that students were observed working on different activities that were directed towards the achievement of results that were achievable for them.

- The channels of communication, between students themselves and between the teacher and the students, were seen to be open. This meant that, with obstructions such as disrespect, misunderstanding, and mistrust, removed the way was open for students to practise and develop their literacy skills in the classroom, for example, talking to the teacher and to each other, listening to various ideas and opinions, writing and preparing presentations in groups, reading and viewing texts and sharing opinions about them.

- Strong student engagement was a feature of the classes observed. Students also appeared highly motivated to express their ideas verbally and in writing.

These elements were reflected in students’ classroom interactions and also in their writing, which, in many cases, was thoughtful and analytical, for example:

On animal rights:

As a vegetarian you would probably think I thought all animals should not be used for food. But in some cases that is the only way. A lot of protein comes from meat (Wendy, Year 6 Wexford PS).

I think it is OK to have pets, but only if you don’t hurt them, because they don’t harm people … Animals just don’t harm people for no reason (Amy, Year 6 Wexford Primary School).

On the Winona Ryder case:

I wonder what is going to happen to her. I would understand it if she was poor, but if yo own 12 million a year (she stole up to 10 thousand dollar.) that no way there won’t put you in jail. Well, let’s wait and see what happens (Jessica, who is from a non-English speaking-background, Year 6 Wexford Primary School).
Winona Ryder earns $12 million a movie, so I don’t really see why she needed to shoplift, I mean it’s not like she didn’t have the money. The reasons that she shoplifted for are still uncertain, but these are the possibilities: depression, anxiety, stress relief, drug reactions, not money or need of some kind (Pedige, who is from a non-English speaking-background, Year 6 Wexford Primary School).

On ‘A pet I would like’:

I would like a pet puppy dog. To replace My Dad’s Dog Sado, because Dad took Sado to the vet and he died. I would take my puppy dog for a walk. Twice a day, I would name it Isabell. (Daisy, Reception, Camden Primary School).

I would like to have all the fish in the pet stores why Because I will be a Person that will study urber watyr creatures and I will feed what they need to eat. I want them to do tricks under the water. I will give them what they want. I would clean their tanks and I will show them their Beds and I will be taking care of them (Danny, Reception Camden Primary School).

The links between the professional development and student learning outcomes that can be inferred from the evidence gathered are thus mainly increased student motivation and engagement in literacy activities. These were largely the result of the teachers’ experiences, especially the reflective processes and professional reading that were undertaken as part of their preparation of evidence for the certificate. Improved student engagement and motivation appear to have led to improved classroom communication, more connectedness with issues and texts, and consequent improvement in literacy skills.

Possible future improvements in the implementation of the GCETL

Discussions with personnel from the Tasmanian Leaders’ Institute produced the following suggestions for improvement.

- The success of the Wilhelm seminar suggests that such a seminar, or series of seminars, might help the teachers to gain a better understanding of the standards. This would be especially useful at the start of the evidence gathering process.

- The role of the mentor/assessors could be investigated and clarified. Research based overseas examples of teacher performance assessment, for example, National Board for Professional Teaching Standards, INTASC, Praxis, choose not to merge the two roles, for several reasons that warrant consideration. The teachers in this study had no problems with the mentor-as-assessor concept, and feedback received by the Leaders’ Institute indicated that teachers generally accepted it. But it needs to be borne in mind these teachers had experienced no other model. It would seem advisable to consider some of the possible shortcomings of this model in light of the existing body of research that relates to ensuring valid and reliable methods of assuring performance for high stakes decisions such as the awarding of a graduate certificate.

- Although the teachers were given explicit guidelines and criteria for the selection of evidence, perusal of the portfolios showed considerable individual differences in their contents. Some teachers chose to include everything from testimonials to examples of students’ work to results of examinations or courses they had taken. Others were more selective, choosing, for example, to include fewer artefacts and more of their own explanations and reflections. These differences in the portfolios must, inevitably, have led to assessment difficulties for the assessors. A possible solution might be to use more specific and targeted ‘portfolio entry’ tasks, such as those developed by the NBPTS (The National Board for Professional Teaching Standards).

- The teachers said that they would have benefited from working more closely with colleagues when working on the certificate. (In South Australia, the teachers were clustered to work together and in addition had three supported whole day—funded—group meetings). Considering the now generally accepted view of the value of collaborative, workplace-based teacher learning focused on problems of practice, it would seem advisable in the future to encourage schools to provide incentives for groups of teachers to enrol in the certificate.
Conclusion

A major feature of the Graduate Certificate in Education: Teaching of Literacy is that it is intended for teachers who have already demonstrated exemplary practice in the teaching of literacy. The expectation is that these teachers’ practice will mirror the standards that were developed on the basis of what such good teachers were already doing.

But, for the teachers in the case study, the GCTEL experience went beyond demonstrating competence and reinforcing what they already knew. Teachers reported that, when gathering evidence in relation to the standards, they had read and reflected in ways they would not have thought possible had they not embarked on meeting the certificate’s requirements for demonstration of competence. All teachers, even the two teachers who did not complete the certificate, were quite sure that their teaching had changed in fundamental ways; chief of which seemed to relate to the ways in which they viewed themselves, their students, and classroom relationships. The changes in teaching practice that have been documented in the case study flowed from these changes in teachers’ perceptions.

The investigations for this case study were made more difficult because the participants did not have common professional development experiences. Changes in teaching practice appeared to be significant among the South Australian teachers who had completed the whole certificate. However, even among these three teachers, Paula, who had adopted a deeply reflective approach in the gathering of evidence for her portfolio, was more convinced that her teaching had changed in major ways than the teachers from Williamsburg South PS, who had approached the portfolio task in a more matter of fact way, as a marshalling of a great variety of documents and artefacts which they saw as attesting to their competence. This could indicate a need for a more targeted and strategic approach to the summative assessment, with more emphasis being placed on the levels of teachers’ performance that are required to meet the standards.

Another complicating factor was that the four Tasmanian teachers who attended the Wilhelm seminar believed that their learning from this seminar was a major impetus for them to change their practice. The principles discussed at the seminar, they said, were reinforced in the GECTL standards. They believed that, as they tackled the requirements of the first Unit of Competence, these principles became more firmly embedded in their practice. All four of these teachers, even the two who did not complete the first Unit of the Certificate, said that demonstrating that they met the standards of the first Unit of Competence, had grounded their learning from the seminar in very powerful ways. Two of these teachers were looking forward to extending this experience by completing the other four units of the certificate.

All teachers believed that student learning outcomes had improved because of the changes in teaching practice that resulted from the enhanced pedagogical perceptions they had gained from completing the professional development program for the Graduate Certificate. They saw these improvements as a result of the processes of reflection and evidence gathering that were required to show that they met the standards of the GCTEL. All candidates, especially those who completed the whole certificate, had become much more sharply and critically aware of the effects of their own actions on the learning of their students. It is therefore clear that the professional development experience had brought about changes to teaching practice, and that students’ learning outcomes had improved.
Chapter 4

Science Standards and Portfolios Professional Development Program

A standards-based professional learning program

Anne Semple

The Australian Science Teachers’ Association (ASTA) and Monash University, with an Australian Research Council grant, developed the National Professional Standards for Highly Accomplished Teachers of Science28. In the professional development program that is the focus of this study, the standards are used as reference points for teachers to analyse their teaching practice and to guide their professional learning. The standards make explicit what teachers of science should get better at—what they should know and be able to do to advance in their professional practice. The three-year development of the standards by ASTA (1999–2001) was the first stage in researching the development of a voluntary system that could provide professional certification to teachers whose practice has attained the standards set by the profession (ASTA, 2002, p. 26).

The eleven ASTA standards should be viewed ‘as a series of highlights in a relatively seamless description of high accomplishment in teaching science’ (ASTA, 2002, p. 3). They are summarised below.

A. Professional knowledge: Highly accomplished teachers of science have an extensive knowledge of science, science education and students.

- Knowledge of science and science curricula
- Knowledge of teaching, learning and assessment in science
- Knowledge of students and how students learn in science

B. Professional practice: Highly accomplished teachers of science work with their students to achieve high quality learning outcomes in science.

- Designing coherent learning programs
- Creating and managing learning environments
- Engaging students in scientific inquiry
- Extending students’ understandings of major ideas in science
- Developing students’ ability to use science in decision-making
- Assessing and monitoring student learning

C. Professional attributes: Highly accomplished teachers of science are reflective, committed to improvement and active members of their professional community.

- Analysing evaluating and refining teaching practice

---

• Professional contributions, to science education (ASTA 2002, p. 3).

ASTA followed the development of the standards with further research on developing and validating methods for assessing the performance of highly accomplished teachers of science. The ASTA/Monash team designed structured portfolio entries that are intended to provide evidence of practice in different domains of teaching. (See specific entries later in this chapter.)

Each portfolio entry is structured—what has to be done and what has to be submitted is clearly set out. How teachers fulfil the requirements of the portfolio entry depends on the context within which they teach and the nature and quality of their practice. Portfolio entries 1 and 2 are based on analysis of student samples of work, portfolio entries 3 and 4 on an analysis of unedited and uninterrupted 20-minute videos of teacher and student classroom interactions, and portfolio entry 5 on documented and authenticated evidence of participation in school and the wider professional community with a reflection on the effect of such participation on practice and student learning.

ACER drew on the ASTA/Monash research to develop a standards-based professional development program intended to engage and support teachers in both preparing for and completing one of four portfolio entries. The Science Standards and Portfolios Professional Development Program was trialled in 2001 followed by further trialling in 2002, which is the subject of this case study. The program involved teachers of science at primary and secondary levels in all sectors of school education and at different levels of experience.

The design of this professional development program is guided by what research tells us about best practice in professional development, and by the vision for the teaching of science in Australian schools as stated in National Professional Standards for Highly Accomplished Teaching of Science (ASTA, 2002, p. 8).

The following principles underpin the program:

- Teachers have a major responsibility for their own professional learning, based on analysis of their needs
- Professional learning is ongoing and to be effective must be connected clearly and appropriately to teachers’ work in the context of the school
- Effective professional learning is based on clearly defined standards of what constitutes high quality teaching and learning in science
- Effective professional learning builds on the current understandings of teachers in relation to teaching science and student learning in science
- Effective professional learning incorporates active participation, research and ongoing reflection on practice in a collaborative environment.

Features of the professional development program

The program has three main features:

- the professional standards that provide a framework of highly accomplished teaching practice in science
- the incorporation of active participation, research and ongoing reflection on the process, which requires deep analysis of teacher and student work samples, or video recordings of teacher-student interactions
- preparation of a portfolio entry that provides evidence of performance in one domain of teaching.

The professional development program of six three-hour sessions is based on the assumptions that teachers themselves are a valuable resource for improving professional learning and that the provision of opportunities for teachers to examine and share their practice in facilitated discussion will promote this learning. The standards clarify and articulate what highly accomplished teachers of science should know and be able to do.
They provide reference points for teachers to analyse and reflect on their practice during the duration of the program and they use them to guide their professional learning.

The completion of the portfolio entry engages the teacher in a deep analysis and reflection on a particular domain of teaching that they have decided to focus on following the examination of their teaching and students’ learning that took place during the first four sessions. The portfolio entry is intimately connected to the work they do in their practice.

Outcomes

The intended outcomes of the program are for teachers to:

- become familiar with the ASTA National Professional Standards for Highly Accomplished Teachers of Science
- deepen their understanding of how professional standards can be used to analyse practice and guide future professional learning
- learn how to design and implement units of work that engage students in their learning
- understand the principles of effective assessment and apply them to students’ learning in science
- be able to elicit students’ prior learning and use it to guide teaching
- be able to use students’ work to guide teaching
- analyse and reflect on their practice and write about their teaching
- develop a portfolio entry as evidence of practice
- share their practice with others and contribute to building a professional community.

The intended outcomes for students are improvement in their attitudes towards learning science, in their subject knowledge, in their ability to apply skills, processes and procedures in science and in developing scientific literacy.

The assumption is made that by improving teachers’ pedagogical content knowledge and by linking professional development strongly to teachers’ practice, professional learning will take place that will link to a higher level of achievement of learning outcomes by their students.

The case study reported here is based on evidence gathered in six schools during 2002 as they participated in the Science Standards and Portfolio Professional Development Program between March and December 2002.

Structure and organisation

In 2002, the professional development program consisted of six three-hour sessions spanning 8–9 months. Support for participants was provided by Catholic Education Office, Diocese of Sale, (two schools, seven teachers) and the Department of Education and Training (one school, four teachers). Three independent schools paid for three teachers each to participate (nine teachers).

Facilitated sessions included:

- developing a deeper understanding of what constitutes a profession and professional practice
- writing about teaching
- designing units of work that engage and support students in their learning of science
- probing students’ prior knowledge and understanding
- understanding the role and purposes of assessment
- exploring the nature of science inquiry
providing opportunities for students to develop scientific literacy.

Though the timing of the first two sessions of the program was set in advance by negotiating with the school administration, the facilitator negotiated the scheduling of the remaining four sessions with the teachers to meet their needs and circumstances and the program requirements.

The first four sessions centred on examining and building teacher knowledge and on discussion and analysis of aspects of participants’ teaching practice. As an outcome of this analysis, participants decided which portfolio entry they would prepare for and complete. Preparation and planning took into account: the timing of the teaching sequence that they would use as a focus of their analysis, how it fitted within the planned school science curriculum, whether they would base their portfolio entry on work samples from students in preference to video taping classroom interactions which may have required additional technical and other support, and the time frame required for writing the portfolio entry. Apart from teaching time and attendance at the professional development sessions, participants required approximately 15 to 20 hours to complete the portfolio entry.

The remaining two sessions were devoted to a collaborative critique of teachers’ portfolio entries in preparation. Optional sessions can be arranged for group work on individual portfolio entries.

The venue for the sessions varied, depending on negotiation with participants. Sessions took place in individual schools, at a particular school in combination with groups of teachers from other schools or at a non-school centre. This flexibility created the opportunity for teachers to build not only their school-based professional community but also allowed them to experience a range of different sites and contexts of teaching and widen their professional community.

Materials and resources

Materials provided to teachers consisted of:

- a copy of the *Australian Science Teachers’ Association Professional Standards for Highly Accomplished Teachers of Science*
- copies of the guidelines and requirements for completing four ASTA/Monash portfolio entries (draft)
- reference material on teaching science, assessment, science inquiry
- hints on writing about teaching and videotaping.

Relevant reference material was added by the facilitator and by the participants during the course of the program.

Facilitator

In addition to facilitating the scheduled sessions, the facilitator provided ongoing support throughout the duration of the program at the request of participants. This involved email, fax and phone contact and visits to the school. The support provided by the facilitator was particularly important during and following the final two sessions when she worked not only with groups of teachers preparing the same portfolio entry but also with individual teachers. Assistance in clarifying conceptual understandings, ways of describing and analysing teaching practice and student learning, drawing out understandings by examining student samples of work and from viewing videos of class interactions, are some examples of the assistance given. Moral support, in often demanding circumstances, was also provided on many occasions.

Conduct of the professional development program

The school-based programs were conducted with at least three teachers from each school. This was intended to ensure, as far as possible, that the professional learning of the participants was closely connected to their work in the school and that it contributed to strengthening their own professional community. Some sessions were held jointly with other schools so that discussions could be enriched and teachers would have the opportunity to gain different perspectives on teaching practice that could contribute to their professional learning.
The program was designed on constructivist principles. It recognised that the participants are its best resource. It assumed that through facilitated collegial exchange and relating their practice to the professional standards developed by their profession, teachers would build on their current understandings of teaching and learning in science and grow in their professional learning. The assumption was that any growth in professional learning would change practice in ways that ultimately would improve the learning outcomes of their students.

In the first four of the six sessions teachers were guided through the elements of what constitutes highly accomplished teaching as described by the standards and how they might incorporate such aspects in their practice. Teachers shared their experiences, ideas and expertise; they raised problems and discussed solutions. Teachers brought in samples of their own work, such as a planned teaching sequence or unit, and examples of learning activities and assessment tasks they had given to their students. These formed the basis of much of the discussion.

The sessions modelled teaching and learning strategies that could be used in the classroom. For example, teachers were asked to create a concept map of all the elements that they thought should be incorporated in the design of a unit of work. Through a think-pair-share activity they contributed their ideas, looked for elements that the maps had in common and justified their inclusion or exclusion.

Strategies such as these were used to engage teachers in meaningful analysis of their teaching and student learning. This, together with reference to the professional standards, assisted teachers in deciding which domain of teaching they would focus on in their portfolio entry.

**Portfolio entries**

Portfolio entry 1: *Teaching a major idea of science over time*

Portfolio entry 2: *Assessing students’ work*

Portfolio entry 3: *Probing students’ understanding*

Portfolio entry 4: *Active engagement in investigation and inquiry (science)*.

The guidelines for each of the entries made explicit the requirements for completion of a portfolio entry. Each portfolio entry provided focus questions to assist teachers in writing their commentaries. During the program teachers were helped to use a common language to describe their pedagogical content knowledge and to communicate this professional knowledge and understanding to their peers. They learnt how to apply this language in discussions and in writing to describe, analyse and reflect on their practice.

Each portfolio entry had, essentially, the same structure with some variation depending on whether it was based on student work samples (1 and 2) or on videos (3 and 4). The introduction describes the practice characteristic of a highly accomplished teacher of science in the particular domain of teaching and the standards that are associated with that domain. This is followed by a short description of the nature of the entry and an outline of what teachers need to do and submit. A diagrammatic representation of what constitutes a portfolio entry and how to assemble the components is then presented. Advice is given on how to make good choices when preparing a response to the portfolio entry. For example, for Portfolio entry 1: *Teaching a major idea of science over time*, advice is given on selecting a major idea in science that could be the focus of the unit or teaching sequence, and related key skills, selecting three teaching activities and selecting the two students whose work will be featured.

For the video-based portfolio entries (3 and 4), advice was given on what to consider when selecting a class, the scientific idea that students engage with in the teaching sequence, and the lesson that will be videotaped. Advice was also provided on techniques for videotaping.

Each portfolio entry included a section that explained the basis for assessing the evidence provided by the portfolio.

The written commentary was organised into four sections: a description of the teaching or class context (in addition to a description of the school context), some aspect of planning (different according to the portfolio entry), analysis and reflection. Each of the sections had a series of questions that provided a framework to assist teachers in their response and a suggested word length. The total word length is prescribed.
Each portfolio entry provided a section on requirements for submission that gave more details than the short outline following the introduction. For example, it included the kinds of teaching and learning artefacts that could be included.

The structured nature of the portfolio entries reduced the chance of ambiguity in interpretation yet took into account the different contexts in which teachers, both primary and secondary, teach and variations in teaching styles.

Completing the portfolio entry was integral to the professional development program. It was the outcome of the process of professional learning that teachers engaged in and provided evidence of performance in their practice. For some teachers the choice of portfolio entry was problematic. The teaching sequence or unit had to extend over a period of time to meet portfolio entry requirements but it also had to fit in with the teaching schedule and other activities taking place in the school. Because of some difficulties in timing two teachers felt they had to compromise on their choice of unit to the extent that it did not give them the opportunity to demonstrate their practice to best effect.

**Video-based portfolio entries**

Some teachers remarked that videotaping classes was difficult because of lack of availability of equipment and assistance. In one school, the equipment was stolen and the teacher who had commenced the portfolio entry had to attempt a different portfolio entry based on student work samples. However, the discussion that was promoted as a result of showing the tapes to colleagues was clear evidence of their worth in analysing practice and generating professional learning.

Those teachers who chose the video-based portfolio entries (3 and 4) had to produce a sequence of up to 20 minutes of uninterrupted and unedited videotape showing their interactions with students in relation to the particular domain of science teaching they were focusing on: probing students’ understanding in science or their ability to engage students actively in science investigation or inquiry. In their written commentary, teachers described and analysed these interactions in depth and reflected on what implications there might be for their teaching and their students’ learning.

One video focused on the teacher probing students’ understanding of geological concepts related to plate tectonics by using concept maps. The teacher had not taught this component of curriculum before and ‘had to do it because it is next on the list’. The teacher used concept maps, a technique he was introduced to during the earlier part of the professional development program. He described his main challenge as creating a positive learning environment, taking into account ‘the attitudes of a close-knit core group of crusty individuals who individually and collectively exhibit a range of behaviours which are not conducive to the smooth functioning of the class [year 9]’. In his written commentary he states that the school recognises that these behaviours are sub-clinical but they do affect learning. The teacher had identified that ‘engaging a class group in meaningful discussion … to be able to probe their understanding’ was a weakness in his teaching. He saw the opportunity to be videotaped in action ‘… as a primary step in improving my all round performance as a teacher’.

Another teacher’s video focused on probing students’ understanding of concepts associated with a mandated post-compulsory curriculum requirement, ‘Light and matter’ in preparation for the examination. She wanted her students to ‘see the clear links between sound and light … see physics as a whole … and draw strong links between topics we have covered’. The segment of the video shows how the teacher established what her students already knew about light and the links between light, matter and sound. The teacher used discussion as her method of probing understanding and the video showed teacher–student and student–student interactions in a small but diverse group she described as ‘two being your average hard-working students, two very bright and two extremely weak and requiring special education assistance’. The segment of dialogue shows clearly the positive relationship between students and teacher, and the progressive elicitation and development of ideas by all in the class.

**Student work-based entries**

The portfolio entries based on student work samples (Portfolio entries 1 and 2) required teachers to track the progress of two students who presented particular challenges to their teaching over a period of several weeks. At three stages in the teaching sequence, teachers sampled the response of these students to learning activities or assessment tasks that they had given to their students. Copies of these activities and the responses of students
were included in the entry. In their written commentaries, teachers described the purpose and conduct of the activities, analysed the responses, provided feedback to the students and reflected on the outcomes of this process in terms of the implications for future teaching and learning.

In each portfolio entry, teachers described both the profile of their school and the class they were working with. For some teachers this was the first time that they had actually thought to this depth about the characteristics of the school and its culture, the make up of their class in terms of student characteristics and background, and how this could affect their teaching and their students’ learning.

The aim of the professional development program was for teachers to undertake an analysis of and reflect on their practice to deepen their awareness of what they are teaching and why, whom they are teaching and the effects of their teaching. Teachers made a strong connection between the learning that they engaged in during the program, completing the portfolio entry and the effects of their teaching on their students’ learning.

Experiences of teachers

The following is an account of some of the experiences of one teacher during the program and the completion of her portfolio entry. Information about her Year 7 class of twenty-five students included: ten students who had recognised learning disabilities in literacy and numeracy, three who had a high level of academic ability, five who were regular school refusers and six who had been officially reprimanded for bullying. At least half the class did not do or did not recall doing any science in their primary school. The teacher took these findings into account in designing a unit of work that specified the learning goals she had for her students and how they would be achieved.

The learning goals included the development of their understanding of the particle model of matter and how it relates to properties of substances, particularly in everyday life. She also aimed help students to develop their skills of science investigation and communication, and their scientific literacy. She designed a teaching sequence that took into account the range of abilities and learning styles that she had identified earlier, particularly the poor levels of literacy. From participating in the program, the teacher had learnt, for example, how concept maps could be used in different ways for effective learning, the significance of relating science experiences to everyday life and strategies to accomplish this. For example, she used word association to help students develop their science vocabulary and annotated drawings of household equipment and processes to help students relate their science understandings to their day-to-day life.

The teacher’s written commentary described reasons for choosing these learning goals for her students, how she planned and implemented a teaching sequence that included three activities that promoted student learning in relation to her goals. The written commentary included her analysis of the students’ responses to these activities in terms of the development of their conceptual understanding of the particle model, their skills of scientific inquiry and their ability to relate their findings to everyday life.

The teacher documented evidence of progressive improvement in the conceptual understandings of her students, and an increase in the extent and use of scientific vocabulary. She also reported on the ability of the students to apply their understandings, though the level of progress associated with each learning goal differed for each student who was tracked for the portfolio entry. Her reflection included what she would do differently next time and why. She attributed her ability to design a cohesive unit that addressed her students’ needs, and her ability to monitor and assess her students’ progress in different ways, to the experiences she had engaged in during the professional development program and meeting the requirements of the portfolio entry. She had ‘done’ units before but not in such a cohesive manner. She reported that she had also changed her practice by incorporating ways of assessing the prior learning of her students.

Sites of the Science Standards Program

Schools

Six schools participated in the Science Standards Program, all of them co-educational. Four schools were in regional Victoria, one urban and one suburban. Four schools were P–12, three with split campuses. Schools ranged in population from approximately 730 (urban) to 1720 (suburban). The schools came from all sectors. One school was a state secondary college, three were Catholic colleges and two schools were from the
independent sector. A total of 19 teachers and their classes commenced the program. In five of the schools the Head of Science or the Science Co-ordinator participated.

Research questions

The following research questions were the focus of data collection:

- What changes in teaching practice and student learning outcomes have occurred?
- What changes can be attributed to the Science Standards professional development program?
- What is it about the professional development program that has contributed to this?
- What school factors have mediated the effects of the professional development program?

Gathering data

Data were collected from three sources: from teachers (interviews and their portfolio entries), students and Heads of Science or Science Co-ordinators.

Teachers

Information on teachers and their practice was gathered by means of:

- a teacher questionnaire: background information on their school, teaching experience and responsibilities
- a structured, face-to-face interview of 45 minutes conducted at the start and at the end of the research period.

Questions in the second interview were designed to elicit responses about the effects of their participation in the Science Standards Program on their professional knowledge and teaching practice, their knowledge of their students’ learning, and their professional interactions within and outside school.

Information was also obtained from examining the portfolio entries that teachers completed as part of the professional development program. In addition, they completed a questionnaire, common to all the projects, on their experience in the professional development program. The questionnaire required by the study was administered before the conclusion of the professional development program and submission of the portfolio entries.

Student data

For the purposes of the case study, the primary teacher worked with her Year 5 class of 25 students, and in the secondary schools science teachers selected their particular research class according to availability. In one secondary school each of the three teachers chose two classes as subjects of the case study research, in all, thirteen Year 7 classes, four Year 8 classes, four Year 9 classes and two Year 11/12 classes. Class sizes ranged from 7–28 (median 24).

Each teacher was asked to administer three kinds of assessment instruments to their students. Each instrument was designed to investigate an aspect of students’ learning in science:

- a survey to determine students’ attitudes towards science learning in their classes (20 minutes)
- a concept mapping exercise to assess students’ scientific literacy—their ability to relate their science knowledge and understanding to their world (30 minutes)
- the International Benchmark Test (IBT) in Science for 9 year olds and 13 year olds, to assess understanding of science concepts, skills, processes and procedures (50 minutes).

The IBT is an ACER assessment instrument assembled from the Third International Mathematics and Science Study (TIMSS) and targeted at students at age 9 (Level 1) and 13 (Level 2).
For primary students, the attitude survey administered was the ACER Science classes—primary schools, and for secondary students the ACER Science classes—secondary schools. The surveys included questions on teacher/student relations, relevance of science, science learning activities and personal engagement and satisfaction. The attitude surveys were to measure cohort rather than individual effect and did not identify individual students.

A concept mapping exercise was used to gather evidence on aspects of students’ scientific literacy—their knowledge of the purposes of science and where it was used in their world. Teachers were trained to analyse the concept maps to provide qualitative data on their students. Three students from each research class were randomly selected for a 15-minute interview by the researcher to validate the analysis of their concept maps by their teachers. In the second round of data gathering, the majority of these students were also asked about their experiences of science in their science classes.

Data were collected from approximately 440 students (22 primary and approximately 418 secondary) in the first collection phase. In some schools, students either side of the age level aligned with the IBT assessment instrument (ages 9 and 13) were subjects because of the limited availability of teachers and classes. In two schools the only possible research class for two teachers was at year 11/12 level and in these cases it was not appropriate to administer the IBT. Repeat assessments of students were made, the first set in Semester 1 (Term 1) and the second in Semester 2 (Term 4).

The three tasks were repeated to find out if change in attitudes and science learning outcomes had occurred. Due to attrition of teachers and students and difficulties in obtaining permissions, data collection in the second phase was reduced by four classes.

Additional information

Additional information was sought that might help to explain links between teacher professional learning and student learning outcomes. This included teachers’ length of teaching experience, the length of time in their current school, the percentage of their teaching time allocated to teaching science and school and curriculum organisation.

Participants’ teaching experience

Nineteen teachers commenced the program, representing a range of teaching experience from approximately two years or less (six teachers) to one teacher with thirty-three years. The median was seven years. Nine teachers were in or up to their third year of teaching at their current school and one teacher had been in the school fourteen years. The median was three years.

Teaching time allocated to science

Two secondary teachers spent 96–100 per cent of their time teaching science and fifteen secondary teachers spent between 20 per cent and 69 per cent of their time teaching science. The primary teacher estimated a negligible amount of time was devoted to science—‘the curriculum was more SOSE’. One secondary teacher estimated 9 per cent of her time was devoted to teaching science at Year 7 level and the rest of the time to a number of different subjects across key learning areas. At least one of the teachers from each of the six schools had responsibilities in addition to their teaching load, five being heads of their department or Science Co-ordinator and one a laboratory manager over two campuses.

Implementation

Motivation for participation in the PD

In two schools, the Heads of Science had participated in the program in 2001 and each had completed a portfolio entry. The level of professional learning they had engaged in and the increase in professional networking resulting from their participation inspired them to take part in the program again and to complete a portfolio entry in a different domain of teaching. Their enthusiasm for the program and the process of having completed a portfolio entry already were strong factors in persuading their school and other teachers to take part. Both teachers reported that the quality of their practice had improved, that overall their students were more
interested and engaged in their learning and that there was some evidence of improvement in learning outcomes since their initial participation in 2001.

Teachers had varying degrees of commitment to the program and to completing a portfolio entry. In some cases it depended on whether they were directed to participate or whether they volunteered. Some found themselves committed to the program by others without really knowing what it entailed. Others found the requirements of the program, together with their other teaching and school responsibilities and the research required for this study, difficult to manage. One school, whose teachers had been very positive about their participation, was unable to complete the program. They withdrew in Term 4 at the request of the school leadership because of

the amount of tasks assigned to us for the rest of the term ... given the amount of time needed to be spent on designing and implementing the new school curriculum for 2003. This priority has taken precedence over a number of existing PD arrangements (at school) and unfortunately this [the Standards Program] is one of them.

Twelve of the nineteen teachers completed the professional development program. Eight had submitted a portfolio entry by the end of the period of collection of data for this study. Despite the difficulties experienced by many teachers who completed the program, they acknowledged the benefits of examining their practice and their students’ work to such depth in a collaborative environment.

Participants’ experience and prior knowledge

Qualifications and training

Primary teacher

The primary teacher had no formal qualifications in science but following her participation in the program she wished to pursue a stronger role in science education in her school.

Secondary teachers

All of the secondary teachers of science were qualified in their teaching area and held postgraduate teaching qualifications.

Experience in the Science Standards program

The program sessions were held during the day in all schools except one, where teachers were allowed to participate provided the program was run after school in teachers’ own time. Several sessions were held jointly with other schools, both during the day and after school to enable teachers to share their experiences and discuss their practice in a broader context.

Some teachers were not able to attend all six sessions. Those who were unable to participate in one or more of the first four sessions of the program reported difficulty in gaining maximum benefit from the ones that followed. Though each session focused on a different aspect of teaching, each session was integral to the whole of the program.

It became apparent that both the level of support given by the school and the number of years teaching had an effect on the experiences and motivation of teachers. In most cases, teachers who participated and completed the program described the experience as being positive.

It’s been good to sit down with other colleagues and build relationships ... exposure to different ways of thinking. The interaction educates you in your own professional path—new ideas, new ways of thinking. It’s good to review especially if you feel you’ve lost your way [in teaching].

The long periods of focused time to work with colleagues in and after school and in other schools ... building professional communities and professional friendships ... refocusing the stuff in my head, the opportunity to feel valued—there’s not so much [of that] in the workplace. I think I’m doing something meaningful.
The program clearly defines your position as science teachers in a measurable way. You can communicate, be accountable. The PD has helped to identify what is required of a science teacher—it’s important to know what you stand for... It’s nice to hear I do things well.

... focused on teaching and learning strategies ... it brought me closer to some colleagues, promoted sharing of ideas, strategies, support. Everything we do in a PD like this—getting together and talking about teaching and learning ... it’s just been wonderful.

For the majority of teachers who had been teaching for a number of years, participating in the program had given them the opportunity to reflect on and refresh their teaching. These comments, made by teachers who described themselves as having perhaps lost motivation, are typical: ‘The program has brought me back to where I was a few years ago—it refocused me ... It takes me back to the beginning of teaching ... maybe I’ve been falling by the wayside …’

For a beginning teacher, the experience was different. She was in her first year and found it stressful trying to combine the program sessions and the research requirements for this study with establishing herself in a difficult school culture that also had poorly documented science programs. Fitting in the planning and implementation of a unit of work specifically to meet the requirements of her portfolio entry proved to be problematic. Eventually she did not complete a portfolio entry.

A number of teachers who were relatively new to teaching expressed similar concerns about school expectations and the competing demands on their time leading, in some cases, to withdrawal from the program. In these cases, together with relative inexperience, the level of support provided by the school leadership and the amount of time release seemed inadequate for them to be able to continue. These findings do alert prospective participants to the importance of having not only a school infrastructure that supports them but also some years of experience before committing to the program if they are to gain maximum benefit.

Even so, some relatively new teachers of science gained from the experience and this seemed to do with the high level of support that they were given. One teacher who had taught for a little over two years and who had already completed one portfolio entry in 2001, described the experience as ‘invaluable’.

getting together with others, the focus on teaching—it’s able to be used in the classroom ... it’s relevant and therefore more effective. It’s highlighted the ways students learn and made me look deeper into the learning environment and how they learn. It’s been an incredibly invaluable experience for me—access to people, hear how they function, curriculum and so on ... it’s benefited me early in my career.

In another school, where support for the teachers was also high in terms of time release, active interest, encouragement and motivation by the school leadership, taking part in the program had broadened the teachers’ horizons and provided the opportunity to deal with issues of concern.

... being aware of doing things ... the realisation of how important science is and should be in the curriculum ... I got to meet other teachers—swap ideas, reflect on practice. It makes you more professional in setting curriculum that addresses learning outcomes and (assessment of) the CSF. ... You confront stresses and strains—it releases concerns.

Results

The commencement of the study corresponded approximately with the start of the professional development program. However, the second set of data for the study, obtained through interviews and the common questionnaire, was collected prior to the completion of the teachers’ portfolio entries. This could explain variations and inconsistencies between some responses in the questionnaire and what was written in the portfolio entries themselves.

The qualitative data obtained from interviews with teachers has been organised according to perceived changes in participants’ thinking about their teaching in general, their practice, specifically in relation to the domain of teaching that they focused on in their portfolio entry, their professional interactions and student learning. Teachers were asked whether identifiable changes could be attributed to their participation in the professional development program, including the process of completing a portfolio entry. This leads to the questions: What
changes in teaching practice and student learning outcomes have occurred? What changes can be attributed to the Science Standards Professional Development Program?

Thinking about teaching

As noted earlier in the report, teachers believed that their experience in the program had changed the way that they thought about their teaching in general and in specific areas of their practice. For more experienced teachers the following comments were typical: ‘… it’s made me more aware of what I do—more conscious …’ and ‘… it’s validated a few of the things I was uncertain about—a contextual approach’.

Teaching practice

There is consistent evidence that most, if not all, teachers changed their practice as a consequence of taking part in the program and completing a portfolio entry. Some differences were apparent between those who were new to the profession and those who had been teaching for a longer period. Although a few new teachers commented that they were already familiar with some of the teaching/learning strategies demonstrated or learnt about in the program because they had studied them in their teacher education course, they had little experience in actually putting them into practice. The preparation of a portfolio entry provided them with the opportunity to do so.

The program sessions covered a number of different dimensions of accomplished teaching as set down in the ASTA standards. These included how to design units of work; how to assess and probe students’ understanding; and the principles underpinning engagement of students in meaningful learning activities including science investigations.

The design of the program enabled all participants to discuss their teaching in relation to these dimensions of teaching, build on their professional knowledge with the help of each other and the facilitator, and implement teaching and learning strategies within the context of their teaching environment. Apart from directly observing teachers in the process during the course of the program, evidence of this was recorded in their portfolio entries.

Discussion and analysis of their practice helped teachers to clarify the aspect that they wished to focus on their portfolio entry. Many teachers chose the portfolio entry Teaching a major idea of science over time, a portfolio entry based on student work samples, believing it to be an important starting point to review and build on their experience in developing a teaching sequence. They believed that aspects of other portfolio entries, such as assessment and probing students understanding in science, could be incorporated successfully, but the major focus would be on the design of a unit.

The two teachers who had completed a portfolio entry in 2001 chose video-based entries, though one of them had to change belatedly due to theft of the video equipment in the school. The videos provided a powerful medium for the teachers, individually and in groups, to analyse their interactions with their students and the quality of their pedagogy. The level of engagement of teachers in critiquing the evidence provided by the videos was high, and the process of providing feedback to teachers was itself able to deepen their professional knowledge and understanding and their ability to communicate it.

Teaching and learning goals

In relation to questions about the effect of the professional development on their general teaching practice, as well as the specific aspects of their portfolio entry, most teachers reported that they were able to identify more clearly the learning goals and outcomes they intended for their students and were incorporating these in the design of their units or teaching sequences. The following are representative responses:

Definitely—it gives more structure. I come up with outcomes beneficial to the kids… I focus on learning outcomes and goals rather than following texts and focussing on content ...

I think about the learning goals now … I have to incorporate them ...

I think about the learning goals, the learning objectives and outcomes—quite an impact on the way I plan. The learning goals [before] were based on the style of teaching we implemented here (textbook orientated). I want ... more relevant outcomes, the students to be able to think for themselves ... I've
done a lot of work with them [since] to be self-educators. Rather than looking at statistical and result outcomes, the units are now more self-directed—I’ve tended to move away to ‘Here’s an activity for you to do—I’m here if you need help’. I’m more of a facilitator now rather than an information giver.

One of the requirements of all four portfolio entries was for teachers to state the learning goals that they had for their students in relation to the activities that were incorporated. One of the sessions in the program addressed this area of content and, together with the advice given in the portfolio entry guidelines, helped teachers to clarify and articulate the learning goals that they had for their students. They were then able to link these learning goals more clearly to the learning outcomes that they expected their students to achieve.

Designing teaching sequences or units of work

Teachers who focused on designing units of work for their portfolio entry reported positive changes. For example, a primary teacher reported that ‘…I think it’s made me want to try science units as opposed to SOSE units—to incorporate science into the curriculum’. For a secondary teacher, for example, the facilitated session in the program on designing units for meaningful and engaged learning, together with the experience of preparing a portfolio entry that demonstrated his practice in that dimension, had helped him to produce more cohesive units of work. He brought examples of such units (as did other teachers) to share and discuss with other participants. He later shared this framework—with acknowledgement—with others in the wider professional community.

Yes—a framework for designing units of work … to build tasks. It’s allowed me to put together a whole lot of stuff that had been filtering in, into some framework I can make use of. … I have pinched the framework—for an article. I use it all the time now to design. Most aspects were already happening in my mind but [there was] no formalised pattern to it …

For others, the program (including the portfolio entry) had helped them to clarify aspects of their planning and implementation in a way that they had not thought about before.

Definitely—separated out the skills from the content—making it more definitive. What skills? What content? I haven’t thought about it before.

Designing and planning—the best place to start … what to teach and how to find out what they know. The PD has helped me to think in that area … highlighted the importance to find out what students know.

Designing for a different range of learning styles—literacy and numeracy skills of students is very poor to none …

Assessing students’ understanding

A significant change for most teachers was in the way that they assessed their students’ understanding in science. This included the kinds of tasks that they set, the kinds of products/artefacts they expected of their students, and the way that they made judgements about their students’ level of learning. Through the use of strategies such as assessment continua, and rubrics that described stages in development of aspects of students’ learning, teachers were better able to assess the level of learning of their students in relation to desired outcomes.

One teacher provided evidence in her portfolio entry of her successful use of rubrics as a strategy to improve students’ skills in science, and their ‘life skills’ that would enable effective learning to take place. Students themselves used a rubric to monitor and guide their own progress, for example in the level of responsibility they took for their own learning, their manners and courtesy, their cooperation with peers and the development of science skills such as ability to observe, analyse and form conclusions, and their ability to adhere to laboratory safety guidelines. This teacher confirmed or modified the student’s own judgements as appropriate and in consultation with the student. In her written analysis she reported in detail on the progressive changes that had occurred in the two students she had chosen to focus on, in relation to these criteria.
The use of rubrics as marking guides; as tools for formative assessment was unfamiliar to all participants except the two who had completed the program in a previous year. Many teachers came to understand the power of rubrics as teaching tools and in helping students to be responsible for their own learning.

Thinking back over the last six months or so the most significant strategy is the rubric—the type of assessment I’ve incorporated into my assessment...not so much after—once I’ve gathered the information from the students to give them an assessment grade—but I’ve also used that system when giving students tasks so that they know what’s expected of them or what level they can strive for. That’s worked quite well—I’ve had a positive response from all classes that I’ve tried it with.

Yes—I’m using assessment tools covered in the PD ... rubrics are fantastic—I need more time to develop them. It gives the students more feedback; it’s made me think more about students as individuals.

I’ve become more objective—rubrics are fantastic and students ask for them. Students have learned not to spend hours on a project. They address the assessment task. A student had always got A+—now she has to prove it [by addressing the criteria and rubric]. Students found it empowering—writing to criteria, address issues...they have to think through—they can’t just cut and paste ... they have to respond to the criteria.

Yes. In the past [I used to] teach to the masses ... identify extremes and help them on their way. Now—I put more effort into students, more individual ... and I’ve widened the scope ... I’ve constructed rubrics myself and used other models.

Teaching and learning strategies

Not all of the teaching and learning strategies modelled in the program or discussed amongst the teachers were new to participants, particularly those who were recently out of teacher training, but nearly all participants seemed to have benefited in some way.

I’m more aware of the power of the strategies I learnt at uni.

I’ve used concept maps in other subjects ... I’m more conscious of finding out what students know before ... it’s [PD] reaffirmed me.

... I see a lot of benefit from using the teaching and learning strategies, particularly the concept mapping [ACER and PD] for probing students’ understanding.

I use them more effectively—and lots of new ones ... I’m trying to fit the strategies better to learning ... more student-centred and away from the text ... I incorporate more activities beneficial to the kids—skills and problem-solving ...

... they’re always diverse but I’ve picked up a few new different things. I use what I have more effectively—in a more focused manner ...

I approach it differently—with experience and PD I’ve heard of them before ... but it’s not the same as doing. This is a license to try it out.

Trying to implement strategies learnt in the program was not always immediately successful as resistance to change by students and the prevailing school culture are mediating factors. One teacher remarked that he had: ‘incorporated different ones ... not as effective [as] trying new things because of the school context for Year 7.’

Thinking about students

Many teachers reported that participation in the program had helped them to think about and deal with their students differently, in some cases more personally. The most significant outcome evident in the data collected was that teachers shifted towards seeing them as individuals with individual learning styles that needed to be addressed, rather than collectively as a ‘class’.
Yes—I look at my students as individual learners rather than a class. I ask questions more, rather than just give them information … identify stages that they’re at … give them more time … speak to them individually.

I think I do… it’s helped me to focus on them as individuals—their needs and capabilities …

Yes—a challenge—how to address their learning goals … it’s made me think more, instead of concentrating on an activity, I wonder how the students will respond’

A teacher who had been teaching for many years and was seen by the school leadership to be ‘set in his ways’, admitted to finding the professional development program ‘daunting’. The time commitment, opening up his practice to others and seeing himself on video interacting with his class, were personal challenges he had to face. But he reported that his relationship with some of his students had changed as a result of the program.

I speak to them more heart to heart … realised that they are kids, that school work is not an issue, they’re full on having a good time with life …’

And:

A couple of the smarter kids have opened up more … an opportunity to have a bit of a joke … I’m not going to throw it [the PD] out. I’ll evaluate it at the end of the year.

**Effect on student learning outcomes**

In terms of student learning outcomes, most teachers were not able to report that there had been significant measurable change in the science learnings of their students as a result of changes in their teaching. In interviews, teachers said that it was premature to expect such change at this stage other than behaviours that could contribute to improving the learning environment. Developing a more positive learning environment might lead to improvement in their students’ learning in science. They believed that changes in their teaching practice that had occurred as a result of participating in the program would take time to have a real and sustained effect on student learning outcomes.

Improvement in students’ behaviour and science skills as documented in a portfolio entry, for example, has been reported earlier. Another teacher who completed the entry on assessment commented on what he had achieved with his students through changing his practice. As a result of his participation in the program he designed units to give more ownership to his students and included strategies to help them become more self-reliant, rather than simply being receivers of information. He incorporated new ways of assessing his students and found that the use of rubrics had helped not only his students in their learning but also his own process of assessing his students.

Generally [the students] have achieved more than I expected at the start of the year. I relate it to the PD—students learn, the way they’re assessed … they [rubrics] provide information not just tests [results].

One teacher was more hesitant about claiming that improvements in her students’ learning could be attributed to her change in practice alone as many students had participated in intensive (English) literacy programs during the year.

The IBT showed variation in student achievement within and between schools but not significantly between repeat assessments. The concept mapping exercise did show improved performance by many students during the repetition. However, this could have reflected increased mastery of the technique or actual improvement in their scientific literacy. Some teachers commented that being trained to analyse concept maps had, in itself, expanded their own understanding of the purposes and role of science. Teachers in one school changed the guidelines for students when administering the repeat task, thus invalidating the results.

**Professional interactions**

Teachers were asked whether participation in the program had affected their interactions with other teachers of science and whether their professional community had been strengthened. The assumption made in the design of
The program was that improving professional interactions and collaborative discussion would improve professional learning. This in turn could lead to improvement in practice and consequently in student learning.

The majority of teachers found participation to be beneficial in terms of interactions between members of the professional development group. Discussing aspects of the program, sharing ideas, building relationships and increased enthusiasm featured in their comments.

_It affects the way you talk to others ... it comes into your thinking... it’s made me more interested in what they [other teachers] are doing—more aware ... I’ve become more involved with the science faculty... I talk to people, learn more..._

_Yes—very beneficial with the Head of Science—excellent. It helped to talk and discuss. With other teachers? Not a huge difference, it tends to be the people doing the PD._

_As Head of Science it’s an easier road to influence others. We’re rewriting our curriculum documents to fulfil the [program] plan. It’s wonderful having other teachers [in the school in the PD]. We bore them [other science teachers] senseless about what we’ve learnt ... they ask the questions and we give the answers!_

Teachers from two different campuses in a rural school noted that though their interactions with teachers other than in the program had not been affected, the program had helped to develop professional relationships with each other. These same teachers, who had very positive support from the school leadership throughout the program, had been asked by their school to share their experiences at an in-service with others in the school early in 2003.

Few teachers were able to report that their participation had affected their interactions with non-science colleagues.

_Little impact sadly—though we have infected the maths department! ... lacks a system in the college to share even though the college expects it._

_... I don’t really talk. I teach other subjects and there’s not really much interaction._

Yet the heightened awareness of the need to cater for individuals led one teacher to interact more with the special needs teacher ‘for different styles of learning’. Another reported that proximity to others had helped ‘...where the desk is—it’s a small staff room. I’ve been able to assist others, for example, with the rubrics’.

In terms of the wider professional community, teachers valued the joint sessions. The opportunity provided by the program to meet, discuss, share ideas, critique each other’s portfolio entries and develop a support network was valued as a significant outcome.

_I’ve a lot more connections with science teachers in many schools—email, phone with a few more. It’s based on the PD we have done—I’ve built strong relationships ..._

_Teachers from other schools who participated in the PD—ideas came from the left field, their experiences ... I got the most benefit ..._

One of the teachers who had already completed the program and a portfolio entry in 2001 had taken his experiences and learning from the program to the wider professional community and to teachers in training.

_... writing papers for publication using ideas, delivering sessions at STAVCON [The Science Teachers' Association of Victoria annual conference]. In Monash—doing [delivering] the Biology method, I talked a lot about the strategies for their [students’] own teaching—especially writing about their teaching. And I’ve been a source of help to other teachers in the district._

Participation in the program provided opportunities for teachers to develop and strengthen their professional relations and networks. However successful this might have been during the program, the opportunity for increasing and improving the nature of professional interactions outside the program itself was sometimes problematic. A few teachers commented on factors that exemplified this, such as,
... there’s very little to no forum—no rooms to talk ... and ... I don’t think so. The staff room has lots of VCE teachers, but two for science ... there’s not much conversation about teaching and learning styles ... there isn’t the opportunity to talk except the lead up to the [PD] meetings ...

The Science Standards Program and change

The program was designed to ensure that it was consistent with the principles of effective professional development that emerged in the research literature (NPEAT, 2000\textsuperscript{29}; NSES, 1995\textsuperscript{30}).

There was an understanding that participants had to develop a clear and credible idea of what constitutes accomplished teaching in science so that they could examine their own practice in relation to this concept. The ASTA National Professional Standards for Highly Accomplished Teachers of Science provided teachers with points of reference against which they could analyse their practice and identify what they needed to learn.

The content of the program encompassed areas of teaching that were connected clearly and appropriately to teachers’ work. Teachers could learn how to base the design and implementation of units of work that defined the goals for student learning, would engage students in meaningful learning, incorporate new assessment strategies that would help teachers and students to monitor learning and measure levels of achievement of learning outcomes, elicit students’ prior learning and use actual samples of students’ work to guide teaching and learning.

The program was conducted in ways that could facilitate teachers’ professional learning in their own community of practice. The majority of sessions was planned to take place on site with at least three teachers, so that they could share their practice within the context of their school. Recognising that sharing ideas and experiences and analysing each other’s teaching had the potential to generate new knowledge and understanding, sessions were also held jointly with other participants in the program. Nearly all teachers commented on the value of these joint sessions.

Through the provision of readings during the program, teachers were given the opportunity for intellectual professional growth—to gain an understanding of the theory underlying the knowledge and skills being learned. The spacing of sessions allowed teachers the opportunity to explore further and apply new ideas, though few reported that they were able to avail themselves of these opportunities to the extent that they needed.

Completing a portfolio entry provided teachers with the opportunity to demonstrate and analyse in depth a particular aspect of their teaching practice. The introduction to each portfolio task paints a word picture of accomplished practice in different domains of teaching that teachers can aspire to and use as a benchmark in their professional growth. Having a choice of which portfolio entry to complete enabled teachers to meet their own needs or the needs of their department. The structure of a portfolio entry assisted teachers in focusing on what to do but left them free to choose how to do it. Seeing themselves and others on video is a powerful tool for learning as is the critique of each other’s written commentary. This process helped to de-privatise practice, an essential prerequisite to building a professional community.

The role of the facilitator in managing the sessions was crucial. Sessions were based on constructivist principles in that teachers examined and built on their own understandings of teaching and student learning but the process had to be guided skilfully. New ideas and strategies often had to be introduced. The facilitator helped teachers to learn and use ways of describing, analysing and reflecting on their practice and communicating this to others. The facilitator also played an important part in helping teachers through the process of compiling their portfolio entry. Being accessible to provide assistance, individually and in groups, was important.

\textsuperscript{29} Improving Professional Development, Research-based principles, (2000). In, \textit{The National Partnership for Excellence and Accountability in Teaching}, Washington DC

This case has reminded us that the quality of professional learning and the quality of teaching are affected by the conditions in which teachers work. The program has high expectations of the participants. It also requires commitment by the school leadership to provide support to their teachers to enable them to make best use of the opportunity to participate in the program.

**What school factors have mediated in the implementation of the Science Standards Professional Development Program?**

The apparent value placed on professional development by the school was seen by teachers to have a significant effect on the way they themselves felt about engaging in professional development.

Factors that mediated in the implementation of the program included those that affected the conditions in which the program itself was conducted and the level of support provided by the school leadership that enabled teachers to participate effectively. Schools varied in the support they provided—in the amount of time release and work release made available, and in providing opportunities for teachers to implement the teaching strategies and practices that they had learnt during the program. During the program, readings were given that provided the theoretical underpinnings to the content of sessions. But nearly all teachers were unable to find the time between sessions to enrich their learning in this way.

In some sites it was difficult to find a free room in the school in which the facilitator could conduct sessions. In one session in a particular school, for example, pressure on room space was so great that the group had to move three times, including to a storeroom. In the same school it was very difficult to obtain casual teachers to release participants for the program. The following comment by one of these teachers summarises the difficulties experienced.

... classes are lost, there are other things going on [competing demands] ... the school context is difficult—with removal of teachers from a class ... because of the high turnover. Students like continuity and stability. Leaving work and knowing it is not likely to be done, trying to get teachers, having ... people to cover the time—it's not a popular school to teach in ...

In contrast, in another school it was possible to use the same facilities for each session of the program with materials, equipment and refreshments provided and the frequent attendance of the curriculum leader to ensure not only that all was well but also to take an interest in the content of the program. Every effort was made for the teachers and facilitator to have suitable conditions for engaging in the program. Additional time was also made available to teachers who needed it to write up their portfolio entries. This school has provided the opportunity for the participants to report on their experiences to the staff in 2003.

In contrast, many teachers identified the lack of opportunity for them to share their learning. In one school, the head of the science department reported that:

support [was given] to attend sessions but due to time and work constraints—it's been an uphill battle to justify the importance. The school needs to value what staff are doing beyond the money. We need time to use it ... to create a learning environment [for the staff] and a process for sharing. We don’t have it.

This same teacher reported on the value of the program to himself and to fellow participants in the school in terms of the professional learning that they had engaged in and in strengthening their professional interactions.

In another school, additional time release was made available to teachers to assist them complete their portfolio entry. The time of writing coincided with an especially busy time of the year when school activities and expectations competed for their attention. The relief expressed by a primary teacher was tangible—‘I’ve been told I can have a day off to write!’ The principal of this school had always made a point of meeting the facilitator regularly to follow the progress of the program.

Though generalisations cannot be made from a small sample, there was some evidence that the quality of the portfolio entries seemed to have been affected by the degree of support provided by the school. This was also apparent during the program when variation in level of preparedness for the sessions and follow-up was evident. The essentials of day-to-day teaching had had to take precedence.
In addition to the constraints of time, the comment below raises another issue relating to what can affect the participation of teachers in ongoing, quality professional development. In many schools there is a tension between budgetary constraints and the value placed on professional development.

"It’s difficult finding time for sessions and to do work in between ... because it’s worth doing it ... it’s fantastic. I’m glad I went. But the cost of the program makes it difficult [for schools and teachers] to take part. If the [school] budget is slashed, PD is the first to go."

A participant in one school reported that she found it difficult to do full justice to her learning in the program because the school science facilities were being rebuilt and were not available for a major part of the year. This was particularly so when she was trying to implement the unit of work she had designed as the focus of her portfolio entry. Yet, in her written commentary for the portfolio entry, the teacher was able to analyse effectively the impact of this on her practice, report on the adjustments that she had had to make to the unit, and the impact of reduced facilities and equipment on her students’ learning.

Some other teachers reported that pressures on science laboratories and computer facilities had made it difficult to implement their learning. [They overcame this] by engaging students in more hands-on activities that would cater better for different learning styles.

However, despite constraints in some cases, the overall level of commitment of the participants who completed the program and a portfolio entry was considerable. The majority of participants believed that they had gained in professional learning and had changed their practice. In several instances, particularly as documented in their portfolio entries, teachers had evidence of change in their students’ learning outcomes in terms of science understandings and behaviours, but the majority of teachers stated that it was too soon to have convincing evidence of sustained change.

The impact of involvement in the case study

Some teachers reported that their involvement in the study had affected their practice. In particular, the combination of the use of concept mapping in the research and as a strategy they had been introduced to during the program had encouraged them to use it in their teaching. This may have accounted for some of the improvement evident in many of the concept maps for those classes in the second phase of data collection.

For research for this study, it was intended that teachers would administer tasks to their own classes but in several instances, because of timetabling constraints, other teachers with varying degrees of guidance, administered the tasks in non-science class time. In the case of the attitude survey, a teacher reported in interview that he believed his students had colluded in providing negative responses to it. On the other hand, a teacher reported that the attitude survey provided useful feedback and a chance to analyse what each child was thinking. ‘From the attitude survey [it is clear that] they don’t know what science is.’ This finding contributed to the teacher’s intention to focus on developing science in her school at primary level—a decision she had made earlier as an outcome of her participation in the program.

One teacher remarked that she had noticed students discussing responses to questions in the IBT but did not intervene because she felt that they would be learning something. In the same school, two teachers had not adhered to the instructions for the concept mapping exercise for the repeat assessment and this may have affected the results in terms of research but, again, ‘it was a learning opportunity for the students’.

Conclusion

The professional learning opportunities provided through the Science Standards and Portfolios Professional Development Program appear to have made considerable impact on the professional learning of the participants in this case study, particularly on individual teacher’s approaches to the teaching of science. Teachers reported that they are more aware of the learning goals that they have for their students and that they have made changes in the way they have designed units of work to make them more cohesive and student-centred. They have reported change in the way they have used techniques and strategies in their practice to engage students in meaningful activities, and particularly to monitor and assess the learning of their students more effectively.

While a few teachers were able to report some improvement in their students’ learning there was general agreement that it was too soon to identify sustained improvement in student learning outcomes.
The Science Standards and Portfolios Professional Development Program has provided a strong example of a standards-based professional development initiative that involves teachers in sharing their teaching experiences and expertise, engaging in deep analysis and reflection on their practice within the context of their school and wider professional community, and demonstrating their accomplishments through completing a portfolio entry.

While building on research that emphasises the importance of collegial dialogue, shared standards and the deprivatisation of practice, this case study also serves to highlight the need for schools to provide the preconditions for an effective learning environment for teachers that facilitates work-based learning and collaborative review of practice. School organisational support and allocation of resources are strong mediating factors in the professional learning of teachers in an extended program such as this.

References


*National Science Standards Committee* (2002). National Professional Standards for Highly Accomplished Teachers of Science, Australian Science Teachers’ Association Inc.: Canberra

Science in Schools (SiS) Strategy Research Project

SiS school improvement model
Anne Semple

The Science in Schools Research Project is a major part of the Science in Schools Initiatives developed by the Victorian Department of Education, Employment and Training in 2000. The purpose of the project was to develop and trial a model for improving science teaching and learning in Victorian schools.

The model had two major features:

- the SiS Components which provide a framework of effective teaching and learning in science
- the SiS process of developing and implementing an Action Plan by which schools can improve teaching and learning in science.

The central core of the SiS process was the sequence of events and actions that teachers of science and SiS Co-ordinators, working as a team, engaged in to improve science teaching and learning in their school. They established the current status of science education and their teaching practice in the school by collecting data obtained by auditing curriculum, resources, school science policy and student learning preferences, and by analysing their own practice with the assistance of the SiS Co-ordinator. At the commencement and end of each year the SiS Co-ordinator conducted interviews with individual teachers to map their practice against the framework provided by eight Components of Effective Teaching and Learning. The SiS Components form the reference points or standards underpinning the theory of action for the SiS Research project.

Results of student achievement tests and attitude surveys administered at the beginning and end of each year contributed information about student learning in science. Information from teacher interviews, together with data from the school audit, were reviewed and discussed at meetings of the science staff. Goals were established and initiatives are prioritised. Small teams then developed and wrote the science department Action Plan, which took into account the particular goals of the school and the issues identified by analysing the data collected. The Plan specified a range of actions to be taken at various times during the implementation process by the SiS Co-ordinator and the teachers. It included actions that drew on available school and SiS support structures such as time release for a SiS Co-ordinator, teacher release support, allocation of resources and identification of different kinds of professional development activities that could further the development of teachers’ knowledge and effectiveness in teaching science.

Consistent with current literature on the principles that underpin effective professional learning, the assumption was made that teachers are ‘professionals possessing expertise, personal commitment and high standards’ and that enabling them to gather together to share their practice, in the context of their own school, will engender professional learning. The SiS process enables teachers to meet as a team to discuss their practice, share ideas and develop their expertise by learning from each other. They may draw on outside expertise either through inviting guests or attending professional development activities. The Regional Project Officers, with the assistance of the SiS Co-ordinators, tailor professional development opportunities or match existing workshops to meet the needs identified in the mapping exercise. The assumption is made that by improving teachers’

31 ibid
pedagogical content knowledge there will be improvement in their practice that will be linked to a higher level of achievement of learning outcomes by their students.

The case study reported here is based on evidence gathered in seven schools during 2002 as they participated in the Science in Schools Research Project. The SiS Research schools engage in a three-year process. One school was a Phase 3 school (commenced in 2002), five were Phase 2 schools (commenced in 2001) and one, a Phase 1 school (commenced in 2000), during the period of this study. The Phase refers to the year in which schools joined the research project.

The Science in Schools (SiS) Research Project, commenced in 2000, was a Department of Education and Training (DE&T) funded project forming part of the Victorian Science in Schools Strategy, which commenced in 1999. The three-year strategy to improve science teaching and learning was developed in response to recent research and policy decisions at national and state levels. Science was identified as a key priority in underpinning economic and technological growth and in achieving Victoria’s social and environmental goals.

Conducted by a Deakin University consortium on behalf of DE&T, the SiS Research Project aimed to identify best practice in science teaching and learning and to develop and trial a well-researched whole-school improvement model, supported by resources. The project was designed to assist teachers to develop challenging and relevant curriculum experiences for students in relation to implementing the Science Curriculum and Standards Framework II (CSFII). It also addressed the differences in teaching and learning of science in primary and secondary schools. These were identified in earlier research by Deakin University, which provided baseline data\textsuperscript{32} on the state of science education in Victoria. Aspects included teaching practice and conditions, differences between primary and secondary science teaching, student engagement, resourcing, and the availability of professional development opportunities and take-up.

The outcomes of the three-year SiS research are intended to be used by the DE&T to provide clear advice to Victoria’s government schools on a whole-school approach that will enhance teaching science and lead to improvement in student learning outcomes in science at all year levels. The model complements the Early Years literacy and numeracy initiatives and the Middle Years Research and Development (MYRAD) Project.

Resources

The SiS strategy has a number of additional features which support the implementation of the SiS Research project: network support provided by science Regional Project Officers, training processes and materials for science leaders, and the provision of a wide range of resources that include time to enable teachers to participate in the school science review and professional development.

The \textit{SiS Project Manual} is an important resource for SiS Co-ordinators. It provides comprehensive and detailed information on: the aims and intentions of the research project, the SiS Components, how to support change in the school, guidance in developing action plans and moving the process forward in the second and third years of implementation. The advice in the manual has been generated from the experience of SiS Co-ordinators and participants in Phases 1 and 2.

The manual also provides advice that relates to helping individuals and groups, arranging professional development, monitoring and evaluating change in students’ attitudes and achievements, and in teachers’ knowledge, skills and concerns over time. The manual offers suggestions about managing organisational support within the school such as encouraging links with other school initiatives and timetabling to allow staff to meet, helping individuals and groups, assisting with the reporting process to the Deakin University consortium, disseminating information and arranging for professional development opportunities for staff who

identify particular needs. The manual contains master copies of teacher and student questionnaires and directions for electronic testing of student achievement.

Another key element of the strategy is the support provided by Science Regional Project Officers who conduct training for school-based SiS Co-ordinators and assist in the development of Action Plans. The Regional Project Officers (RPOs) also co-ordinate the provision of professional development activities within their region. These may take the form of single sessions after school or whole-day sessions in school time and some are on a fee for service basis.

In addition to professional learning gained by participating in the SiS process conducted within the school, teachers had opportunities to take part in professional development activities of different kinds, such as an industry program for teachers of technology and science, and travelling scholarships for teachers of science. Professional development modules were devised to support primary teachers in the use of science equipment that has been made available through grant applications.

In addition, the SiS Strategy implemented projects in the key areas of community partnerships such as scientists and engineers in schools, family science and student science fellowships. Both primary and secondary teachers had access to a range of text and multimedia resources that were developed to support the SiS Research schools and non-SiS schools. A Communications strategy ensures stakeholders were kept informed.

The School Innovation in Science Professional Development Program (SISPD) was developed by the DE&T as an outcome of the SiS Research and was available for schools to trial in Term 3 of 2002. Several of the SiS Research Project schools in the study took the opportunity to participate in the SISPD as part of implementing their Action Plan. The program consisted of six modules, each of two or two+ hours duration, forming an integrated package that focused on the key features of science teaching and learning identified by the SiS Research and articulated in the SiS Components. The SISPD program itself is not the main focus of this study but it is relevant in that many teachers in this study took part in the program.

**Features of the SiS Research Project**

The SiS Strategy incorporated research that was ongoing during the three-year span of the project. Initially, the Deakin SiS Research project involved 54 schools across Victoria. The SiS Research project was refined as it was phased in annually over three years. There were 224 SiS Research schools in 2002. Seven of these schools form the focus of the present study.

The SiS Research project was comprehensive in terms of providing the pre-conditions that support effective professional learning:

- the provision and training of key personnel
- a process that all SiS Research schools follow to develop and implement their Action Plan
- financial support for release of teachers to participate in professional learning
- provision of a range of resources to support science teaching and learning in the school.

The SiS research team worked with primary and secondary schools in each region of Victoria assisted by a SiS Co-ordinator in each of the SiS Research schools, and Regional Project Officers. The SiS Co-ordinators were provided with time release to plan and work with teachers in their schools on an ongoing basis. In the first year of the SiS Research process (Phase 1), SiS Co-ordinators were allocated 1+ days per week for example, and by Phase 3 the allocation was 1 to 2 hours per week as funding for the SiS Co-ordinator was reduced progressively. The amount of time release depended on the size of the school and the phase the school was in.

The project website <www.scienceinschools.org> describes the core features of the project and archives project documents.
Outcomes

The SiS Research Project is intended to achieve:

- an increased understanding in schools of the principles of effective teaching and learning of science
- the development of a model that will be able to be used by government schools across Victoria to improve science teaching and learning
- the generation of specific teaching strategies in a variety of topic areas that will engage, challenge support students in learning science

The SiS School Improvement Model was intended to lead to an increase in student knowledge, skills, attitudes and science learning, and improved understandings and skills for the teachers.

Structure and organisation of the SiS Research project

The model of professional development underlying the Science in Schools Research Project can be summarised as action learning spanning three years. At the school level, the SiS Research project involved the participation of the whole science team in developing a three-year Action Plan. The process, facilitated by the SiS Coordinator, promoted professional learning by involving teachers in:

- analysing their practice against the Components of Effective Teaching and Learning
- gathering data on student learning preferences and achievement
- auditing science curriculum and resources
- auditing relevant school policies and initiatives
- auditing individual teacher and team practices
- reviewing the issues arising that lead to possible initiatives
- meeting to prioritise initiatives and to discuss goals
- developing and writing an Action Plan.

The SiS Components of Effective Teaching and Learning in Science

The components form the core of the strategy and provide a reference point for teachers to evaluate their practice and to identify what to aim for to improve science teaching and learning in the school.

1. Students are encouraged to actively engage with ideas and evidence.
2. Students are challenged to develop meaningful understandings.
3. Science is linked to students’ lives and interests.

---

33 Effective Teaching and Learning in Science—what research into student conceptions has to say, summary of draft SiS position paper 2, SiS Research project
4 Students’ individual learning needs are catered for.
5 Assessment is embedded within the science learning strategy.
6 Science is represented in its many facets.
7 The classroom is linked to the broader community.
8 Learning technologies are exploited for their learning potentialities.

Each component was elaborated, and examples of teaching practice that demonstrate each component were provided in the support materials. Examples of teaching practice that did not exemplify the components are also included. In effect, the components may be regarded as standards against which teachers evaluated their practice.

At the beginning and end of the school year, teachers mapped their practice against the SiS components on a scale of 1–4 (low–high) with the assistance of the SiS Co-ordinator. Each scale has a descriptor. The component mapping exercise provided the feedback necessary for teachers to monitor their own practice over the lifetime of the project and supported the development and refinement of the school Action Plan at small team and whole science staff meetings. In many ways the real business of changing science teaching and learning practice begins with the second year of the project.

An important feature of the SiS Research strategy was its flexibility. It allowed schools and teachers to plan and implement initiatives based on the particular needs and values of the school as identified in the school science audit, and the professional learning needs of individual teachers identified in the component mapping exercise.

Gathering data

The SiS Research Schools

Seven SiS Research schools participated in the ACER research project, three primary schools and four secondary schools. All are government schools in the eastern and southern metropolitan regions of Victoria, one rural and six urban suburban. All schools are co-educational and range in size from 165 (primary school) to 1270 (secondary school). Six of the schools were in Phase 2 of the three-year SiS research and one in Phase 1 (entry). One of the secondary schools was organised into four mini-schools each comprising Years 7–10 and one mini-school for the senior school.

A total of 21 teachers and their classes were the focus of the study—three teachers and three classes from each school. In four of the schools the SiS Co-ordinator was one of the three subjects of this case study and also the ACER Research co-ordinator. In two schools, the SiS Co-ordinator took on the role of the ACER contact but was not directly involved in the study. In one school the acting principal liaised with the researcher in place of the SiS Co-ordinator who was on leave for one term.

Research questions

The following research questions were the focus of data collection:

- What changes in teaching practice and student learning outcomes have occurred?
- What changes can be attributed to the teacher professional development program (SiS Research)?
- What is it about the SiS Research process that has contributed to this?
- What school factors have mediated the effects of the professional development program?

36 Ibid
Data were collected from four sources: from teachers, students, SiS Co-ordinators and a Science Regional Project Officer.

Teachers

Information on teachers and their practice was gathered by means of:

- a teacher questionnaire: background information on their school, teaching experience and responsibilities their previous and current participation in the SiS Research and professional development opportunities available through the overall DE&T SiS Strategy

- a structured, face-to-face interview of 45 minutes conducted at the end of the research period with each teacher*. Questions were designed to elicit responses about the effects of their participation in the SiS Research on their professional knowledge and teaching practice, their knowledge of their students, their students’ learning and their professional interactions within and outside school. One of the 21 teachers was unavailable for the scheduled interview.

*Three teachers interviewed were also interviewed at the start of the research period

The SiS teachers also completed a questionnaire, common to all the projects, on their experience in the SiS Research Project that forms the professional development program being studied.

Student data

Teachers in primary schools worked with their own classes. In all, three Year 4 classes, four Year 5 classes and two Year 6 classes took part. Class sizes ranged from 14 to 29. In the secondary schools science teachers selected their particular research class, totalling six Year 7 classes and six Year 8 classes. Class size ranged from 16 to 29. In two schools, the science classes were a composite of students drawn from across the year level rather than according to homeroom class. This was a result of a re-organisation of the middle school and curriculum.

Each teacher was asked to administer three kinds of assessment tasks to their students. Each task was designed to gather evidence of an aspect of students’ learning in science:

- the International Benchmark Test (IBT) in Science for 9-year-olds and 13-year-olds, to assess understanding of science concepts, skills, processes and procedures (50 minutes)

- a survey of students’ attitudes towards science in their classes (20 minutes)

- a concept mapping exercise to assess students’ scientific literacy—their ability to relate their science knowledge and understanding to their world (30 minutes)

Data were collected from approximately 215 primary students and 270 secondary students whose teachers participated in the study. In some schools, students either side of the target age level of the IBT assessment instrument (ages 9 and 13) were subjects. Teachers of Years 4–8 took part in the study because teachers and classes of the target level were not available to participate. Repeated assessments of students were made, the first set in Semester 1 and the second in Semester 2.

The IBT is an ACER assessment instrument assembled from the Third International Mathematics and Science Study (TIMSS) and targeted at students at age 9 (Level 1) and 13 (Level 2). The 1999 Primary School Science Questionnaire and the 1999 Secondary School Science Questionnaire37 were used to collect data on student attitudes. The surveys included questions on teacher/student relations, the relevance of science, science learning

activities, and personal engagement and satisfaction in learning science. The attitude surveys were used to measure cohort rather than individual effect, and did not identify individual students.

A concept mapping exercise was used to gather evidence on aspects of students’ scientific literacy—their knowledge of the purposes of science and where it was used in their world. Teachers were trained to analyse the concept maps to provide data on their students. Three students from each research class were randomly selected for a 15-minute interview by the researcher to validate the analysis of their concept maps by their teachers. In the second round of data gathering, these students were also asked about their experiences in their science classes. The three tasks were repeated later in the year to find out if change in attitudes and science learning outcomes had occurred. In the second data collection phase, two of the three students initially interviewed from each class were interviewed again. Difficulties in obtaining permissions from parents/caregivers, absence of students on days when the tasks were administered and the departure of students to other schools or classes meant that data were not obtained from the full cohort of students.

**SiS Co-ordinators**

The researcher recorded interviews with the SiS Research Co-ordinators at the end of the case study research. Structured questions were designed to elicit information on the way they perceived their role, the training for the role, the support provided, the way they implemented the SiS Research, and the outcomes of the SiS Research for themselves, the teachers they worked with, the students and the wider school community.

**Science Regional Project Officer**

An open-ended interview was conducted with a Regional Science Project Officer during the research.

**Additional information**

Additional information was sought that might help to explain links between teacher professional learning and student learning outcomes. This included teachers’ teaching experience, the length of time they had been teaching in their current school, time allocated to teaching science, and school and curriculum organisation.

**Teaching experience**

Ten of the twenty-one teachers taking part in the ACER case study were male, and eleven female. The length of teaching experience varied from less than one semester (four teachers) to twenty-five years (one teacher). The median was thirteen years. Time spent at their present school varied from less than one semester to twenty-four years. The median was five years.

**Teaching time allocated to science**

In two of the three primary schools surveyed, science was taught as part of an integrated program. Depending on the theme or topic, teachers estimated the science component to be between 50–100 minutes per week in one school and up to 180 minutes in the others (national average for primary schools is 59 minutes per week, regarded as an upper estimate). In general, teachers estimated that they spent about 15 per cent of their time teaching science, the rest of the time being devoted to teaching in other key learning areas.

In the secondary schools, teachers found it easier to estimate the number of minutes devoted to teaching science. Time allocated ranged from 150–180 minutes per week, though one teacher’s estimate was 200 minutes (national average 200 minutes). In one school, science at Year 7 was taught for 240 minutes per week for one semester only. As the case study overlapped the two semesters, one of the teachers had not taught the class at the start of the research and other classes had finished their science allocation before the end of the research period. For one class at this school, two teachers shared the teaching allotment, each following their own program.

Four of the twelve secondary teachers spent 100 per cent of their teaching time teaching a science of some kind to classes between Years 7 and 12 and eight spent 15 per cent to 80 per cent of their teaching time. In no school did all three case study teachers teach science for 100 per cent of their time. Additional subjects taught included mathematics (seven teachers) and a non-science VCE subject (one teacher). Four of the teachers had responsibilities additional to their teaching.
Implementation

Motivation for participation in the SiS Research Project

In all cases, the schools had applied to be a SiS Research school. Some schools had science as a priority in their school charter and saw the available funding as an opportunity to upgrade their science resources and curriculum. Others, particularly the primary schools, wished to improve science knowledge and confidence in teaching practice and student learning in science. As the SiS Research Project requires involvement of all teachers of science in a school, the motivation of teachers varied from ‘I had to do it …’ to others who welcomed the opportunity to engage in professional learning.

Participants’ experience and prior knowledge

Qualifications and training

Primary teachers

Qualifications of teachers varied and included a Master of Education held by one teacher, Bachelors of Education held by the majority of teachers and two teachers with a Graduate Diploma. None of the qualifications held by primary teachers included any specialisation in science but one teacher was currently studying science at tertiary level as a result of his involvement in the SiS process.

Secondary teachers

All teachers held bachelor degrees in science and all had either a Diploma in Education or a Bachelor of Education.

Experience in the SiS Research Project

The teachers involved brought a variety of experience in the SiS Research Project to their participation in the ACER study. Although five of the seven schools were in Phase 2 (introduced 2001) and one in Phase 1 (introduced 2000) of the SiS Research, a few of the teachers had little to no experience of participating in the SiS Research as they had come from non-SiS schools or had recently started teaching. Some teachers had participated in the SiS Research in their previous schools. One school was in the third phase of introduction of the SiS Research (2002) and was very much in the early stages of developing their Action Plan. One teacher claimed no knowledge of the SiS project in the school until the ACER study commenced.

For the purposes of the ACER study there was no discrete period that aligned with the starting point and end point for teachers participating in the SiS Research Project. Different entry points for teachers were evident and some teachers new to SiS viewed it passively: ‘I haven’t been in it long enough. It’s second year SiS at school but I’m a first year teacher. I just go along with it.’

SiS process – developing and implementing the Action Plan

All schools taking part in the SiS research followed the school improvement model or process that involved auditing the current status of science education and teaching practice within the school and using the data to inform actions that need to be taken at individual, departmental and school levels, to improve teaching and learning in science. The process of developing and implementing Action Plans by the science department seems significant as a means of bringing about change in teaching practice and enriching the science experiences and learning of their students. The effects of engaging in this process on teaching and learning can be demonstrated by outlining an example in one school.

One school’s experience

SiS funding in 2001 made it possible for teachers of science to be released for three to four days to map their individual practice against the components with the assistance of the SiS Co-ordinator, a well respected and
trusted member of the staff who was also the Science Co-ordinator, carry out a syllabus review, and gather data on students’ learning preferences and attitudes by means of a questionnaire. Arrangements were made for staff to meet to discuss the information obtained. The SiS Co-ordinator, who had received training by SiS research personnel at the start of the school’s participation, facilitated the process for faculty staff. A series of meetings was held to analyse and discuss the data and to develop their Action Plan.

Each component of effective teaching and learning was taken as an organiser in the plan. The faculty decided what project they would initiate in relation to the component, what actions would be needed to implement the initiative, the timeline, the staff responsible and the resources required. Achievement measures were stated for each goal for each initiative. For example, the actions associated with one of the components—encouraging active engagement with ideas and evidence, were teachers to write lessons and activities designed to increase student engagement, participation in the Middle Years Research Project, establishing cross-faculty Project for Enhancing Effective Learning (PEEL) teams and incorporating the Thinking Curriculum into the science syllabus. Resources needs were identified, such as time release for all staff to write units, review progress and share experiences, and purchase of reference material. Professional development activities that related to the initiative were identified for teachers to take part. The measures of achieving the goal were the production of new syllabus documentation, achieved over the life of the project, and improvement in student attitudes as measured by the student surveys.

Additional actions associated with this initiative in this school were for students to participate in the Solar Car Challenge and the Waterwatch programs that necessitated obtaining funding from the school council and assistance and resources from the Waterwatch Project officer respectively.

Participation in the ACER study was included in the plan as an action related to the component ‘monitoring science learning’. The school’s Action Plan also included the establishment of links with their local primary school for Term 2, 2003 and arranging a program for Year 9 students to take a travelling science show to the school as an action relating to linking science with the broader community. In all, the science department identified five projects or initiatives with seventeen corresponding actions to be implemented during 2002 and 2003.

During the process, small groups, who were responsible for particular actions associated with initiatives, reported back to the faculty meetings twice per term. On an individual basis, the SiS Co-ordinator had informal chats to staff and mentored new staff, inducting them into the process. At the beginning of 2002, the staff reviewed progress in implementing their Action Plan and made some adjustments. The SiS Co-ordinator reported that the process had built team bonds and had broadened the range of teaching strategies that the staff practised. The school had to report progress in implementing the Action Plan to the Deakin consortium at the end of each year, as did all SiS research schools.

The Regional Project Officer assisted in arranging professional development for teachers in the school. The SiS Co-ordinator and teachers reported that those who participated were more inclined to try different ways of teaching science such as group work, increasing the emphasis on mastering science skills, having students design topic tests and revision sheets, doing more visual work and being more aware of how to make science more relevant to the students. One teacher, for example, reported that she had changed her Year 8 ecology unit to incorporate water testing in the local area and had invited a local Parks expert to come and talk to her students.

The Co-ordinator reported that teachers were responding more to student needs and this had been reflected in the responses given in the student attitude surveys (SiS) and in the overall achievement levels of students. Evidence from the data gathered in this study supports this view. Overall improvement was also noted in the outcomes of the concept mapping exercise that focused on students knowledge and understanding of science in their world.

The numbers of students wishing to do VCE (Units 1 and 2, Year 11) sciences had increased by the end of the second year of participating in SiS and plans were being made to increase the number of classes for 2003. The Co-ordinator believed that the increase in interest was directly attributable to SiS. This particular school had a long and strong culture that valued student achievement, had a cohesive and experienced staff and effective science leadership that made SiS work for them.

In contrast, another school that was less well established, had less experienced staff and had just entered the SiS Research Project, did not report the same extent of change or improvement. However, the SiS Co-ordinator did
report that even in the short time of their involvement, the school had had to review its policy and ‘get its act together’. He noted an increase in communication between staff, and that as a result of reflecting on student feedback provided by attitude surveys, the emphasis had to be put on improving teaching. He believed that the SiS process provided a goal to strive for and that it had forced action. With the reorganisation of the curriculum and timetabling in 2003 he hoped to be able to move the process forward more effectively.

Materials and Resources

Personnel

The leadership and support provided by the Science Regional Project Officers (RPOs) were seen by teachers to be critical in ensuring effective implementation of the SiS Research. The SiS consultants and RPOs visited schools on request, assisted in the development of the school’s Action Plan, organised cluster meetings for the SiS Co-ordinators, helped to negotiate with school leaders to ensure appropriate organisational support was available. RPOs also analysed the results of the component mapping exercise in each school to find out how to assist teachers fulfil their professional development needs.

The Regional Project Officers dealt with the sometimes demanding and complex administrative school and SiS research requirements and ensured that communication between stakeholders was as efficient as possible.

Science in Schools Research Project Online

The SiS Research Project website provided comprehensive information for teachers. It included the research background in a series of position papers based on review of the research literature on contemporary development in science education, elaboration of each of the SiS Components and examples of learning activities to illustrate each component. However, no teachers sampled mentioned that they had accessed the website.

As noted earlier in the report, the overall SiS Strategy offered a range of professional development opportunities to teachers and science learning experiences for students. The Action Plan developed by each SiS Research School could include suggestions for teachers to use particular resources to support the learning needs that they identified in the component mapping exercise. Take-up of the resources varied from teacher to teacher and school to school.

Primary teachers

Most of the primary teachers took the opportunity to participate in the professional development opportunities available through the SiS strategy. Six of the nine primary teachers in this study completed the Extended Professional Development Program and one completed the Graduate Certificate in Science. These courses covered science content and strategies applicable to teaching science. Six of the teachers agreed that the experiences were valuable for their teaching to a moderate or major extent.

Primary teachers varied in their use of the SiS resources and tended to use those that focused more on science content and examples of curriculum programs such as TOPS (Teachers’ Online Primary Science) the Sample Science Program, STEPS and ScienceTREK.

Secondary teachers

Use of the SiS resources varied. In contrast to the primary sample, only one of the twelve secondary teachers participated in an extended professional development activity as an outcome of the school Action Plan, perhaps because they already held qualifications in science and were more confident of their science knowledge. Overall, secondary teachers made less use of the SiS resources and relied on participation in professional development workshops and seminars made available in the region on a fee-for-service basis. These professional development activities, intended to improve participants’ teaching skills and thereby the learning outcomes of their students, included Science Professional Development for Teachers in Specialist Settings, Going Green Chemistry Professional Development (Year 10 Chemistry), Investigating Scientifically (secondary teachers) and PEEL—Project for Enhancing Professional Learning (general).
The SISPD Program

The Schools Innovation in Science Professional Development Program (SISPD) was part of the overall SiS Strategy and was available to SiS Research schools to trial in Term 3 of 2002. Though it was not the main focus of ACER’s study, it was relevant for many of the teachers in this study to undertake trial modules. Trialling the program was seen as an opportunity to meet professional development needs that teachers and science teams had identified in their Action Plan.

The SISPDP consists of an integrated package of six modules that are based on the components of effective science teaching and learning as identified in the SiS Research: Student engagement with ideas and evidence, Teaching for meaningful understanding, Focusing on the learner, Teaching the nature of science, Assessment and Exploiting learning technologies.

The program was developed as an outcome of the SiS Research. Five of the ACER case study schools took part in the trials in Term 3 with varying levels of participation. In one primary school, for example, twenty-five teachers completed four modules and in another primary school, one teacher completed one module. Fifteen teachers from one of the secondary schools completed four modules and eighteen from another completed one module. Two schools did not participate. Variation in uptake was due to availability of sessions and the ability of schools to free teachers to attend.

Results

Investigating the links between the professional learning undergone by teachers in the SiS Research Project and student learning outcomes is complex. In common with all SiS Research schools, the seven schools in this study went through the SiS process of collecting data on the state of science education in their schools, mapping their practice against the components, meeting together to discuss the issues and prioritise initiatives and actions in developing an Action Plan.

Participating in this part of the SiS process engaged teachers in informal professional development or learning. As an outcome of this learning about their teaching and students’ learning, teachers engaged in different kinds of professional development activities to improve aspects of their practice. These activities included school-based discussions about teaching and learning and attendance at out-of-school, formal professional development.

There seems to be no strong evidence of a link between what teachers as individuals did for their own professional learning and their engagement in professional development in teams. This could strengthen the cohesion and expertise of the department as a whole but it is problematic as to whether individual needs were met to the extent that may have been required. Some teachers were able to identify a relationship between particular professional development activities that they had engaged in as an outcome of the Action Plan, and changes in their teaching practice, but others found it difficult to make that link.

The research questions have been used to organise the qualitative and quantitative data collected.

Changes attributable to the SiS Research Project

The qualitative data obtained from interviews with teachers has been organised according to the focus questions about their teaching, students and student learning, and professional interactions. Participants were asked whether they could make identifiable links between changes in their practice due to their experiences in the SiS Research, and changes in student learning outcomes.

Teaching

The overall response of primary and secondary teachers was that participating in the SiS Research prompted them to think more about their knowledge of teaching and their practice. For many teachers new to the profession involvement in the SiS process reinforced their knowledge of the kinds of teaching practices that they had studied in their teacher education courses: ‘it backed up uni … going back over helped …’

The involvement of the more experienced secondary teachers in the SiS Research made them rethink their practice. These comments are representative of the views expressed.
I’ve been teaching a long time … got into a rut and SiS has shown me other ways.

I’ve five more years of teaching and I was set in my ways, comfortable in what I was doing … positive feedback from kids and parents … carry on that way, BUT on the component mapping scale of 1–4, I was 1. I was controlling the class but was I engaging kids in science?’

For one teacher the two years she spent experimenting in changing the ways she taught: ‘… forced me out of my comfort zone—opened my eyes to other ways of teaching—but I don’t know whether they are right for me…’

An enthusiastic and committed teacher was highly regarded by her peers and students and admitted that she was a control freak. This same teacher later said about her students that:

I now think more about their lives and why students are not coping with school … the socio-economic conditions. SiS has broadened my eyes on home conditions—now more compassionate and don’t have such black and white expectations … I see reasons for lack of work, motivation … no matter what I do…

For all but one of the primary teachers, engaging in the SiS process changed their feelings about teaching science. Nearly all commented that their confidence had increased as they had learnt more science and more strategies used in teaching science, that they had gained more direction in their teaching of science and were more aware of the need to make science relevant to their students’ lives. The one primary teacher who did not express such views said that she was ‘… always into active and engaging learning in science anyway …’

Teaching practice

The component mapping exercise, when teachers mapped their practice against the Components of Effective Teaching and Learning on a scale of 1–4 with the assistance of the SiS Co-ordinator, helped many teachers either to reinforce, or identify more clearly, the learning goals they had, not only for themselves but for their students. For example, two teachers identified the need to increase the level of cognitive thinking of their students and many mentioned the need for students to be more active and reflective in their learning—to ‘empower students to be active learners, make decisions, reason and increase awareness’.

The collective results of the component mapping exercise also helped teachers to identify areas of their teaching that they needed to address as a team, such as the strategic use of information technologies. Some primary teachers identified the need to increase their time allocation to science, to link science into all Key Learning Areas or other curriculum initiatives such as the Middle Years Research And Development Project (MYRAD)\(^3^8\). Others identified the need to ‘bring everyday science happenings into the classroom’.

In many cases, mapping identified the need for schools to make or increase links with the local and wider communities, and to broaden the science experiences of their students. This was achieved with varying degrees of success. Limitations included distance from appropriate activities that students could take part in, lack of financial resources to cover costs and teacher replacements and, for a new teacher, ‘It’s hard to keep kids in check outside the classroom’. Many teachers reported an increase in the number of visiting guests and speakers and participation in activities such as Family Science and Science week. Some teachers reported that they ‘… did this anyway but better matched to the CSF’. Two schools made links with their local (non-SiS) primary schools as a direct result of their involvement in SiS.

One teacher (the ‘five-years-to-go’ teacher) was so successful in establishing an environmental school group with the local rural community that it became so consuming, for both himself and his students that it was eventually taken over by the local council. He was not sure to what extent his participation in SiS had contributed to this success.

\(^3^8\)Science in Schools Research Project Manual, 2002, DEET
Nearly all primary teachers found that as a result of their school-based team discussions facilitated by their SiS Co-ordinator, they were able to design their units and teaching sequences, whether science or integrated, more effectively. For example, one teacher described how he looked at what he wanted his students to learn by the end of the unit; then sequenced the activities appropriately. He planned to assess his students’ learning at the beginning of the unit rather than at the end as was formerly the case.

In addition to discussing and sharing ideas within the science department as part of the SiS process, participation in the School Innovation in Science Professional Development Program raised participants’ awareness of differences in individual learning styles of their students and gave them knowledge of strategies to deal with them.

Many primary teachers spoke of an increased confidence in teaching science as a result of increasing their subject content knowledge. They reported that they had been better able to incorporate a wider range of teaching and learning strategies in their science classes as a result of their participation in the SiS process and the courses and sessions that they attended. Examples of change included more open-ended questioning, co-operative and group work, the increased use of ICT and more problem-based and student-centred teaching in science: ‘thinking beyond the knowledge to the why.’ For some, finding out about students’ prior learning was a significant change in their practice that helped them to plan their work.

Through participating in the SiS process, many secondary teachers reported that they had expanded the range of their teaching strategies. Examples included increased group work and discussion and the involvement of students in designing their own tests and activities. Some teachers had incorporated Project for Enhancing Effective Learning (PEEL) activities they had learnt in workshops they had attended as an outcome of implementing the school’s Action Plan.

**Assessment**

Both primary and secondary teachers described a variety of ways that they assessed their students, including the use of PowerPoint presentations, students’ engagement in discussion, and observation of the way students work in class. Both written and oral assessments were used. Some of these methods were new to teachers. However, it was apparent that nearly all teachers in the sample had difficulty in making judgements about the level of learning of students. Methods reported by teachers were observational—how students behaved in the classroom, the responses they gave to questions and their contribution to discussion. Most teachers had not understood the distinction between different products of assessment tasks, and how to assess or evaluate the level of learning evident in the students’ responses to those assessment tasks. The following comments are representative: ‘It’s professional judgement about pass or fail’ and ‘it’s using teachers’ intuition—knowing children so well’.

A primary teacher believed that he made ‘better judgements because I am more aware … and I have a better understanding of the CSF’.

Two secondary teachers expressed some uncertainty about how to measure change reliably. ‘How do we measure and what?’ Would not being a SiS school make any difference?’ And, ‘it’s difficult to quantify—is it maturity or the program?’

Teachers tended to use behaviours as indicators of increased engagement in learning that could, perhaps, be indicative of a deeper level of learning in science. Most teachers reported that they did not yet have actual measures of change in the level of student achievement in science.

Many primary teachers commented on a range of assessment methods they were now using, including more self-evaluation. One particularly remarked on the need to give clear expectations of what was required.

> Before … by observation and anecdotal ways. Now I use a greater range such as formal tests, reports, power point presentations and orally. Expectations are clearly stated at the beginning of the lesson …

For many secondary teachers the traditional unit test remained, though it was apparent that teachers were experimenting and trying to expand their repertoire. One secondary teacher commented that, though SiS had helped him, and his science department, to make assessment more relevant to the students, it was difficult to change assessment practices overall because of school reporting requirements based on topic tests, grades for practical reports and research projects that limited the introduction of new methods.
With a little prompting, one primary teacher referred to moderation. A secondary teacher referred to the use of criteria, but without descriptors for achievement at different levels. Two secondary teachers, who were also SiS Co-ordinators, mentioned that they used the results of the SiS and ACER project surveys administered to the students to obtain feedback on students’ learning and attitudes.

For a few teachers, participation in SiS had not changed their assessment practices in terms of the kind of tasks they set or the kind of products they required as evidence of their work. These teachers believed that SiS had affirmed their existing practice. Even so, they were not able to describe how they made judgements about the level of achievement of their students. It seems that this aspect of teachers’ work, for the teachers in this study, was not helped in the SiS process.

**Student learning outcomes**

Some teachers, both primary and secondary, thought that even though they might have changed their practice, it was too soon to expect change in student learning outcomes or to provide evidence of change other than through observations of behaviour. A teacher new to the school said he had had little chance to make comparisons as it was ‘still early days’. Similar comments were made by teachers who had been part of the SiS project for longer—it was too soon to have real evidence of change in student learning outcomes.

One teacher highlighted a factor that he perceived to influence the level and rate of change in student learning— the external environment and parental attitudes: ‘the apathy in families and communities—it’ll take a long time to change …’ and again ‘I sometimes felt angry—all the effort put in, no excitement with the kids, but yes …’

Some Science Co-ordinators commented on the difficulty of obtaining reliable feedback from SiS in the initial stages as difficulties had been encountered with the establishment of the electronic testing system in 2001. Teachers in schools who had opted for electronic testing therefore had no measure of students’ achievement and attitude at the beginning of the SiS Research in their school. Feedback had not been obtained in 2002 by the time of ACER’s second stage of data collection.

Many teachers commented on the value of the ACER student assessments in increasing their professional knowledge, particularly the concept mapping exercise that was designed to elicit students’ understanding of the purposes of science, and who used it and where. Some teachers found it a revealing exercise for themselves as well as for their students as it had made them think about the purposes of science and how it was linked to their everyday world. Some reported that they had adopted the technique in their teaching as it gave a different insight into their students’ learning. Many students noted that the exercise made them think, that it was fun and a different way of demonstrating their understanding ‘…it made me think… it’s not just words and I like drawing’. Many remarked that they were better able to link their ideas, ‘… thinking about one thing made me think about others. It just popped into my head’.

No significant change was evident between the first and second ACER concept maps for many students but some showed improvement in their ability to map and an increased understanding of the concepts. It is likely that for many, this is a reactive effect. Differences were apparent in the concept maps between schools and even between classes within schools.

**Engagement in science learning**

A significant outcome for students reported by teachers was a change in the kind and level of student engagement in science—in discussions, practical activities and group work. Teachers related this to their participation in SiS and the more varied opportunities for learning that they were offering their students. Some secondary teachers of science noted the increase in confidence, self-reliance and engagement of their students that they were better at reflecting on their learning and that ‘they were talking and explaining better.’ ‘… they participate more in activities’ ‘…more creative, more effort …’ and ‘they are learning more about communication skills—working together’.

Several primary teachers suggested that changes in themselves had been reflected in the changes occurring in their students. The following comments are typical. ‘Teachers’ confidence has lifted students’ confidence.’ And ‘I have lifted expectations— more “why, why not?” … students AND teachers know more.’

An increase in engagement of students in learning activities in science does not necessarily mean an increase in their knowledge and understanding of science, but it might be a pre-condition for learning science. Comparison
of the IBT results across schools and within schools shows variations in student achievement but the repeat sets of data do not show significant improvement. This could well be due to the relatively short period of time between the repeated assessments. As teachers commented, ‘change takes time’.

The SiS Research Project’s contribution to change

The final interviews with teachers clearly indicated that the SiS Research Project had had a positive effect on the practice of nearly all teachers sampled. Most were able to identify what changes in their practice had occurred and what could be attributed to their participation in the SiS Research Project, though there was less indication that there had been quantifiable changes in student learning outcomes.

The SiS Research Project, designed to improve teaching practice and student learning in science, relied on a number of factors for it to be effective:

- the promotion of science education at government level and school level
- the provision of funding to develop an organisational infrastructure that would support professional learning in schools
- a defined process by which schools could improve their science teaching and learning
- a credible framework for describing effective teaching and learning in science
- the assumption that teachers are professionals with the ability to take responsibility for their professional learning
- external assistance provided by project officers, networks of professionals, and material resources to support schools and individual teachers.

One of the strengths of the SiS Research seems to be that it aimed to provide the conditions in which effective professional learning could take place. The level of professional learning itself resulted from the engagement of the teachers in a number of activities—the process of analysing practice against a standards framework as in the component mapping exercise, discussing what they needed to do to improve in areas they identified and then implementing actions decided upon by the science department.

Overall, teachers traced changes in the way they thought about their teaching, in the way they planned their teaching more effectively to suit their needs, in their exploration of different teaching and learning strategies, to their participation in the SiS process and other professional learning opportunities associated with implementing the Action Plan. A number of teachers who participated in non-SiS professional development activities sometimes found it difficult to attribute changes to one or the other. In some instances, such as the MYRAD Project, the professional learning complemented that experienced through the SiS Research Project.

The SiS research process

The government made a large financial commitment to resource the state-wide SiS strategy over three years. Without this support the school leadership, teachers and Regional Project Officers believed that they would not have been able to engage in the whole-school SiS research process to the extent that they had.

All teachers were emphatic about what they considered were essential support for any kind of professional development. The most important was time release—time to gather data to inform professional development needs, time to meet together as a group, time to discuss, time to take part in more formal professional development and time to follow-up on learning.

SiS research funding made it possible for teachers and other personnel involved in the project to be given time to meet to implement the SiS research process. This involved analysis, planning, action and reflection both at individual and school levels to develop and implement their Action Plan. The SiS Research Project also made available external assistance from project personnel and resources that teachers and schools could call upon to help them improve their practice. The expected outcome of this would be for teachers to engage their students more effectively in learning science with the consequent link to improvement in learning outcomes.
SiS research funding made it possible for schools to collect data on the state of science education in their school. The student attitude and achievement tests, prepared and managed by the Deakin University consortium, made data available that schools could act on. In 2001, difficulties experienced with electronic testing delayed the process in some instances and meant that some schools did not have reliable baseline data to work with for 2002. In 2002, some schools took the option of paper and pencil testing to avoid the possibility of technical and administrative difficulties. This also provided flexibility in administering the tests. As one SiS Co-ordinator remarked in relation to scheduling electronic testing, ‘… there’s the pressure of time, there’s only one period to do the testing’. If there are difficulties, the time is lost.

The Regional Project Officer commented on the potential value of feedback to schools and on some of the actions schools were taking in response. Some had given science a higher priority in their charter and others wished to continue to track their students’ progress even though they would have to pay to be able to do this beyond the period of SiS funding.

Restructuring and re-organising curricula were mentioned as outcomes. One school, for example, was to restructure its Year 7 organisation in 2003 on the basis of feedback from SiS and ACER testing (IBT). Results had shown that in the first round of testing their students were at the lower end of the scale in relation to representative samples in Australia for the same age. The change in organisation was to ensure science classes were held throughout the year rather than for different combinations of two terms (for example, terms 1 and 3, or terms 2 and 4), and that classes could be allocated to laboratories more frequently. It was thought this might give teachers and students the chance to improve the attitudes of staff to teaching science and help consolidate student learning in science.

Changes to school science programs were being considered in some schools where science was offered for two or three terms only. ‘They can argue the case for core science units in Years 9 and 10’ that could have a flow-on effect for increasing VCE science classes in Years 11 and 12.’

One Phase 2 school had already increased the number of its VCE science classes and had attributed the increase in interest in science among their students to the school’s involvement in SiS. This was a school that had a relatively stable core of teachers of science who had been actively involved for two years in raising the profile of science and the level of engagement of their students. The department had the full support of its leadership in promoting science and the work of its teachers.

Some concern was expressed by a number of SiS Co-ordinators about the sustainability of SiS without external funding from DE&T to make time release possible.

SiS Components of Effective Teaching and Learning in Science

A major assumption of the SiS strategy was that teachers are professionals who could reflect on their practice and identify areas requiring attention. The Components of Effective Teaching and Learning in Science provided clear reference points for teachers to analyse their practice. They could identify their strengths and the areas that they needed to address for themselves and for their students, using the scale of descriptors, 1–4, for each component. Teachers and Science Co-ordinators valued the exercise even though considerable demands were made on co-ordinators’ time to interview teachers on an individual basis. In some cases this numbered up to twenty teachers. The second set of interviews was scheduled to take place at the end of the year and had not taken place by the time the ACER study had been completed.

The results of the mapping exercise, together with additional data on the state of science education in each school, informed the development of the school Action Plan.

Even those few teachers who did not believe that they had changed their practice in significant ways as a result of their participation in SiS, said that the opportunity to examine their practice against the SiS Components and to discuss teaching with their peers, had affirmed what they were doing. New teachers, who had limited experience in the SiS Research Project, found that their participation in this initial part of the process had reinforced what they had learnt in their training but they had not had much opportunity to put the strategies into practice. For some teachers entering the school where the Action Plan had already been in place the experience was different. As one remarked, ‘I just went along with it’.
Professional learning opportunities

Regional Project Officers played a significant role in helping teachers to participate in professional learning activities. The results of the mapping exercise were given to the Regional Project Officers who then assisted the science department in tailoring external professional development opportunities to meet their needs such as networking for SiS Co-ordinators, regional workshops for teachers who needed to focus on particular aspects of teaching and skill development. Variation in take-up was evident between schools. In some cases teachers reported participating in such activities, in others the whole-school professional development program rather than science specific professional development took priority.

Take-up of trialling the SISPD Program in Term 3 varied both in number of schools and the number of modules trialled. The Regional Project Officer (RPO) interviewed described the procedure involved in arranging the sessions. Volunteer participation was called for initially and based on the response—which was ‘very good’—the RPO attempted to schedule sessions that would provide the highest quality professional development by a pool of trained facilitators and that would enable maximum attendance. For example, sessions were to include at least a Phase 1 and a Phase 3 school, both primary and secondary representation, and were to model different modes of delivery.

Professional interactions

In terms of professional interactions many teachers commented that SiS teacher release funding had provided time for them to share ideas and resources and engage in the general talk about the business of teaching. Having time available to work together appeared to have a more significant effect on science secondary teachers, than on primary teachers who were already used to planning together.

*The SiS time and money for planning enabled the whole staff [secondary] to get together.*

*SiS pulled the KLA together—no co-ordination before, now we’re working more functionally.*

*Teachers are in two faculties, science is now more of a team ... share activities, communicate more ...’ and ‘... we are writing new courses for next year ...’*

Two primary teachers remarked that they did not interact differently with other teachers as a result of SiS, but others reported an increase in the focus on science for example, ‘… make key knowledge and understandings in science more explicit’. And, ‘working together to develop [science] strategies and curriculum’.

In one secondary school particularly, the Action Plan model was recommended to co-ordinators of other Key Learning Areas to follow: ‘other faculties should have similar programs ... the Action Plan helps focus.’

In contrast, a teacher in another school reported that some non-science teachers were not as positive about the school commitment to SiS Research because calls were made on their time resulting in an increase in their load. They ‘were not very enthusiastic [as the] time allocation for the SiS Co-ordinator was not high enough so time was taken from others’.

Teachers, SiS Co-ordinators and the Science Regional Project Officer interviewed believed that the identifiable positive outcomes of the SiS Research Project were largely due to its multi-faceted approach. The provision of personnel and other resources, particularly time, to help support teachers engage in the process of professional learning was critical to achieving the desired outcomes even though they considered it too soon at this stage to be sure of sustained improvements in student achievement in science.

School factors that mediated in the implementation of the SiS professional development

Teachers interviewed had clear expectations of what they thought was necessary for them to be able to participate meaningfully in high quality professional learning—time, relief from teaching and non-teaching responsibilities, relevant content of the professional development, a high quality facilitator, and the opportunity
to share and practice the outcomes of their learning. They also commented on the need for the school leadership to value and promote professional development and support them in the process. Participants in the study were asked whether these expectations were matched by their experiences.

Teachers and SiS Co-ordinators identified a number of factors that affected the implementation of the SiS Project in their schools that therefore affected the outcome of their professional learning. A number of common mediating factors emerged that varied from school to school and between teachers.

**Structural and organisational factors**

Differences were apparent in the way the organisation of schools affected teachers’ ability to develop and implement their Action Plan. In general, teachers in primary schools found it easier to meet than secondary teachers. For example, one secondary school was organised into four mini-schools from Years 7–10 and one Victorian Certificate of Education mini-school. These mini-schools were set up to facilitate the pastoral care of students and to develop productive relationships. However, in terms of the teachers’ work and professional interactions with others teaching science, the structure made it difficult for teachers in the department to meet other than formally to address some of the issues identified in their Action Plan. The informal day-to-day talk and exchange was less possible: ‘Formal SiS meetings ... helped with the interaction, gets teachers to communicate more. The mini-school system is hard.’

However, their commitment to the SiS process was such that these teachers were prepared to meet during lunchtimes to continue with their discussions but some expressed doubts as to how long they could manage to sustain this with competing demands on their time.

In 2002, the organisation of curriculum in one school meant that science was taught five periods per week for one semester only in that year. The school leadership and teachers acknowledged that this arrangement had adversely affected the teaching and the learning of their students in science. Initial SiS and ACER (IBT) test results supported this view.

Currently there is not time to consolidate learning ... if there’re any sport activities or they’re sick for a week they’ve lost a considerable amount of time for work ... also not enough time for homework ... if you set it, it’s due for tomorrow, with three days (in the week) they have more time to do it ...

**School leadership support**

The Regional Project Officer, SiS Co-ordinators and the teachers in the sample reported that the kind and level of support given by the school leadership affected implementation of the SiS Research process and were significant in the outcomes they achieved. Promotion of the SiS Research and the value placed on the professional learning affected the way teachers felt about their involvement.

Variations in resourcing of the science departments affected the way some teachers were able to develop new learning activities for their students in school. Limitations were to do with access to laboratories, equipment, and time allocated to teaching and learning science. Differences in school priorities and budget allocation affected the degree to which schools could organise visiting speakers and excursions to expand the experience of their students in line with, for example, one of the SiS Components: The classroom is linked to the broader community. Opportunities to participate in professional learning identified in the component mapping exercise were affected by budget priorities and the way competing demands on resources in the schools were handled.

**Staffing**

Natural attrition in staffing meant that in some cases new staff were unfamiliar with the SiS Research or had experienced it differently in their previous school. Beginning teachers brought little or no SiS experience with them. In schools where staffing was more stable and the teachers had more experience both in teaching and as a SiS Research school, the SiS Research process had enabled them, as a cohesive group, to consolidate and further their professional learning and make changes in practice as a whole team.

In two schools, a core of committed staff had worked together for many years, including the eighteen-month period of the SiS Project. During this time they had built what they considered to be an effective team that supported each other but the SiS Research Project gave them the time and a process to review their practice, to
share their expertise more and to motivate each other. They acknowledged that this had created a lot of work but it had revitalised their practice. One SiS Co-ordinator was in the process of mentoring a new teacher, commenting: ‘I’ve time to ride shotgun in the corridor while she gets on with it…’

In both these schools teachers were in the process of reviewing and revising their science curriculum in a way that had not been possible before the SiS Research Project. They believed that the stability of the staff and their ability to work as a team had helped their students to engage more in their learning experiences. It was noticeable that in these two schools science was a high priority. For example, on each occasion that the researcher visited one of the schools to work with a group, the principal called away the co-ordinator to announce some science related project he expected the teachers to be involved in that would raise the profile of the school. The comment by one of the teachers was, ‘he knows we can … and will do it!’ The science department was held up to be a model for others and though they were pleased and flattered by the recognition they were concerned about the increasing workload.

**Time allocated to science teaching**

The proportion of time allocated to teaching science also seemed to affect the motivation and quality of outcomes for some teachers. The many secondary staff who taught subjects other than science had their ‘commitment and time divided’ and were seen by some teachers not to participate fully in the SiS process. In contrast, a few described their attempts to transfer the teaching and learning strategies learnt in the SiS process to other areas of their teaching.

Some primary schools had greater flexibility and increased the time allocated to science. Teachers noted a corresponding increase in interest and engagement of their students.

One of the common concerns reported was that teachers did not have time to follow-up on the learning they had experienced, particularly in relation to sharing with colleagues and in trying new strategies with their students. They need ‘lots of time to absorb, analyse and incorporate’, ‘time to sit with colleagues to evaluate the course and try things …’ and ‘not to be penalised for being out of school’.

The SiS Research has provided an effective model for whole-school improvement in science. The SiS process of developing a school Action Plan for improving science education in the school, together with the provision of internal and external resources to support its implementation, has the potential for significant change.

At individual teacher level, the Components for Effective Teaching and Learning in science provided clear reference points for teachers to examine their practice. What seems less certain in this case study is the depth of individual change that has occurred and the sustainability of such change.

In terms of change in student learning outcomes, teachers, SiS Co-ordinators and the Regional Project Officer generally agreed that the effects of the SiS Research are not yet fully evident other than in behaviours. There was general agreement that more time will be needed for the changes in teaching practice that the SiS Research Project has promoted to be realised in improvement in student learning outcomes.

**The impact of involvement in the case study**

Some teachers noted that the process of carrying out the ACER project itself has had an effect on the participants that may influence the outcomes of the research investigating the links between the SiS Research Project and student learning outcomes. The concept mapping task in particular caused some teachers to change their thinking and, in some cases, their practice. Training of teachers to administer and analyse concept maps made them more aware of students’ understanding of science in their world and in their own world too. Some teachers responded by emphasising this more in their teaching.

It was intended that teachers would administer the assessment instruments to their own classes but in several instances other teachers, with varying degrees of guidance, administered the tasks. In the case of the attitude survey and the concept mapping exercise in particular this was thought to have affected the quality of the responses.

A few teachers commented that ACER student testing requirements on top of those for the SiS Research project were repetitive and onerous. Some secondary teachers found it difficult to find time to administer the tests amongst all the other demands on class time. They commented that this combination may have affected the
motivation of their students—‘Oh no, not again!’—so that the results of the data collected may not fully reflect students’ knowledge, understanding and attitude.

The majority of primary schools seemed more easily able to administer the tests, perhaps because of more flexibility in their timetabling. However, competing demands from other school activities, particularly during the period of second data collection made it difficult in some instances.

Conclusion

The high profile that was given by the Victorian government to improving science education state-wide, and the level of funding and resourcing made available by the SiS Research project, made it possible to establish a strong infrastructure that supported the participation of teachers of science in a whole-school approach to improving the quality of science learning. The three-year phasing in of the SiS Research project meant that there was a measured approach to resource use and that the findings of the research in progress could be applied systematically to subsequent stages of implementation.

The SiS Research Project made it possible for teachers to engage in professional development that could improve the quality of their practice. The opportunity to engage in this professional discourse over a three-year period, using a common professional language based on the Components of Effective Teaching and Learning in science was a strength of the project.

The professional development opportunities appear to have made a positive impact on teachers in the case study schools, particularly on whole-school approaches to the teaching of science, both in planning and in teaching and learning activities. Teachers reported changes in how they were going about the teaching of science, and that they had greater awareness of their students’ responses. While there was general agreement that students were more engaged in science learning, most teachers in this study reported that it was too soon to identify consistent changes in student learning outcomes. However, as a generalisation, differences in degree of change were apparent between schools that were in different phases of implementation.

The Science in Schools Research project has provided a strong example of a system wide, whole school, standards-based professional development initiative that draws teachers of science into stronger collaborative partnerships with their colleagues.

References

Effective Teaching and Learning in Science—what research into student conceptions has to say. (ND).

Summary of draft SiS Position Paper 2, SiS Research Project.


Science In Schools Research Project Manual (2002). DEET, p. 27

Chapter 6

A Content-focused Approach to Professional Development

The Early Years Numeracy Program

Kathy Nolan

The focus of this research is the Early Numeracy Professional Development for Teachers component of the Victorian Early Years Numeracy Program. This professional development program aims to further the understandings and skills early years teachers will need to implement the Early Years Numeracy Program as a whole. Teachers undertake modules that ‘...explore key understandings in the teaching and learning of mathematics. They then work towards a deeper knowledge of these understandings and how they can be applied so teaching and learning are informed by student needs. (Early Years of Schooling Branch, 2001, p. 6)

Context of the case study

The Early Years Numeracy Program

The Victorian Early Years Numeracy Program was developed in 2001 by the Early Years Strategy Learning and Teaching Innovation Division, DE&T, (formerly the Victorian Department of Education, Employment and Training). The program is not mandatory in Victorian State primary schools, but its uptake is recommended.

The Early Years Numeracy Program (EYNP) is based on the Victorian Early Years Literacy Program that preceded it, and includes:

- structured classroom learning programs
- additional assistance
- parent participation
- professional development for teachers.

The program is also based on the results of the Victorian Early Numeracy Research Project (ENRP), which involved 35 reference primary schools in the development and refinement of the design elements of the Early Years Literacy Program in the area of numeracy. The ENRP used a whole school design approach to improving student learning outcomes. This approach asserts that:

... teacher beliefs and understandings are central to effective teaching programs. Schools need to have high expectations of students. Teaching needs to be focused to ensure engagement with the desired mathematical ideas, and continuous monitoring and assessment of students is essential. Early intervention needs to occur where students are identified as not making expected progress, and strong links should be made between the home and school. Teachers need opportunities to work together in professional learning teams, and effective leadership and coordination is critical (Hill and Crevola, 1997). (Early Years Numeracy Program, 2001, p. 2)
The EYNP has been developed around the whole-school design approach. It is designed for primary schools to use in planning and implementing mathematical teaching and learning in the first five years of schooling. As with the ENRP, the EYNP is aimed at the whole school community, including principals, co-ordinators, classroom teachers, students and their parents.

The program follows a train-the-trainer model with designated Early Years Numeracy Trainers participating in a six-day initial training program run by DE&T. These trainers then deliver the program to Early Years Numeracy School-based Co-ordinators from schools in their own districts. The Early Years Numeracy School-based Co-ordinators then present the program to staff and parents at their school.

Australian Government Quality Teacher Program funding has supported the six-day initial training program and the ongoing support for Early Years Numeracy Trainers. These funds provide the initial six day training and ongoing development of Early Years Numeracy school-based co-ordinators. Victorian state government funding has financed the production of accompanying resources, which include printed and electronic material to support classroom teachers. Whilst the EYNP makes no direct charges to participating schools, schools do have to cover the costs of teacher release to attend the initial six-day training program.

The focus of this research is the Early Numeracy Professional Development for Teachers component of the EYNP. This teacher professional development program consists of seven modules, each approximately two hours long. The accompanying resource kit contains books, videos, CD-ROMS, OHP (overhead projector) sheets and other material considered essential for delivering high quality training sessions. School-based co-ordinators in each participating school deliver the professional development in a format that suits the school’s particular situation. This may involve a specifically designated curriculum day, staff meetings or year level meetings. The timing and sequence of topics is left to the discretion and professional judgement of the teachers involved in delivering the program.

The main intended outcome of the EYNP teacher professional development program is for teachers to increase their mathematical understanding and then apply this knowledge in their classrooms. Participating teachers are encouraged to focus on their own mathematical skills and understandings and how they, as adults, apply these to solve problems and make connections between mathematical ideas.

This subject matter is dealt with in the first professional module titled ‘Understanding Mathematics’. In this module teachers cover definitions of numeracy and mathematics and explore the notion that different people use different mathematical skills and understandings to solve the same problem and reach the same answer. The module also outlines a process all learners use to construct mathematical understandings: moving from application of current knowledge, making sense of new ideas, making generalisations and connections to finally creating deeper understandings.


Investigating the Links between Teacher Professional Learning and Student Learning Outcomes

p. 24). Teachers are told their role includes identifying student skills and understandings, selecting suitable mathematical experiences, assisting students to make sense of mathematical ideas and to construct generalisations. Teachers also discuss the importance of transferring a generalisation to a new mathematical idea.

The topics covered in the teacher professional development component include understanding mathematics, monitoring and assessment—the interview, mathematical growth, teaching approaches, the learning environment, additional assistance, parent participation and whole school planning. Participant activities include keeping a reflective journal, reading selected articles, and implementing follow-up tasks at a classroom level.

For students, the intended outcome from the EYNP is that each will achieve mathematical success, given sufficient time and support. Early intervention, continuous monitoring and assessment are considered crucial in the overall program.

As per the literature review for this study, the NPEAT review of professional development literature outlines nine principles for effective professional development (Hawley and Valli, 1999). These principles focus on the form rather than the content of effective professional development. The NPEAT review states that effective professional development should:

- have content related to student needs
- involve teachers in their own learning
- be collaborative and school-based
- be continuous with ongoing evaluation
- provide opportunities to understand the theory underlying the knowledge and skills being learned
- be part of an overall change process focused on improving student learning.

The EYNP appears to have all of the principles for effective professional development as outlined in the NPEAT review.

Gathering data

This study focused on the links between the Early Numeracy Professional Development for Teachers component of the Early Years Numeracy Program (EYNP) and student learning outcomes. These links were investigated in six Victorian State primary schools over the 2002 school year. Within each case study school the Early Years Numeracy School-Based Co-ordinator, the principal, two Year 1 classroom teachers and their Year 1 students participated in the study.

Of the six schools, two were rural and four were metropolitan Melbourne schools. One of the metropolitan schools was an inner city primary school and the rest were outer suburban schools. Student numbers ranged from 315 in one of the country schools to 880 at a metropolitan school. One school had a large number of students for whom English is a Second Language (ESL).

Every three years Victorian primary schools are required to develop a charter that outlines their curriculum priorities for the ensuing three years. Four of the six case study schools had identified literacy as their first priority and numeracy as their second priority. The other two schools had identified literacy only as their focus. (See Table 1.)
Table 1: Overview of case study schools

<table>
<thead>
<tr>
<th>EYNP case study school</th>
<th>Location</th>
<th>Size</th>
<th>Charter priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birmingham Primary School</td>
<td>Inner city Melbourne</td>
<td>315 students</td>
<td>English, Mathematics</td>
</tr>
<tr>
<td>Morris Park Primary School</td>
<td>Outer suburban Melbourne</td>
<td>880 students</td>
<td>Literacy, Mathematics</td>
</tr>
<tr>
<td>Cooks Bay Primary School</td>
<td>Rural, coastal Victorian</td>
<td>360 students</td>
<td>English, Mathematics</td>
</tr>
<tr>
<td>Finch Street Primary School</td>
<td>Outer suburban Melbourne</td>
<td>629 students</td>
<td>Literacy, Numeracy</td>
</tr>
<tr>
<td>Andrews Crossing Primary School</td>
<td>Rural Victorian</td>
<td>318 students</td>
<td>Literacy</td>
</tr>
<tr>
<td>Tallard Primary School</td>
<td>Outer suburban Melbourne</td>
<td>607 students</td>
<td>Early Years Literacy</td>
</tr>
</tbody>
</table>

The ACER link researcher visited each case study school twice during the 2002 school year. The main aim of the visits was to collect information that would provide insights into the situation at each school before, during and after implementation of the professional development for the teachers’ component of the EYNP. Regular contact with the schools was also maintained via email, fax, post and telephone.

Assessing student achievement

Assessment tools were chosen to gather relevant information from the Year 1 class teachers, the Year 1 students, the school-based co-ordinators and the school community in general. (See Table 2) The EYNP interview was used as an assessment tool in this project because it is an integral part of the EYNP and a useful tool for teachers in the case study schools. The interview is a substantial part of the EYNP teacher professional development program within the module monitoring and assessment—\textit{the interview}. The EYNP requires teachers to use the interview as an assessment tool to collect information on students’ understandings of mathematics. The interview is designed to provide detailed information for teachers to use when planning numeracy sessions and throughout the year to monitor individual student progress.

Table 2: Overview of data gathering

<table>
<thead>
<tr>
<th>Assessment tool</th>
<th>Staff involved (per school)</th>
<th>Date implemented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rowe Behavioural Rating Inventory</td>
<td>Two class teachers and their Year 1 students</td>
<td>Term 2 and Term 4</td>
</tr>
<tr>
<td>ACER LLANS (Year 1 Numeracy Tasks and Assessment Guidelines)</td>
<td>Teacher and ten Year 1 students</td>
<td>Term 2 and Term 4</td>
</tr>
<tr>
<td>Teacher Implementation Log Teacher Analysis of Case Study Scenario</td>
<td>Two class teachers</td>
<td>Terms 2, 3 and 4</td>
</tr>
<tr>
<td></td>
<td>Two class teachers</td>
<td>Term 2 and Term 4</td>
</tr>
<tr>
<td>Interviews (informal)</td>
<td>Principal, EYNP Co-ordinator, two class teachers</td>
<td>Term 2 and Term 4</td>
</tr>
<tr>
<td>Questionnaires (informal)</td>
<td>EYNP co-ordinator, two class teachers</td>
<td>Term 2, 3 and 4</td>
</tr>
<tr>
<td>School visit observation</td>
<td>ACER researcher, two class teachers and Year 1 students</td>
<td>Term 3</td>
</tr>
<tr>
<td>EYNP interview</td>
<td>Two class teachers, Year 1 students (ten students only, Term 4)</td>
<td>Term 2 and Term 4</td>
</tr>
</tbody>
</table>
The EYNP interview is an individual student assessment that provides an opportunity for students to demonstrate their level of mathematical development in a given area by responding to structured questions and tasks. The interviews take approximately 40 minutes per student and can be used to gather information on each student’s mathematical understandings, skills and stage of mathematical development, according to the EYNP.

The EYNP interview is organised into the following areas:

- counting
- place value
- addition and subtraction strategies
- multiplication and division strategies
- time
- length measurement
- space (properties)
- space (visualisation).

The following example is adapted from the EYNP interview section titled \textit{Strategies for addition and subtraction}:

\begin{quote}
Equipment needed—green toy teddies, ice-cream lid

Strategy—Counting on

Place nine green teddies on the table.

Say: ‘Please get four green teddies for me.’

And then say: ‘I have nine green teddies here.’

(Show the child the nine teddies, and then screen the nine teddies with the ice-cream lid.)

Say: ‘That’s nine teddies hiding here and four teddies here.’ (Point to the groups.)

Say: ‘Tell me how many teddies we have altogether. Please explain how you worked it out.’

If an incorrect answer is given, remove the lid and say:

‘Please tell me how many teddies there are altogether.’
\end{quote}

In this study, information was gathered via the EYNP interview at two stages during the school year to monitor changes in students’ mathematical understandings, skills and thinking.

The ACER LLANS (Longitudinal Literacy and Numeracy Study) numeracy tasks and the Rowe Behavioural Rating Inventory were also used at two stages during the year to monitor changes in student achievement and attentiveness. These instruments are particularly useful since they have been used in other large studies and thus results from this project can be compared with those of other large cohorts of Year 1 students.

The informal questionnaires, interviews, school visits, teachers’ logs and case study scenarios were all used to monitor and record teachers’ views on, and approaches to, student learning. They were also used to monitor changes throughout the school year in teachers’ thinking and level of mathematical understanding relating to the EYNP.
Implementation

Motivation for participation in the EYNP

All six case study schools were keen to participate in the EYNP. The principals of the six schools supported the program and were familiar with its aims, objectives and content. The principal of Morris Park Primary School had been a member of the Early Numeracy Research Project Steering Committee, which oversaw the original pilot research study that preceded the current program. She was therefore extremely interested in the final version of the EYNP.

The decision to participate in the professional development component of the EYNP was usually made at a school management level. As a result, the class teachers often had little choice as to their involvement in the EYNP teacher professional development program, or the EYNP as a whole. However, all teachers stated that they wanted to participate in the EYNP and were keen to improve their own knowledge and skill base via the professional development component. As Anne, a Year 1 class teacher from Morris Park Primary School said, ‘I’m happy to participate so I can improve my own learning and build up my confidence in this area’.

Jennifer, the principal at Morris Park was keen for her school to adopt the EYNP because of its focus on concrete materials and group work in the classroom. She felt this type of teaching assisted the large numbers of ESL students in her school who needed this supportive environment.

The six school-based co-ordinators had both short- and long-term goals for their school communities in relation to the overall program. Most hoped to achieve goals, such as implementing the EYNP interview in all Prep to Year 4 classes by the end of 2002. Long-term expectations were more general and concerned with improving teachers' understanding of mathematics, revitalising teaching practices, and improving student learning outcomes in particular areas such as number or measurement.

Participants' experience and prior knowledge

The school-based co-ordinators in each school were all experienced early years teachers. Several had postgraduate qualifications in areas such as mathematics education, Special Education and Reading Recovery (a reading intervention program). The school-based co-ordinators were all motivated teachers and very keen to implement the program in their schools. Four of the six co-ordinators were also Early Years Numeracy Trainers who were involved in conducting training for teachers at other schools in their districts as well as for their own staff.

The class teachers in the case study schools were also highly motivated and one teacher was an EYN Trainer. Four of the twelve class teachers were recent graduates, while the others were all very experienced teachers. The less experienced teachers were essentially concerned about classroom management issues while the more experienced teachers were focused on using the information they were receiving to enhance their current mathematics programs. Monica, a Year 1 class teacher at Birmingham Primary School and a recent graduate stated: ‘It’s tiring and a real challenge with all the group work I have to organise during maths.’ Lee, an experienced teacher and EYN Trainer at Cooks Bay Primary School was looking forward to implementing the program in her Year 1 class because she believed ‘the EYNP is worthwhile and will produce positive learning for the children’.

Resourcing and support

Resourcing and support was a crucial factor in the implementation of the EYNP. All case study schools had appointed school-based co-ordinators to oversee the total EYNP. Their role included delivery of the teacher professional development component, co-ordinating parent involvement, support of class teachers and provision of useful classroom resource material. The EYNP has no direct costs for schools apart from releasing teachers involved in the six-day initial training program. However, all six schools had allocated money and resources from their maths budgets to support the program and ensure its successful implementation. Three schools had allocated funding to allow their school-based co-ordinators time release to fully implement the program. For example, Tallard Primary School had allocated 0.3 FTE to the role of EYNP school-based co-ordinator. The teacher in this role was then able to have 1.5 days per week out of her class to co-ordinate the EYNP.
Intended and actual implementation

The intended implementation of the EYNP, as stated in the EYNP manual, and the actual implementation in the six case study schools were sometimes quite different. For example, the EYNP suggests that all participating schools implement a numeracy block, which is a daily maths session of at least one hour. This time is to be divided into three sections starting with a whole-class focus, then a small-group focus and finally a whole-class share time. In the case study schools, several classes did adopt this structure, but others did not. This situation was repeated with many aspects of the EYNP. The reasons given by the schools for not adopting the approaches exactly as suggested in the program were the same across the six schools. All the principals, school-based coordinators and class teachers said that they were extremely busy and spoke of a crowded curriculum. They also said that other curriculum areas such as literacy also had a high priority in their schools and required a lot of time and resources.

Lack of time was the greatest impediment to fully implementing the EYNP. For example, all six schools saw the EYNP interview as valuable, but found it almost impossible to conduct, since each interview took at least 40 minutes per child. Schools had to employ emergency teachers to give the class teachers the opportunity to conduct the interviews. The lack of departmental funding for EYNP then became an issue for all the case study schools. Several schools noted that without the ACER project funds they would not have been able to conduct the EYNP interviews.

The Early Numeracy Professional Development for Classroom Teachers component of the EYNP is designed to be a flexible program so as to accommodate individual school communities. The aim of the teacher professional development section of the EYNP is for participating teachers to explore key mathematical understandings and then learn how to apply them in the classroom. The program stresses the importance of information about student understandings to effective classroom teaching. The accompanying manual suggests modules can be conducted at weekly or fortnightly intervals, or adapted for student-free days. No time line for delivery is explicitly stated.

The school-based co-ordinators in the six schools delivered the teacher professional development program in a variety of ways. Several schools used pupil-free curriculum days to introduce the program, often including teachers from Prep to Year 6 to gain whole school support. All schools used early years unit or level meetings to deliver the program and most also used general staff meetings. Finch Street Primary School had several extended staff meetings from 4 p.m. to 6 p.m. to cover aspects of the program. In all the case study schools, the modules within the teacher professional development component were delivered by the school-based co-ordinators who were often assisted by class teachers with special interests or skills in the area of mathematics.

The most striking feature of the delivery of the teacher professional development program over the course of the year was the selection and range of topics chosen by the case study schools. All six schools started with the general introduction and overview, but then each school dipped into the program and delivered modules considered appropriate for its staff and students. Most schools covered the EYNP interview and how to implement it. Most schools also dealt with the topics of open-ended questions and teaching approaches.

The six schools differed in the order and range of topics they chose to deliver. The planned professional development for Term 4 also differed. For example, in Terms 2 and 3 of 2002, Andrews Crossing Primary School covered the EYNP interview in detail. In Term 4, they planned to deal with assessment and moderation. In contrast, Cooks Bay Primary School encouraged its staff to choose any element of the EYNP and have a go at implementing it in their classrooms. In Term 4, the aim was to concentrate on the recommended teaching approaches and answer the question ‘Where to now after the EYNP interview?’

The six school-based co-ordinators referred to similar successful outcomes from their EYNP teacher professional development sessions. These outcomes fell into two categories. The first included concrete, practical outcomes, such as implementation of the EYNP interview in all Prep to Year 2 classes. The second, more intangible, outcomes included participants engaging in professional discussion and exchanging views on a range of topics, such as the interpretation and use of students’ results.

The school-based co-ordinators also spoke about similar problems that had arisen during the delivery of the teacher professional development program. Lack of time and difficulty in organising meetings were the most common problems. Several schools noted that some staff felt threatened by the new approaches outlined. Fatigue was also listed as a concern since many sessions were held after school.
Although the EYNP teacher professional development program is structured and sequential, each of the case study schools tailored the program to suit the needs of their school community. This flexibility appeared to be necessary for the ongoing implementation of the teacher professional development. Common concerns and highlights were also identified by the co-ordinators, indicating possible areas of further development for the program designers.

Leadership

The importance of strong leadership was evident throughout this study. The six case study schools all had principals who were interested in, and supportive of, the EYNP. They were principals who knew a lot about the entire program and made a firm commitment to it, even though they received no funding to implement it. All six principals said they saw the EYNP as beneficial to their schools since it increased the knowledge and skill of their staff. More importantly they felt it would assist with student learning in mathematics.

All principals supported their school-based co-ordinators who, in turn, were able to support the class teachers. Several schools also noted that their school councils specifically supported the EYNP.

Links between home, school and the EYNP

One of the overall aims of the EYNP is to foster a ‘home-school partnership to improve student learning’ (Early Years Numeracy Program, 2001, p. 4). In the module ‘Whole-school planning’ the teacher professional development program deals with parent participation, which can take many forms. The importance of home/school/community links is highlighted.

The EYNP features a substantial amount of resource material devoted to informing and involving the parent community. The EYNP Parent Pack consists of books, a video and CD-ROM dealing with topics such as: Early Numeracy-Developing Partnerships, Classroom Helpers and Exploring Maths Together. By Term 2 of 2002, the Parent Pack had not yet arrived at the schools and they were unable to implement this section of the program. The schools did not view this as a problem since most of the school-based co-ordinators expressed a desire to have the EYNP fully operational before involving parents.

The parent communities played an important role in each of the six case study schools. However the degree of parental involvement differed across schools. Birmingham, Cooks Bay and Tallard Primary Schools had very active parent communities with a high level of parental assistance in classrooms, particularly in the area of literacy.

Most of the case study schools organised parent information nights on a regular basis. For example, in 2001, Birmingham Primary School held a Family Maths Night for students and parents. This event was well attended and involved parents and children completing mathematics activities together. The activities were representative of the classroom work students were doing at school. The aim of the evening was to better inform parents about the school mathematics program and to create a positive attitude in the school community toward this area of the curriculum. Due to the success of the evening the event was to be held again in late 2002.

All six school-based co-ordinators were keen to have any problems eradicated before inviting parents into classrooms. Morris Park Primary School, which has a high proportion of ESL families, wanted to have the program underway before they involved parents as they predicted parents would have concerns with the practical nature of the EYNP classroom activities. Damien, the school-based co-ordinator said, ‘I’m concerned about community understanding of the activities involving concrete materials and the open-ended nature of the tasks. Some parents won’t see this as real maths since it doesn’t involve a worksheet.’ Ironically the principal and teaching staff at Morris Park saw this aspect of the program as extremely beneficial to their ESL students.

Several class teachers noted that parent helpers in the classroom would be of tremendous assistance, but they could not see it eventuating. The main reason seemed to be that the EYNP numeracy block (i.e. daily mathematics session) was usually held after recess, a time unsuitable for many parents. Most of the case study schools had parents involved in the literacy program, which is most often the first teaching session in the morning. The timing of the literacy session enabled parents to drop off their children, and then stay on to help in the classroom. Several teachers also expressed the view that parents were generally keen to assist with literacy, but not so confident of their ability to help in the area of numeracy.
Results

The assessment tools used to gather information in this study were chosen to reveal changes in both teacher practice and student learning outcomes over a given period of time. The assessment tools were designed to measure the extent to which changes in the six case study schools could be linked to the Early Numeracy Professional Development for Teachers component of the EYNP. Information was gathered from the case study schools throughout the 2002 school year.

Changes in teacher practice

Teacher log

The twelve Year 1 teachers participating in this study were all asked to keep a logbook over Terms 2, 3 and 4 of 2002 and record changes to their teaching practice that could be attributed to the Early Numeracy Professional Development for Teachers component of the EYNP. They were also required to document the progress in numeracy of two students in their class. The teacher logbooks provided anecdotal evidence of changes to teacher practice. Out of the original twelve classroom teachers, one failed to complete all the logbook entries and another teacher resigned from her position during the year.

Throughout the course of the year, each teacher adopted the numeracy block format for maths lessons as suggested in the professional development program. The numeracy block is a daily mathematics session of at least one hour, structured into:

- a whole-class focus
- a small-group focus
- a whole-class share time.

The rationale behind this structure is that it allows for individual and group teaching, student reflection and the sharing of learning. The flexible teaching groups formed are based on students’ current understandings and needs, which are highlighted via the EYNP interview.

An excerpt from Anne’s Teacher Log (Morris Park Primary School) illustrates changes to teaching practice. In Term 2, Anne used the numeracy block model about two hours a week. By Term 4, she was using this model about one hour most days of the week. In Term 2, her lesson structure was largely a whole-class introductory session followed by independent tasks. By Term 4, she had adopted the numeracy block structure and associated teaching approaches as outlined in the professional development sessions. Her student groupings were also informed by the EYNP interview results.

As the year progressed, the Teacher Logs revealed that some teachers had become more focused and specific in their lesson objectives. Having focused objectives is a suggestion outlined in the teacher professional development program. The program states that teachers ‘need to plan the focus of each session carefully to meet the needs of their students’ (Early Years Numeracy Program, 2001, p. 36). Teachers are also encouraged to consider how their students will apply knowledge gained, and transfer this knowledge so they can develop deeper mathematical understandings.

Eva’s Teacher Log (Cooks Bay Primary School) illustrates an acceptance of the importance of focused teaching as outlined in the EYNP teacher professional development. In Term 2, Eva’s lesson objective relating to addition was: ‘Addition (strategies for)’ In Term 4, her objective on the same topic was: ‘To develop strategies to foster increased skills in addition of numbers to 20.’

In their Teacher Logs, several teachers expressed an increased confidence in using the EYNP in their classroom. Richard, a teacher at Morris Park Primary School said he still had reservations about the EYNP, but by Term 4 was ‘quite pleased with the whole set-up of the program’.

In Term 4, all teachers reported that the students they were following for the logbook had progressed according to the EYNP ‘Stages of Mathematical Growth’ (a mathematical developmental framework). All the teachers
used these EYNP stages as a measure of progress together with their own personal observations, indicating the value they placed on this continuum.

By the end of Term 4, some teachers’ concerns about the program had changed from management issues to concerns about how best to use information gained and the implications of the information they had gathered for their needs. Concerns such as these were identified by Hall and Hord (1984). Their stages of teachers concerns ranged from ‘task concerns’ (preparation of material, coordination and scheduling), to ‘impact concerns’ (how teaching is affecting students, how teaching can be improved).

Madeline, a teacher at Finch Street Primary School, provided an example of change in stages of concern. In Term 4, she was focusing outside her immediate classroom environment and had noted a development in parental involvement. She attributed this change to the EYNP. Madeline had provided advice and suggested activities, as per the EYNP, to the parents of one of the students she was following for her logbook. This resulted in the parents providing increased support in numeracy to the child at home, and Madeline saw this as a very positive change for all concerned.

As well as change, the logbooks highlighted teacher concerns during the year. All the teachers identified lack of time and physical resource material as concerns in Term 2 and these concerns were still evident in Term 4. Many found the EYNP numeracy block model demanding in terms of setting up several activities each session. Despite their concerns, the logbooks provided evidence that throughout the year all the teachers considered their students needs and interests when planning lessons.

In her logbook, Nola, a teacher at Tallard Primary School, revealed the type of classroom activities teachers used in the numeracy block and the large amount of equipment required for all the students. For a lesson on place value, Nola needed Unifix blocks, ten frame sheets (laminated), counters, and dice. She also required icy pole sticks, rubber bands and notebooks for her 23 students. The students were to begin the session with grouping activities using the Unifix blocks, then the icy pole sticks and rubber bands. They also used these resources in a banking game. The students then went on to use the other material in making groups of tens and writing up their experiments and games. The activities had to be set up by the teacher during recess before the numeracy block without assistance. Material could not be set out before recess because it would interfere with material used in the literacy block. Nola also had yard duty during recess several times a week!

The logbooks highlighted the fact that most of the teachers used the classroom teaching approaches and assessment tools outlined in the EYNP throughout the year. Most teachers used approaches such as Modelled Mathematics (highest level of teacher support) and Guided Mathematics (least level of teacher support). The EYNP interview was used by all teachers as an assessment tool, largely due to the provision of ACER project funds to allow teacher time release. Several teachers noted in their end of year entry into their logbook, that their confidence in using these approaches and tools had increased by Term 4, 2002.

Teacher case study scenarios

At the start of Terms 2 and 4, the participating teachers were required to respond to a given case study scenario prepared by the ACER researcher. The case studies were scenarios of Year 1 students with various skills and deficits in numeracy. The teachers were asked to record their initial thoughts about the case study and then describe some activities to further develop the student’s numeracy skills. Of the 12 Year 1 class teachers, two failed to complete the Term 4 case study and as previously stated, one teacher resigned during the year. Changes in the way that teachers responded between Terms 2 and 4 were noted as well as elements that stayed the same.

By term 4, most of the teachers were using the EYNP terminology when describing a proposed activity or mathematical skill in response to the case study scenario. In Term 2, these same teachers had not been using a common language to discuss numeracy.

By Term 4, many of the teachers also said they would use the EYNP interview as a device to help them decipher a student’s numeracy skills and provide information on the gaps in their knowledge and skill base. In Term 2, the EYNP interview was not referred to in this context by many of the teachers. This indicates that after having used the EYNP interview and the information gained from it throughout the year, the teachers found it to be an informative and practical tool for classroom use.

In both Terms 2 and 4, all the participating teachers said that, for accurate and effective planning to occur, they would require more information on the students than was provided in the case studies presented. Most teachers
identified similar strengths and weaknesses in the case study students. This suggests that the teachers agreed with the premise put forward by the EYNP—accurate and detailed information on students needs should inform and direct teaching.

**Informal interviews and questionnaires**

Throughout 2002, informal interviews and questionnaires were conducted with the principals, Year 1 class teachers and the school-based co-ordinators at each case study school. In Term 2, the interviews and questionnaires focused on plans for the ensuing year concerning the teacher professional development part of the EYNP, and feelings toward the overall program. The interviews and questionnaires in Term 4 asked participants to reflect on their involvement in all aspects of the EYNP during the 2002 school year.

In Term 2, all participants, excepting one principal, were involved in the interview and questionnaires. In Term 4 once again, all participants, apart from one class teacher, were involved.

By comparing responses from Term 2 and Term 4, it was evident that changes to both attitude and practice had occurred in all groups. In Term 2, most of the principals were concerned about the impact that a lack of funding would have on the effectiveness of the EYNP in their schools. By Term 4, few principals mentioned this subject again, possibly due to the fact that the DE&T had released information relating to increased funding for school-based co-ordinator positions in 2003. This illustrates the importance of funding in the successful implementation of the EYNP at a school level.

Other attitudes and practices did not appear to alter over the course of the year. The importance of linking professional development to school charter priorities was a view expressed by several principals in Term 2 and Term 4. Most principals also held the view that the success of the Early Years Literacy Program model, which preceded the EYNP, helped pave the way in schools for the EYNP. Principals viewed the Early Years Literacy Program as successful because their students had achieved better results in statewide literacy assessments (Victorian AIM [Achievement Improvement Monitor] assessments). Principals also said that their teaching staff noted increased literacy skills in students after implementation of the Early Years Literacy Program. The questionnaires and interviews in Terms 2 and 4 revealed that most principals felt parents and teachers in particular, would be supportive of adopting the EYNP.

In Term 2, most of the school-based co-ordinators said that a staged implementation of the EYNP would be most effective in their school. The co-ordinators said that this would allow staff time to absorb information and then implement changes within their classrooms. In practice, a staged implementation would mean presenting the teacher professional development component over several terms or years. The corresponding activities would also be implemented over this time frame. This view was again expressed in Term 4.

The usefulness of the EYNP interview as an informative assessment tool was a view expressed by the co-ordinators throughout the year.

The principals’ support remained a crucial element in effective implementation of the overall EYNP and time constraints remained a constant concern. Birmingham Primary School provided an example of how essential these management issues were when implementing the EYNP.

Pat, the principal, was enthusiastic about the overall program and had decided that numeracy would be one of the school’s charter priorities. She had attended part of the EYNP six-day training program with her school-based co-ordinator so as to learn more about the program. She was concerned about the lack of funding for the program, but was prepared to shuffle funding at a school level to support it because she felt it would benefit both students and staff. Consequently the EYNP school-based co-ordinator at Birmingham Primary School was given time release to fulfil her role and in 2002, was able to devote one full, school curriculum day (P–6) to the EYNP teacher professional development component. The principal also enabled the school-based co-ordinator to conduct the EYNP interview with all junior classes and use the interview as a Prep entry assessment tool.

The principal also supported the EYNP at a school council level. She proposed the EYNP be the numeracy focus for the school over the ensuing three years so it could be implemented slowly and carefully. She felt that by adopting the program slowly staff would not feel threatened or rushed and would have time to fully absorb the program and not just go through the motions.
Lack of staff support for the EYNP was a concern expressed by several co-ordinators in Term 2. Donna, the school-based co-ordinator at Andrews Crossing Primary School, articulated this sentiment. ‘I’m very keen to implement the EYNP, but I’m worried about getting whole staff support. I feel this is crucial to the success of the program.’

By Term 4 however, this concern was not mentioned, and all co-ordinators said staff had taken at least some elements of the teacher professional program into their classrooms. Examples of transferring knowledge into practice included teachers using open-ended questions (a technique to encourage students to reveal their mathematical thinking and skills), implementing a daily numeracy block and encouraging students’ self-reflection on their learning. Other examples included changing the physical classroom environment to allow students easy access to material and technology, and using information from the EYNP interview to pinpoint students learning strengths and weaknesses.

By Term 4, most co-ordinators felt they had planned too much for their schools in terms of the teacher professional development component. Most school-based co-ordinators had not covered the content they had hoped to. This was due largely to time constraints and staff requiring more time to discuss and implement associated activities. As Damien, the school-based co-ordinator at Morris Park Primary School, said, ‘effecting change is slower than I’d like’.

In Term 2, most of the Year 1 class teachers listed intensive preparation, lack of resource material and time as concerns with the EYNP. These concerns were still evident in Term 4, although some teachers expressed the view that this was an unavoidable part of teaching in all curriculum areas. Sandra at Finch Street Primary School expressed this sentiment: ‘The timetable will always be a constraint—but I’m endeavouring not to allow it to interfere too much with my maths program.’

By Term 4, all participating teachers said the EYNP had changed their teaching practices and they all felt positively toward the program. They were all keen to learn more about the program in 2003 and to implement more of the strategies into their classrooms. The EYNP interview in particular seemed to sell the program to the teachers. They all stressed the importance of knowing where the children are at and of seeing gaps in knowledge. Two of the teachers relayed stories that highlighted these points. Cooks Bay Primary School and Tallard Primary School both told of students who had presented as behavioural problems since Grade Prep. The EYNP interview revealed that these children were working at a high level in terms of their mathematical understandings and the strategies they were using. Having this knowledge enabled the class teachers to cater more effectively for these students in class and student behaviour subsequently improved.

Anecdotes from the interviews and questionnaires conducted in the six case study schools provide examples of a successful professional development strategy. The strategy appeared to induce changes to teaching and result in improved student learning outcomes.

School observation visit

During Term 3 of 2002, the ACER Link Researcher visited five of the case study schools. One school, Tallard Primary School, was not visited due to staff illness and absence.

The purpose of this visit was to observe a numeracy block in each school. The numeracy block is an important feature of the EYNP. This daily, one hour, structured session is designed to allow teachers and students uninterrupted time to focus on a task and the mathematics involved.

By Term 3, all of the Year 1 classrooms visited featured a numeracy block. This was a change from the start of the year for most teachers, who had previously taken a more traditional structure during maths time. The several recently graduated teachers however, had not changed their practices a great deal since they had been taught about the EYNP at university and knew no other approach.

Lee, an EYN trainer and class teacher at Cooks Bay Primary School, illustrated how teacher change could occur. Before her involvement in the EYNP, Lee did not use the numeracy block structure of whole, small,
whole and her planning was largely informed by the Victorian CSF documents (Curriculum and Standards Frameworks). She grouped students according to her own criteria and devised her own assessment material both oral and written. Worksheets comprised a large part of her daily class activities.

After involvement in the EYNP, she used the numeracy block model every day and used concrete material in classroom activities more than worksheets. She used the EYNP interview as both a planning and assessment tool. She also used open-ended questions much more along with peer learning activities and problem solving. She said, ‘Now I use real money in real situations—not a cut and paste sheet’.

Lee illustrated that she was able to incorporate the strategies that had worked for her in the past with the new insights gained from the EYNP. With the added advantage of being a motivated teacher and an EYN trainer with more expertise and knowledge about the program than most, her classroom did reveal how the EYNP could work.

The EYNP suggests that the numeracy block be a daily occurrence. However, many class teachers found they could not manage this and scheduled the numeracy block approximately three times per week. A busy timetable, specialist lessons such as music and art, and the amount of organisation required for the session were all reasons given for not having the daily numeracy block. Nola, a class teacher at Tallard Primary School noted: ‘Time! There doesn’t seem to be enough, ever. Even on days when I don’t have specialist subjects.’

All teachers had made changes to their teaching practice and planning since the start of the year and their initial involvement in the professional development. Changes to practice included using the suggested EYNP teaching approaches and strategies, altering the learning environment and using the EYNP interview as an assessment and monitoring tool. Changes to planning often involved setting up and working in Professional Learning Teams (PLTs), developing a whole-school or early years team approach to numeracy, and using the suggested planning sheets, which encourage teachers to explicitly state the focus of a lesson.

When asked what she was doing differently from the start of the year, Anne, a class teacher at Morris Park Primary School, said that her teaching was now not as tied to worksheets. She also now tries to focus on the language involved in mathematics with the children and get them to use this language with her. She also said her thinking about mathematics had changed. When asked to elaborate she said that she now tried to explore the ‘depth’ of a topic and felt her own mathematical knowledge had been strengthened.

By Term 3, definite concerns and problems had arisen for the class teachers implementing the EYNP. The most common concerns were lack of time and resources. Teachers wanted resource material to back up their lessons, most particularly resources featuring open ended activities. All six schools had one resource book with open-ended activities and questions in it and this book had become a highly sought after document! The demand for this type of resource indicated that many teachers were not yet able to create their own open-ended activities and were operating at a superficial level. They appeared to not yet be able to internalise the information and adapt it to suit their own situation. One school-based co-ordinator suggested that at this stage of the year the class teachers were lacking in confidence with the program content and that they also had little time for preparation. She also added that some teachers had not moved away from the notion of a ‘book providing all the answers’.

Teachers also noted that individual differences among children made the EYNP model hard to implement. Children with special needs and children who were not independent learners made it difficult for the class teacher to set an independent task for the class and then concentrate on the small, focus teaching group, that is, a small teaching group of students with like needs.

The school observation visits provided an opportunity to see the EYNP in practice. One striking feature was the use of a common, shared language between students and teachers. Students were able to articulate what they were doing using strategies such as doubles, near doubles, adding ten, and so on. The teachers and other students were all able to immediately understand what was being done and how it was being done. This ability to articulate appeared to be a useful and positive feature of the EYNP, which the teachers and co-ordinators saw as crucial to their overall mathematics program.

Although the teachers had numerous concerns and troubling management issues while implementing the EYNP, the overall reaction to it was very positive. All teachers said their students enjoyed maths more and responded particularly well to the concrete, practical nature of the EYNP classroom activities. Genny, a class teacher at Tallard Primary School, summed up this view: ‘I enjoy using this type of teaching in my classroom. I enjoy the
practical, hands on approaches and I know that the students really enjoy it too. Therefore it is not a chore to
teach or be taught!'

The features of the teacher professional development program that appeared to be most important in causing
change to teacher practice were the EYNP interview and the classroom teaching approaches. All the teachers
commented on the usefulness of the information provided by the interview and how they used the information to
shape their classroom program and teaching sessions. The teaching approaches outlined in the professional
development also proved to be useful to the teachers. This seemed to be largely because the students enjoyed
them and the teachers could see the results they were after—for example, the use of a common shared language,
use of strategies such as counting on and doubles.

Many of the changes to teacher practice were not voluntary since the decision to adopt the program was made at
a school level. The interview and the classroom teaching approaches were initially compulsory for teachers;
however by Term 3 all teachers said they would happily use them again since they had been so useful to them
and so successful with the students.

Changes in student learning outcomes

EYNP interview Terms 2 and 4

All 12 class teachers conducted the EYNP interview with their Year 1 students in early Term 2 and late Term 4,
2002. As previously mentioned, the EYNP interview is an individual assessment designed to gather information
on a student’s mathematical skills and understandings. The purpose of conducting the EYNP interview at two
stages during the year was to try to monitor the students’ mathematical development over 2002.

The class teachers reported that most participating students did progress according to the ‘Stages of
Mathematical Growth’ outlined in the EYNP interview. The ‘Stages of Mathematical Growth’ is a
‘developmental framework across Number, Space and Measurement’ (Early Years Numeracy Program, 2001,
p. 69). This framework describes the likely mathematical growth and development of students in the early years
of schooling. It was identified by the Early Numeracy Research Project, which preceded the EYNP, and relates
to a number of Australian and international research findings. The stages outlined help teachers monitor
students’ mathematical development and growth.

By Term 4, the teachers reported that some students had progressed further than others along this continuum,
and a few remained much the same as in Term 2. However, the teachers noted that most students made a steady,
oticeable gain in the mathematical skills and understandings that they could demonstrate in the EYNP
interview. Morris Park Primary School had several children who achieved noticeable growth from Term 2 to
Term 4. This meant that by Term 4 they were able to demonstrate several mathematical skills and
understandings that they were unable to do in Term 2—for example, ‘Read, record, interpret and order two-digit
numbers’.

This school has a high proportion of its students with an ESL background. Both the principal and staff felt the
hands-on, concrete style of activities in the EYNP would particularly suit their students. Their EYNP interview
results appear to support this view. The class teachers at Morris Park Primary School were especially delighted
with their students’ progress and the EYNP co-ordinator said the results would help to give the program further
‘good press’ at his school.

Obviously many factors affect students throughout a school year and this would be reflected in any assessment
undertaken. It is difficult to determine the extent to which the EYNP played a role in the progress of the students
in this study. Throughout the year all topics and teaching activities were geared around the EYNP interview, so
in some respects it is no surprise that the students progressed according to the set criteria in the ‘Stages of
Mathematical Growth’. However, it is important to note that the majority of principals, school-based co-
ordinators and class teachers involved were adamant the EYNP was a major factor contributing to the success
that many of their students were experiencing.

They considered success to be noticeable changes, such as progress as per the EYNP interview, engagement and
enjoyment of activities in the numeracy block. Many of the student success stories recounted can be linked to
the changes teachers made over the year to their classroom practice. These changes to practice appear to revolve
around the results from the EYNP interview. Teachers conduct the interview with their students, note the skills
and understandings they have, and then gear their teaching and programs towards helping them achieve the next level of mathematical development, as per the interview.

**Conclusion**

The purpose of this study was to investigate the links between the teacher professional development component of the EYNP, teacher change and student learning outcomes. Evidence gathered over the course of the year, indicates that teacher change did in fact occur.

Hall and Hord (1984), identified levels of use of an innovation. Levels range from ‘non-use’, in which the user has little knowledge, connection or involvement with the innovation, to ‘mechanical use’, in which effort is focused on day-to-day use of the innovation, to ‘renewal’, in which the user re-evaluates, modifies, and explores new developments in relation to the innovation. Hall and Hord’s research ‘… implies that implementation to the point of institutionalisation … will require three to five years’ (Hall and Hord, 1984, p. 105).

In this study several class teachers appeared to move from a non-use state with the EYNP in Term 2, to a mechanical use of aspects of the program in Term 4. Most of the school-based co-ordinators said they wanted to implement the EYNP over a long period of time to enable their staff to move from a mechanical level of use to a more thoughtful and knowledgeable stage. The co-ordinators all stated that such change would require time and they also recognised the need for teachers to practise using the EYNP within their classrooms.

The two teachers who were EYN trainers as well as class teachers started further along the continuum of use as outlined by Hall and Hord. By Term 4, these teachers had consolidated and refined their knowledge and skills and appeared to be working at the renewal stage.

When matched against Hall and Hord’s research, most of the teachers in this study appear to have progressed along the levels of use continuum more quickly than would be expected. However, once again, all the teachers in the study were expected to participate in the EYNP and to implement it within their classroom. Therefore, in some respects, they were forced to move along the continuum as the year progressed (eg) from a non–use state in Term 2 to a mechanical-use state in Term 4.

The conclusion of the 2002 school year and the end of the fieldwork of this ACER study has evoked more questions than answers. The EYNP is based on a train-the-trainer style of delivery. Variations in the teacher professional development program delivery and implementation were clearly evident in the six case study schools. These variations were caused by many factors including school size, timetables, parent communities, staff expertise and interest in mathematics, and the school-based co-ordinators skills and concerns.

How effective is professional development, for both teachers and students, when it is delegated in this manner? How can the knowledge and skill base of the trainers be standardised and ensured? Yet with over 1100 Victorian state primary schools this mode of delivery seems both inevitable and cost effective for the DE&T.

Linking student outcomes to the EYNP teacher professional development program has proved a difficult task. The short time frame in this study has contributed to the difficulty in linking improved student learning outcomes specifically to the EYNP. Would the same level of student growth and development in mathematics have occurred anyway? Anecdotal evidence from the principals, teachers and school-based co-ordinators in this study suggest this is not the case, and that the EYNP has had a positive effect on all involved.

A struggling student at Morris Park Primary School illustrated this point. The school-based co-ordinator spoke of a child in Year 5 who had always had difficulty with mathematics. The co-ordinator decided to use the EYNP with this child in 2002. The EYNP is designed for P–4, but the co-ordinator felt this child would benefit greatly from the supportive strategies and teaching approaches used in the program. Damien, the co-ordinator said he felt the EYNP interview helped to clarify the student’s strengths and weaknesses and that perhaps for the first time in mathematics she was being taught at her point of need, that is, teaching in response to a student’s mathematical understandings. Damien said that when using the EYNP he was able to use a common, shared language with this student and that she was able to articulate her thoughts—a task which had previously proved extremely difficult for her to do. Damien said that it was a very rewarding experience for all involved.

If the enjoyment and success a student experiences in a teaching situation is related to an increase in their learning, then the EYNP appears to be making a positive contribution to this process.
The data collected from the case study schools during 2002 indicates that as a professional development strategy, the *Early Numeracy Professional Development for Teachers* seems to be successful. Changes to teacher practice have been viewed as indicators of success—for example, changes to planning, teaching strategies and assessment. Observable student learning outcomes have also been viewed as success indicators—for example, use of a common, shared language, EYNP interview results, student enjoyment of numeracy block sessions.

Some of these changes occurred due to the compulsory participation of early years teachers in the professional development program and the subsequent follow-up activities required in classrooms. However, other changes appear to have been induced by teachers being encouraged by the results they were seeing, and then refining and developing the program in their classrooms.

**References**


Chapter 7

Count Me In Too

Giving depth to teachers’ understandings of how students learn
to work with numbers

Prue Anderson

Context

The Count Me in Too (CMIT) early numeracy program Stage One has been operating in New South Wales Department of Education (DET) primary schools since 1996. Stage One covers Years K–2. Stage Two of the program, introduced in 2002, covers Years 3–6. The focus of this case study is on the Stage One program.

DET district mathematics consultants work with school-based learning teams of teachers (typically three to five) with the consultant as co-learner assisting schools to implement CMIT. Schools negotiate involvement in CMIT professional development with their district mathematics consultant. The district consultant’s involvement with schools varies, but is generally sustained on a weekly or fortnightly basis over one or two terms when schools are being introduced to CMIT. The district consultant also provides ongoing support for schools continuing with CMIT through the co-ordination of district network meetings to facilitate the sharing of information and new ideas and through assisting schools in the management of their own CMIT in-service activities and parent information sessions.

The CMIT professional development strategy is to give depth to teachers’ understandings about how students learn to work with numbers. The underpinning belief is that that teachers will be effective if they have a deep understanding of what their students know and where their students stand in relation to more sophisticated understandings about number. The strategy also assumes that paying close attention to the ways students learn, and what it means to understand, will challenge many teachers’ prior beliefs and personal theories about how children learn and that these ideas need to be changed to achieve substantial improvements in practice.

Teachers work with their own students, learning how to elicit and observe the strategies their students use to solve number problems. Teachers are shown how to map their students’ strategy use onto a research-based learning framework that describes the development of young children’s understanding of number. Teachers are introduced to a wide range of activities and resources designed to assist students, working at different levels of the framework, to consolidate and extend their understandings. It is expected that teachers will adapt the materials, demonstrations and modelling of activities provided through the support of the district consultant to suit their own students.

The CMIT professional development strategy

The model engages teachers in classroom-based learning through observation, diagnostic interviews and reflection, using videos of student’s classroom activities as a reflective tool. The focus on the learning framework enables its adoption as a personal theoretical model to be facilitated by being grounded in a teacher’s classroom experiences. The teacher’s classroom practice is modified to accommodate the change in personal theories on how children learn, which in turn impacts on teaching and on student outcomes. Consequently, the learning framework takes on the function of a viewing frame to guide assessment and instruction in early number strategies (Gould, 2000, p. 24.)

The Count Me In Too professional development strategy is based on linking four groups within the project: academic facilitators, consultants, teachers and students. (See Figure 1.)
Count Me In Too

Figure 1: Professional development strategy

The CMIT PD strategy constantly evolves. Every year the strategy and its supporting resources are updated to incorporate relevant new findings from academics, consultants, teachers and students engaged in the collaborative work of improving the teaching of number. The academic facilitator influences the evolution of the learning framework in the light of new research and also contributes to the ongoing modification of the PD strategy through evaluation of its effectiveness. The district mathematics consultant shares theoretical and practical knowledge, drawn from being a specialist in primary mathematics and having a breadth of school experience, with the classroom teacher, who has expert knowledge of her own students and school. The students are the focus of the strategy that seeks, through this partnership of teachers, consultants and academics, to increase students’ knowledge, understanding and skill in working with number.

The key features of the professional development model are:

- the use of quality information on student performance that impacts on teachers’ expectations and provides a starting point for their teaching
- the adoption of research-based learning framework linked to the assessment that provides direction in instruction and a shared purpose for student learning
- collaborative learning focused on the core work of teachers (Count Me in Too Professional Development Package 2002).

Intentions

Teachers

CMIT is intended to promote good quality learning in teachers through real inquiry into student learning, engagement with their knowledge of the development of understanding in number and encouragement to reflect more deeply on their practice. ‘It is not what they are told to change but what they come to believe in that counts’ (Gould, 2002, Feb CMIT District Consultants’ Conference). CMIT meets many of the criteria outlined in the literature review as features of programs that are likely to provide effective opportunities for teacher learning. It is grounded in classroom practice and the curriculum that students study. It is connected to several elements of instruction including assessment and it is extended in time (Cohen and Hill, 2000).

CMIT uses a powerful assessment tool, the Schedule for Early Number Assessment (SENA), which teachers are taught to administer by the district consultant. Student responses to the SENA challenge teachers’ beliefs about how children understand number. The SENA often gives highly proficient students the opportunity to demonstrate sophisticated levels of understanding that may come as a surprise to those teachers who have confined their teaching to the year level curriculum. It includes activities that may reveal weaknesses in strategies and understandings of students whom teachers had previously regarded as highly competent because these students were able to recall basic number facts accurately.
The SENA also confirms teachers’ assessments of many students’ general level of skill, but it sharpens their perceptions of what these skills actually are and how they might differ between students who appear to be performing at a similar level. Teachers map each student’s performance against a theoretical framework, the Learning Framework in Number (LFN), which describes a progression of development in conceptual understanding of our base ten number system, enabling teachers to identify those skills and understandings that will most help each student to increase their level of understanding.

*The learning framework provides a basis for observing and understanding children’s solution strategies. It can be applied in assessment and teaching and provides a means of documenting students’ progress. Count Me in Too uses the learning framework as a tool to assist teachers to ‘get inside’ the learning process and understand how our learners make mental connections between different concepts in mathematics.*


A defining characteristic of the intent of this PD strategy is its focus on changing teachers’ knowledge by engaging teachers in the examination of how students learn in a specific content area and what student proficiency means rather than by focusing on what effective practice might look like. The CMIT strategy emphasises five of the six critical components of professional development outlined by Supovitz (Supovitz, 2001, p 83). Administration of the SENA shows teachers how to connect their work to specific standards for student performance, described in the LFN. The results of the SENA immerse participants in questioning and experimentation, therefore modelling inquiry forms of teaching. The district consultant engages teachers in concrete teaching tasks, based on teachers’ experiences with students. CMIT also focuses on subject matter knowledge with the intent of deepening teachers’ content skills. The CMIT PD strategy is sustained over time with the initial introduction of the SENA and LFN followed by classroom demonstrations and support provided by the district consultant. To a lesser extent the negotiations between the district consultant and the school take into some account other aspects of school change that impact on the effectiveness of PD.

**Students**

The intended student learning outcomes for CMIT are to develop students’ knowledge, skills and understanding of number by engaging students in sustained mathematical thinking and reflection on the methods that they use to solve problems. Students are encouraged to develop increasingly sophisticated solution strategies through being given the time and opportunity to think about ways to solve problems that they find challenging. The initial SENA assessment, combined with ongoing observation and assessment, assists teachers to fine-tune their teaching so that problems presented to students are pitched just beyond the leading edge of the student’s current knowledge. Classroom discussion of solution strategies helps students to construct shared meanings about number that lead to deeper understanding.

**Connections with the content that teachers teach**

The content of CMIT addresses number skills already present in the early years curriculum, but the intention of the program is to change the way this content is taught. A draft version of the DET mathematics curriculum reflects the CMIT emphasis on the development of students’ solution strategies to number problems and also describes higher expectations of performance in number in the early years of school. This will provide a greater degree of system level support for CMIT.

**Delivery mode**

The district consultant introduces teachers to the Schedule for Early Number Assessment (SENA) and the Learning Framework in Number (LFN). Teachers are required to administer the SENA to all their students and to allocate the students to levels of the LFN. The district consultant then works with teachers in their classrooms, assisting them to provide teaching activities designed to suit students working at different levels of the LFN.
There is no module to present or resource to implement. As teachers work with ideas from the framework, they start to incorporate their personal theories of learning. This produces an integration of curriculum development with staff development (Count Me In Too Professional Development Package, 2002, p. 3).

The district consultants modify the support they provide to suit the needs of each participant.

The CMIT program is supported by a resource package, distributed to each CMIT co-ordinator, that describes the professional development model, details the school commitment required and includes a suggested outline for implementation. Accessible readings are provided with an extensive reference list. The package includes a detailed explanation of the LFN and the SENA. Two videos describe the purpose of the program in greater detail, illustrate administration of the SENA and provide examples of how to select and use games and activities that will appropriately challenge children’s understanding. A CD-ROM provides greater detail about the use of the LFN. A DET publication Developing Efficient Numeracy Strategies has extensive descriptions of games, activities and teaching resources linked to each level of the LFN. 1-2-3 Count with Me is a new CD resource produced for isolated rural schools that explains critical features of the program.

Schools in the case study

Seven research schools were selected for the CMIT case studies. By the end of 2001, many schools in NSW had already participated in Stage One of CMIT. Three of the schools in this study, Bakers’ Hill Primary School, Inner Primary School and Station Street, made a commitment to CMIT for the first time in 2002. Three were revisiting CMIT—Dove Street Primary School, Tree Tops Primary School and Sun Valley Primary School, and one school, Rose Meadows Primary School, had maintained an ongoing commitment since its original introduction in 1996.

All the principals of the research schools were persuaded, by the Education Department that CMIT was worth the effort given the substantial research evidence of improvement in student learning outcomes and the Department’s ongoing commitment to its implementation. At Baker’s Hill Primary School, the decision to commit to CMIT for the first time was based on a new principal’s commitment to the professional development of staff. At Inner Primary School and Station Street Primary School a substantial reason for this decision was the principal’s perception that newly appointed CMIT co-ordinators had the necessary leadership skills to implement and support the program. The schools re-introducing CMIT were doing so because staff with CMIT expertise had left or the program had not acquired sufficient support at the time of its introduction to be maintained.

However, principals’ commitment to CMIT was invariably qualified during interviews. Enthusiasm for a good quality PD program was balanced by concerns. CMIT was seen as having a fairly narrow focus on number and restricted to the early years of schooling. Principals were concerned that CMIT did not address the breadth of a mathematics curriculum that also included space and measurement. Some principals were aware of the new Count Me In Space and Count Me In Measurement programs being developed, but were concerned about how much of their PD budget they were able to devote to mathematics, while also covering the whole school curriculum.

While some principals were informed about Stage 2 of CMIT, they tended to be more sceptical about how the program would be implemented or supported by teachers in the upper years of primary school. All principals were concerned about the time and resources that CMIT absorbed, given what they perceived as its fairly limited curriculum coverage. In some schools this concern was reflected in CMIT being only one of a wide diversity of school priorities, or a small aspect of a larger program of mathematics reform, while other schools restricted their focus and made CMIT a key priority for a short period. Rose Meadows P.S., the one school with a sustained commitment to CMIT, placed a strong emphasis on the language of mathematics developed in CMIT activities to align CMIT priorities with the high level of language needs in a school with 98 per cent NESB (non-English Speaking Background) students.
Gathering data

The following research questions were the focus of data gathering:

- What are the intended outcomes of the CMIT professional development program?
- How does the school context influence the introduction of CMIT and the nature of support given to teachers?
- What is the teacher’s initial level of knowledge and understanding of CMIT and how is this reflected in the initial implementation of CMIT?
- How does CMIT professional development change teachers’ knowledge and practise in the teaching of number?
- To what extent do teachers’ CMIT lessons focus student learning on core number concepts and extend student understanding of number?
- Does CMIT significantly improve student learning outcomes?

The intended outcomes of the CMIT program were determined through examination of the CMIT Professional Development resource materials, attendance at a full-day training session conducted by DET for new district mathematics consultants and attendance at the first day of the annual Mathematics District Consultants’ Conference. Peter Gould, Chief Education Officer Mathematics DET, was also interviewed.

Understanding of the school context and support given to the implementation of CMIT was based on one-hour interviews with principals conducted in April and November 2002 and examination of school policy documents and annual reports. Where appropriate, the assistant principal and CMIT co-ordinator were also interviewed.

Exploration of changes to Year 1 teachers’ knowledge, understanding and level of use of CMIT were based on several sources of information. One source was an interview with each teacher of approximately 40 minutes and observation of a CMIT class in April and a second interview and CMIT class observation in November 2002. All interviews were recorded. The Year 1 teachers also completed some written tasks. Teachers explained a diagnostic assessment they made for a hypothetical student, ‘Julie’, based on responses to a series of number problems in April and a second explanation of a diagnostic assessment for a different student was made in November. Teachers also made four entries over two terms in a logbook. Teachers recorded what they considered were examples of exemplary CMIT lessons and made detailed notes of the progress of three students, selected as case studies, working at different levels of the LFN at the outset of the program. Each teacher also completed a background questionnaire about teaching experience.

Changes in student learning outcomes were measured through teachers’ pre- and post-administration of the SENA as part of the CMIT professional development program. It was common for the gap between administrations of the SENA to be ten to fifteen weeks. Teachers also administered two ACER LLANS (Longitudinal Literacy and Numeracy Study) assessments of number skills on an individual basis to all Year 1 students. The first assessment was administered in April and the second in November 2002. The LLANS study provides normative data for these assessments. These assessments have been calibrated onto a common scale and a comparison made of the growth in achievement of the CMIT students with the growth in achievement of the normative cohort over the same time period. Teachers also recorded student attentiveness in mathematics classes in April and November 2002 using the Rowe Behavioural Index. Student work that provided evidence of changes in students’ understanding of number was collected by each teacher for the three students whom they had selected as case studies for the logbook entries.

The four district consultants providing CMIT professional development to each of the research schools were contacted by email or interviewed by phone. The consultants were asked their opinion of influential aspects of school context in relation to the implementation of CMIT and their overall estimation of the teachers’ knowledge, understanding and level of use of CMIT in each school.
Research sites

Seven schools were selected for the CMIT research. Two Year 1 teachers from each school participated in the case studies. The schools were all located in the Sydney metropolitan area. Table 1 shows some of the characteristics of these schools.

Table 1: Characteristics of CMIT research schools

<table>
<thead>
<tr>
<th>School</th>
<th>Size</th>
<th>Location</th>
<th>SES</th>
<th>NESB</th>
<th>ATSI</th>
<th>Average number of transient students</th>
<th>Population trend</th>
<th>Principal’s experience in school</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dove St P.S.</td>
<td>320</td>
<td>suburban high</td>
<td>30%</td>
<td>0</td>
<td>10</td>
<td>increasing</td>
<td>2nd year</td>
<td></td>
</tr>
<tr>
<td>Bakers Hill P.S.</td>
<td>182</td>
<td>inner urban mid to low</td>
<td>33%</td>
<td>5</td>
<td>6</td>
<td>increasing</td>
<td>1st year</td>
<td></td>
</tr>
<tr>
<td>Inner P.S.</td>
<td>125</td>
<td>inner urban low</td>
<td>80%</td>
<td>6</td>
<td>70–90</td>
<td>decreasing</td>
<td>7th year</td>
<td></td>
</tr>
<tr>
<td>Rose Meadows P.S.</td>
<td>245</td>
<td>inner urban mid-low</td>
<td>98%</td>
<td>1</td>
<td>40–60</td>
<td>stable</td>
<td>13th year</td>
<td></td>
</tr>
<tr>
<td>Station Street P.S.</td>
<td>635</td>
<td>outer urban high-low</td>
<td>27%</td>
<td>16</td>
<td>minimal</td>
<td>stable</td>
<td>11th year</td>
<td></td>
</tr>
<tr>
<td>Treetops P.S.</td>
<td>370</td>
<td>suburban mid-high</td>
<td>36%</td>
<td>0</td>
<td>minimal</td>
<td>increasing</td>
<td>2nd year</td>
<td></td>
</tr>
<tr>
<td>Sun Valley P.S.</td>
<td>317</td>
<td>suburban high-low</td>
<td>15%</td>
<td>1</td>
<td>10</td>
<td>increasing</td>
<td>1st year</td>
<td></td>
</tr>
</tbody>
</table>

The schools ranged from a highly transient inner urban population of 125 students to 635 students from a stable outer suburban school population. Students from non-English speaking backgrounds formed as little as 15 per cent of the population in one school, approximately 30 per cent of the population of four schools and over 80 per cent of the school population in two schools. The school populations represented a range of socio-economic backgrounds. Most schools had stable or increasing enrolments and staff turnover in all schools was minimal. Four principals were in their first or second year in the role and three had been principal of their school for over five years.

The school context

The classroom

The Year 1 classrooms of the research schools had much in common. Rooms were festooned with many examples of students’ work. There was always a quiet reading area with cushions and displays of books. Rows of shelves stored a wide range of resource materials from mathematics and science equipment to art materials and stationery, as well as there being drawers for students to store their own work. Tables were arranged for groups of four to six students to work together. Most classes had just enough space for approximately 28 students to sit together on the floor and to also spread out when working in small groups, some enjoying the squeeze into nooks and crannies.

Most classrooms had challenges for the teacher. These ranged from a large number of students with limited English in several classes, highly disruptive students with pronounced behavioural problems in some classes, large numbers of Kindergarten students in some composite grades with no preschool or child-care experience, a constant in-flow of new students and loss of settled students in two classes and two classes with a large influx of students from a local alternative school who needed to adjust to a different school culture. A few teachers relished their good fortune in having an ‘easy’ class.

The staffroom

Teachers were generally isolated in their classrooms. They rarely had the time or opportunity to be involved with other teacher’s classes. Time spent in joint planning of curriculum activities ranged from as little as a few hours a term to rarely more than an hour a week. CMIT was only one of many activities on the school calendar that needed to be planned at these times.
The observed culture of most staff room conversations during recess and lunch was of light-hearted chat, provision of empathy, support and encouragement and the resolution of organisational issues. Teachers seemed generally willing to offer advice to teachers with problems or give forthright opinions but were not seen to engage in sustained discussion of teaching issues. Teachers who were interviewed generally did not report discussing CMIT issues with other staff or with their district consultant except to seek practical support, usually from the CMIT co-ordinator or the consultant.

The principals

All principals wanted to improve the mathematics teaching in their schools. At Station Street Primary School, CMIT was one of two major priorities in the school. The principal had waited until he was sure CMIT was a worthwhile innovation that was likely to last, before committing extensive school resources to its implementation. In five schools CMIT was part of a program of major change envisaged by the principal to have teachers become more student focused and reduce teacher use of work sheets. At Treetops Primary School mathematics performance was seen to have dropped according to BST results and Rose Meadows Primary School, with its ongoing commitment, supported CMIT to maintain high standards. Apart from Rose Meadows and Station St., most principals saw CMIT as ‘heading in the right direction’, but not a core aspect of their program of whole school change.

Principals valued CMIT as an activity based, hands-on approach that was child focused, generated student enthusiasm and engaged students, teachers and parents in mathematics in a non-threatening manner. Several principals suggested that CMIT was a recycled version of programs teaching mathematics through games that had been popular twenty years ago. They supported CMIT but did not consider it to be particularly innovative. Most principals were impressed by the research supporting the effectiveness of CMIT, but did not appear familiar with the theory or the intended outcomes of the program. Only two principals, from Baker’s Hill and Rose Meadows, clearly voiced a recognition of the role of the SENA assessment in challenging teachers’ perceptions of student ability and explicitly valued the ensuing staff dialogue and questioning of previous assumptions.

Principals generally entrusted the implementation of CMIT to the co-ordinator and saw their role as one of support and encouragement of the co-ordinator. This varied from expressions of confidence and appreciation through to the mobilisation of time, money and people resources to assist co-ordinators in the preparation of activities and implementation of CMIT. Station St P.S. was the most generous in terms of the time release and budget support given to the CMIT co-ordinator.

The CMIT co-ordinators

All CMIT co-ordinators were positive, enthusiastic and committed to their role in successful implementation of CMIT. The overall perception of the co-ordinators was that they were likely to encounter increasing resistance to CMIT at higher year levels. Only the kindergarten teachers were ever referred to by the co-ordinators as a likely source of support and advice in the implementation of CMIT. Apart from the one school with an ongoing CMIT program, co-ordinators usually perceived that staff would be reluctant to embrace CMIT unless it was made as painless to administer as possible. While the theory of the CMIT PD strategy is not about implementing a lock step program, teachers expected that they would be asked to follow a reasonably explicit set of guidelines. Most teachers knew that CMIT required a lot of resource preparation as well as demanding a high level of classroom organisation. CMIT co-ordinators took various paths in trying to lighten the teacher’s load in preparation for CMIT classes. A major part of the co-ordinator’s role was seen to be producing resources, running around, supporting and hand holding that would make CMIT easy for others. The CMIT co-ordinator was usually also the mathematics co-ordinator for the whole school and generally had one-hour time release per week for this role. They often also carried additional responsibilities, such as student welfare with no additional time release. The co-ordinators all put a lot of their own time into preparation for the implementation of CMIT.

The district consultant

Good consultants were seen to raise the level of engagement and excitement about CMIT in the whole school, ranging from the enthusiasm of the students who delighted in the activities, to the motivation of staff, involvement of parents and support from the principal. CMIT co-ordinators seemed to be particularly affected...
by the quality of their relationship with the district consultant and either spoke in glowing terms, or with serious
disappointment, about the perceived level of inspiration and support provided.

Co-ordinators often claimed they could not have gone ahead without the support of consultants with whom they
had good rapport. In one case the same consultant was described in quite different terms by co-ordinators from
different schools: Sun Valley P.S. and Dove Street P.S. The consultant also saw Sun Valley P.S. as having staff
with the capacity to take up the CMIT initiative and Dove Street P.S. as having overly dependent staff who
‘needed to have their hand held every step of the way’ and were unlikely to sustain a commitment to CMIT. The
Dove Street co-ordinator found the consultant from a rural area where she had previously been teaching to be
more supportive and maintained extensive contact with this consultant as she struggled to bring highly resistant
staff onside. At Baker’s Hill teachers’ initial perception of a lack of leadership from the consultant, based on
concerns over the introductory sessions and early demonstrations, were counteracted by a highly motivated and
skilled co-ordinator.

The parent community

Parent communities varied in their attitude to CMIT. In Sun Valley it was the parents who initiated a major
innovation in the school mathematics curriculum, being entirely responsible for establishing, and running the
Puzzle Box program. All students in the school borrowed mathematical puzzles on a weekly basis to take home
and share with their families. The principal attributed much of the former success of the school mathematics
performance to this program, which had subsequently lapsed for lack of space.

Parents at this school were keenly involved in all aspects of CMIT, as well as the re-establishment of the Puzzle
Box program. Inner school saw that it had a major role in providing a sense of community to new arrived
isolated immigrants. The school went out of its way to find roles and accommodate parents in school activities.
Teachers cheerfully managed enthusiastic parents with varying levels of competence in supporting activities and
generally limited English. At Baker’s Hill most parents were too preoccupied managing their own lives to be in
a position to contribute to the school.

In other schools parent communities were suspicious of the effectiveness of a mathematics curriculum that
appeared to be based on games. Most of these schools invested time and effort into explaining CMIT to parents
and were generally able to bring the parents onside. Many subsequently found some parents who were initially
willing to help in the classroom or spend time making resources, but only Station Street, Inner School and Sun
Valley were able to sustain a commitment from parents to provide ongoing help with CMIT. At Dove St and
Tree Tops several teachers expressed uncertainty and anxiety about implementing CMIT when they also felt
obliged to meet perceived parents’ demands for a more traditional mathematics curriculum. These teachers
tended to resolve this dilemma by regarding CMIT as a ‘hands-on, fun’ extension to their existing practice.

Implementation

Support and resourcing

Involvement in CMIT is negotiated between the school and the district consultant to ensure program delivery is
flexible and meets the needs of the school. In practice the mode of delivery of the program to the urban research
schools in this study was fairly uniform.

The district consultant worked with principals and CMIT co-ordinators to introduce school communities to
CMIT through activities such as whole school staff in-service sessions and parent information evenings. All
staff were encouraged to develop a basic understanding of the Learning Framework in Number (LFN) and its
relevance to every level of primary school. Samples of games and activities were generally used to explain how
CMIT was implemented. Schools did not appear to use the videos included in the CMIT resource materials to
support the introduction of the program. Most co-ordinators had not watched the videos and teachers usually did
not know of their existence. Co-ordinators were invariably so focused on preparation of materials and co-
ordination of training that watching videos simply didn’t make it onto their extensive list of things to do.

Teachers participating in the professional development program were introduced to CMIT through a one-day
training session. The district consultant modelled SENA administration, usually with real children, introducing
and explaining its links to the Learning Framework in Number (LFN). The consultant demonstrated a selection
of activities designed to extend students at different stages of the LFN. Teachers were provided with SENA kits and summaries of the LFN and expected to then assess each student in their class, which was quite a tall order for those entirely new to CMIT. The LFN is divided into five aspects, each of which is further divided into five or six levels. Teachers needed to assign students to appropriate levels for each aspect of the framework. Teachers generally found this task initially quite overwhelming and reported confusion about the framework and concern about ‘getting it right’ in spite of consultant’s extensive efforts to reassure teachers that the assignment of students to levels was always subject to ongoing modification.

Most schools provided between half to one-day time release for each teacher to administer the SENA, which takes up to twenty minutes per child. The inadequacy of this time allowance was cited by all teachers as highly stressful. Principals were aware of this pressure and generally did what they could to muster additional resources or provide extra snippets of time using ‘creative budgeting’. The district consultant often spent one or even two whole days at the school helping with the assessments and supporting teachers in their interpretation of the results. Considering the time pressure it is not surprising that none of the research schools made videos of their students doing the SENA, even though this is the recommended practice in the CMIT manual. Once the SENA had been administered, teachers attended a moderation session, usually after school, when they discussed their interpretations of the SENA, addressing concerns about the matching of students to LFN levels and the effect of the SENA on their perceptions of students’ number knowledge. Consultants gave advice about the selection of appropriate activities for students at different levels of the LFN. At this stage, consultants usually arranged some demonstration sessions in schools that were designed to show case a range of CMIT activities and teaching strategies.

The district consultant then came to the school, usually on a weekly basis over a ten week term. Teachers were expected to assign at least two teaching sessions per week to CMIT. The consultant worked with the teachers to identify appropriate activities that matched the assessed levels of their students’ proficiencies and planned activities with the teachers for a class in the upcoming week. The consultant then attended each teacher’s class adjusting the level of support from a demonstration lesson to team teaching depending on the confidence and capability of each teacher.

Consultants reported ‘treading very carefully’ with teachers who were having difficulty implementing CMIT. The consultants did not consider that they had a mandate to be critical and relied on modelling, the students’ enthusiasm and provision of patient encouragement and support to assist teachers to change their practice. Consultants fitted themselves into each teacher’s comfort zone. One consultant saw that a teacher who put one group a day in the corridor to work at their assigned CMIT level with a parent supervising, while she worked with the rest of the students on a whole class activity, was at least moving in the right direction. Consultants were also appreciative of the difficulties of managing some classes. One consultant spoke of the extensive planning and sheer hard work that had gone into a CMIT team teaching session with a very competent Kindergarten teacher and an immature, unsettled class and admitted that it was not the sort of thing that you would want to do too often in that class. Consultants also reported the variety and range of activities that they always needed to bring with them to cater for the diversity of students’ abilities and levels of average ability in different schools.

At the end of the ten-week program of supported classroom assistance teachers assessed each student again using the SENA with another half to one day time release allowance. Teachers had to supply the results of both the pre and post SENA tests to the district consultant.

Preparation and storage of materials for the CMIT activities was a major concern for all teachers. The emphasis on working with small groups of students at different levels of the LFN required teachers to prepare a range of activities. Most classrooms were not stocked with basics such as counting frames, a range of dice and counters all of which needed to be purchased from a meagre budget and stored. Few commercial activities are available so teachers had to make their own. Much of the CMIT budget was used for cardboard and self-sealing plastic bags. Station Street Primary School invested heavily in sturdy storage containers and gave participating teachers a wide range of activities that had been prepared in the previous year.

In most schools the CMIT co-ordinator was given a single day of time release and access to parental support to prepare what she could for others to share. Teachers were on their own after that. Most teachers acquired resources through extensive commitment of their own time and often their own money. Provision of adequate resources was usually cited as a major source of stress by the CMIT co-ordinator. The success of CMIT was often seen as hinging on teachers having easy, ready access to materials. The CMIT co-ordinators at Station St
and Inner PS put a huge amount of effort into preparation of a wealth of resources to ensure that teachers would have everything they needed to work with small groups of students at different levels. Most co-ordinators used virtually all the time release they had for CMIT to organise making resources.

**Effects of participants’ motivation, experience and prior knowledge**

Co-ordinators and more recent graduate teachers expressed real enthusiasm for CMIT but more often the highly experienced Year 1 teachers were less committed. Most were interested in CMIT and willing to give it a go but reserved their judgement about its value. Teachers who were comfortable with their ability to manage multiple small groups working on different activities were more likely to express confidence and enthusiasm about CMIT than those for whom CMIT required substantial organisational changes.

Teachers with no previous experience of CMIT generally believed, like many principals, that CMIT was essentially a hands-on, fun approach to teaching mathematics through games. They had gleaned, from observation of other staff or through contact with teachers in other schools, that CMIT was heavily focused on the preparation and administration of games. The belief that CMIT is simply maths games appeared to be pervasive. A number also felt that the ‘wheel had turned full circle’ and this was a methodology that they had practised twenty-odd years ago. Scepticism generally centred on whether the amount of effort required to organise materials was worth the outcome in terms of students’ knowledge. Outcomes of student enthusiasm and enjoyment of mathematics were highly valued and usually the prime source of motivation for participation, along with an interest in revitalising teaching of mathematics that had become a little stale, or had not been the focus of professional development for a while.

Two teachers who had previously participated in CMIT programs that they considered to be unsuccessful were quite sceptical about this program and their commitment to it. One of these teachers, from Dove Street Primary School, began the interview by vehemently denying any knowledge of CMIT claiming that she had been left in the dark about implementing a program that had not been explained to her. It subsequently became apparent that she had a good understanding of the LFN and the development of number solution strategies and knew the SENA well. However, she preferred to only utilise limited aspects of the LFN that she considered to be important and preferred to work in whole or half class groups offering individual extension and support work to students through her questions. Because her adaptation of CMIT did not match the official version she perceived that she either was not doing it or did not understand it.

Denials of competence once teachers had integrated aspects of CMIT into their daily practice were not uncommon. The district consultant spoke highly of Rose Meadows Primary School, which had sustained a commitment to CMIT, saying that CMIT had simply become a part of the daily routine and the way that teachers thought about teaching number. Yet two of the teachers at this school expressed real doubt about their belief in or adherence to CMIT based on their perception that they did not do it properly. One teacher confessed, with embarrassment, that she only used one section of the SENA and did not even test her students on the other aspects because she did not find it useful. Another teacher preferred to use a very small range of game formats, mainly bingo, simply adapting the tasks to alter the level of difficulty. She also preferred to do most of her teaching in whole class groups so she had the chance to reinforce the language skills of students who nearly all came from ESL backgrounds. She did not feel her students got the support they required to understand key concepts when they worked in small groups. The district consultant acknowledged that when CMIT had been first introduced consultants had adopted a heavy stance about doing it ‘properly’. She said that the approach had been considerably softened and she now modelled whole class work as well as small group work in her demonstration lessons.

The notion of what constitutes ‘proper’ practice of CMIT is not easy to answer. In some ways these teachers’ perception of not doing CMIT properly is true. They did not appear to value students’ constructing meaning about mathematics. Instead they valued aspects of the content of CMIT that the SENA had shown them it was important for students to learn. They proceeded to teach this content in an effective but fairly teacher-controlled manner that was unlikely to elicit student inquiry. These teachers, who were highly regarded in their school, did not see a need to develop beyond this stage. They anticipated that this second time around with the CMIT program offered the chance to pick up a few new ideas to add to their teaching repertoire. There was also a sense of impending disappointment that CMIT was likely to show their teaching practice in a poor light.
Making meaning of CMIT

The constructivist theories of learning that form the basis of CMIT are enacted through the meaning teachers make of CMIT. Teachers attach their formative beliefs about CMIT onto their existing understandings. For some the join is good from the outset, for others less so.

A small number of research teachers expressed knowledge and pedagogical understandings that appeared to be closely aligned to the philosophical beliefs that underpin CMIT. The following example shows how one of these teachers organised her CMIT class.

This teacher was able to draw on her existing knowledge and experience to be selective about what she chose to emphasise in CMIT. In monitoring and adapting activities to suit her students, this teacher talked about focusing on what it was that helped students to make sense of what they were doing. She had a small class and in this observation she demonstrated a well-developed capacity to monitor and realistically evaluate student capabilities. She was quick to contain and channel students moving away from the task and praised students judiciously to encourage focused work. She was concerned that students thought about the mathematics in the games they played and monitored the way groups struggled when they came upon challenges, holding back and allowing students to puzzle over ideas they had not got quite right but also making sure they did not deal with problems by avoiding or ignoring them. She tried to match students with partners or in small groups that would ensure at least one student in the group would take on the role of monitoring and challenging the accuracy of the responses of the other students, or assume the role of supporting a weaker student by providing accurate feedback. When she worked with groups, the teacher asked the students to articulate what they were doing and why they were doing it that way. All was not perfect and students struggled to talk about what they did and the way they did it. Not all groups sustained a focus on the mathematics of the games they played. The teacher was experimenting with ways that students could record their responses to number problems with the purpose of encouraging student talk about processes and to also to encourage students to question and challenge the way they obtained their results. The teacher was concerned to improve her questioning skills so she could assist students to think about what they were doing and how it connected with what they already knew.

Three of the research teachers, more recent graduates with about five years teaching experience, also expressed the belief that their teacher training matched the CMIT approach. They were excited about the prospect of learning many new ideas and skills from CMIT that they saw as complementing and enhancing their practice.

The following is an example of one teacher’s early experimentation with CMIT. The teacher set up several activities that were designed to match different levels of the LFN. A large group of students played a game taking it in turns to land ‘jumping frogs’ on playing cards. The purpose was random selection of two numbers that the student then subtracted to earn a card. Subtraction of the numbers on cards that were landed on became addition especially when the first number selected was smaller than the second. With no one monitoring whether the answer was correct or not, addition was gradually abandoned and the purpose of the game became to acquire cards. Disputes began to occur as it became harder to land the ‘frogs’ on the few cards left. The teacher, who had been working with a group of students, reading the instructions from a work sheet in a mathematics book, came over to remind the group of the rules and walk them through the process of playing the game properly. Once she left, the exercise continued much as before. Students were playing the game, but the purpose of exploring strategies that might be used to calculate subtraction problems efficiently was being lost as students concentrated on how to control the frog’s jump so that it landed on the card they wanted.

In another group students were working in pairs fitting twenty plastic dinosaurs onto a bus drawn on a piece of paper. Getting the dinosaurs to fit without falling over and knocking the other dinosaurs down was a challenge. The purpose of the game was to throw a die, take that number of dinosaurs from the bus, and then tell a story, with variations, as different numbers of dinosaurs left the bus. One child became entirely engrossed with her story after the first two dinosaurs left the bus, while others ignored the story and took the dinosaurs on and off the bus, throwing the die and checking the number but also removing or adding the number of dinosaurs they preferred especially since the dinosaurs tended to fall over and knock each other off the bus.

The teacher’s assessment of this class was that it had been very successful. She felt that the students had enjoyed the activities, participated enthusiastically and, while they needed a few reminders about the rules, she was pleased with how much they had remembered from the previous session when she had introduced the games. She was confident that these activities had benefited the students since she had assessed students with the SENA, found their levels and given them appropriate activities that matched their level of development.
This teacher believed that there was a good match between her teaching pedagogy and CMIT and interpreted her students’ learning in a way that supported her beliefs. The district consultants’ opinion, after a term working in the school, was that overall the number of students in the school with behaviours that were challenging to manage made implementation of CMIT difficult. Both classes described above were observed in the same school, the district consultant describing the first teacher as ‘just a really good teacher’.

Management and effective monitoring of small group games in order to maintain a focus on number was a challenge that the CMIT PD strategy did not directly address. Experienced, confident consultants modelling tried and true activities did not make explicit the many strategies and techniques they employed to manage classes effectively. Consultants modelled and moved on. Not one of the research teachers reported having the opportunity to discuss the consultant’s experience of working with their class. Consultants usually recognised when there were large gaps between their classroom management techniques and a teacher’s, but did not wish to threaten teachers by drawing attention to these issues. They hoped that modelling effective alternatives might encourage teachers to adopt a different approach. Consultants also appreciated the difference between making a novel guest appearance in a classroom with a bag of exciting new goodies and the complexities of daily classroom management.

Observation of some of the other teachers with only a few years’ experience suggested that they also appeared to have difficulty making accurate observations about the mathematical knowledge that students were using in CMIT activities. It is possible that inexperience, combined with a novel and demanding set up of unfamiliar games and young students, made it too hard for these teachers to focus beyond the physical achievement of students working in small groups in their initial experimentation with CMIT. However, the teacher described earlier whose implementation of CMIT showed real depth of understanding had also only been teaching for five years.

The capacity to accurately observe and perceptively interpret students’ responses is not a skill that teachers have necessarily acquired as part of their teacher training yet it lies at the heart of successful implementation of CMIT. The usefulness of the SENA depends on accurate interpretation of student responses. It is impossible to know whether these less experienced teachers had also misinterpreted the SENA or whether their capacity to observe students diminished in the face of complex, competing classroom demands. The CMIT PD strategy recommends that teachers video some of their student responses to the SENA. The intention is to use these videos as a means of moderating teachers’ interpretations of student behaviour. Not one of the research schools had contemplated the possibility of using videos. CMIT co-ordinators did not mention it as a possibility suggesting that district consultants also avoided it. High levels of teacher anxiety about understanding the SENA and LFN, combined with lack of adequate time to administer the assessment, meant videos were most likely seen as an impossible extra demand.

The initial implementation of CMIT by some of the highly experienced teachers seemed to have the same focus on form rather than substance as that of the somewhat disaffected teachers referred to earlier. Observation of one class, at Treetops Primary School, showed a high level of teacher knowledge of student ability. Students sat quietly and patiently waiting their turn in whole class games. The teacher skilfully matched questions of different levels of difficulty to students’ different levels of knowledge and varied the pace of individual focus and whole group participation to keep all engaged.

Much of teaching was patterning student responses. Students recited counting forwards and backwards and in twos, fives and tens. The teacher asked individual students to give the number before or after and reinforced the answer through repetition. In games played with giant dice the teacher asked individual students to double, add and subtract mentally, again reinforcing the process as well as the answer for the rest of the group. This teacher grouped her students in pairs, selecting activities that reinforced skills the students generally appeared to have mastered. The teacher had games matched to three different levels of the LFN. While she had one or two students in different levels she did not find it practical to set out more activities for these students. The students were very focused, knew how to play the games correctly and generally kept a check on each other for accuracy. In one larger group, which sustained a game of bingo for a long period, the group obliged one child who always waited until the others supplied the answer to his calculation. The teacher was aware of this and said this child could perform the calculations, but was shy in the group. The teacher usually worked with the weaker students helping them to master basic concepts like numeral recognition and counting forwards number sequences while the others practiced their skills with the games she had given them. The teacher had paid careful attention to the CMIT PD. She had adopted games in the way that she perceived they had been modelled and was focussing on core skills described in different levels of the LFN.
This teacher had adapted CMIT to align with her beliefs. She believed her primary responsibility in mathematics was to teach the Year 1 curriculum. She saw teaching young children as a process of systematic, organised presentation and reinforcement of key concepts delivered with calm authority and enlivened by games. She believed the research reports stemming from CMIT and the importance of learning skills such as backwards number sequences and giving the ‘number before’ that had not been a part of her curriculum previously. While she had been interested to discover how unexpectedly well one or two students had performed on the SENA, she did not feel able to effectively pitch her teaching at more than three ability groups. She saw the groups defined by the LFN as very similar to her previous groupings of high, middle and low, but appreciated that the LFN spelt out what skills were associated with each of these levels. She saw that the LFN had sharpened her focus about what each group needed to learn. Her primary concern, like most research teachers, was with the weaker students.

Another teacher commented that it really did not help her to know that she had one student who could count to 100, when most of her students could not count to ten. These teachers tended to frame their interpretations of CMIT from the perspective of what they thought students needed to know rather than what might help students to understand. One teacher expressed feelings of extreme guilt about former classes whom she had not taught to count backwards because she did not know it mattered. Another teacher interpreted the SENA results as showing an increased level of dependence of students on their teachers. She expressed surprise at what her students could not do. She noted that she had not taught these skills explicitly but said she really thought her students would be able to work it out. Now she saw herself as having to teach those skills as well!

It is interesting to speculate as to why teachers misinterpret what CMIT is fundamentally about. The pressure of time, introducing the SENA, allocating students to levels of the LFN and matching activities to levels, possibly leads to an inadvertent focus on what needs to be done rather than why. Some district consultants spoke of their constant emphasis on CMIT being more than games but possibly teacher anxiety over unfamiliar demands and an expectation of a packaged program lead to selective retention. It is also difficult to pin down the interactive nature of a skilled teacher setting up and supporting student investigation of a problem than it is to show how to build and reinforce a repertoire of basic number skills. It is possible that a widespread lack of depth in their own mathematical knowledge can lead primary teachers to emphasis mathematics as discrete pieces of disconnected knowledge, reflecting their own limited understanding, rather than the underlying principles of a base ten number system.

What have teachers learned from undertaking CMIT and how has this learning been reflected in their teaching?

By November, teachers’ commitment to the implementation of CMIT varied. The teachers’ use of CMIT, as it appeared from a pre- and post-observation and interview, is mapped against Halls and Louck’s Levels of Use of an innovation (LoU chart, 1975) in the table below. The first three levels of non-use, orientation and preparation have been omitted from this table.
Two of the teachers appeared to be working at a level of renewal where they re-evaluated the quality of use of CMIT, made major modifications to increase the impact of their teaching and were exploring new ways to improve their teaching, drawing on extensive outside knowledge. None of the teachers had the time or support they needed to work at the level of integration, though one wished she could. Some teachers were more willing than others to collaborate with colleagues but this rarely amounted to more than a shared agreement to ‘do’ CMIT that sometimes extended to the selection of a common set of activities. Large variations in teacher familiarity with CMIT also meant that CMIT co-ordinators often used time spent in a team to provide inexperienced teachers with some basic guidelines and structure.

Six of the teachers appeared to be working at the level of refinement, varying the use of CMIT but staying within the immediate sphere of influence suggested by the PD. Three teacher’s use of CMIT had stabilised at the level of routine. Few changes were being made or contemplated. These teachers appeared to be largely complying with school policy rather than being motivated by their own sense of the value of CMIT. Two teachers were probably best described as working at the level of mechanical use because their implementation showed a superficial adherence to the structure of the innovation with little reflection on the how their teaching met student needs. However, this description diminishes the effort and thought that these teachers were putting into CMIT, albeit based on some misguided assumptions. Two teachers had abandoned formal CMIT sessions and reverted to their former number programs.

The amount of time that teachers formally committed to CMIT did not necessarily indicate of higher level of use of CMIT. As teachers absorbed and adapted CMIT it became less recognisable. Formal use of CMIT generally meant the teacher used games and activities that were linked to the levels of the LFN. Six of the teachers had continued with the twice-weekly formal CMIT sessions of approximately forty minutes duration established during the district consultant’s visits. Six teachers had reduced their sessions to once a week. All teachers said they continued to regularly use whole class ‘filler’ time for brief CMIT games, quizzes and counting practice. The reasons teachers gave for reducing the time spent on CMIT were either lack of reliable adult support to supervise different groups at their games, lack of sufficient suitable resources to cater for students who had reached the facile stage, a preference for including some more traditional ways of teaching number or the desire to achieve a better balance in their coverage of all aspects of the mathematics curriculum.

Many teachers’ attitudes and beliefs about CMIT had altered. The teachers who appeared to be operating at the highest level of use of renewal also showed a higher degree of reflective questioning of their practice. They
consciously focused their teaching on students’ understanding rather than what they thought students needed to learn. They had a breadth and depth of knowledge about the development of young children’s understanding of mathematics that they were more consciously seeking to link with their understandings of CMIT.

One teacher’s jaundiced views were turned around as she became interested in refining CMIT activities in order to see how her students learned. Other teachers engaged in refining CMIT were confidently building on their original positive outlook while others had some serious questions about aspects of CMIT. These teachers continued to enthusiastically implement a program that was conscientiously aligned to the district consultant’s model.

Two of the teachers working at the routine level did not show much commitment to CMIT. It appeared that the closer examination of CMIT required by this research program had confirmed their doubts about its value. One teacher was quite content with the benefits of the program as she was implementing it. Two teachers, assigned to the mechanical level in the table above, were enthusiastically implementing a program that did not appear to be as clearly aligned with their beliefs as they claimed. Two teachers had tried CMIT for the second time and rejected it for much the same reasons as before. They were not able to find a way to manage small group games so that students learned effectively.

**Changed beliefs**

One teacher was unusual. She appeared to have changed the direction of her attitude, moving from vehement disinterest in CMIT to a deeper understanding accompanied by engagement and interest in students’ development of number strategies. In April, this teacher had been adamant that the initial implementation of the SENA was a waste of time and told her nothing new. By November she saw that the benefit of CMIT was in learning more about the way her students think, seeing which students need to start from one and who can start from other points.

> I can’t believe how clever some of them are. They can think in ways I never thought they could. They get a deeper understanding from all the talking and explaining that we do. They don’t say that they just knew the answer anymore.

This teacher had previously given administration of some of the SENA assessment to a relief teacher but now said,

> If someone else does the testing for you it is really hard to see where the students are at. You really need to evaluate at the same time. The relief teacher did not ask enough questions but I knew what I was looking for. I did the ACER tests with all my students too. Some of the students are so confident in class, but it is different on their own.

The teacher had come to value what she learned about students’ understandings through the administration of a well-designed assessment instrument.

She felt that she had changed a lot and was asking the students much more about how they worked things out. She had extended the curriculum in appreciation of the ability of some of her students. Whereas she would not have gone beyond a 100 previously, she now did numeral recognition to 1000 and simple vertical additions with 100s and counting by 100s. This teacher wished that she could do a course to increase her understanding of how students learn, especially how to get students to move on from one stage to the next. She also wanted reassurance that she was doing the testing properly.

Unlike most other teachers, this teacher was able to sustain the use of games over the whole year without other adult help, while maintaining a calm, focused classroom environment. She was able to produce the variety of resources required to keep games relevant and interesting without subjecting herself to undue personal pressure. She did this by only teaching one game at a time and providing variations that catered for two levels only usually differentiating ‘head thinkers’ who were able to count on and perform some operations mentally from ‘block thinkers’ who needed to start from one or required concrete materials. This divided the class into two approximately equal groups. She also got the children to make their own resources as much as possible, such as bingo sheets from folded pieces of paper, or dice from MAB units.

In her new-found enthusiasm this teacher was reluctant to acknowledge her previous scepticism. The structural and organisational features of her lessons had not changed significantly over the course of the year. What had
changed was the teacher’s increased interest and focus on the development of strategies in number as a window into the student’s understanding of mathematics. Somehow, this teacher had managed to link her existing classroom practice to the theory of CMIT in a way that gave increased depth to her teaching and integrated her effective pedagogical techniques even though this was not her understanding of the modelled approach.

The teacher was not able to articulate the reasons for this change. It is possible that my interpretation of the initial class I observed, as showing a substantial influence from the teacher’s previous exposure to CMIT, began a process of change. In that first interview the teacher moved from a position of denial of her understanding of CMIT to one of acknowledgement of certain aspects of CMIT that she valued, once she had been given permission to be selective and endorsement of her current practice. This teacher’s development appeared to be largely derived from personal reflection. She did not report gaining more than new ideas for activities from the district consultant nor did she work closely with the other staff in her school.

The intention of the CMIT PD strategy is to encourage teachers to use their own professional judgement and become friendly critics of reform. But this message was either not conveyed or not heard by many of the research teachers. This teacher would appear to have become more willing to take up CMIT once she felt that she could legitimately make her own professional judgements about what mattered.

### Adaptation and refinement of practice

Five teachers, all of whom had been positive and confident about the value of CMIT in their classroom from the outset, had refined their practice in different ways. All but one of these teachers had been exposed to CMIT before. Two teachers were from Rose Meadows, the school with ongoing commitment to CMIT, one, at Baker’s Hill had moved from a school that used CMIT the year before, and one was from Dove Street, where CMIT had fizzled out a few years earlier. The other teacher, from Inner was new to CMIT but she had extensive experience in the development of hands-on numeracy curriculum materials for infants. This teacher found it easy to link the CMIT framework to her extensive knowledge of young children’s mathematical skills. These teachers each had respectively 4, 6, 8, 10 and 24 years of experience teaching in the K–2 area.

These teachers did not require convincing that CMIT would benefit their students. They were committed to hands-on mathematical activities, believed in the value of individual assessment and expected students to be working at different levels in their classroom. CMIT provided an assessment instrument and framework for assigning students to described levels of performance. The teachers’ initial concerns about the accuracy of their assessments had diminished. For some, the second round of exposure meant things fell into place that had been confusing and overwhelming first time round. Participating in this research program also increased their sense of professional obligation to understand and implement the program more effectively this time than previously.

For the two teachers in the school with ongoing commitment to CMIT, it was the ACER research that provided the incentive to reflect more deeply on the value of CMIT. The initial interviews began a process of reflection that was continued in completing logbooks and preparation for the final interview. Formal requirements to reflect on their practice appeared to assist the teachers to make links between their existing knowledge and CMIT. By the end of the year, these teachers were confident that their implementation of CMIT had improved and that commitment had increased. They believed that the organisation of CMIT was effective and realistic given the students they had and the resources they were able to access. Three of the five had cut back to one formal CMIT lesson per week, but used brief CMIT counting activities, games, and quizzes frequently at other times. They felt well on the way towards achieving the objectives they considered to be of prime importance in implementing CMIT. They were constantly on the lookout for new games and activities, mainly to provide novel ways for students to consolidate skills but also to provide extension for brighter students.

The ways teachers refined CMIT varied. Some teachers focused on the games, problem solving or language development. For other teachers it was the increased understanding of CMIT that raised their level of commitment and interest in reflecting on the beliefs underpinning CMIT. This helped to develop greater depth and focus in their lessons. The common characteristic of these teachers was movement in a direction that was faithful to the intentions of CMIT, though the teachers’ depth of understanding varied. Some teachers were more reflective by nature than others. Some teachers had a greater understanding of mathematics and more sophisticated theories of learning that they were able to link with CMIT to develop a well-integrated personal practice. Understanding of mathematics was not necessarily linked with formal qualifications. Some teachers’ knowledge was acquired by reflecting on their own learning of mathematics and observation of students.
Games focus

The one teacher who was new to CMIT focused on providing a range of games to engage students in enjoyable activities that helped them to practice or reinforce number skills. She had regular support from an ESL teacher-aide and a skilled parent. She also benefited from a CMIT co-ordinator who had made a comprehensive set of CMIT materials for each class in the infant area. She also had a very challenging class with almost all NESB students, many of whom had traumatic family backgrounds and little pre-school experience. This teacher usually divided the class into three groups, loosely based on ability, but also designed to swap students around and keep behaviour reasonable. She made sure any parents were only given students they could manage. Each group was supervised as they worked through four or five different games. Having a variety of games maintained students’ interest and focus and reduced pressure to win as a new game was always around the corner. The most immediately noticeable difference between the two observations of this classroom was the far greater degree of organisational smoothness by the end of the year. Overall the students were more focused and able to practise skills they understood but were not yet absolutely fluent or consistent in demonstrating in the later class. The earlier class had seen many students floundering to understand the rules of unfamiliar games or master processes that were just beyond their level of development and required almost one-on-one adult support for the students to make sense of the task. Familiarity with a range of skills, a reduction in the demand of the games relative to students’ level of development and a variety of games had made the class run more effectively.

This teacher was very confident of her proficiency and experience in teaching mathematics. She had appreciated finding out about the SENA, which was new to her, and enjoyed the half-day demonstration of games but said she did not really need this. She also said it was

interesting to see someone else handling your kids. You don’t often get the chance to sit back and watch your own class. It was nice to have someone else in the room but because I’m very experienced in infant I didn’t get much from it. I would have preferred to see upper primary. It would be essential for new teachers though.

She had been using number games for some time and appreciated the ideas for new games provided through CMIT. The change she noted most in her curriculum coverage was to focus on the backwards-number sequence that had been included almost incidentally in her former program. Otherwise she said she had never stuck with a syllabus or held students back.

This teacher appeared to be working at the level of refinement as she monitored and adjusted her program to ensure students participated productively. However, it is also possible to argue that her focus on games reflected a lack of depth in her understanding and that refinements were organisational rather than substantial. Given the difficulties of managing her class, and her limited exposure to CMIT this teacher appeared to have a repertoire of teaching strategies and depth of understanding of mathematics that would lead to the integration of CMIT in the longer term.

Problem-solving focus

Another teacher had abandoned the CMIT small group games altogether, largely because one highly disruptive student in her grade could not cope and regularly destroyed the games. She said the children knew how to pack up and move on, but she had not been able to change the child’s behaviour and felt it was too disruptive. Without access to any other adult support, this teacher reported her CMIT program as ‘falling off a bit after two or three months because there were too many behavioural issues that just put a limit to group work’. She also felt that students had difficulty applying skills they learned through playing games to other contexts. She wanted her number teaching to focus students on the application of skills rather than just skill acquisition.

This was the teacher who had shown the greatest depth of understanding of the CMIT philosophy in April. By November, her CMIT classes had become focused on problem solving. CMIT had supported this teacher’s interest in what it was that helped students to make sense of number. She had been particularly interested in ways that the district consultant set up problems for students to solve and elicited discussion of strategies. One of her innovations had been to challenge the students to set their own problems for homework with the requirement that they also had worked out the answers. Students then tested each other with the problems they had devised. She had gradually increased the specificity about the nature of the problems, for example, written
problems had to include groups of fives or tens. ‘Instead of me just providing problems the students had to think about how to word them.’ But she acknowledged that the kind of open-ended problems she wanted were hard to come by and wished she had more of them. She also felt that problem-solving activities were often hard to get going because it was difficult to set up an engaging context for the students with weaker skills. She felt that the best thing about CMIT was the challenge that it offered to the top students. This was also clear in the class observed in November, where some of the weaker students’ ability to participate in the problem set to the whole class was severely limited by their level of development in understanding numbers. The teacher continued to engage the whole class in CMIT games, quizzes and counting chants that reinforced basic skills or strategic thinking.

The successes and failures of CMIT in this teacher’s class had been a stimulus for her to refine her ideas about how to teach mathematics more effectively. CMIT added new perspectives and different ideas to her already extensive repertoire of skills and knowledge about teaching mathematics. Taking a problem-focused approach to teaching number was a new direction for this teacher. She felt the greatest change that she had seen in the students was in their willingness to have a go. This was confirmed in the November observation of this class, where a number of students were able to speculate on solutions to a problem that arose in the course of students developing their own Guess My Number games. Students had been asked to specify the numbers that were ten greater and ten less than their secret number. The problem that arose was whether it was possible to find a number that was ten less than one. One child suggested zero, but the class agreed that zero was not ten less than one. Two students suggested minus numbers. When the teacher asked how minus numbers might go, they chanted, minus one, minus two, minus three … When asked how they knew this, one student replied, ‘at the top weather station at Thredbo the weather is always minus, never Celsius or degrees just minus’. Another student came up with a different solution. She suggested that baby clothes often have four zeros, so they could do the same thing. The teacher acknowledged that this was another way to show amounts less than zero and recognised that this was also a good idea for how the problem might be solved. The teacher then left this problem and the suggested solutions in the students’ hands.

The teacher said that the students had also done a lot more recording about what they’ve done and the way they found solutions than she had ever asked of students in the past. She found that asking students to simply write down six addition sums that they could answer gave a very good insight into: ‘where the student is at and what they are comfortable doing for example, some students will write down 2000 + 2000 and others 1 + 3.’ Her appreciation of the insight into student strategies that carefully constructed, individually administered tests could provide had been increased:

> You’ve got to spend that time with each student. There are things you don’t see (in the classroom). One student was so much better. I hadn’t seen it. If I hadn’t done the SENA I might have missed it.

An increased awareness of individual students and their learning underpins the CMIT PD strategy as a characteristic of more effective teachers. This teacher regretted the tight financial constraints that prevented the school from supplying adequate CRT funds to allow reasonable time for teachers to administer tests. A forecast compromise was to possibly to do the SENA once in mid-year, with some other teacher relief funding, as a ‘better than nothing’ option.

In a whole-school maths survey done in October, this teacher reported that almost all of her students had written, ‘I enjoy maths.’ or ‘I’m really good at maths.’ She said she had never had this kind of feedback from her students before. She felt that the students had enjoyed the games, liked writing and recording their work and also enjoyed reflecting and that her class had got better at doing these things.

This example shows some of the complications of attribution. CMIT has contributed to this teachers’ development of her practice but not in isolation. The SENA has proved to be a useful assessment tool, the games and activities targeted at different levels of the LFN, less useful. The teacher was interested in building on students’ reflective capacity, which she had done previously through use of mathematics journals. CMIT encouraged her to focus more explicitly on problem solving.
Language development focus

Another teacher set out to focus more consciously on the development of language skills through CMIT. This was a major reason for Rose Meadows ongoing commitment to CMIT, as the school had a very high ESL population. But as this teacher admitted at the start of the year, with a busy schedule, her deliberate implementation of CMIT had probably dropped off in the last couple of years. This teacher chose to use some of her allocated support from a ‘fantastic’ CMIT trained ESL teacher to maintain her two CMIT lessons per week this year. She valued the importance of introducing academic language to students with high ESL needs from the beginning of school based on research findings, which suggested that ESL students acquire playground language in two to three years but can take five to six years to acquire academic language. This teacher placed great importance on developing students’ ability to describe what they had done. ‘I give the language when I explain the activities and then hopefully they can give back the language.’ Students listening to modelled descriptions, reporting back and writing about activities were prominent aspects of this teacher’s CMIT lessons. Having students tell her what they understood about the games also helped the teacher to control the effectiveness of the games that she was not always in a position to closely monitor.

Participation in the research project had encouraged her to think more deeply about students’ progression in learning number and to gain a renewed appreciation of differences in ability that can be hidden in a group and only revealed through individual assessments such as SENA or the ACER assessment.

You get surprises, there was one child who was such a shock. I didn’t realise what he could do ... I’m surprised how many children have difficulty with the backwards number sequences, they can do 10, 9, 8 and so on but they can’t do the others. I’m sure language problems are the cause. They always need to be reminded what the number before means. When I do this as a whole class I now realise that lots of kids are tuned out, what looks like the whole class chanting can just be led by a few. I need to think of activities that focus these children.

This teacher felt her skills in matching students to levels and knowing what to provide for students at different levels had been refined. She was confident about her adaptation of the progression of the CMIT program over the year. She felt the dice games suited the emergent and perceptual students who were learning to count and recognise numbers but found activities, rather than dice games, were more suited to teaching understanding of addition, subtraction and working with groups. She often used dice to support activities as a way of helping students to count.

This teacher’s clear focus on the meaning students make of the activities they do shows a faithful implementation of the intent of CMIT. The teacher was constantly refining her practice to improve the student’s understanding, gradually becoming more confident in discarding aspects of CMIT that were not useful and incorporating her own ideas about what worked.

Reflection and increased commitment

Another teacher at the same school had an experience that had powerfully reinforced the importance of CMIT. A girl had entered Year 1 midway through the year. The child seemed to be clever and was able to perform quite difficult number calculations for her age. Closer interrogation revealed that she used the extremely inefficient strategies even though she obtained the correct answer. ‘This showed me why it [CMIT] matters. You don’t often get to see it displayed this clearly.’ For this teacher an emphasis on teaching number strategies had become second nature and almost invisible. She derived enormous motivation and inspiration from this simple episode. As her colleague had commented earlier in relation to the difficulty of even noticing the huge developments in fluency in her class that were so obvious to me when I compared her lessons in April and November: ‘Teachers hardly ever get this kind of feedback. They don’t know when they are succeeding.’

This teacher spoke animatedly of her passion:

I love teaching maths. I struggled with maths and realised that I was badly taught. My husband and kids are very good at maths. It is not a foreign language.

She valued CMIT for its capacity to make maths easy and enjoyable and had observed a real change in the overall attitude of students to maths over time across the whole school.
Over several years she had come to discard many of the CMIT games that she felt were too simple and over too quickly. ‘They don’t last long, they are good for Kindergarten and the beginning of Year 1 but children need to move on.’

A recent change for her was to move more into the generation of multi-step problems with an emphasis on students’ comprehension of what they are being asked to do. She gave an example, ‘If there are 16 feet on the bridge, how many people would it be?’ She would play with variations of this problem over several lessons in a week always emphasising the groups and patterns students need to learn to see. She also noted that she used to look at a number per week but now she concentrated on the important numbers such as five, ten, twelve and twenty. She would spend a whole lesson on one number such as twenty, each child working individually with twenty cubes making and recording combinations and solving problems such as is the number odd or even. She preferred to work this way as she could monitor and correct individual understandings that were mainly lost in group work. The limited English skills of many of her students also meant close monitoring of comprehension of the task was important.

A major difference that was observed, but not noted by this teacher, was that earlier in the year she had been almost apologetic about her adaptation of CMIT to a point where she felt it no longer could be claimed as CMIT. At the end of the year she appeared to be a great deal more confident about the value of shaping her own pedagogy, acknowledging many important roots in CMIT but also integrating her own extensive understanding of how to help children understand number. This seems to put her at the highest level of use of an innovation. For this teacher the episode with the new student had given her an increased sense of having professional knowledge. She had found this enormously empowering.

Serious questions

Three teachers, all of whom were highly motivated and committed CMIT co-ordinators, ended the year feeling proud of what they had been able to achieve, but also each had some serious questions. Each teacher had made heroic efforts to facilitate the implementation of CMIT in their schools. All were agreed that the effort they had made for CMIT was excessive but none regretted this commitment. Having invested such efforts, these teachers continued to talk extremely positively about what they had achieved, but there were clear negatives. Two teachers were frustrated by the drawbacks of games and one by the lack of collegial support.

The two teachers who were beginning to question the role of games were both new to CMIT. They had focused their investment in CMIT in the development of extremely comprehensive sets of materials for all the teachers in the infant area. Both teachers had almost single-handedly made beautiful duplicate sets of games in every possible variation for the five levels of the number framework. Great care had been paid to the attractive presentation, durability and packaging of all these games, but their faith that the games would unilaterally improve students’ understanding was being tested by their observations. Both were aware of the ways in which students could subvert games to the point where the original purpose was largely lost and of the near impossibility of preventing this from happening in some groups when you had multiple groups working on different tasks. Even when parents were available for support, the parents often did not appreciate the purpose of a game and were not trained to know how to intervene in ways that would support development of a student’s understanding.

One of these teachers was particularly concerned that teaching through games encouraged a competitive spirit that made it difficult to avoid the dominant child ruling the game, cheating or overly supporting the other child. She was also frustrated by her inability to keep track of the accuracy with which games were played and mainly balanced games with worksheets of equivalent skills to keep track of accuracy. She also noted that some children could play the game but not use a worksheet. She attempted to dismiss her frustration with the observation that children working on the same worksheet can copy and rely on others to tell them the answers and this may also pass unnoticed.

Otherwise, this teacher was a stanch advocate of CMIT. Her confidence in recognising students’ level of development and matching this to appropriate activities had clearly increased. The most substantial change she had seen in herself had been a change in approach from the imposition of her solution strategy onto students, to an exploration of students’ strategies and testing of possibilities, before coming to conclusions. She reported:

*I used to teach concepts but now I teach strategies. I started at the end before and used my method. They were not necessarily the students’ methods. Now I see how they try to do it.*
She also said she probably tended to teach to the brighter child before but now had a greater awareness of the full range of abilities in her class.

The other teacher had similar concerns about the games.

_Sometimes they play without really understanding what they’re doing. I sit with them and say, ‘Stop, slow down, now how many did you get? How many do you have already? They want to rush in and win. You need to be there for everyone to have a turn._

In the November observation, this teacher was struggling to control the class once she had students playing games, even with support from two other adults during the game playing. She had a number of highly disruptive students in her class with little school experience who mainly came from recently traumatised home backgrounds and had limited English. Dividing the class by ability meant these students were distributed across the groups supervised by adult helpers who could not easily contain these children once their interest in the game they had been given waned. The teacher tended to focus her attention on one group and ignore disruptions for as long as possible: consequently she had a very wound up, excitable group of children to try to calm by the end of the session. Her commitment to CMIT was shown through her determination to leave a comprehensive legacy of resources catering for all levels in the infant area to the school that she was leaving at the end of the year.

CMIT has stimulated this teacher to think more deeply about her mathematics teaching and kindled her interest in a new program, five fingers mathematics. One of the attractions of this program was that it was less resource intensive and appeared simpler to implement than CMIT while addressing similar concerns.

The third teacher was in her second year of exposure to CMIT. She was frustrated by the lack of collegial support in her new school and missed both the sharing of resource development that had happened with staff at her previous school and the opportunity to just drop in for a chat with the local district co-ordinator whose office had been up the road from the school. She felt her implementation of CMIT had suffered from the lack of opportunity to bounce ideas off others, exchange ideas that worked and simply share the burden of planning and preparation. While she had continued to develop and implement her own program, using much of the material she had developed the previous year, she questioned the long-term sustainability or effectiveness of working on this kind of program in such isolation. She was also disappointed that her role as the CMIT co-ordinator, that she had imagined would involve facilitation of staff excitement and interest in CMIT, had met with such stone-faced resistance from the staff.

Improvements this teacher had noted in her implementation had been teaching the games more clearly because she understood them better. She also used language more concisely, especially ensuring that she avoided terms that frightened students such as multiply and divide and used ‘groups’ and ‘lots of’ which were words they understood.

**Confirmation of doubt**

For four teachers, their second attempt at CMIT had confirmed their previous response several years earlier—that CMIT was too difficult, too noisy and too hard to manage alone. These were teachers at Treetops, Baker’s Hill and Sun Valley. Two teachers were continuing to implement CMIT at a level of minimal routine use to conform with school policy. One teacher expressed the frustration of all:

_The groups tend to end up making you angry. You try to work with one group, another group starts a fight, you go to fix that, then the weak group loses track. Meanwhile the middle kids may be messing up or a child needs help._

All these teachers ran successful literacy groups first thing in the morning. One teacher commented that the literacy groups were easier to manage because, once the activities were established, they remained the same, only the level of text increased in difficulty. The teachers were also able to obtain parent helpers for the literacy sessions that began at 9 a.m., whereas the 11:30 a.m. start for numeracy classes was difficult for most parents. The same teacher also expressed the feelings of many when she said that she preferred literacy, felt she was really good at literacy and was confident about teaching it. By recess she was ‘grouped out’.

This teacher was also concerned that administration of the SENA test in November showed children not knowing things she thought they had understood. She was surprised by how many mistakes the children made in
their number sequences. Implicit in this was a conviction that children required more systematic teaching than she could deliver under a games-based CMIT program.

Teachers who, after extensive experimentation, still found it difficult to work with small groups of students playing number games often did not know where to go with CMIT other than rejection. Teachers seemed to require a high level of confidence in their capacity to teach mathematics and extended exposure to CMIT before they were able to make radical changes to the way CMIT was implemented in their class and still understand how their practice linked to CMIT. The rejection of small group games and therefore CMIT also reflects these teachers’ superficial understanding of the purpose of the games.

Two teachers from the same school indicated, under the assurance of anonymity, that they would definitely not be using CMIT in the following year. This appeared to be part of concerted move from the Year 3 and 4 teachers to change school policy regarding CMIT and reinstate a number program that they believed was more effective than CMIT. These teachers were concerned that the BST results had fallen and felt this vindicated a return to teaching practices that they knew worked.

Two other teachers deferred to the school policy regarding ongoing implementation of CMIT, but also appeared deeply committed to aligning their number teaching with the current mathematics curriculum outcome statements. They recognised that the new draft curriculum will align CMIT more closely to the outcomes and felt that they included CMIT activities in their program where appropriate and would be able to adjust to these changes. They justified their program as containing many CMIT like activities. These teachers did not spend a lot of time doing what they understood CMIT to be, because they were convinced that CMIT was not very effective. Rowdy groups of students subverting games in order to win did not constitute good mathematics teaching. These were hard working teachers who put a lot of thought into the coherence of their mathematics program and the relevance of the assessments they used. Their fundamental commitment to student understanding motivated their decision to diminish the time spent on CMIT activities.

All four teachers felt they would continue to use whole class games learned through CMIT and were agreed that children enjoyed playing the games. All recognised and valued the positive student attitude to mathematics that CMIT games fostered.

Misaligned practices

Two teachers, both new to CMIT, were enthusiastic in their commitment to the implementation of CMIT and spoke at length about its benefits, but their lessons were less obviously aligned with their beliefs about what students were learning.

One teacher, whose April class was described earlier in this report, still seemed unaware of a possible mismatch between what she understood the games were teaching and what students were learning. In the observation made in November, she explained the two games in greater detail, focussing her description on aspects that might need reinforcement. Students in the first group understood how to play their game but they selected pairs of dice, from a mixed collection, that did not always correspond with the possible answers offered on their games sheets. Students tended to miss turns for a while when the total did not fit and then adapted the game, often simplifying calculations to make the dice they had better match the options on their sheet. Students in another group were sorting counters into groups and then counting the totals. They tended to either avoid any challenge by cheating and only selecting directions to make very small groups or they ended up losing track with large groups and laying out quantities of counters that they were unable to organise in a way that they could count.

This teacher did not seem to have well developed skills in the observation or interpretation of student responses. It is also possible that her repeated valuing of hands-on activities in both interviews reflected a belief that simply participating in concrete activities was beneficial, in and of itself, and required no further interrogation.

The other teacher had organised a lesson where students rotated through five different activities in the forty-minute session. There were two games with different rules, a challenging worksheet, a teacher led session counting by twos with a hundred frame and with calculators (most students had been seen the calculators once before) and an unrelated food pyramid cutting-and-pasting activity overseen by a student teacher. The teacher explained the different activities to all including the three parent helpers.
As the groups rotated, the teacher hastily explained modifications that parents needed to make as groups of different ability undertook the activity being supervised. The teacher briskly moved her group through a variety of ways to count by two, giving students a brief opportunity to answer her questions before providing or repeating the response she wanted. At the same time the teacher also intervened to model the ways she wanted children to do the other activities when parents had misunderstood. The parents tended to concentrate on students getting it right and often supplied or strongly cued the correct answer to help students get through their activity. The most able students appeared to thrive on the ever-changing stimuli but the weaker students appeared to be completely bamboozled by the end.

This teacher’s sincere determination to give CMIT her absolute best shot appeared to be heading in a direction where quantity and diversity threatened to overwhelm quality of understanding for many of the students in her class. While this teacher emphasised the importance of eliciting strategies and teaching for understanding in interviews, her practice was focused on successful completion of activities according to teacher direction. She showed little awareness of the gap between her theory and practice. There was not time or scope for most students to take stock or think about their responses to activities in this lesson. This teacher appeared to have attached her perception of the form of CMIT to a model of skill instruction through small rotating groups that is commonly used for physical education. She was delighted with the success of her strategy. The co-ordinator and the consultant were the only people in a position to possibly observe this teacher’s class, but neither were likely to give her the kind of critical feedback that might cause her to reflect on her practice more carefully.

The experiences of these two teachers highlight the importance of schools being willing and able to make judgements about successful implementation of CMIT or to support and endorse the judgement of the district co-ordinator. Both of these teachers were committed, enthusiastic and willing to make changes to their practice. Appropriate feedback would have increased the effectiveness of their implementation of CMIT.

Universal changes

All teachers had adopted the terminology of the levels of the Learning Framework in Number. Most found it particularly useful to distinguish between students who were perceptual, needing to count from one, and those who had learned to count on. For many teachers this had become the main basis for any divisions of the majority of students by ability. Teachers new to CMIT had not divided classes this way before.

One CMIT co-ordinator was excited by the talk in the staffroom that indicated all the infant teachers were comfortable using the labels for levels and ‘knew what their students know’. For her, this was a tangible measure of the success of her efforts in facilitating the implementation of the program. Teachers had always been aware of their bright group of students, but the interesting change for some was to include able Year 1 students in the top group with Year Two students in a composite grade. For one teacher this was a change in practice that she would never have considered in the past.

For teachers new to CMIT, their ability to proficiently and confidently diagnose areas of difficulty from administration of the SENA had improved by the second administration.

Improvement in student learning outcomes

All teachers said that their students enjoyed CMIT games regardless of the various forms that lessons took. CMIT games were seen by everyone to increase students’ positive attitude to mathematics and their confidence in their ability to do mathematics. For some teachers this was the chief virtue of CMIT. By and large, observation of classes and teacher self reports suggest that most students learned what they had been taught.

Teachers who focused on engaging their students in playing games (with quiet concentration) had students who counted with interest and dexterity, showing familiarity with skills appropriate to their level of understanding such as combining, counting on and counting back, doubling or basic number facts. These students had also learned many social skills and were mostly able to take turns, treat equipment with care, and follow the rules of a number of simple games. In these classrooms students often reduced the competitive aspects of their games. This suggests that some students possibly found the pressure of competition interfered with their concentration or that it created difficult emotions or fraught social situations. It was quite common to see students playing bingo individually while sitting in a group. Each student put a counter on their sheet to match their throw of the die only and then waited for the die to return, some calculating which combinations they hoped to throw next time. Games played with a higher level of competition tended to reward students who calculated quickly, but
were also more likely to involve computational errors, avoidance of difficult calculations and, in some unsupervised cases, sabotaging of the game.

Teachers who emphasised language skills had students who were able to describe and reflect on what they had done in their number work in ways that were largely beyond them at the beginning of the year. These students showed increased confidence in their use of simple mathematical language and their ability to describe simple games clearly.

Students familiar with being given challenging problems were more likely to be willing to think about ways to solve them. They were prepared to make suggestions, try more than one approach and use modelled techniques to map out and record their answers.

Most teachers reported a raised level of consciousness about using language clearly especially to help students to differentiate common confusions between teens and tens such as fifteen and fifty that the teachers had not previously recognised.

All teachers reported that participation in CMIT had led them to increase the amount of whole class time spent practising counting by ones and groups both forwards and backwards, counting on, counting back, and combining groups. This change in practice appeared to be an ongoing consequence of participation in the PD for most teachers. These were whole class activities modelled by the district consultant that made sense to all teachers as worth incorporating into their regular practice. Teachers generally integrated these practices into their everyday teaching regardless of whether they considered that they were implementing formal CMIT sessions or not.

While most students’ mastery of these skills had increased substantially over the year, teachers were often most concerned about those students whom SENA or the ACER tests had shown to have less skill than the teacher thought. Many, but not all, teachers had extended the range of numbers counted well beyond the traditional Year 1 limit of 30. Many students were clearly familiar with counting in various ways to at least 100 but appeared less confident with numeral recognition for larger numbers. Most students seemed able to follow instructions to give the number before or after a given number. Questions about the ‘number before’ often elicited an automatic ‘number after’ response but by the end of the year most students had learned to self-correct. This was a skill teachers rarely addressed in any concerted manner prior to implementation of CMIT.

A number of teachers also commented about their increased emphasis on subtraction, whereas previously they had focused on addition. Subtraction was introduced earlier and included in quizzes, games and worksheets to a much greater extent than it had been prior to participation in CMIT.

Some teachers also felt they had better catered to the needs of their top students by trying to give them work that matched their ability rather than be limited by the Year 1 curriculum guidelines. CMIT had increased the measure of guilt, if nothing else. If teachers didn’t know before, the SENA made it clear that they invariably had some very competent mathematicians in their class. This had increased teachers’ consciousness of how boring activities would be to a child who had well and truly mastered the skills they were intended to teach. Lack of appropriate resources and the difficulties of teaching to a wide range of skill levels frustrated some teachers’ intentions, especially when only one child was clearly at an advanced level, but the child also wanted to engage in the social aspects of working with others.

Teachers participating in CMIT for the first time were required to administer the SENA in a pre-and post-exercise. All teachers reported that most of their students had advanced to higher levels, even when the time between administrations was barely two terms. For most this was treated as a ‘to-be-expected’ event. Some teachers had been surprised by the level of skill demonstrated by students initially, but fewer teachers were surprised by the subsequent growth trajectories, though some were disappointed when these appeared to be particularly slow. Many teachers had lacked confidence and understanding in their first administration of SENA, so placed more weight on the accuracy of their second assessment.
Connections between changes in teaching and opportunities for students to learn

The intended CMIT learning outcomes are for students to acquire a deep understanding of number through the development of knowledge, skills, understanding and engagement in sustained mathematical thinking. Analysis of these case studies would suggest that many teachers, especially those who were new to CMIT, tend to focus on the more superficial level of knowledge and skill acquisition. All teachers reported making more sustained efforts to teach counting backwards and forwards, counting on, counting back and combining groups. Increasing students’ abilities in these areas is an intention of the CMIT strategy. For many teachers this appeared to be the extent of their vision and understanding of what it means to learn mathematics. A smaller number of the case study teachers, with a clear predisposition to deep reflection and educational beliefs that emphasised understanding, were seriously interrogating their CMIT teaching practices or experimenting with other ways in which they could engage students in sustained mathematical thinking.

The role of small group games in this process is unclear. Teachers who had undertaken pre- and post-SENA testing found most students’ progressed in their level of development when their teaching included both whole class activities and small group games. Most teachers generally reduced their use of small group games or stopped altogether once participation in the formal CMIT PD program had finished. These teachers either felt that they could teach the knowledge and skills without the small group games or that the games were only useful for students working at the lower levels of the Learning Number Framework.

There is some indirect supporting evidence that student gains will occur without intensive use of small group games. The one school with ongoing commitment to CMIT has sustained higher than expected Basic Skills Test (BST) results in number over several years, yet two of the teachers interviewed used few small-group games and the other teacher admitted her use of such games had dropped off and that she had revived it only for this research project. Another possible source of supporting evidence is from one of the findings of the White and Mitchelmore (2002) study, referred to in the literature review, of trends in BST data in schools implementing CMIT over a five-year period. They report that teachers in the most successful schools tend to focus less on resource development as one of the most important parts of the program than do those teachers in less successful schools (White and Mitchelmore, 2002).

Resource development is mainly required for small group games

In theory, CMIT does not advocate any particular teaching style, but focuses teachers attention on how students learn the content in the belief that this will lead to better practice. However, CMIT implementation, as modelled by district consultants, places a heavy emphasis on the use of small group games.

All schools had targets for numeracy improvement stated in terms of student learning outcomes. Some targets were general and others more specific, such as increasing the levels of performance of girls in number. The most tangible measure of success in achieving their targets for many schools was through comparison over time of the results of the BST. Schools are held accountable to the Education Department of NSW and their parent communities for the BST results. The consequences of changes in overall level of performance could be a potential boon or disaster for schools as performance on BST was closely linked to possible enrolment patterns by most principals and teachers. The BST is administered in Year 3, but all teachers and principals appeared to firmly believe that what happened in Year 1 laid foundations in both skill and attitude that would affect subsequent performance in Year 3. The teachers and principals in this study were not aware of the findings of White and Mitchelmore’s (2002) study that the main gains in BST scores occur at or soon after the implementation of CMIT and not when students reach Year 3. Therefore, principals did not attribute changes in this year’s BST performance to what was happening with CMIT in Year 1, except in the case of the one school where CMIT was an ongoing program. This school had maintained their above-like-schools score.

One of the difficulties of relying on the BST as a measure of changes in student performance on number skills is that the BST assessment is closely aligned with the NSW Mathematics curriculum and CMIT is an approach to teaching mathematics that is less clearly aligned with current curriculum outcome statements. The new mathematics curriculum is intended to change this, but it has not yet been released. This was publicly acknowledged as a source of tension at Baker’s Hill. Extreme discrepancies between one Year 3 student’s high
performance on the SENA II and low performance on BST raised questions among the staff about what was being measured and what was valued. Some teachers felt their SENA results did not measure aspects of their curriculum that they considered important, while others valued what CMIT offered.

The principal saw this as a useful debate to encourage staff to think more deeply about the correlation between teaching practice and assessment. ‘If we’re not finding out what we think we want to know how else might we get this information? This is a problem we need to solve.’ The principal wanted staff to debate the issue of what mattered in teaching mathematics and how well the assessments, that the school might chose to use, reflected what was valued. He believed that encouraging teachers to question and engage in critical reflection about their practice lay at the heart of improving professional practice. CMIT had provided a useful impetus for this principal to engage his staff in substantive professional dialogue.

Schools were generally unable to commit themselves to their own goals for any length of time as they tried to juggle limited resources and unlimited demands. By November any additional resources that had been available for CMIT were largely being diverted to new goals and new priorities. CMIT co-ordinators had submitted their budgets requesting ongoing funding to support the implementation of the SENA and to increase CMIT resources, but understood well the competition for a share of the curriculum budget. Some principals resisted staff pressure to have time release for SENA comparing it to running records, which staff had thrown their hands up over using a few years ago. These principals felt that staff had come to accept running records as common practice and had learned how to fit them into their classroom routine. Other principals supported the need for additional time and hoped they could afford to fund at least some CRT time.

Accountability can also be a motivating force in the implementation of change. Most principals saw BST results as a measure of the effectiveness of early numeracy programs for which the school was held accountable. The extent to which teachers identified with the school goals of improvement in numeracy, as measured through the BST, appeared to be directly related to their position of responsibility within the school. Assistant principals were far more conscious of enrolment patterns and familiar with BST data than most classroom teachers and hence more likely to closely identify with school goals. For many teachers the school goals were simply part of the furniture. The incentive for most teachers to improve the numeracy performance of their students appeared to come from a professional identification with the possibility and desirability of making their mathematics teaching more effective.

Schools did not appear to have many accountability mechanisms in place for monitoring changes in levels of skill for Year 1 students. Schools collected Year 1 teacher records and reports of Year 1 student performance. Even if these data were aggregated or compared over time, staff did not seem aware of, or comment on, any trends. Some schools collected annual SENA results from infant teachers, but these were used for diagnostic purposes and passed on to the subsequent teacher. No principals reported monitoring SENA results at the school level though several expressed an interest in being able to map student achievement over time through the SENA, or similar instruments. Longitudinal comparisons of students’ work appeared to occur informally and infrequently, if at all. One teacher noted, with some embarrassment, that a rare examination of students’ portfolios at the end of Year 2 had shown almost no change in the Measurement activities completed by students in Kindergarten, Year 1 and Year 2. The lack of progression in the level of demand of the activities had apparently escaped the teachers’ notice. The Count Me In Measurement PD strategy being trialled at the school had prompted this investigation.

Schools did monitor changes in student attitude through the collection of questionnaires and several proudly demonstrated the higher level of interest and confidence about mathematics shown by students who had participated in CMIT programs.

The incentive for most teachers participating in CMIT was the professional satisfaction of acquiring more sophisticated knowledge about student development in mathematics. But it was entirely up to them to make this judgement. Schools had very low levels of accountability for teacher effectiveness in implementing CMIT. Teachers appeared to be neither rewarded nor reprimanded for the nature or extent of their implementation of CMIT. Principals generally defined higher standards in mathematics as meaning increased student understanding, but this was rarely elaborated beyond the use of more hands-on activities, activities for different ability levels and fewer worksheets. Public displays of CMIT implementation such as the administration of the SENA and making of resources, along with teacher self reports of enthusiastic participation were usually taken as evidence of success. Teachers generally did not know how their practice of teaching number compared with that of others in the school, how the principal regarded their practice or what exemplary practice might look
like. Teacher concerns about student learning tended to be expressed and managed in terms of the adequacy of resources and support provided rather than as opportunities to examine teacher practice. In a small number of schools it became clear that the CMIT co-ordinator or the principal did not really know whether CMIT was being implemented by teachers. Some teachers were dismissed as resistant to change when they were implementing CMIT effectively, albeit in a less orthodox manner, and other teachers were assumed to be following procedures that had long since been abandoned.

A number of CMIT co-ordinators were frustrated by their inability to access other classrooms and see what teachers were doing. This was generally motivated by a real interest in sharing ideas and plans and a sincere desire to assist teachers who may be having difficulty. But there was also a suggestion that other teachers’ accounts of their practice were unreliable or that the teachers were likely to have misunderstood what effective practice meant. Strong norms of privacy of practice that were evident in all the schools tended to build mistrust between teachers that was usually shown in a passive refusal to comment or effusive expressions of unqualified praise regarding other teachers’ work. Two CMIT co-ordinators did work in other teacher’s classrooms. They were assisting teachers who were new to the school and had missed out on CMIT training. The co-ordinators seemed to adopt the same approach as the district consultant of modelling desirable practices and encouraging the teacher to participate within their comfort zone. A number of Kindergarten teachers had successful team teaching arrangements with another Kindergarten teacher that they said improved effectiveness and teacher enjoyment in implementing CMIT. This level of collaboration was not observed in any of the Year 1 classes.

**The future**

One school, Station Street, was committed to expanding CMIT to Stage II, relying on the current co-ordinator to continue her excellent work in engaging and supporting staff in the implementation of the program. This school had set aside substantial resources to support CMIT. Ongoing commitment to CMIT had been a long-term strategy of the principal who had ensured that he had a highly able co-ordinator and had provided her with extensive opportunities and support to prepare the ground for implementation of CMIT the previous year. This principal had made CMIT a major priority of the school and ensured that resources and support backed his vision.

Two schools, Rose Meadows and Inner were definitely going to lose their CMIT co-ordinators through falling enrolments. Sun Valley was possibly going to lose their co-ordinator to become a district consultant for CMIT. It was not yet clear who would replace them. At Rose Meadows the co-ordinator was also an Assistant Principal whose strong leadership and depth of understanding of CMIT would be sorely missed. However, the principal of Rose Meadows would still be there with her strong commitment to CMIT. At Inner Primary School, the co-ordinator was leaving and the other CMIT trained Year 1 teacher was moving to the upper school. These two teachers had been the mainstay of the CMIT program in the infant area. This school was also getting a new principal whose views on CMIT were not yet known. The future of CMIT at this school was very unclear. Sun Valley was also likely to miss the enthusiastic commitment of their current co-ordinator whose depth of understanding of CMIT was not obviously matched by that of the remaining staff. On the positive side at least two enthusiastic and competent teachers of CMIT were adding their expertise to that of other schools and an experienced infant teacher was likely to explore the possibilities of adapting CMIT for the upper grades.

Three schools had a number of staff with serious concerns about the value of CMIT. Ongoing formal development of CMIT at Dove St, Treetops and Baker’s Hill was likely to meet with some resistance from these staff. High levels of commitment and interest from at least three teachers in these schools suggests that they would probably continue to implement and adapt CMIT in the privacy of their classrooms regardless of school policy. The teacher at Baker’s Hill had already begun to make major modifications to her implementation of CMIT as she sought more effective means of increasing her students’ understanding of how to think mathematically.

**Conclusion**

The CMIT professional development program meets many of the criteria that are hallmarks of an effective PD program outlined by Sykes (2000) in the literature review. Compulsory administration of the SENA ensures that teacher begin the program with a systematic examination of student learning in a core aspect of curriculum. The PD program is continuous and ongoing in its support for interpretations of SENA results and the modelling and provision of games and activities related to different levels of the Learning Number Framework. The PD
program is likely to lead to instructional improvement because it is not prescriptive, but rather deals with big ideas about the development of children’s understanding of number. The strategy is intended to generate teacher knowledge based on their own observations and judgements about students’ learning considered in the context of a developmental learning framework. These case studies would tend to suggest that it takes teachers several years of sustained or repeated exposure to CMIT, possibly also combined with the incentive and opportunity to reflect provided through this research project, before they begin to make deep connections between their beliefs about student learning and the ideas underpinning CMIT.

The strong emphasis placed on a particular CMIT teaching style of playing games with small ability based groups, by district co-ordinators, appears to possibly interfere with teachers’ ability to make connections with CMIT. For many teachers the organisational difficulties of implementing group games in their classroom seems to discourage them from thinking beyond a superficial level of understanding of CMIT. Alternatively, it may be that the tensions, caused by observant teachers more careful attention to what students learn from games, that provides the impetus to change. It is these teachers’ questioning and dissatisfaction with games that leads them to invent new practices that integrate their philosophy with CMIT. The teachers who seemed to show the greatest depth of understanding of CMIT in their practice had generally tried and largely abandoned or substantially reduced the amount of time they put into organising small group games. It may be that learning to trust their own professional judgement, and be selective about what they valued and observed as effective practice, was part of the process of being empowered to shape the way they taught.

Meaningful intellectual engagement is the fourth of Sykes criteria. This is what the more effective teachers of CMIT craved to have with others, especially if it was accompanied by accurate and perceptive feedback about their strengths. Few got what they desired. The chance to talk, bounce ideas off others and reflect on their practice was occasionally enjoyed by CMIT co-ordinators who had formed a good relationship with their busy district consultants. Some teachers enjoyed more collaborative and supportive school environments than others, but none reported discussing ideas in any depth. School interactions were nearly always based around practical concerns. It is unfortunate that the strong norms of privatised practice in schools prevent district consultants from taking greater advantage of their time in classrooms. Ideally consultants could observe teachers’ initial attempts to implement CMIT and use this as a basis for giving feedback and encouraging teachers to reflect on and interrogate their practice in the context of the consultant’s greater depth of knowledge and experience. In practice, not one teacher reported having the opportunity to critically reflect on her class with the district consultant.

Increasing the effectiveness of well-designed PD programs such as CMIT requires schools to raise their organisational capacity to support collaborative work environments in substantive ways and commit themselves to public judgements about teacher quality and expertise. These are difficult, complex issues. All the principals interviewed knew that a more collegial workplace was desirable and likely to improve the quality of teaching practice. Some were more strongly committed to this than others, but all saw it as a highly challenging task to seriously change a deeply rooted school culture.

Crowded curricula and finite time were also real barriers. Principals wished they could identify exemplary performance but did not know how to do so without nightmare repercussions for staff relationships within their school. Principals generally felt that their hands were tied by DET staffing policies and regulations. These are not issues that can be easily solved within the confines of schools. They also need to be addressed at a system level.

The large body of contemporary research literature supporting the development of professional teacher standards begins with the premise that if students are to achieve high standards then the first priority is to reach agreement on what teachers should know and be able to do.

*The entire process of improvement depends on schools making public and authoritative distinctions among teachers and administrators based on quality, competence, expertise and performance. If everyone is equally good at what they do, then no one has anything to teach anyone about how to do it better. Thus, educators’ pretence of absolute equality is a major impediment to improvement and a significant factor in determining the capacity of schools to engage in effective professional development* (Elmore, 2002).

The CMIT PD strategy is based on the assumption that improvements to student learning outcomes will occur through raising the standard of teaching performance. And in turn, this is based on the assumption that the
standard of teaching performance will be improved by focussing teachers’ attention on how students learn specific content. This case study indicates that this assumption is largely justified when teachers are able to focus on how students learn. But, learning to observe and perceptively analyse how student learn and then respond with constructive and appropriate teaching strategies is a complex process. These difficulties may not be sufficiently acknowledged in the current CMIT PD strategy. Many teachers tend to focus instead on content, addressing what students ought to know rather than how well students understand. This also leads to improvements in the standard of teaching as the content covered is more comprehensive and teaching more systematic. Real depth of understanding about how to support and extend students’ mathematical thinking comes when teachers begin to see the meaning in CMIT that extends beyond the games.

**References**


Chapter 8

The Power of Public Presentations

Case Study

Margaret McGregor

The Professional Development Program (Year 9 Exhibitions)

Context

The ACT Year 9 Exhibitions Professional Development Program (Year 9 Exhibitions) is part of the High School Development Program of the ACT Department of Education and Community Services (DECS), Curriculum Initiatives Section.

The need and opportunity for an innovative school improvement program in ACT was described in a discussion paper, ‘A new generation of high schools for the ACT’, prepared by Marie Brennan. The paper outlined contexts in which all schools needed to balance the competing needs of the range of students, and the opportunity that the ACT presented to ensure that all students have access to broad and general education which pays significant attention to the changing contexts of society (p. 1). The paper suggested new priorities of curriculum reform increasing overall achievement levels across the whole student cohort, addressing the specific needs of under-performing students and engaging the community in the purposes and changing practices in high schools. It proposed changes to the ways that schools respond to a changing society and to possible future workplaces for students. It suggested that ways to achieve improvement and relevance in schooling for adolescents include finding ways to engage all students, to prepare them for the various future roles that they will be expected to play to balance personal, social, vocational and academic dimensions of schooling and to monitor processes and outcomes in ways that are publicly shared.

The Professional Development program was developed using a research circle methodology by the Australian National Schools Network (ANSN). Called Year 9 Exhibitions, it was trialled in the ACT during 2001 with support from a project officer from DECS and officers from the ANSN. In 2002, it was implemented in all government secondary schools in the ACT. The professional development was designed to challenge teachers’ beliefs and understanding about curriculum planning and assessment, and establish collegial groups to facilitate the professional learning.

This case study is based on findings from eight of the ACT government secondary schools. One of the eight schools was unable to provide the same detailed responses as were collected from the other seven.

Year 9 Exhibitions involved teachers attending a set of workshops and then working collaboratively to implement their learning about curriculum and assessment from the workshops. The teams worked together to develop multi-disciplinary units of work. They designed learning sequences that enabled students to experience

---

5 Brennan, M., A new generation of high schools for the ACT: a discussion paper developed for the ACT Department of Education and Community Services as part of their project: High Schools for the New Millennium, University of Canberra, 2000.
deep understanding of content and involved cross-disciplinary tasks. They implemented assessment processes that included a broad rubric of student achievement and reflective assessment processes. The final outcome of the program was a public presentation by students of their learning.

The ACT Year 9 Exhibitions professional development program has several key features:

1 **Professional development workshops.**

The first component of the professional development was a series of four linked workshops in which the intentions and theory of the program were introduced and demonstrated. The workshops were scheduled in two blocks of two days each with a break between, during which time school teams could begin the curriculum development process.

All schools were provided with DECS funding for four Year 9 teachers to participate in the four full-day professional development workshops conducted early in the year. After that a collaborative team was established in each school to design and implement the program. In schools where a larger scale implementation was undertaken, the approach was for the funded team to attend and then to work with colleagues back at school to share the planning and implementation. DECS funding also included an Exhibitions budget of $3680 that schools could expend in any way to support the implementation.

During the workshops the presenters described possible classroom organisation strategies and learning contexts, and established opportunities for participants to learn about effective learning and assessment approaches. They reminded teachers of the DECS guidelines for curriculum including the four essential areas of knowledge (as described on page 5). Other essential features of curriculum planning were to provide an opportunity for student negotiation of their learning, the completion of a work portfolio and participation in a round-table presentation.

In addition to learning about the rationale and content of the program, the teachers learned about and participated in teaching and learning activities such as co-operative learning strategies, reading and discussion of articles, listening to personal anecdotes, paired and small group discussions and reflections on what was learned. An important feature of the professional development meetings was the personal story of one teacher who had participated in the 2001 pilot. Her experiences were used at various stages to illustrate what she had done to develop the unit. She vividly described her initial planning of an extensive and coherent set of interesting activities for a unit of work related to the study of the environment. She then described the challenge of reflecting on her approach to curriculum planning and realising that she was not really providing for the needs of all of her students. In order to come to terms with the planning requirements of Year 9 Exhibitions she needed to begin from a different starting point of thinking about why she wanted the students to do the work and what she wanted them to learn from it. She described the ways she eventually changed her ideas and beliefs about teaching and learning, and what was essential learning for students. She also provided detailed information about the ways she had prepared and coached her students for the round-table presentations. She reported on the improvements in student outcomes and the differences in her teaching. The inclusion in the program, of a teacher who had participated in the 2001 pilot, was an important aspect of the professional development workshops. Her experience, recounted at various times over the four days, provided a credible and practical model of the Year 9 Exhibitions.

The teachers were provided with professional readings, unit plans from the trial schools and planning pro forma. The main curriculum planning worksheets came from *Understanding by Design* by Wiggins and McTighe41. They provided a conceptual framework, design process and planning template aimed at ensuring that enduring student understanding was a more likely outcome of classroom practice. The teachers were challenged to identify the fundamental or essential learning to be aimed for in their planned unit of work, and to use that as the basis for planning the rest of the unit.

2 **Multi-disciplinary, school-based teams of Year 9 teachers**

The professional development program involved the teachers in ongoing collegial teams. The school teams continued to meet together to establish close working relationships, to continue to learn about and to reflect on the content and ideas of the professional development workshops and to refine their individual school curriculum plans. As the curriculum program was implemented, they shared the preparation of student worksheets and materials, discussed the success of the activities and collaborated on assessment decisions. In some schools this behaviour was congruent with their normal work organisation. In others, the establishment and maintenance of collegial teams was difficult for reasons such as lack of shared staff-rooms, challenges with finding shared free preparation times and lack of experience in multi-disciplinary approaches.

3 Organisational support

DECS provided ongoing organisational support through the project officer. This officer provided advice and resources during and after the professional development workshops and maintained close relationships with the participating schools throughout the year. Senior officers from DECS visited the teachers at the professional development meeting days and demonstrated the system’s commitment to the success of the Year 9 Exhibitions.

The school principals reported great enthusiasm about the outcomes of the 2001 pilot, especially reporting instances of greatly improved attitudes in individual students, improved study habits for the Year 10 cohort who had experienced the pilot and increased community awareness of the quality of the school. They were highly supportive of their school’s involvement in Year 9 Exhibitions for 2002, but they were conscious of the challenges the school needed to overcome. These included establishing appropriate student and staff groupings, making changes to timetabling and meeting community expectations that the school would be organised by subject area specialities.

Each of the schools in this study designated a senior teacher to be the Year 9 Exhibitions co-ordinator whose role was to devote time to organising the program and to provide resources and guidance to the team of teachers. Most of these co-ordinators attended the professional development workshops and their previous administrative experience helped them to support their colleagues.

Several of the schools re-designed aspects of their school organisation for Year 9 to accommodate the requirements of the program. This was especially necessary where the existing school organisation was structured around key learning area faculties and staff-rooms. Some schools suspended normal Year 9 timetables and staff allocations for the implementation period. All of the schools in the study made special arrangements for the round-table presentations, which were conducted as the climax of the implementation period.

4 Innovative curriculum planning

The separation of secondary studies into subject based or key-learning-area-based compartments was identified as a feature of existing ACT school organisation. This was one feature that Brennan’s paper associated with student disengagement and the school’s lack of relevance to the lives of the students. One aspect of the professional development program was the suggestion that classroom learning activities needed to emulate extra-curricula activities, such as the Rock Eisteddfod and Environmental Science and Mathematics projects, in which students demonstrated high levels of commitment and enthusiasm, and the development of durable skills and attitudes.

Underlying the program is the belief that authentic intellectual work should be the rationale for all curriculum planning, classroom activities and assessment decisions. Such authentic intellectual work is described as high-level cognitive performance that requires knowledge of the disciplines, skills and rigorous thinking, but is also

---

relevant to real areas of human endeavour. It does not include challenging work that is simply contrived to pass tests or please teachers. This commitment to reflecting higher order thinking skills drew on the underlying concepts of Productive Pedagogy. This states that the key features to be reflected in curriculum provision are:

- intellectual quality
- relevance
- supportive classroom environment
- recognition of difference.

The teachers were challenged to re-conceptualise the content of their teaching and to find ways to circumvent the usual key learning area separation of school faculties, school organisation and curriculum. The teachers were introduced to information and knowledge about learning, curriculum planning for authentic intellectual work and assessment, and then expected to use that knowledge in the conduct of a specific classroom program culminating in a round-table exhibition of student description of and reflection on their learning.

The Year 9 Exhibitions asked teachers to consider their key learning area content in terms of its contribution to authentic intellectual work. It asked them to consider their usual selection of content using the questions ‘What is worthwhile learning for students? What is important to know and do? What enduring understanding underpins the study?’ The usual order of planning was described as moving from designing activities to introduce or practise aspects of content and then assessing the learning. The redesign of the program planning process asked teachers to follow the following steps:

- Consider curriculum content in three main levels:
  - What is the ‘essential’ understanding?
  - What is important to know and do?
  - What is worth being familiar with?
- Design acceptable evidence of learning
- Plan teaching and learning experiences required to achieve that evidence.

5 Innovative pedagogical understanding

The knowledge and understanding required of the teachers of Year 9 Exhibitions were based on several strands:

- data from educational research, most particularly from ideas of Productive Pedagogy and Authentic Assessment from the Coalition of Essential Schools in USA and the New Basics Project in Queensland
- the research work of the Australian National Schools Network
- the pre-existing policy and directions of the DECS.

The professional development was designed to:

- challenge teachers’ beliefs and understanding about ‘what was essential for students to know and do’
- support the establishment of collegial groups

---

• provide models for planning support, with a focus on considering the question: ‘What is the essential understanding in this learning sequence?’

• introduce and describe contexts for authentic assessment such as work portfolios, round-table presentations and student learning exhibitions.

Professional development program design

The program design of Year 9 Exhibitions reflected an integrated approach to teacher change that was intended to be directly linked to improved student outcomes. Underpinned by a theoretical and research base, teacher understanding of learning and curriculum planning, it was intended to result in changes to classroom programs and activities that would result in authentic student learning supported by student demonstration of their reflections on that learning.

Introductory workshops during which information was disseminated through addresses, workshops, modelling and readings.

School teams working together to design a unit of work using, information, pro forma and focus questions from workshops.

Teachers and students working on planned multi-disciplinary classroom program including student negotiation, active learning and the development of a student work portfolio.

Public presentation of learning by students supported by interview protocols and assessed using criteria sheets.

Intended outcomes of the professional development program

Teachers

The outcomes for participating teachers could be far-reaching. Not only was there potential for changes in teacher beliefs and understanding about teaching and learning and in teachers’ professional behaviours, there was potential for changes affecting school organisation, timetabling and other organisational processes. The teachers were expected to design tasks that were multi-disciplinary and appropriate for students with a variety of learning styles and capabilities. Teachers’ planning and practice were expected to reflect a number of curriculum characteristics including:

• Four essential areas of knowledge as described by DECS:
• Critical literacies: reading the world
• Community building: learning to live together and with others
• Real-life research and futures study
• Working with cultural, ethical and environmental heritages
• Capacity for student negotiation
• Assessment processes that reflect a multi-disciplinary approach that encourages student reflection: portfolios, round-table presentations.

Students

Throughout the Exhibitions process, it was intended that Year 9 students should be involved in real-life research that promotes student-centred learning and increases student agency as producers of knowledge. The students were to collect a portfolio of oral, written and graphical evidence of their learning across curriculum areas. They were to use this to reflect on their learning and prepare a public presentation to a round-table consisting of teachers, peers and community members.

The program was intended to provide the following to support the improvement of student outcomes:
• Access to a broad and general education which pays significant attention to the changing contexts of our society
• Curriculum balance between citizenship, work and academic/educational goals
• Opportunities to participate, to construct futures, or to join in socially valued activities
• To exhibit engagement, commitment, skills, enthusiasm and creativity and
• To participate in school experiences that reflect the four essential areas of learning which students require in the high school years.

Delivery mode

The 2002 professional development workshops were designed and presented by a representative team. The team included the ACT Year 9 Exhibitions Project Officer, a representative from ANSN, the Year 9 Exhibitions 2001 pilot project officer, a school principal and a practising teacher who participated in the 2001 pilot project. This presentation strategy enabled a balance between system and theoretical input and practical, experiential classroom-based input. The presentation established the context for the professional development program by describing the world-wide movement towards productive pedagogies and authentic assessment and linking it to existing initiatives in the ACT and the innovative and committed characteristics of ACT schools and teachers.

After the workshops the schools made arrangements for a phase of curriculum planning and program design. This was followed later in the year by a phase of program implementation. The implementation involved phases of classroom work of varying duration and a follow-up phase in which students presented their learning to panels as the Year 9 Exhibition round-table. As a general rule the sequence tended to be professional development workshops in Term One, planning and preparation in Term Two and program presentation in Term Three, with the round-table exhibitions conducted in an intensive one or two week phase late in Term Three to complete the program implementation.

The policy context

The ACT has a tradition of high levels of autonomy for schools. Schools have been responsible for their own decisions about matters such as organisation and implementation of DECS initiatives. In the case of Year 9 Exhibitions, schools were required by DECS to implement the program in 2002. The initiative had high-level support from the Chief Executive Officer and from principal groups.

The professional development program itself specifically included details of the curriculum policy for the ACT, and links were made in the ways the existing policy informed the new directions on Year 9 Exhibitions.

The school context

The organisation of the focus schools ranged from highly key learning area or faculty based structures to mini-schools based on key learning area or multi-disciplinary approaches. Each of the schools used some ability streaming to group the students. They differed in their commitment to student negotiation of the curriculum, and to the levels of provision of alternative learning experiences for different students.

For the faculty-based schools, participation involved modifying aspects of the existing ethos and organisation. The basis of organisation into key learning areas in these schools was valued by the staff, students and the parent community. It was described as contributing to our reputation for high standards. In these schools, the staff experienced some difficulty in establishing multi-disciplinary teams, especially because their work locations were widely separate, and they had to make special arrangements for planning, time-tableing and determining teaching allotments. At the same time they also were concerned that the work undertaken during Year 9 Exhibitions met their usual aspirations for high levels of intellectual rigour and control in the subject learning. Several of the schools, where only part of the Year 9 cohort were involved in the Year 9 Exhibitions, were concerned that those students would fall behind the others or miss out on essential topics.

While several of the schools had been involved in the trial and were already prepared to implement the curriculum plans, some who attended the workshops were, at first, relatively unfamiliar with the underlying concepts and the organisational requirements involved. Each of the focus schools sent representatives to the
professional development workshops, and each school was committed to developing a unit of work and establishing round-table presentations.

Planning the topic

Early in the professional development meeting teachers from each school were asked to describe their selection of the designated focus for their 2002 Year 9 Exhibitions. It was intended that the experience of the workshops would result in modifications and refinements to the focus.

The selections very much reflected the key learning area orientation of the team of teachers who were representing the school. At this stage, some schools had not finally decided on a topic, especially those where high levels of student negotiation were the norm, or where the subject selection processes for the second semester made class composition and teacher availability less predictable.

In some cases, the teacher-selected focus remained unchanged during the course of the professional development workshops and during planning. In one school a detailed purpose-designed framework had been developed prior to the professional development meetings. This took the form of a grid to ensure that students covered certain core elements of the topic, and remained unchanged throughout the planning. The grid was linked to Year 9 Exhibitions in that it allowed a higher than usual degree of student selection from a set of associated activities that were given a scaled rating to contribute to a required score point. In one case the curriculum leadership team took a highly pro-active role, guiding and leading the teaching team in accordance with school priorities rather than Year 9 Exhibitions.

Only one school appeared to substantially reconsider the focus topic as a result of their attendance at the professional development workshops, although several schools made intensive use of the materials provided to refine and develop the selected topic. Given the emphasis placed on revising previous approaches to curriculum planning this was surprising. Many teachers felt there should have been more opportunity to present their proposals for units of work to be critiqued and challenged. This could have occurred during the professional development workshops or in an additional meeting held some time after the professional development workshops but before the unit of work began. Some of these teachers felt that pragmatic issues overcame the potential to design a really satisfying unit of work that fitted all of the criteria from the professional development meetings. A comment made frequently by teachers was the desire for ongoing support from the project officer in the development and refinement of the curriculum plan.

The following table outlines some characteristics of the schools and the topics they selected.
<table>
<thead>
<tr>
<th>School</th>
<th>Size (Year 9 students)</th>
<th>SES</th>
<th>NESB (%)</th>
<th>ATSI students</th>
<th>School Structure</th>
<th>Teachers’ specialisation/ Summary organisation/ Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital High School</td>
<td>836/205 Mid</td>
<td>20 (44 nationalities)</td>
<td></td>
<td></td>
<td>Traditional key learning area based structure.</td>
<td>Tech/Home Sci; English Sci; All Year 9 students participated; Normal classes suspended for three weeks; Topic: Drug education</td>
</tr>
<tr>
<td>Elisabeth High School</td>
<td>675/180 Low-High</td>
<td>36 8</td>
<td></td>
<td></td>
<td>Established high school middle school structure.</td>
<td>Classes organised into groups of 16-22 with a team of teachers; All Year 9 worked on Exhibitions for one day a week for eight weeks, then intensively for one week and then presented the round-table presentations; Topic: Conflict</td>
</tr>
<tr>
<td>Silvency High School</td>
<td>1080/ Low-High</td>
<td>23</td>
<td></td>
<td></td>
<td>Relatively new school with a middle school structure.</td>
<td>Middle school organisation: three classes; Year 9/10 workroom; Topic: Negotiated topic; How other people live their lives</td>
</tr>
<tr>
<td>Hyacinth High School</td>
<td>775/174 High</td>
<td>Multi-cultural 33 different nationalities</td>
<td></td>
<td></td>
<td>Traditional key learning area based structure.</td>
<td>Teachers working individually; Topics specific to subjects; Sci: reproductive technology; Drama: Aboriginal culture; Very structured assignment in History</td>
</tr>
<tr>
<td>Willows High School</td>
<td>800/115</td>
<td></td>
<td></td>
<td></td>
<td>Core group of subjects ability-grouped and electives vertical grouped.</td>
<td>Year 9/10 team of teachers; High levels of communication possible.</td>
</tr>
<tr>
<td>Capital Gully High School</td>
<td>750/180 Varied – high to mid</td>
<td>5</td>
<td></td>
<td></td>
<td>Use curriculum banks rather than faculties; Integration occurs at many levels.</td>
<td>Team of Yr 9 Co-ord. and three teachers; Sci; English; Maths/Tech; One class of 24 with three teachers; Worked on theme each class; Round table presentations included year 8 and community members; Topic: Business development plan</td>
</tr>
<tr>
<td>School</td>
<td>Size (Year 9 students)</td>
<td>SES</td>
<td>NESB (%)</td>
<td>ATSI students</td>
<td>School Structure</td>
<td>Teachers' specialisation/ Summary organisation/ Theme</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------------------</td>
<td>-----------</td>
<td>----------</td>
<td>---------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Langhorn High School</td>
<td>840/210</td>
<td>High-low</td>
<td>36 nationalities</td>
<td></td>
<td>Traditional key learning area based structure with selective gifted and talented program. Many students come from out of area for special programs. Common staffroom.</td>
<td>Two classes—intended to link English with Visual Arts round-table presentations included Year 8 and community members Topic: Global remix: cultural art practices</td>
</tr>
<tr>
<td>Nellie Street High School</td>
<td>410/80</td>
<td>Low-mid</td>
<td>Small % LBOTE</td>
<td></td>
<td>Key learning area based organisation.</td>
<td>Team for Yr 9 Ex = 1Sci, 1 Ma and 2 Eng/Soc All Year 9 worked for 7 weeks in 4 different key learning areas. Student portfolio reflecting work from each area—same general theme but no links Sometimes worked on same topic all day. Tried to avoid clashes of topics. Topic: What influences teenage behaviour?</td>
</tr>
</tbody>
</table>
Gathering Data

Summary of research processes

There were three main focus areas for the research into the ACT Year 9 Exhibitions: the system, the teachers and the students. The research was planned to gather information about the plans, aspirations and supporting strategies of DECS various aspects of the school including existing characteristics, the principal’s opinions and commitment the understanding, attitudes and behaviour of the teachers and the experience of the participating Year 9 students.

Table 2: Data collection

<table>
<thead>
<tr>
<th>Data Collection Focus</th>
<th>Data Collection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>System</td>
<td></td>
</tr>
<tr>
<td>• identify the bases for the development of the professional development program—What was intended for teachers and students in the Year 9 Exhibitions?</td>
<td>• collection and perusal of readings, documentation and handouts (as available)</td>
</tr>
<tr>
<td>• describe the materials and resources provided to the participating teachers—What resources were provided and what purpose did they serve?</td>
<td>• discussions and interview with project officer (May, October and November)</td>
</tr>
<tr>
<td>• observation visits to selected professional development workshops (April)</td>
<td>• observation visits to selected professional development workshops (April)</td>
</tr>
<tr>
<td>Schools / Teachers</td>
<td></td>
</tr>
<tr>
<td>• school characteristics • (enrolment, SES, etc; school organisation)</td>
<td>• discussions and questionnaires (Principal and Year 9 Co-ordinator)</td>
</tr>
<tr>
<td>• interviews with school based Year 9 Exhibitions Co-ordinator (March, November)</td>
<td>• collection of Prospectus and other documents</td>
</tr>
<tr>
<td>• interviews with selected teachers (March, November)</td>
<td>• interviews with selected teachers (March, November)</td>
</tr>
<tr>
<td>• email conversation focused on response to professional development and issues and decisions about the design and implementation of the project</td>
<td>• email conversation focused on response to professional development and issues and decisions about the design and implementation of the project</td>
</tr>
<tr>
<td>• questionnaires for school based Year 9 Exhibitions Co-ordinator at two times during the year (March, November)</td>
<td>• questionnaires for school based Year 9 Exhibitions Co-ordinator at two times during the year (March, November)</td>
</tr>
<tr>
<td>• questionnaires for selected teachers at two times during the year (March, November)</td>
<td>• questionnaires for selected teachers at two times during the year (March, November)</td>
</tr>
<tr>
<td>Students</td>
<td></td>
</tr>
<tr>
<td>• changes to teachers’ knowledge—What professional learning occurred in content knowledge and in pedagogical knowledge?</td>
<td>• collection of curriculum design and report of classroom implementation of project. (as available)</td>
</tr>
<tr>
<td>• changes to teachers’ practice—What was different about the teachers’ teaching?</td>
<td>interviews with selected teachers (March, November)</td>
</tr>
<tr>
<td>• interviews with selected teachers (March, November)</td>
<td>• collection of curriculum design and report of classroom implementation of project. (as available)</td>
</tr>
<tr>
<td>• quality of observed student work, particularly selected portfolio and round-table presentations.</td>
<td>interviews with selected teachers (March, November)</td>
</tr>
<tr>
<td>• the level of achievement at which students were assessed by teachers using the Exhibitions rubric: student as researcher as active learner as reflective learner as presenter—To what extent is the level of achievement notable or unexpected?</td>
<td>• collection of samples of student portfolios (October)</td>
</tr>
<tr>
<td>• Secondary School Life attitude survey for two classes (March, November)</td>
<td>• attendance at selected round-table exhibitions (October)</td>
</tr>
<tr>
<td>• collection of student writing assessed by teachers using their usual class procedure and an additional application of common criteria</td>
<td>• interview with principal (March) and Year 9 Exhibitions Co-ordinator</td>
</tr>
<tr>
<td>• and selected teachers (March, November)</td>
<td>• and selected teachers (March, November)</td>
</tr>
</tbody>
</table>
Discussion

The purpose of this case study was to gather data to identify the links between the teachers’ undertaking of Year 9 Exhibitions professional development and improved student learning outcomes. It also addressed the nature of the links. This research report examines the set of sites where links could be expected:

- between the intentions and presentation of the professional development workshops and the teachers’ reported changes in beliefs
- between the changes in teachers’ practice and the changes in the students that were identified by the teachers and by the students themselves.

Although identifying any precise causal nature of the links might be problematic, the following evidence indicates that there are clear effects on student outcomes, broadly defined, as a result of the teachers’ participation in the program.

Response to the professional development workshops

The professional development workshops for teachers were specifically designed to contribute to teacher knowledge about curriculum planning, student learning and authentic assessment. The theory about curriculum, classroom planning and improving student outcomes that informed the design and organisation of Year 9 Exhibitions, was presented to the teachers through the use of lectures, readings, handouts and anecdotal oral presentations.

The extent to which teachers recognised and were conscious of the intent of the professional development program is varied. After several months some teachers could not recall the main ideas and could not identify a way in which their participation in the workshops had influenced their beliefs about teaching, their planning of their unit of work or their classroom practices. In some cases, the teachers who could not recall their learning from the professional development workshops nevertheless participated in the school implementation and recognised the implications of what had occurred. The most highly informed and aware teachers were those who had experienced the pilot phase in the previous year. They had first attended the professional development workshops in 2001, participated in the planning and implementation of the pilot and had reflected on the outcomes of that experience. This prior experience enabled them to feel much more satisfied and certain about the planning and implementation of the 2002 program.

A comparison of the interview responses of teachers of different levels of seniority and experience shows that more experienced and more senior teachers responded to questions about their own learning from the workshops using terminology related to inclusiveness, essential learning, curriculum improvement and the advantages of student articulation of their learning. The others tended to recall much more about organisational and procedural aspects of implementation.

Although many teachers were able to discuss their interpretation of the learning theories and were committed to implementing the program in ways that reflected the aims and purposes of Year 9 Exhibitions, some struggled to understand the purpose of Year 9 Exhibitions and its intended classroom activities and student learning outcomes.

All teachers were highly aware of the processes and procedures that they were expected to implement. This was especially reinforced by the need to implement the round-table assessment contexts. In some cases they saw these expectations as overly restrictive and time-consuming.

The extent to which teachers valued aspects of the professional development workshops varied. Some teachers were highly positive about the experience. They were able to describe aspects of the program and ideas that were valuable to them. For some of these their experience constituted an important affirmation of their existing teaching beliefs.

I first learned about it listening to other teachers last year and it sounded very enjoyable. The main message was about the styles of learning and the importance of deep learning. It affects your teaching because your ideas are reinforced and you are encouraged to feel good about what you are doing.
Others were able to identify aspects of the theory and materials that assisted them to understand the ideas. These teachers identified ways in which they had made personal and professional connections with new ideas and new ways to be a teacher. For these the program provided a new and exciting dimension to their professional understanding.

The PD focused on a change that means teaching differently. I loved this approach to my work. I learned it is important not to go straight to learning activities—to tease out students’ learning and put their work in ways that students will remember forever. I recognised some of the ideas from my university course and it was good to make connections.

Some teachers reported their response to the professional development workshops in ways that were less positive.

I can see the links they were trying to set up but I’m not sure if they knew what the problems could be. The link between the theory and the practice occurs at school and there is a basic understanding to build up. The PD days need to be quite practical and give lots of examples.

It was well spaced but some of the content was obtuse and not necessary and a bit confusing. It depended on lots of outside knowledge. The conceptualising was vast.

In some cases the presentation format they recalled did not reflect the researchers’ observations of the presentation made during the workshops.

They talked about some fantastic ways to work but relied on a Chalk and Talk—formal lecture approach. I thought there was a conflict between teaching purpose and what they did.

The response of other teachers was more negative.

I learned the Exhibitions would be very involved, complex and time-consuming. Also that it would have to be made much less onerous on teachers and schools if this is to be ongoing with enthusiasm.

Much of the stuff presented to us was—in my opinion—unrealistic and fanciful. Teachers do not have the time to achieve these incredible goals placed (forced) upon us by the higher echelons of the system.

This range of responses reflects the differential effects that the workshops had on the teachers. Their response appears to be directly reflected in their descriptions of what is valuable to them in professional development. Teachers who valued professional development that was practical and directly related to their classroom were much more inclined to view the ideas of the program as too theoretical and irrelevant to themselves.

**What have teachers learned from undertaking this professional development program?**

Year 9 Exhibitions has clearly defined expectations related to changes in teacher knowledge about curriculum planning, program implementation and authentic assessment. Equally, the program challenges teachers to reconsider their subject content knowledge in possibly quite different ways.

**Curriculum planning**

The theory of student learning is related to addressing the essential learning about a topic and providing opportunities for students to develop deep understanding. Some teachers responded to the professional development in ways that reflected their understanding of such ideas.

The most important thing I learned about during the professional development days was to think about the big question. That is what we want kids to learn and be able to use or remember over their lifetimes.

Many teachers tended to interpret the ideas in the light of their key learning area approaches.
The thing which has been of most assistance in my planning and teaching has been the reinforcement of different teaching strategies to cater for different learning types. I already do this in science with practicals/written work, etc, but it makes me think about it consciously.

I learned I needed to teach different approaches, student centred approaches. It’s a problem because you tend to fall back into chalk and talk and text books.

The teaching application was not really relevant to Maths.

Some teachers could not specifically identify something they learned about curriculum content during the workshops, and many of their school curriculum plans did not reflect the multi-disciplinary characteristics implied in the models provided. Some hardly moved beyond a simple conglomeration of KLA based tasks or worksheets.

Student negotiation was achieved in some schools, especially those that used negotiated approaches as an integral part of curriculum planning. In other schools the choices students were given were more controlled—to choose from a set of tasks, to select from a given set of topics or to do more or less of a larger topic.

During the professional development workshops the teachers were provided with documentation with clearly defined planning guides and models of classroom activities that were intended to give practical assistance to schools. Many teachers reported their response to the professional development workshops in terms of these organisational strategies. They commented on the usefulness of learning ‘the basic procedure to produce the proposal and the make-up of the unit and on the excellent reading strategies to use in my English classes’. They were appreciative of the practical resources while finding the ideas too obscure.

These responses can be readily associated with teachers’ early reflections on what made professional development valuable for them. The main response from the teachers was the importance of practical ideas or activities to be immediately implemented in the classroom. They did not want professional development that is ‘all theory and impractical ideas’. Those who were more appreciative of the ideas were those who had tried out the processes in the 2001 pilot year and had the chance to consider the ideas in the light of their own experiences.

**Challenging intellectual work**

An important feature of productive pedagogy is the commitment to high intellectual quality. High intellectual quality combines the following characteristics: higher order thinking deep knowledge deep understanding substantive conversation knowledge as problematic and metalanguage. This combination of higher order thinking and student reflection to develop deep understanding was to be achieved by considering the fundamental planning questions described previously. The teachers were to collaboratively construct multi-disciplinary curriculum plans and carry them out using the features of Year 9 Exhibitions tasks, student negotiation and student self-reflection.

Several schools used the planning process to incorporate ways to achieve high intellectual quality. In one of the schools the planning process closely reflected the process and content of Year 9 Exhibitions. The team worked on a curriculum plan that was predicated on a careful consideration of the ‘key questions’ (McTighe and Wiggins) and the use of the planning resources provided.

*We used the overarching questions and the planning handouts. After the PD we tried to look at each facet and we brought the ideas to the group. We were trying to think about how to look at the overarching questions from the situation of an adolescent.*

In others, planning to encourage high intellectual quality reflected the theory of Productive Pedagogy, but with re-interpretations. Their final approach tended to reflect a pragmatic modification to fit with the existing characteristics of the school or with the perceived capabilities of the classes.

*We brainstormed ideas looking for a topic that was broad enough to get something out of but had the structure they needed. We were working with a Level 3 group. We spent a day discussing our topic idea to find how to balance English, Mathematics, Art and Information Technology (The key learning area specialities of the team).*
I knew about the idea of Rich Tasks and I wanted to plan for that. We needed to consider the class dynamics. The idea was designed to encompass elements of all of the KLAs. There was scope for negotiation and a real life context.

Some senior staff were concerned that the curriculum content and the resultant student work did not properly reflect what could be expected from Year 9 students. In many cases this arose from the teachers’ reluctance to plan for students to work independently on curriculum content that would usually be covered through more teacher directed approaches.

The Mathematics that the students did looked more like Year 4 Arithmetic. I want to see that improved next year.

A few teachers mentioned the term ‘Deep knowledge’ but mostly, they interpreted the idea of ‘challenging intellectual work’ in ways related to key learning area considerations.

It is hard to identify challenging intellectual work that was specifically associated with idea of deep learning.

The focus on individual student research left some shallow areas. We did not achieve high intellectual quality very well because trying to extend them is hard. They have been made aware but it is hard to challenge them to high levels.

The work was definitely challenging because they had to demonstrate independence and perseverance and resilience of learning.

Some saw the intellectual challenge as more to do with the student’s personal capacity for self-organisation, for carrying through an extended task or for achieving good results.

A wide variety of work was done—I hadn’t come across that before.

Some students really took it on board and learned. The average to lower ability still didn’t have organisational skills to carry it out. For Level 3 kids any work is challenging. The main challenge for them is to know they can do well. It is important for them to read aloud or to speak to strangers. There is also an intellectual challenge in achieving some quantity of work, to finish a page or to do the % interest in maths.

The schools’ responses demonstrated the extent to which professional conversations about challenging intellectual work were associated with being satisfied that the work undertaken by students was worthwhile and appropriate to Year 9 students.

Senior teachers reflected some concern about the extent to which there was successful achievement of intellectual challenge in the Year 9 Exhibitions. They mentioned two main reasons to explain their concerns. The first was that they believed that the teachers had planned activities that could be undertaken by students without too much teacher support, or that were seen to be interesting to the students. In some cases this meant including pleasant activities that resulted in very attractive work of not much intellectual substance. The other area was that the teachers had tended to stand back too far and permit the students to follow their own plans. The teachers had distanced themselves in some cases and relied too much on handouts and assignment style tasks based on individual research. The teachers described themselves as facilitators only and defined this as a powerless role.

The most powerful response from teachers about high intellectual quality was to do with the students’ capacity as reflective learner and presenter. Some teachers were not so confident about the usual factual or intellectual understanding that students might have shown, which in some cases, especially Mathematics, they felt was of lower quality. However, they wanted to praise the notable, and in some cases unexpected, indications of higher order thinking and reflection, self-motivation and presentation skills.
How has teachers’ learning been reflected in their teaching?

The teacher’s practice is expected to change as a result of Year 9 Exhibitions, associated with the need to adjust to different beliefs about learning and content knowledge. The changes include changes in school organisation, in teachers’ planning and classroom behaviour, and their relationships with colleagues and with the classes they teach. The multi-disciplinary learning activities that are suggested to support Year 9 Exhibitions include many open-ended tasks, sometimes with a group focus, which were different from those that many teachers usually use. The recommended assessment strategies are also more varied, descriptive, criterion-referenced, self-reflective and long-term.

School organisation

Each of the schools faced challenges to change aspects of school organisation to accommodate the Year 9 Exhibitions. In some cases the existing school processes were relatively supportive and in others they were a challenge to be overcome.

*The school physical structure and the culture facilitate planning and the school has a climate that acknowledges and understands integrated teaching.*

*The most difficult barriers for the team to overcome have been the structure of the timetable and the curriculum changes to suit our outcomes. We have needed to adjust our timetable and switch classes to suit teaching loads.*

*The main challenges were organisational, especially to get 200 students through the round-table.*

*Our students really enjoyed that experience where they remained in a ‘home room’ and the team of teachers rotated.*

Year 9 Exhibitions is conducted during a concentrated period. This varied in the research schools from as short as two weeks to as long as one term. Each of the schools made timetable changes, such as suspending the usual school timetable for the required weeks of the teaching stage, modifying the work-load and room allocations for teachers and making new timetables. Other changes included modifications to the teachers’ preparation time to coincide with that of other team members, and teaching in pairs or teams in common classrooms. Some teachers operated as ‘tag-teams’ to continue supervision of students working on independent projects. In some cases the students were permitted freedoms to attend school or not, and to decide what work they would complete.

In every case, the school made major organisational changes to accommodate the round-table exhibitions. Some, with the whole cohort involved, suspended classes for the Year 9 students for the week. Others made less intrusive changes to their organisation. Some teachers questioned the cost-benefit of the upheaval to the school, while most felt the benefits to students and to the community warranted the disruption of existing organisation.

The necessary organisational changes have practical implications for schools and possibly for the long-term viability of the program. Each of the changes for finding time and accommodation that teacher collaboration demands, for common timetabling to permit team teaching and multi-disciplinary approaches, and for organising panels and resources for all participating students to present to a round-table are integral to the success of Year 9 Exhibitions. While Year 9 Exhibitions remains separate from the usual program of work for Year 9, the need for substantial organisational re-arrangements will not reduce. In fact, in many schools, the whole Year 9 cohort was not involved, although the issues these schools faced were still great. They will increase as the program involves more students.

Planning and program design

The need to allow more extensive planning time was common to all of the schools. Each school identified as an issue the demands on teacher time required for Year 9 Exhibitions. There were differences between schools in the extent to which they were able to devote time to planning. While planning time was timetabled for some school teams, others found great difficulty to get together. In many cases the teachers found it necessary to work
off-site or at weekends in order to gain the intensive and uninterrupted time required. They indicated that the attitude of the principal was an essential feature in facilitating or hindering the capacity of staff to work together. Schools whose existing organisation was built around mini-schools or cross faculty teams found it easier to discuss plans and have ongoing consultations with each other about the program.

The most difficult thing was having enough time to collaborate and organise the ideas and concepts needed. At our school the most helpful thing in our planning was our planning day that was organised to help plan for the Exhibition. Our principal and deputy principal were also involved with our planning which was excellent. It was all done as extra work and all of the meetings were after school or during holidays but the teachers were committed. My usual planning of teaching is done on the run so compared with that I have done much more preparation.

Most teachers reported changes in planning and program design in order to meet the challenges of interpreting and implementing the Year 9 Exhibitions program, especially the requirements to include aspects of productive pedagogy, student negotiation and authentic assessment in the curriculum plan.

We chose the theme and stimulus to assist diversity. Then we negotiated with the students to develop their specific focus questions. Students could decide to research something they were interested in. We designed it to have a wide range of activities—not the usual normal ones.

I wanted to focus on cooperation—the group processes and student team building. Also to have good opportunity to work on literacy—for example, letter writing and to have varied activities like guests and using graphic design to prepare a portfolio and round-table presentation.

We worked through a process of developing unit outlines built on the PD and tried to include negotiation and diversity in the common broad theme. We had to work hard to make sure that the unit we are doing is a genuine Exhibition task.

Even so, the most common solution to the challenge of conducting a Year 9 Exhibitions learning task was to provide students with large amounts of work sheets and guidelines for compulsory components of their work. Even teachers who planned for student negotiation were often referring to students’ selecting from a set of pre-planned learning activities.

I have changed my planning because I am teaching material which is not on the high school curriculum. The vast majority of our teachers took on the idea of planning Rich Tasks but there was a great variety in how to implement them. There was some tension about covering the curriculum, even though our curriculum is school-based.

In all of the schools, curriculum materials had been developed to support the students. As a rule, they were attractively and clearly designed and presented, and often showed considerable teacher research and planning. One teacher had established a website of researched information on the topic for students to use. However, many of the curriculum materials used by the students for the Year 9 Exhibitions appeared to be little different from what might have been presented in programs not influenced by the theories and ideas of the professional development workshops. Most students were given standard worksheets of procedures, tasks and questions. Even within a framework of student negotiation, tasks were often fragmented and unreflective. Some students were provided with assessment schedules for areas of achievement such as essay, group work, portfolio, creative response and attendance, each with a related percentage score.

There were few genuine opportunities for student negotiation of the whole of their work. Students could, for example, choose from a set of tasks, or they could develop a specific research question related to a designated learning area to follow-up. Many teachers reported they had been finding their way in this year and would feel much more confident in giving students greater responsibility in the future. Others suggested that students needed to be taught self-organisation skills before they could be given real freedom to choose and plan their own work.
Collegial interactions

The changes in teachers’ relationships with colleagues were primarily as a result of the establishment of teams. This was consistently reported as a positive and supportive aspect of Year 9 Exhibitions. The collegial interactions in many of the schools included frequent and ongoing consultation and reflection on the progress of the unit of work and the assessment of the students. In other cases, the teachers had few opportunities to reflect on the success or challenges of their work.

*We formed a really nice team, a very communicative group. It is so important to have a really tight group because you are always talking about where to go next. There will be a definite long-term effect on the ways we work together.*

*We worked so closely together. After every session we talked about what worked well and where we were going. We have come closer. Not necessarily the whole staff but certainly members of the team. I think others are a bit envious.*

*The usual practice here is three teachers for two classes so it is part of the culture. The project required reaching out for a collaborative relationship with others. It is a very sharing staff so it was a good basis.*

*It has changed the way we work together. Changed the way we teach and the way we build our curriculum.*

*Even the teachers who were dissatisfied with the extent to which they could meet together to plan and reflect on their teaching practice, reported on this as a positive experience. Many members of collegial teams often devoted their own time to working together.*

*We made time to collaborate before and after classes. Sometimes we felt we were getting nowhere, but we kept on talking and in the end it worked out well.*

In two schools the challenges of developing a collegial team could not be overcome. The reasons included lack of staff continuity and lack of time, but they were also to do with the existing organisation and relationships within the staff. In one school the teachers selected one very broad theme, and then worked on it separately within their faculties. The Year 9 students worked to develop a portfolio for each learning area and selected one of them as the focus to present at the round-table. Several teachers in the research schools felt they had been forced into an innovation they did not volunteer for and did not believe in. Most continued with the project, but in one case, one of the two teachers withdrew after attending the professional development workshops.

*Within faculties the relationships are very effective—there was a lot of sharing and exchange of ideas. Not so much across faculties though.*

*It was disappointing that we had so much trouble getting a team together. We had so many staff changes.*

*The breakdown of the team meant that all the work occurred in one class and one KLA. That one teacher followed the curriculum plans by including some multi-disciplinary tasks, but it was very disappointing.*

An important effect of developing collegial teams to implement Year 9 Exhibitions was in the ways in which teachers collaborated with other staff. Early in the year teachers described their informal interactions with their colleagues in terms of social, interpersonal conversations and discussions about student behaviour. They frequently talked about getting on well together, but their responses about professional learning centred on more formal professional development experiences. After the professional development workshops and conducting the program, they more frequently talked about learning from the team and discussing the success of lessons or sharing classroom strategies.
Classroom organisation

The teachers reported a range of changes to their classroom practice as a result of their participation in the professional development workshops and meeting the challenges of implementing the planned unit. These changes ranged from minor changes to the organisation of their work to major changes in the ways they conducted their classrooms and interacted with their classes.

*My classroom was definitely different from usual. We began each lesson with a whole class review and then they all moved to their own tasks. Keeping up with the kids was a really difficult task.*

*The level of freedom and the amount of group work was unusual because we are usually more structured with these kids. This was directly linked to the PD.*

*I needed to cut back on the subject content and adjust to the fact that I took on a more ‘troubleshooting’ role than the usual ‘teacher’ role.*

*Team teaching is different for me. With extra teachers on the same class we have to communicate before and after each lesson, which is sometimes difficult.*

There was considerable variation in the degree to which teachers considered the reported changes to the classroom organisation to be an improvement on their previous practice. Some of them felt they lacked control and responsibility in the more flexible classroom relationships they established for students to undertake the unit of work. Some were excited by the relationships they established and planned to experiment with more negotiation and more individual work focuses for the students.

Even though many teachers recognised the difficulties of changing their usual classroom organisation, they reported looking for ways to address the difficulties rather than wishing to abandon the changes altogether.

Teaching and learning strategies

Most teachers reported changes to the teaching strategies they used and many attributed the new approaches directly to the professional development workshops. They appreciated the opportunity to work on the different approaches and to develop the different teacher/student relationships associated with Year 9 Exhibitions. In most cases the teachers reported a change from their role in the classroom to a more facilitating and monitoring role. They also described different learning contexts for the students—moving outside the usual classroom activities.

*I had a chance to explore options that I’ve never done before—dealing with open-ended issues.*

*My group worked at their own pace and I was merely a helper, a suggester, a guider, a facilitator.*

*We used much wider range of activities and resources— documentaries and film, books, written materials and excursion and the daily newspaper.*

Some reported they had made few, if any, changes to their usual teaching approaches.

*I didn’t think about them directly from the PD, but I used strategies that focused directly in the main topic. I asked students to interpret and analyse the information they found.*

*I needed to cut back on subject content and adjust to the fact that I took on a more ‘trouble-shooter’ than ‘teacher’ role.*

*I didn’t use any teaching and learning strategies from the PD. The strategies were the same as I would usually do but I tried to ask more reflective questions.*

Most teachers reported their enthusiasm for such approaches, even though some felt they were adopting a challenging innovative teaching role.
I loved the role of teaching/talking and developing close relationships with the kids. We were hoping for the students to experience ‘Rich Tasks’ so we had a school wide learning circle across year levels.

There was a great variety of activities going on. It was important to keep an eye on what they were doing. There was virtually no didactic teaching. I love this kind of teaching.

A small group of the teachers were cynical about the ways Year 9 Exhibitions attempted to change teacher behaviour. They felt disempowered and uncomfortable, especially where they believed their teaching role had been diminished.

What is the point of Exhibitions? Out of control students, plagiarism from the internet, worried about the depth of thought given by students to their topics of choices. I found it hard not giving much input to what the students researched—just being on hand to help.

Many of the teachers reported being pleased when the unit was over. A few indicated they would return to their usual approaches. Others indicated that they planned to incorporate such teaching and learning approaches into other units of work, or make other changes for the future.

Enabling kids to have that experience to do learn and talk about it is invaluable. Even kids who weren’t really mature were empowered.

It will definitely have a long-term effect on my teaching—giving the students more freedom and focusing on them articulating their learning.

I hope it will have a long-term effect. I now know I can be more flexible and the kids will still get something. It doesn’t have to be so me directed.

All of the teachers recognised that implementing Year 9 Exhibitions involved them in being a different teacher. For some it was a chance to teach in accordance their philosophy of education and their beliefs about teaching, a chance that they felt was not usually available. For many it was a challenging innovation, but exciting and rewarding. Of these, some were looking forward to returning to a comfort zone for a period. Others could not imagine themselves working in such ways outside the period of the Exhibitions, certainly not without support from a team. On the whole, there was a level of satisfaction and a capacity to reflect on the positive aspects of the changes, suggesting that the teachers will continue to incorporate different approaches into their teaching. None of the teachers planned to ignore what was learned, but the extent to which teachers will continue to modify their usual teaching roles and implement different strategies is difficult to judge over such a short time frame.

Assessment processes

Very few teachers reported that the assessment strategies they used could be associated explicitly with the professional development workshops, productive pedagogy or authentic assessment. The professional development workshops, and the assessment sheets provided by DECS to support the record keeping during the round-table presentations, described a rubric of student achievement in four main areas: student as researcher as active learner as reflective learner as presenter. Except in assessing the students’ performances at the round-table presentation, the teachers did not use such terminology to discuss changes in their assessment of students. Those who reported an explicit recollection of the kinds of assessment they learned about during the professional development workshops, nominated the assessment of student journals and portfolios.

All schools used the resources provided by DECS to assess student performance in the round-table presentations. This information included protocols for panel training, sets of guiding questions and descriptions of student learning characteristics, and record-keeping pro forma.

We were looking for different things—looking for different outcomes. We gave them criteria sheets from the beginning so they knew what to do.

I assessed them for things I had in mind. I also realised the assessment should include valuing initiative, etc. We had checklists for some of the Exhibitions tasks and the students kept a learning journal during the project.
We set up assessment criteria for the round-table presentation as well as a portfolio and journal. All of their results were included into their report. We had more informal assessment—looking at the work closely because the very small class helped to know what they were doing. We will have more focus on the structure of the learning process next year.

We just developed a checklist of task completion. We provided all kids with a set of tasks to be completed. We told them about the marking but we made the assessment more of the kids’ responsibility. We didn’t really have any different assessment. We set up time frames that they had to meet and used the round-table criterion sheets.

It is interesting to note the importance the teachers placed on the round-table presentations as sources of information about student outcomes. However, the assessment of student work appeared to be an area in which teachers were least conscious of the links between the professional development workshops and program implementation. In some cases, the assessment strategies still reflected key learning area content assessment using checklists and grades. In others they used checklists that included other aspects of student achievement. Although the teachers did not use terminology related to Year 9 Exhibitions, many reported using more explicit approaches to assessment, ensuring that the students were familiar with the requirements of the work they were doing, and providing opportunities for self-evaluation.

**Improvement in student learning outcomes**

Year 9 Exhibitions is designed specifically to achieve changes in the ways that students experience school, in the ways they understand their learning experiences and in the ways they reflect on those experiences. On the whole, the teachers were not convinced that there were identifiable changes in student outcomes during the class work phase of the implementation. Most teachers identified reasons why outcomes associated with Year 9 Exhibitions were difficult for students to achieve. These reasons were related to the difficulties Year 9 students experienced in taking responsibility for a learning program, to developing capacities for organisation and to making personal evaluations of learning.

However, there was a clear difference in the ways teachers described their assessments of the learning outcomes demonstrated during the round-table presentations. On the whole the teachers were prepared to take a long-term view, recognising the benefits for students of having greater control over, and more self-awareness of, their learning.

There was some difficulty for individuals in identifying their research question and focusing their research. For some it was hard to demonstrate their own learning. It is important to have a go at reflection—even though it is hard.

Change for students is a very gradual thing. The capacity to self-evaluate is very hard to develop. It is difficult for Year 9 but it helps them to improve. Students can negotiate their work and make choices. Since they can talk easily about their work the reflecting will come.

I am not sure about any deep learning but there were a whole barrage of other benefits: working on their own research, explaining their work to strangers, receiving feedback on skills that aren’t often part of ordinary assessment and developing self-esteem.

The professional development program aimed to provide opportunities to students to present their learning in explicit and highly public ways. Even in schools where there was little opportunity for student negotiation and self-generated learning, the effect of establishing and conducting the round-table presentations ensured that important aspects of the program related to student outcomes as researchers, active learners, reflective learners and presenters of their learning were achieved.

I was astounded that these students could present the way they did.

I saw some of my class being proud of their work for the first time in three years.

It was interesting to see that the thought of public presentations meant that some students who never do any work made an effort.
The intended student outcomes were very broad, and any decision about improvement in learning outcomes needs to be considered in relation to what the program was intending to achieve. In most cases, teachers were trying to implement their classroom program to reflect what they had experienced in the professional development workshops, even where their understanding or interpretation of the intentions appeared to be not entirely congruent with the intentions of the program. At the very least, the implementation of the round-table presentations ensured that all of the Year 9 students experienced something different from the learning program they would have experienced without the professional development program. This highly public presentation had a most powerful effect on the positive attitudes to Year 9 Exhibitions shown by teachers and community members, as well as by the students.

**Quality of student work**

The teachers had mixed responses when asked about improvement in the quality of student work. Those who were looking for content learning tended to be sceptical of the value of the approaches they had implemented. Others were very satisfied that improvements had occurred or had at least been introduced. On the whole the teachers were planning ways to achieve a better balance in the work outcomes to reflect the qualities they saw in the oral reports.

*The outcomes for students are different from normal—out of the KLA frame and into broad cross-curriculum outcomes.*

*To judge the quality we need to go beyond the traditional ideas of what kids should be learning and looking at deeper understanding, respecting students capacity to think about things.*

*Some kids did really well but others are just not ready for it. The changes may be produced for many of them next year.*

*Some middle standard students really excelled themselves in focus and impetus.*

*There were some unexpected good results for the bottom 33 per cent—the real low achievers.*

*The kids who usually do well did well and the ones who usually don’t do well didn’t. I don’t think a program like this can change the nature of the kids. They will remember it but there was no practical benefit.*

Most teachers agreed that improvements had occurred for students in aspects of learning such as self-management, time organisation and responsibility for their learning.

There were differences in the extent to which teachers identified particular ability groups of the students who had most benefited from the program. Some felt all students had improved while others identified either the high achievers or low achievers as receiving most benefit.

*The Year 9 Exhibitions was very important in its way of making students interested. They were all very keen to receive feedback on their work.*

*Some kids really grew a lot.*

*It is powerful to get kids to identify their own strengths and weaknesses.*

*The use of the journal is now part of the Year 9 culture—it is becoming easier for them to write about what they have been doing.*

*There was a mixed response. This approach suited a certain type of student. Some boys could not apply themselves and articulate their learning.*

*For them it was no different from usual classes but they enjoyed the round-table.*
Reflecting on learning

Teachers identified the effects of preparing for the round-table presentations and the use of portfolios and learning journals as important contributors to student improvement as reflective learners.

*Overall the kids have a good understanding about what they have done.*

*Students were positive about the round tables and they certainly have higher levels of understanding about their own learning.*

*The real importance of Year 9 exhibitions is to encourage students to reflect on their learning. The round tables were very positive for them and showed them lots about themselves.*

Attitudes to learning

The areas in which teachers reported most positive improvements for Year 9 students related to generalised outcomes such as attitudes, maturity and commitment.

*The kids really impressed me. They liked it very much and wanted to work like this all the time. Some really got into it. The program results in sustained interest from the students and they are better able to respond to what is happening and what is affecting us.*

*It was interesting to observe them coming to terms with their learning. They are more aware of their different styles and their power over their learning. They mainly liked it but some students found it a struggle, especially those with low ability or special learning needs.*

*Some especially responded to individual work. I think the kids who already work independently were advantaged but there were no real drawbacks except for the real resisters.*

The improvements in student attitudes seemed to be enduring in the students who experienced the pilot program. Teachers were pleased with the changes and, as reported later, the students also recognised the ways they worked in the Year 9 Exhibitions period had changed their attitudes to learning.

Behaviour and demeanour

Comments about the positive effects of the program on student behaviour, attendance, cooperation and maturity were common throughout the schools. School principals tended to use these characteristics to describe why they supported implementing the Year 9 Exhibitions after the success of the 2001 pilot program, and to measure the success of the 2002 implementation.

Principals also valued the improvement in community perceptions of the Year 9 students after they had participated in the program. During the November school contacts, teachers reported on their improved relationships with the classes and the ongoing positive effects of the program.

*They are a much nicer bunch now. They gave me hell in Term 1 but this term in Maths they’ve been astounding, far beyond our expectations and very different from the other level 3 class.*

*For some students there were definite changes. Some have identified a special interest they want to follow-up. We have noticed a change in many of these kids similar to the difference in the kids from last year and for them that change is still there.*

*The teacher and students know each other much better and the teacher established a good relationship with a hard class.*

*Students are more likely to attempt to negotiate than they were.*

The following teacher’s comment, however, indicates that some students learned to appreciate the easier life of ‘chalk and talk’.
Since the Exhibitions the students have been easier in class. They lap up the ‘board work’. Before they moaned and groaned.

The responses of a few students supported this: they felt more familiar with the more directed learning they had experienced in their previous schooling.

Many teachers who expressed reservations about Year 9 Exhibitions were nevertheless extremely supportive of providing students with the opportunity to report publicly on their learning.

I was really happy with it after the round tables. We need to sit down as a team and work out what to do to improve the way we ran the unit. I would try to always keep the choice there for the students. The round table was quite a nice exercise—not often do parents have the chance to see that kind of thing. The round tables were really formal but the kids were relaxed.

I was not very happy but the outcome for the kids was fantastic. There were some very moving situations for some of them.

Others indicated that Year 9 Exhibitions was either too costly in time and effort or an opportunity for confident or articulate students to mask their failure to work hard.

I have nothing against it but I don’t know if it is better. There was no proportional benefit for students for the time and effort.

Some students who did no work in class still did very well in the exhibitions.

The mixed evaluation by teachers, of the success of Year 9 Exhibitions in improving student outcomes, related most closely to what aspects of student improvement they valued. The most positive teachers were those who valued broadly defined outcomes. Those who evaluated the success in more content oriented terms tended to be more critical of the capacity of the program to improve learning. Even so, many of them were pleased with the extent to which students demonstrated their understanding of the content during their oral presentations. The aspiration of the professional development program was to improve student engagement with and consciousness of, their learning. In these areas, most teachers saw the program as successful.

**Student perceptions**

The observed round-table presentations comprised a panel of five or so people, sitting around a table, asking questions and listening to explanations and reflections by the individual student. In every case detailed timetables for attendance had been provided to the students to ensure timely and smooth running of the interviews. The panels always included the class teacher, a classmate or peer, and a student from another Year level (usually Year 8). In most cases the panel also included a community member or parent, and, sometimes, another teacher. Each student had prepared presentation materials such as a PowerPoint presentation or a creative arts piece and tabled a folio of work samples. Most had prepared an introductory statement to open their presentation. They were familiar with the kinds of questions they would be asked and the four main criteria they would be expected to address. Many of the students had gone to extraordinary lengths with their personal grooming and appearance.

During the round-table presentations every student was required to explain aspects of the work they had done and to reflect on their success in learning new aspects of the topic. Most students responded to questions about their learning in highly informed ways. Most were able to use their portfolio as evidence for work completed and as a source to remind them about aspects of the topic.

All students were able to respond to questions about providing advice to others about ways to be successful in the Year 9 Exhibitions, and only a very few were unable to identify ways in which they had become a better organised and more efficient learner. The students frequently discussed the advice they would provide to other students in terms of organisation and time-management, finding questions to research that were very interesting and using different resources.
Many were able to identify solutions to establishing group approaches, to resolving conflicts and to sharing tasks. They had developed explicit skills and processes to follow to establish co-operative working relationships with other group members.

**Parent perceptions**

The public nature of the round-table presentations led to direct observation of some most notable episodes. Most students had gone to a great deal of trouble with their clothing and appearance. There were instances where students who had been predicted to truant on the round-table day arrived on time and prepared for their presentation. In other cases students had worked hard to overcome equipment failure and damaged work to participate in the public presentation. In several cases principals reported ongoing, powerful improvements in the behaviour and demeanour of reluctant or alienated students who had experienced the round-tables, both during the pilot phases and in the 2002 implementation.

The round-table panels were quite large and some students had to overcome a level of shyness or nervousness to participate. In one case, a student had negotiated with his teachers to make his presentation to a closed panel because of his extreme, life-long shyness. It had been agreed that his panel would comprise only his teacher, a supportive Year 9 classmate and his mother. After some special cajoling and an undertaking not to ask questions or make comments, he agreed to his panel being observed as part of some ‘special and very important research’. He had prepared a portfolio in a plastic cover and a Power-point presentation of his project. The panel members followed the questioning protocol supplied by DECS. As the panel proceeded, the demeanour and audibility of this boy gradually changed to reflect his growing confidence and pride. By the end of the panel he was making eye contact with the researcher and responding readily to questions about his experience of the project and the round-table. His mother was close to tears and very complimentary to the staff for providing her son with such an experience.

In another instance, a boy was able to impress his father, a high-ranking military officer, with his articulate and confident description of his work and his clear responses to the questioning from the panel. The father was pleased with the maturity of the work the student had completed and his understanding of the real-life situation that had been framed as the context for the Year 9 Exhibitions project in that school.

**To what extent can improvements in student learning outcomes be attributed to the teachers’ learning from the professional development program?**

The opportunity to observe and describe the Year 9 Exhibitions has generated a number of suggestions about the reasons for its success. In the first case, the main reason for the success of the program in affecting individual student outcomes is clear. It is established in the design of the professional development program itself. Year 9 Exhibitions professional development program was designed from the premise that the purpose of a professional development program is to change student learning outcomes. Therefore, the structure and organisation of the program explicitly linked student learning to the initial professional development meetings. Even though it is very difficult to determine a set of causal links between the professional development meetings and the various steps in changing teacher knowledge and pedagogy, the intentions of the program were clear. It set out directly to change student outcomes.

It seems important that the teachers were encouraged to form collegial groups and to support each other. It also seems important that the focus of the program was students in Year 9. Students in the middle years of schooling respond well to increased self-determination and to taking responsibility for their own learning. Their experience of school life and their maturity permit them to learn more independently and to make public presentations of their learning.

There were instances in the implementation when the links were modified, and yet the general response from principals, teachers and students was that changes had occurred, in some instances, likely to have permanent effects. The changes, or improvements, in the students’ learning outcomes can be clearly linked to the implementation of the program. Even where the links break down, because of local interpretations and pragmatic responses to the program, students still have new opportunities to experience school in a different way. Many teachers were explicitly aware of those links.
The links I can see are that the teachers who went to the PD took the project further. They can’t keep on the old methods but it needs a balance between teaching methods. Planning for learning outcomes provides explicit goals for all and focused learning. They planned work to cater for all students and linked up the assessment to a range of outcomes.

As one Year 9 Exhibitions co-ordinator said:

The important links between the PD and the student outcomes is getting to know the students and providing a program that has the kinds of choices we have in real life.

References


Chapter 9

The New Basics: A Curriculum Reform Case Study

Sue Ferguson

Context of the case study

The New Basics was a school reform that was trialled in 59 Queensland government schools. The trial commenced with 38 schools in 2000 (Phase 1) with another 21 schools joining in 2001 (Phase 2). Phase 1 of the trial will be complete in 2003 with the Phase 2 schools continuing their involvement until 2004.

The professional development program conducted to assist the trial schools to implement the New Basics included formal professional development programs facilitated by the New Basics Unit, teachers working together in professional learning communities, and the provision of funding for a critical friend for two days per week for each school or cluster.

New Basics was conceived as part of *Queensland State Education 2010*[^1]. This document outlines the summary and conclusions of an extensive consultation process about the future of schooling in Queensland and how schooling could contribute to the future of the state. In the document the New Basics is defined as

> an integrated framework for curriculum, pedagogy and assessment that defines the essential areas of learning appropriate and effective approaches to teaching affiliated modes of assessment and assurances about student development at key points of schooling (Queensland State Education 2010, p.15).

Curriculum

The New Basics trial developers asked schools to re-conceptualise the curriculum. The eight Key Learning Areas with student learning outcomes expressed at eight levels of progress were no longer the key organisers for the curriculum. Instead, the curriculum was structured around four clusters or groups of practices:

- life pathways and social futures
- multi-literacies and communications media
- active citizenship
- environment and technologies.

Trial schools devised curriculum plans based on these groups of practices and have been quarantined from the need to implement the new syllabuses that have been released recently in Queensland. Most schools adopted a transdisciplinary approach to the designing of curriculum programs that blended the traditional disciplines and the structures above.

Pedagogy

[^1]: Queensland State Education 2010 was the result of extensive research and consultation commissioned by the Queensland Government in 1999.
Advocates of the New Basics program ask teachers to refer their teaching to a set of educational values called productive pedagogies. Productive pedagogies were developed from Newmann and Associates' (1996) concept of authentic pedagogy. The intention was that teachers would use these standards as a framework to analyse and reflect on their teaching and improve student outcomes. Productive pedagogies have the following characteristics:

- intellectual quality
- connectedness
- supportive classroom environment
- recognition of difference

Table 1 lists the elements of Productive Pedagogies, a set of values believed to be characteristic of effective teaching, as presented in the New Basics Technical Paper.⁴⁵

<table>
<thead>
<tr>
<th>Table 1: Intellectual quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher-order thinking</td>
</tr>
<tr>
<td>Deep knowledge</td>
</tr>
<tr>
<td>Are higher-order thinking and critical analysis occurring?</td>
</tr>
<tr>
<td>Does the lesson cover operational fields in any depth, detail or level of specificity?</td>
</tr>
<tr>
<td>Deep understanding</td>
</tr>
<tr>
<td>Do the work and response of the students provide evidence of depth of understanding of concepts or ideas?</td>
</tr>
<tr>
<td>Substantive conversation</td>
</tr>
<tr>
<td>Does classroom talk break out of the initiation/response/evaluation pattern and lead to sustained dialogue between students, and between teachers and students?</td>
</tr>
<tr>
<td>Knowledge problematic</td>
</tr>
<tr>
<td>Are students critiquing and second-guessing texts, ideas and knowledge?</td>
</tr>
<tr>
<td>Metalanguage</td>
</tr>
<tr>
<td>Are aspects of language, grammar, technical vocabulary being foregrounded?</td>
</tr>
<tr>
<td>Relevance</td>
</tr>
<tr>
<td>Knowledge integration</td>
</tr>
<tr>
<td>Does the lesson range across diverse fields, disciplines and paradigms?</td>
</tr>
<tr>
<td>Background knowledge</td>
</tr>
<tr>
<td>Is there an attempt to connect with students' background knowledge?</td>
</tr>
<tr>
<td>Connectedness to the world</td>
</tr>
<tr>
<td>Do the lesson and the assigned work have any resemblance or connection to real-life contexts?</td>
</tr>
<tr>
<td>Problem-based curriculum</td>
</tr>
<tr>
<td>Is there a focus on identifying and solving intellectual and/or real-world problems?</td>
</tr>
<tr>
<td>Supportive classroom environment</td>
</tr>
<tr>
<td>Student control</td>
</tr>
<tr>
<td>Do students have any say in the pace, direction or outcomes of the lesson?</td>
</tr>
<tr>
<td>Social support</td>
</tr>
<tr>
<td>Is the classroom a socially supportive, positive environment?</td>
</tr>
<tr>
<td>Engagement</td>
</tr>
<tr>
<td>Are students engaged and on-task?</td>
</tr>
<tr>
<td>Explicit criteria</td>
</tr>
<tr>
<td>Are criteria for student performance made explicit?</td>
</tr>
<tr>
<td>Self-regulation</td>
</tr>
<tr>
<td>Is the direction of student behaviour implicit and self-regulatory or explicit?</td>
</tr>
<tr>
<td>Recognition of difference</td>
</tr>
<tr>
<td>Cultural knowledges</td>
</tr>
<tr>
<td>Are diverse cultural knowledges brought into play?</td>
</tr>
<tr>
<td>Inclusivity</td>
</tr>
<tr>
<td>Are deliberate attempts made to increase the participation of all students of different backgrounds</td>
</tr>
</tbody>
</table>

⁴⁵ The New Basics Technical Paper, Education Queensland, consists of two substantive parts: Part 1 provides a detailed contextual rationale for the New Basics Project and Part 2 outlines the technical specifications for the New Basics Project in operation, including the harnessing of relevant theoretical explanations and reviews of the research literature to specific implementation proposals and accountabilities.
Investigating the Links between Teacher Professional Learning and Student Learning Outcomes

<table>
<thead>
<tr>
<th>Higher-order thinking</th>
<th>Are higher-order thinking and critical analysis occurring?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrative</td>
<td>Is the teaching principally narrative, or is it expository?</td>
</tr>
<tr>
<td>Group identity</td>
<td>Does the teaching build a sense of community and identity?</td>
</tr>
<tr>
<td>Citizenship</td>
<td>Are attempts made to foster active citizenship?</td>
</tr>
</tbody>
</table>

Adapted from the *Queensland: School Reform Longitudinal Study (Literature Review)*, University of Queensland, 1999

One aim of the New Basics Trial was to provide teachers with professional development to assist them to move their practice towards the values described in productive pedagogies.

**Assessment**

Advocates of New Basics asked teachers to base their student assessments on the idea Rich Tasks (RT). Rich Tasks are designed to have real-world value and use. Each Rich Task draws on:

- Repertoires of practices—the cognitive, cultural, linguistic and social skills that need to be acquired
- Operational fields—the New Basics plus other disciplinary, Key Learning Area and/or other transdisciplinary fields of knowledge

_Rich Basics Theory into Practice*, 1999, Education Queensland

Rich Tasks are intended for use at three juncture years: Years 3, 6 and 9. Rich Tasks were to be accompanied by grading masters to be distributed early in 2003, which would describe statewide standards for each Rich Task. A moderation process was set in place to ensure that comparable assessments are made across the trial schools.

Rich Tasks included:

1. **Narrative text: Away with Words (for Year 6)**

Students will critically examine books written for emergent readers. They will determine the criteria for categorising these books and select one category for further examination. In this selected category, students will present a review of a book. Using the selected category, they will then choose an aspect of nature and create an illustrated storybook—crafted by hand and/or electronic technology—for their peers to review.

2. **The Built Environment: Designing a Structure (for Year 9)**

Students will identify a client’s needs and take these and other factors into account in preparing a design brief for a structure. They will design an environmentally sensitive and aesthetic structure to fulfil this brief and communicate the design through sketches, plans and models. They will give due consideration to structure and materials, quantities and costs.

The Rich Tasks art booklet were distributed to all trial schools. This booklet included descriptions of each task reference to the New Basics organisers a list of targeted repertoires of practice a flow chart suggesting a process of undertaking the task ideas, hints and comments and a description of the task parameters. Also included were the desirable features with a description of the criteria for high-quality and acceptable performance.

---

47 Juncture years are Years 3, 6 and 9 where the Rich Tasks were assessed.
In other ‘non-juncture’ years, trial schools could assess students’ progress using Rich Task-like activities or in other ways, although schools were encouraged to use authentic assessment techniques based around rubrics.

Learning to use Rich Tasks was a second focus of the statewide professional development program for New Basics trial schools.

**Trial schools**

To be selected for the study, interested schools submitted expressions of interest. To be accepted for Phase 1, schools had to demonstrate:

- whole-school support for involvement
- that a program of pedagogical reform had already begun
- ability to access the internet, with computer networking across the school.

Trial schools were selected on the basis of these criteria, ensuring that there was a balance of types of schools across the state.

To be selected as part of Phase 2, schools had to demonstrate an understanding of the New Basics program in addition to the criteria listed above for Phase 1. Many schools selected for Phase 2 were small rural schools, often working in clusters.

Expressions of interest in Phases 1 and 2 far outnumbered the number of schools selected to participate in the trial.

**The professional development program**

As befits a major school reform trial of this nature, provision of professional development opportunities has been extensive and complex. The professional development program to support implementation of New Basics is organised in two categories: formal and informal.

For the purpose of this study, formal professional development programs are defined as programs conducted by an external facilitator—often sponsored by the New Basics Unit. In the case of the New Basics Trial the following major programs were conducted.

**Formal professional development**

**Rich Task immersion**

This three-day program was designed to introduce teachers to the Rich Tasks, their characteristics and desired features. The intention of this program was that teachers gain a detailed understanding of at least two Rich Tasks and their implications for curriculum planning and assessment. The program was attended by nominated representatives of each school, with the intention that their understanding would be passed on to the remainder of the staff.
Protocols training

This two-day session was designed to establish working relationships for the professional development program and was based on work undertaken by the National Schools Network, in conjunction with the Coalition of Essential Schools in the USA.

The protocols are designed to systematise discussion on a range of educational issues. These issues include the presentation of a new idea, a report on progress or the evaluation of student work. Some protocols are designed for use in classrooms with students while others are more suitable for teacher professional discussions.

One protocol used in the New Basics trial is the Tuning Protocol. In this protocol, there was a strict time limit and sequence for each discussion. The presenter had up to seven minutes to present their case and then there were two to three minutes available for answering questions. Feedback was then given. First, warm feedback highlighted the positive aspects of the presentation. Second, cool (not cruel) feedback was provided by another participant who gave suggestions for improvement and raised issues that the presenter may not have considered.

The roles were assigned before the session and were usually rotated among a group. Sometimes the rules were amended but if this was the case, all participants had to understand and agree with the amendments. It was intended that the protocols be used for all New Basics training sessions and in teacher professional learning communities in schools.

Productive pedagogies

This three-day program was conducted in the second half of 2001 for Phase 1 schools. The aim was to give participants an understanding of Productive Pedagogies and to enable them to experience a teacher professional learning community through the group processes being modelled.

The professional development program gave a significant proportion time to coding teachers’ use of productive pedagogies. The Tuning Protocol was used with the mixed groups of participants from primary, secondary and special schools. Day 3 of the program focused on connections between pedagogy and assessment, using a drama approach presented by a teacher and a group of students. This video-based presentation provided participants with the opportunity to develop awareness of productive pedagogies using real classroom practice.

While the main program was conducted in 2001 there were some follow-up programs conducted in local areas for new teachers in 2002. For instance, a cluster of schools in the Sunshine Coast area offered a Productive Pedagogies program for all teachers at the beginning of 2002.

Sharing and assessment day

This was a one-day program where teachers came together to share an element of their work. The purpose was to facilitate professional conversation with colleagues from other schools. For the first half of the day structured groups discussed the various presentations using the Tuning protocol.

The second half of the day was devoted to commencing the development of standards for assessing performance on the Rich Tasks. It was intended that these standards were developed collaboratively by the teachers involved in the trial although some work was also undertaken by the New Basics Branch.

Phase 2 schools participated in these programs in 2002—some of them were conducted by Phase 1 teachers and principals. Not all teachers attended the programs. In most schools the participants had the opportunity to brief the remainder of the staff on what they had learned from the professional development program. This varied from school to school in the case study schools. In one case a full program was offered for all teachers but in others it was only briefly mentioned at a staff meeting.

The protocols training kit, The Heart of Teaching Network is published by the Australian National Schools Network (2000).
Introduction to the grading masters

This program was offered across the trial schools in late 2002 to brief teachers and principals on the planned format and process of assessment for the Rich Tasks and to gain feedback on the approach. This topic was of great interest to Phase 1 schools preparing for the first complete implementation of the Rich Tasks at juncture years in 2003.

Informal professional development

Informal professional development activities are defined here as activities such as discussions in team or faculty groups, curriculum planning meetings, staff meetings, professional reading or participation in online discussion groups. In the case of the New Basics Trial in 2002, the focus of this research, informal professional development activities cited by teachers included a number of activities.

Curriculum planning meetings

All schools in the trial were required to develop a three-year curriculum plan. While most of the schools in the case study had nearly completed their plan, all stressed that this document was a work in progress.

The format of the Curriculum Plan was guided by a CD-ROM, which provided a template to assist teachers with their overall curriculum plans as well as their individual unit plans. Many of the schools in the sample were using this template, while others developed their own.

In addition to preparing the three-year curriculum plan all schools were involved in planning at the unit level, constructing units both at the juncture years and those leading up to the juncture years. All teachers surveyed for this case study referred to this opportunity as one of the most valuable professional development experiences of the New Basics experience.

Network meetings

Five of the schools involved in this case study are part of the Cyber School Cluster centred around Nambour. Teachers from these schools met monthly to discuss issues related to New Basics, share ideas, discuss learnings and exchange plans.

Participation in the New Basics discussion list

The discussion list was very successful in 2002 with more than 600 registered users, many of whom were ‘lurkers’. Participation in the discussion list was not cited as professional development by many teachers but the New Basics team described the list as a vital professional development strategy. While officers from the Branch participated in the discussion list, their policy was to delay posting messages to provide the opportunity for the schools to assist each other.

Professional discussions

Several teachers, in interviews and surveys, said that the level of professional discussion had increased. Secondary school teachers cited the increase in discussion across discipline areas.

This case study traces the effects of both types of professional development, formal and informal, that teachers participated in since the commencement of the trial. Arguably, 2002 was not the best year for conducting this research, as the majority of the formal professional development programs for New Basics had been conducted in previous years. Teachers were asked to list and reflect upon the effects of all professional development activities, including those conducted before 2002, but the passing of time made this difficult for some teachers.
Additional support from the New Basics Unit

Schools in the New Basics trial were provided with budgetary support to implement New Basics with a grant for teacher release days, equivalent to approximately two days per year for every teacher involved in the school.

Officers from the New Basics unit visited the schools throughout the trial. These officers met with the principal of the school and with key curriculum people in the schools. In addition, they conducted staff meetings to discuss the implications of New Basics.

The aim of this quite extensive support program was to build relationships between the Unit and the schools, to assist in the planning process and to build new relationships between schools. Schools were visited on request.

Each school received an annual $11,000 allowance for ‘a critical friend’. The schools chose their own critical friend, usually an academic. The use of the critical friend varied considerably across the trial. Some critical friends gathered research evidence; others supported the curriculum planning process; while others conducted professional development programs for teachers in the schools on topics such as the productive pedagogies.

It is interesting to note that the critical friend was not mentioned in the context of professional development by teachers in the case study schools, except those from Plateau Secondary School. In this school two staff members were each provided with 0.2 time release to act as critical friends in their own school. They worked with staff in planning curriculum, explaining the jargon and intentions of the program and they observed their colleagues teaching and offered constructive feedback. This move was very positively received in the school.

Research sites

The New Basics Unit nominated seven schools for this study: five primary schools and two secondary schools. Teachers of Years 5 and 6 were included in the primary school study and a team of three teachers from each of the secondary schools. In the case of the secondary schools teachers were selected from differing discipline backgrounds. Some characteristics of the schools are shown in Table 1.

Table 1: Case study school characteristics

<table>
<thead>
<tr>
<th>School</th>
<th>Size</th>
<th>Location</th>
<th>SES*</th>
<th>No. of teachers included in this study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riverview SHS</td>
<td>702</td>
<td>Sunshine Coast</td>
<td>Middle/High</td>
<td>3</td>
</tr>
<tr>
<td>Garden SS</td>
<td>207</td>
<td>Sunshine Coast</td>
<td>Middle/High</td>
<td>3</td>
</tr>
<tr>
<td>Valeside SS</td>
<td>123</td>
<td>Sunshine Coast</td>
<td>Middle/High</td>
<td>2</td>
</tr>
<tr>
<td>Mountain SS</td>
<td>295</td>
<td>Sunshine Coast</td>
<td>Middle/Lower</td>
<td>3</td>
</tr>
<tr>
<td>Ferntree SS</td>
<td>360</td>
<td>Sunshine Coast</td>
<td>Middle/High</td>
<td>3</td>
</tr>
<tr>
<td>Avenue SC^</td>
<td>1500</td>
<td>Brisbane</td>
<td>New school</td>
<td>3</td>
</tr>
<tr>
<td>Plateau SS</td>
<td>380</td>
<td>South Burnett</td>
<td>Middle/Lower</td>
<td>3</td>
</tr>
</tbody>
</table>

* These classifications were provided by the Assessment and New Basics Unit and are based on an index constructed from twenty variables collected at the 1996 census. The school score is an average of the index weighted by enrolments taking account of the geographical location of the student population.

^ Avenue SC was formed by the amalgamation of two schools in 2000 and did not have an official SES classification.

Principals were asked to nominate up to three teachers of Years 5/6 or Year 8. Because of the size of the primary schools this meant that all teachers of those year levels were included in the study. In secondary schools, principals were requested to nominate teachers across subject areas, specifically a Mathematics/Science teacher, an English/SOSE teacher and one other teacher.
Gathering data

The following research questions were the focus of data gathering:

- What are the intended outcomes of the New Basics professional development program?
- What is the nature of the New Basics professional development program, both formal and informal and does this vary across schools?
- How does the school context influence the introduction of New Basics and the nature of support given to teachers?
- What is the teacher’s initial level of knowledge and understanding of New Basics and how is this reflected in its implementation?
- Does New Basics significantly improve student learning outcomes?

Data was collected from a number of sources.

Principal

Each school principal was interviewed on two occasions. The interviews spanned all questions above but concentrated in particular on the school context.

Teachers

Interviews and surveys were used to investigate the teachers’ participation in and response to both formal and informal professional development the changes made to curriculum, pedagogy and assessment and the perceived effects of these on student learning outcomes. Teachers were also asked to submit three pieces of student work on Rich Tasks (or Rich Task-like work) along with their assessments of the students’ performance.

Students

The Developmental Assessment Resource for Teachers (DART) reading assessment and the Progressive Achievement Tests in Mathematics (PATMaths) test were administered in May and again in November to obtain a measure of changes in literacy and numeracy performance. Students also completed a classroom environment survey in an attempt to identify, from the student perspective, the pedagogical approaches of their teacher. In addition some classes were observed and discussions held with students. Samples of student work on Rich Tasks or school-based tasks were analysed for three students from each teacher.

The assessment and New Basics Unit

Interviews were conducted with the Director of the Unit and Senior officers. These interviews concentrated on the intentions of the professional development program and its nature.

Implementation of New Basics

A collaborative approach

By the end of 2002 all schools had developed three-year curriculum plans, at least in draft form. In all cases, there had been several drafts and different attempts to get a format that suited their school. The plan included an outline of the curriculum and assessment strategies for the whole school. Individual groups of teachers were responsible for fleshing out this plan into units of work for the stage of schooling for which they were responsible.

All curriculum plans included reference to the New Basics referents and the repertoires of practice associated with the Rich Tasks. Often there was reference to the development of deep understandings discipline knowledge, and to literacy and numeracy skills. Many schools also included other programs such as Jump heart for rope.
Often the principal was involved along with the teachers. As one principal put it:

*Schools are about curriculum. If we [principals] take on a strictly managerial role we are not doing our job. Schools are learning institutions and everyone in our schools is a learner: teachers, me [sic] and the students. My role is to facilitate this learning and to make teacher change a natural and enjoyable activity.* (Principal, Garden SS)

Many other principals echoed this comment although some had delegated this role to others in the school—assistant principals or curriculum co-ordinators.

Analysis of the curriculum plans revealed that they were strongly influenced by the Rich Tasks and the associated repertoires of practice. Planning was always divided into sections of the school leading up to the juncture years, so there were plans for Years 1–3, 4–6 and 8–9.

### Transition to secondary school

The professional development program offered many opportunities for primary and secondary school teachers to interact and discuss issues related to the transition between primary and secondary school. New Basics was set up so that the last cycle of Rich Tasks began in Year 7, the last year of primary school in Queensland. However, there was no evidence of primary schools doing any substantial planning for the next set of Rich Tasks in Year 7, nor was there any evidence of secondary schools taking account of what was happening in Year 7 classes. When primary teachers and principals were questioned about the lack of planning for Year 7 the main reason given was the time required for ‘getting our act together for the other years that are completely our responsibility’.

The following comment represents the other concern of primary schools.

*None of the secondary schools that our students will attend are New Basics schools. We have to make sure that our students are able to cope with the demands of a ‘normal’ program based around the syllabuses. So in Year 7 we try to catch up on the outcomes that may have been missed out in the previous years, particularly Science, Mathematics and LOTE.* (Principal, Plateau SS)

There was recognition that in future the primary schools would need to have conversations with the secondary schools in the area to streamline the planning for Year 7. On the Sunshine Coast there had been some cluster discussions between primary schools and the New Basics secondary schools in the area. But even in that case there was concern expressed similar to that noted above.

The secondary school involved in this study, Riverview SHS, said that they would like to have had closer working relationships with the primary schools but there simply wasn’t time when they were wrestling with the implementation of New Basics themselves while ensuring that their students were adequately prepared for the senior years.

Avenue SC was an exception to this problem with Year 7. This school was a newly established amalgamation of a primary school and a secondary school. Avenue has established a separate middle school for Years 6–9. Teachers in the middle school work closely with the junior school to plan for the development of the skills and understandings required for the Year 6 Rich Tasks in particular.

### Planning classroom programs

While three-year plans were a priority for the curriculum leaders in the school, most of the teachers in this study were more pre-occupied with the day-to-day planning of their classroom programs. All teachers commented on the benefit of working together to plan the units, learning from each other and sharing the workload. The following comment was typical of those made by many teachers:
To provide such programs, teachers need to be released in groups to discuss and plan together during work hours. (It is very difficult to talk meaningfully at the end of the day.) Quality outcomes need access to funding to provide the resources (and human resources) that discovering new educational outcomes require (Teacher, Mountain SS).

All schools developed school based tasks for non-juncture years. For example, at Garden SS, a multi-age setting, the three teachers involved in this study developed their own school tasks, which they use as the basis of their teaching program. For instance, one of their tasks was to plan a production of *Putting on the Ritz*. This school-based task was designed to lead into the Year 6 task ‘A Celebratory, Festive or Artistic Event or Performance’.

The task involved students in Years 5–7 working in committees to manage the staging of the annual school concert held in the community hall. The students also rehearsed and performed a play with three options for performance venues, including the community hall. The planning notes for the task include identification of the productive pedagogies to be employed, the repertoires of practice to be addressed and the significant questions to be answered. These questions include: How can I contribute my individual abilities to a group venture? How do I communicate using performance of as a medium? The teachers also identified the deep understandings they wanted the students to gain as a result of undertaking this task.

The above example is not isolated all schools provided evidence of thinking about the intersection between curriculum, pedagogy, and assessment and teachers could talk about the way this was different, and better, than the way they had worked before.

Almost all teachers said they have made the following changes in their practice:

- involvement of students in planning learning programs
- inclusion of information technology in learning
- collaborative planning of the units and lessons
- team teaching and providing (and receiving) feedback on their teaching.

**Student responses**

One intention of the professional development program was that students would take control of their own learning. One classroom observation of an oral presentation was illuminating on this aspect of New Basics. The teacher played no part in the lesson except as a member of the audience. The children ran the class, made sure everyone was paying attention, had feedback mechanisms imbedded in their presentation to ensure the ideas presented were understood and made a conscious effort to include all members of the class. All five students observed had obviously researched their topic in detail, presented their findings in a clear and engaging manner and constructed PowerPoint slides that were interesting and pertinent. The audience comments were thoughtful and constructively critical.

Subsequent discussions with the students revealed that these skills had been modelled by the teacher and that, along with the content of their presentation, they were taught how to research information for their presentation, tutored in how to make oral presentations and how to make appropriate responses whilst providing feedback to the presenter.

This was not an isolated incident. Classroom observations were undertaken in many of the schools. While the quality of the presentations varied as always, all students interviewed could articulate what they were doing and why, and could offer constructive evaluations of their own and others work.

Engagement of students was generally high. This is another dimension of the productive pedagogies dealt with in the professional development program. Many of the students interviewed cited the idea that working with other members of the class on real tasks as the best thing they experienced in their lessons. The opportunity to use the computer to design presentations, research and communicate their findings was also applauded by the students. Of course there were some students who thought that school was ‘boring’ but this comment was far outweighed by the number of positive comments.
The professional development program stressed the link between the New Basics and student learning outcomes. However it was the informal activities at the school and cluster levels that had the greatest impact on the idea of focusing on student learning outcomes. In all schools evidence was presented of planning based around what students were to learn, usually guided by the Rich Tasks and their associated repertoires of practice. Many of the teachers identified the deep knowledge and deep understandings they expected to arise from their units of work. These student learning outcomes though were defined more broadly than the traditional content based concepts and extended to student planning and engagement outcomes. This is where the analysis of the student products and the interviews with students showed the greatest improvement.

**Assessment**

Assessment was the driver of much of the implementation of the New Basics. As outlined above, all schools used the Rich Tasks as the foundation of their work in planning. This had spin-offs to pedagogy and to assessment techniques as well. In all schools, standards-based assessment techniques were developed by the staff to guide their evaluation of students. These assessment rubrics covered knowledge and understanding, together with skills of working together, research and inclusiveness. The idea that New Basics is about learning to work together was well understood and implemented in what was evaluated and hence valued in the assessment strategies. Almost all rubrics prepared by the schools included elements related to student participation and engagement along with the students’ planning skills. In one school students developed their own rubrics to use as the basis of self and peer assessment activities.

It was evident that all teachers understood the notion of authentic assessment tasks, although the translation sometimes led to quite contrived and closed projects. On the whole, the assessment element of the professional development, both formal and informal, led to a shift in assessment techniques with all teachers being able to judge student achievement against criterion-based rubrics. In the period of this research project all assessment rubrics were school-based and the issue of cross-school comparison had not been addressed.

The New Basics Unit plans to introduce a trial-wide moderation process in 2003 to assist in the development of common standards. The focus of much of the professional development in 2003 will be on the moderation process. Indeed, one could argue that the moderation process itself will be a powerful professional development strategy.

**Pedagogy**

The purpose of the productive pedagogies program was to assist teachers to monitor their pedagogical approaches and to focus more on strategies that led to deep understanding and engagement of all students in the learning process. All teachers in the sample had participated the productive pedagogies program and all report revision of their pedagogical processes was a focus of their work in 2002.

The extent to which teachers use of the productive pedagogies has increased can be seen in Figure 1 on the following page.

This chart was based on the teachers’ assessment and not on the basis of a systematic observation in classrooms. However, the intention of the teachers is clear and, even if the implementation was not quite as the teachers meant, it demonstrates the commitment teachers have to the productive pedagogies.

One teacher made the following comment:

*Productive Pedagogies has helped me develop a more systematic approach to New Basics and made me reassess my teaching practices and philosophy, and to realise that I still have a further journey to travel.* (Teacher, Avenue SC)
To complement the teachers’ survey, students also completed a survey on their experiences in their classroom. They were asked to describe the frequency of experiences on a four-point scale from ‘always’ to ‘never’. As expected, the modal responses from the students were in the middle range indicating they experienced certain strategies sometimes. There were however some exceptions to this.

The most interesting exception was Valeside SS. Both the mean and modal responses were ‘never’ to the students’ questions ‘I work hard’, ‘I know I can do good work’, and ‘My teacher respects me’. This is quite disturbing if one group of the productive pedagogies was to develop a supportive classroom environment. The two teachers had both participated in the productive pedagogy program and both were very experienced teachers. The principal of this school was new to the school and in interviews showed great commitment to the New Basics. Interviews with the two teachers involved and their responses on the survey showed little understanding of, or commitment to, the New Basics. This school was one where the principal made the decision to participate in the trial without any discussion with the staff or the community. That principal has since left the school.

At the other end of the scale was Ferntree SS where the mean and modal responses were all on the scale at ‘always’ or ‘mostly’. This school has a very active and supportive principal and assistant principal who work closely with the teachers in planning exercises and where two staff meeting per month are set aside to deal with matters relating to the implementation of New Basics. The decision in this school to participate in the New Basics trial was made after lengthy discussion with all staff in the school. The principal reported a preparation to pull out of the cluster application for the trial if there was not complete agreement from the staff.
The success of Ferntree SS concurs with Elmore’s\(^9\) view that ‘the key to effective professional learning is to build a new professional culture characterised by collective responsibility for teaching practice and student learning’.

**Student achievement**

The major source of evidence about the effect of the professional development program on student achievement was the samples provided of student work on Rich Tasks or school-based tasks. Each teacher was asked to provide three examples of student work, along with their assessments of the students: one which was judged to be of a high standard, one of a medium standard and one of a satisfactory standard.

The tasks from which these samples were drawn varied across schools both in focus and in format. Several teachers provided copies of the student journals, as well as videotapes, audiotapes and PowerPoint presentations. Included with the samples were teachers’ notes about the unit, assessment rubrics and the teacher’s assessment of the three students.

**Avenue SC**

Avenue SC presented samples related to a task that led up to the International Trade Rich Task for the Year 9 juncture year. The task covered aspects of Science, Mathematics, LOTE, English and SOSE. This school has re-organised some of their curriculum into transdisciplinary studies (TDS) with one teacher taking Maths/Science and another taking English/SOSE. Specialists remain responsible for Business education, LOTE and there is a separate block called TOP, which covers the Arts and Technology.

The task required that students prepare a product (in this case a bath bomb) and design a brochure to advertise that product in a marketplace attended by LOTE speaking customers. They were to make packaging for their bath bomb and use a computer program to prepare a brochure to advertise their product. They were to engage in a sales exchange in a LOTE and finally present a document that detailed the financial aspects of exporting a quantity of the product to another country. The teachers developed assessment rubrics for each of these elements.

The samples provided included scientific reports and flow charts to show the process of preparing the bath bombs, the export calculations and the students’ responses in test situations. Analysis of the samples revealed a quite high level of understanding of the scientific process required to make a bath bomb. The level of scientific understanding of states of matter is commensurate with what would be expected in Year 8, according to the Queensland Science syllabus\(^50\). Similarly the mathematics understanding was as expected. The scientific reports were of a quite high standard—at least at the level expected in the syllabus for Science and the National English profile, which was the document used in Queensland in 2002\(^51\). No LOTE samples were supplied, nor did any of the samples provide any insight into the understanding of trade.

The ability of the students to reflect on their work and to describe the processes they undertook was impressive. The teachers reported that all students were highly engaged throughout the task and enjoyed learning some fairly standard maths and science concepts in this setting.

---


\(^50\) The researcher examined the rich task and identified the outcomes exhibited in the work samples and compared these to the outcomes listed in the relevant Queensland syllabus.

\(^51\) A new Queensland syllabus for English was expected to be released in Queensland in 2003. It should be noted that the New Basics schools have been quarantined from the implementation of the new syllabuses. However these syllabuses can be used as one benchmark for judging student achievement in New Basics schools.
Garden SS

Samples from two school tasks were supplied for this study. These two tasks were school-developed tasks (not official Rich Tasks published by the New Basics Unit), the first focused on building a structure in the school and the second on a food tour of a European country.

The first task required that the students design and make a model of the structure after researching the needs of the animals to be housed within it. They also had to plan an educational program for the students in the school.

In the second task the students had to prepare a PowerPoint presentation summarising their research and engaging the audience interest in the country. Again the range of levels of understanding was consistent with what is expected in the syllabuses.

One exception was the quality of the PowerPoint presentations, which were quite sophisticated and included sound, pictures sourced from the internet and animated graphics. Each sample showed a good understanding of graphic design and, while perhaps too ‘busy’ for a fully professional product, was of a very high standard for grade 5/6 students.

Several other school presented samples involving PowerPoint and these samples were similarly proficient to those at Garden SS. Perhaps this is a demonstration of the limits put on expectations of students in other programs.

Another exception was the acuity of the educational programs designed by the students. These showed deep understanding of issues surrounding the keeping of these animals on the school grounds and the learning possibilities for other students in the school.

Other samples showed similar results. The knowledge and understanding displayed by the students fitted that which was expected in the syllabuses. The outstanding features were the interpretation of the data, showing a deep understanding of the concepts and the presentation skills of the students when using computer-based technology and in oral presentations.

In interviews teachers reported improvements in student performance in the areas of working together in groups or individually their engagement in their learning and their ability to plan and conduct research with guidance, but not direction, from the teachers. In one case the students even designed their own assessment rubrics demonstrating that they were very clear about the requirements of the task and the levels of achievement required.

Students mostly substantiated teachers’ reports about the level of engagement, saying that they really enjoyed the ‘more real’ tasks and that their teachers were letting them decide how to do their task but helping them along the way. There were some students who thought that they had to work too hard and that the tasks were too difficult. These students were the exception.

The tasks and student work give an impression that levels of achievement were not consistent across the schools but as the tasks were all very different this is difficult to substantiate. Certainly the design of the tasks was inconsistent across the schools. Many were very well thought out and really stretched the idea of transdisciplinary studies. But in other cases the connections were not really there. In one case the task was to conduct a games session for other students in the school but there was no attempt to link this games session to the conceptual understanding of the discipline that underpinned the games.

The Rich Task immersion element of the professional development program has been influential in the development of authentic tasks at the school level. All schools in the study had developed their own tasks based on the published tasks. The schools in the sample have taken up the notion of criteria-based assessment presented in the professional development program. The other influence on the student learning outcomes was the Productive Pedagogy professional development, broadening the scope of the performance to be assessed to elements such as student planning and team work. Communication and multi-literacies, fundamental aspects of the New Basics, were also reflected in the student outcomes. The quality of oral presentation and the use of electronic presentation mechanisms such as PowerPoint were outstanding, reflecting the focus of the professional development programs.
It remains to be seen how the Rich Tasks will work when they are fully implemented. All the Rich Tasks were assessed in 2003 for the first time. The schools had only just received the grading masters and wrestled with these, along with the practicalities of fitting seven quite substantial tasks into a Year 6 school year and eight tasks in Year 9. How to deal with composite and multi-age classes in primary schools was also raised as an issue in all primary schools in this study.

The online discussion list was very active in the 2002 fourth term, with list members asking for advice, sample timetables and resources for the Rich Tasks. The response was very positive with ideas and supplementary questions being offered in a very positive and supportive manner.

The vast majority of teachers said that the professional development, both formal and informal, had prepared them as well as possible to deal with the Rich Tasks and that the organisational issues would just have to be dealt with as they worked with the students and other staff.

Findings

Intended outcomes of the New Basics professional development program

The intended outcomes of the New Basics professional development program are complex and entail a major change in philosophy and practice for many teachers. It is an ambitious program, one that will take a long time to be fully implemented. Consequently significant changes within a six-month period are difficult to ascertain. This study, while focusing on the year 2002, also investigated teachers’ perceptions of the professional development process from the commencement of the trial.

For Phase 1 schools, 2002 was the penultimate year of a four-year trial. In 2003, implemented the full suite of Rich Tasks for the first time. Planning for this was the main focus of 2002, from the seemingly prosaic task of scheduling the Rich Tasks so that all can be covered in the year, to the complex issues of how to deal with multi-age and composite groupings in many classrooms. Curriculum, pedagogy and assessment strategies were all occupying the minds of these teachers and principals.

The professional development program did not have a specific component designed to assist teachers to understand the theoretical or philosophical underpinnings of the New Basics. This was left to teachers and schools to discern from their own reading, often of quite complex academic documents.

In interviews and in the surveys, very few teachers listed professional reading as an avenue for their professional development. Most struggled to articulate the rationale for New Basics except in a very broad way. For instance

*New Basics has encouraged me to include new technologies and prepare children for new worlds of work. Assessment has dramatically changed with standardised and specific criteria being used more readily in the primary area* (Teacher, Riverview SS).

*The hardest thing I've had to do is stop being the provider of knowledge and become the facilitator—having kids working in groups more and giving them problem-based activities to work through* (Teacher, Mountain SS).

While these two comments and many like them demonstrate an understanding of the implementation issues surrounding New Basics, no teacher was prepared to put a position on why or how the New Basics was being trialled or what principles underpinned its development. The New Basics technical paper states the following rationale:

*... a major challenge facing curriculum, pedagogy and assessment is the production of educational outcomes suited for a networked society, where the rapid global, regional and local exchange of information, knowledge and symbols is at the heart of the worlds of work, civic and community participation, leisure, and consumption. These conditions will require blends of old and new knowledges and skills ...*

New Basics technical paper
The teachers and principals interviewed and surveyed were pre-occupied by the implementation issues. This is understandable given the pressure of full implementation in 2003. But there questions to be asked about the long-term sustainability of New Basics if the schools have not gained a deep understanding and commitment of the philosophy and rationale behind the reform.

Consistency of the New Basics professional development program, both formal and informal, across schools

The New Basics professional development program in the formal sense does not vary across the system. All elements of the program have manuals associated with them but the implementation varied from school to school. All programs were attended by representatives of the school, mostly by senior staff. The opportunities to share their knowledge and understanding included making the manuals available in staff rooms, full day sessions devoted to issues related to New Basics and brief mentions in staff meetings.

Riverview SHS had a unique response to the professional development. The school had three separate teams working on the implementation. These teams varied considerably in their approach and implementation. Talking to teachers involved in this sample was instructive: there were many contrasting opinions of what New Basics meant and how it should be realised in classroom programs. The link to student achievement was difficult to discern as the samples of student work were brief and hence impossible to analyse in any meaningful way.

This can be contrasted with Avenue SC where the principal conducted briefings for all staff, including those not involved in the trial, after each formal professional development program. This school had a consistent approach to the New Basics and all teachers involved in the study suggested that, even if they had not had the opportunity to attend the program themselves, they felt they were fully cognisant of the ideas presented.

Avenue SC had used their critical friend to conduct a program to provide all teachers involved in the trial with a version of the productive pedagogies. The school also has regular meetings with a parent committee with the aim of including parents and community members providing these community members with the opportunity for input and comment on the trial. A regular, detailed newsletter is compiled and distributed to all parents.

Ferntree and Garden SSs were both committed to providing the teachers who attended the formal professional development programs with the opportunity, and obligation, to fully describe their experiences to staff who did not attend. These schools had year level teams working together on implementation. There was evidence of productive professional learning communities both within their year level teams and across the school. The samples of student work provided by these schools showed evidence of higher levels of achievement than other schools in the sample.

Plateau SS, with their critical friends being members of the school staff, also had a strong commitment to ensuring all teachers had a full briefing of the formal professional development programs. The trial seemed to be going very well in the school with similar levels of achievement to Ferntree and Garden SSs in the areas of presentation skills and multi-literacies. However the level of engagement of the students did not appear to be as high. This was born out by the mean and modal responses of the students on the student survey which were lower than Ferntree SS and Garden SS.

Influence of the school commitment

The New Basics trial is a school reform targeted at all students and teachers in primary schools and Years 8 and 9 in secondary schools. While schools had to apply to be involved, the decision to apply was made in a range of ways.

In some schools there was extensive discussion with staff. The principal of Ferntree SS, for example, stated that while it was a cluster decision to apply for inclusion in the trial he would have left the cluster if his staff were not completely committed to their involvement. Garden SS had a similar approach to Ferntree with parents and staff holding meetings to discuss the implications of being involved in the trial.

Avenue SC, an amalgamation of two schools, was established to implement the New Basics and was permitted to advertise for staff committed to New Basics. The principal of the middle school expressed the view that if teachers were not committed to working in the trial they would be excused and either given allotments in other...
parts of the school, or transferred out of the school. Interviews with teachers in this school confirmed their commitment to the trial. One of the teachers has subsequently enrolled in a Masters program using the trial as the basis of her thesis.

Plateau SS is the only phase 2 school in the trial. The decision was made by the previous principal with some involvement from the staff. The trial is going well in the school, with the reservations noted above.

At Riverview, Mountain and Valeside, the decision to be involved was made by the principal with little involvement from the staff. These schools provided the most lukewarm responses from teachers to the trial. The Riverview principal seemed to play no part in the trial, delegating his responsibility to an assistant principal and a head of department. One of the teachers from this school was quite critical of the support provided from the New Basics unit and continually raised the issue of workload. Other teachers, however, commented on the potential of the new approach to deal with the often disaffected nature of the middle school students at the school.

The impetus for Mountain SS’s involved came from the principal who saw the trial as a way of renewing the practices of many of the teachers in the school. Most of the teachers stated their commitment to the trial but one comment from a teacher was ‘it’s not that different to what we have always done’. This school demonstrated a range of attitudes to the trial from total commitment from one staff member, to resignation from another. The students, when questioned about what had changed, could only mention that they used the computer more often than before. School was still boring for many and ‘just school’ for many others.

Valeside staff had the weakest commitment among schools in this study. One of the teachers had just returned from a long leave of absence and was struggling to come to terms with the trial and was concerned that the children were not learning what they should be learning. The other teacher professed commitment, but talked about the school tasks in terms of the key learning areas rather than espousing the ideas of New Basics.

The schools where the trial was working most effectively in terms of analysing the teacher responses and the student work samples had the following characteristics:

- the principal was openly committed to and involved in the trial
- the teachers were involved in making the decision to be involved in the trial
- there was a culture of professional discussion in the school, with time being made available both in the form of teacher release and at the regular scheduled meetings.

A further characteristic that is not really substantiated by the data, but which was hinted at in discussions, was the involvement of the school community. While this question was not explored in any depth on reading the teacher surveys and in interviews with the principals, the idea of involving was mentioned at all in very few schools. One school expressed the view that it was better if the parents were not informed about the nature of the trial as they might not have approved.

**Teacher’s initial level of knowledge and understanding of New Basics**

Teacher’s initial level of knowledge and understanding was very low at the beginning of the trial. Two of the principals had been involved in the consultations at the principals’ association level and had a slightly more detailed concept of what the trial was trying to attempt. These principals had also been involved at the national level in curriculum debate and one was active in studying school reforms across Australia and internationally. This school was one in which the staff spoke glowingly about the potential of the trial for their students.

One problem with any school reform is new teachers arriving at the school. All schools in this study had teachers who had returned from leave or transferred into the school after the commencement of the trial. Avenue SC had a special program for these teachers, but in other schools these teachers were left to catch up with the other members of staff. This is not an uncommon problem in matters of school reform but did have serious implications for these staff members.

The New Basics Unit decided to leave precise implementation details for the schools. No sample programs or other documents were provided, apart from the suites of Rich Tasks. This caused mixed responses from the teachers in the sample:
This is PD as it should be, help and support but allowing us as practitioners to have real input into the directions and a respect for our view. We know the students and how things work in schools, only we can make this thing really happen and improve learning outcomes for all of our students (Teacher, Mountain SS).

We needed more advice. The New Basics unit can’t expect us to do everything; teacher our students and plan programs. I would have preferred to have some samples that I could have adapted for my own situation. The idea of Rich Tasks at specific levels doesn’t suit our composite classes, so these were more a hindrance than a help (Teacher, Valeside SS).

The extent to which the central authority should provide advice or direction is a vexed issue. In the words of a senior member of the Unit:

We had a dilemma in planning the support for the implementation of New Basics. One method is to offer solutions for schools to follow. The difficulty with this method is that our solutions would not suit the individual needs of schools. Also, if we gave a detailed prescription, they would complain about ‘top down’. The method we adopted was to provide opportunities for schools to work together, with advice from the Unit, to find their own solutions tailored to the needs of their individual contexts. Sustainability can only be achieved if there is a deep understanding of the issues and this can only be gained by getting their hands dirty.

This attitude can be questioned. Other school reforms and professional development programs have taken the opposite view. For instance the Discovering Democracy program funded by the Australian took the approach that teachers would only reform their approach to civics and citizenship education if detailed teaching units were provided around which the professional development could be focused.

Perhaps in the case of the New Basics it was the right decision to provide direction only in the matter of the assessment tasks. Certainly it had exercised the minds and work of the schools involved in a long term way. What happens after the trial concludes and how much of the reform is sustained remains to be seen.

Improving student learning outcomes

The answer to this question is still unresolved. There is some evidence as discussed above that there are aspects of student achievement which has improved but in terms of the whole gamut of achievement there is no evidence of higher student performance.

There are three areas where there is evidence of improvement. The first is in students’ presentation skills. This is evident in high quality of oral presentations and in the use of computer technology to prepare engaging and informative PowerPoint presentations.

The second area of improvement has been gained is in the student’s ability to articulate what they have learned and third is their engagement in their learning. Almost all students reported that they preferred this kind of learning and reported that their teachers thought that they could learn.

Conclusion

After reviewing the research literature, Supovitz, in his chapter ‘Translating Teaching Practice into Improved Student Achievement’ suggests five critical components of professional development programs: First, professional development must show teachers how to connect their work to specific standards … Second, effective professional development must immerse participants in questioning and experimentation Third, … professional development must be both intensive and sustained. Fourth, staff development must engage teachers

---

52 See Reference on page 179.
in concrete teaching tasks and be based on teachers’ experiences with students. Fifth, professional development must focus on subject matter knowledge and deepen teachers’ content skills.

The New Basics professional development program addresses each of these critical components, except perhaps the last. The standards were addressed through the Rich Tasks and associated desirable features. The Rich Tasks professional development program was the first to be conducted, giving teachers plenty of time and information to get their heads around implementation issues. The grading masters to supplement and expand on the desirable features were not to be provided until the beginning of 2003 and this caused some concern to the teachers involved in the study. It should be noted that the original intention was to provide advice only on the high-quality and satisfactory performance. Trial schools requested more guidance on judging performance and this resulted in the development of the grading masters.

The whole suite of professional development programs, both formal and informal, was designed to create a culture of professional learning where teachers collaborated on the design of overall and classroom programs. All teachers in the study remarked that the level of conversation about matters of curriculum, pedagogy and assessment had been raised as a result of taking part in the New Basics trial.

The program was both intensive and sustained with all the teachers’ professional energy being occupied by the implementation of the trial for at least three years. It remains to be seen if this will continue after the conclusion of the trial.

By asking teachers to design their own programs and not providing sample programs the professional development required that teachers were engaged in teaching tasks of their own design matched to the needs of their students. The variation among the schools in the study in the programs they designed was all predicated upon the reality of their own student cohorts.

Subject matter knowledge was not an element of the New Basics professional development in the traditional sense. There were no activities designed to deepen teachers’ understanding of mathematics or literacy but there was an emphasis on understanding the nature of the Rich Tasks. On the other hand, there was no aspect of the program designed to explicate the rationale for or philosophical underpinnings of the trial. This is of concern and is likely to have implications for the sustainability of the ideas once the trial is complete.

Overall this is an ambitious school reform with an extensive professional development program and has great potential. New Basics is taxing for the teachers and principals involved, but almost all in the sample demonstrated their commitment to making the very best attempt. The professional development strategy of mixing formal, centrally conducted and scripted, professional development programs with informal programs conducted at individual schools is consistent with what the literature says about effective professional development strategies. One outstanding feature resulting from this strategy is the development of ‘professional learning communities’ to a greater or lesser degree within each school in the study. Those schools who took the idea of professional learning communities seriously and ensured that there was time available for teachers to plan together, discuss issues and to consider the achievement of their students based on samples of work. They have gained the rewards of students who believe they can learn and who show high levels of achievement in presentation skills and in the processes of planning and team work.

The resultant improvement in other areas of student achievement is yet to be determined, this was not possible in the relatively short period of a single school year covered by this investigation, and really need further exploration once students move beyond New Basics to further study and life after school.

The researcher examined the rich task and identified the outcomes exhibited in the work samples and compared these to the outcomes listed in the relevant Queensland syllabus. A new Queensland syllabus for English was expected to be released in Queensland in 2003. It should be noted that the New Basics schools have been quarantined from the implementation of the new syllabuses. However these syllabuses can be used as one benchmark for judging student achievement in New Basics schools.

Reference

Learning through Action

The Australian Government Quality Teacher Program (AGQTP) in WA
Department of Education and Training schools

Megan Ewing

The Quality Teacher Programme is a key element of the Australian Government national initiative Teachers for the 21st Century. The AGQTP includes a strong focus on student learning outcomes as a powerful catalyst for teacher revitalisation and the enhancement of teaching as a profession.

The WA Department of Education and Training decided to use action learning as the main strategy for implementing the intentions of the Australian Government Quality Teacher Programme in schools.

Action learning describes learning that occurs when effective action is taken to solve real work-based problems. The learning occurs with a group of colleagues, who may share the problem or who are able to offer mutual support, advice and constructive criticism. The main aim is to assist educators to improve their professional practice53 (AGQTP Implementation Strategy and Guidelines for government schools in Western Australia, p. 3).

The target groups for the Australian Government Quality Teacher Programme were:

- teachers who had completed formal training more than ten years ago
- casual teachers
- teachers re-entering the profession.

In addition, the AGQTP aimed to address the needs of teachers of indigenous students, teachers in rural and remote schools and teachers in disadvantaged metropolitan schools.

The AGQTP is implemented in Western Australian government schools in two interconnecting ways. Firstly, extensive and strategic system-wide support is provided to train project leaders and operate a co-ordinating framework for school based activity across the state. Support materials are also available in the form of a website, links to other relevant websites and resources including reflective tools for teachers and examples of shared exemplary practice.

Secondly, school based action learning projects allow teachers to develop collegiate and collaborative relationships. This encourages groups of teachers to explore relevant workplace issues utilising system wide support networks. Both elements provide an integrated approach to workplace based learning for teachers.

WA government schools applied for AGQTP funding through their local district education office to conduct school-based action learning projects. Notional funding allocations were made to each district based on the numbers of teachers in each of the target groups, the socio-economic status of students, the isolation factor and the number of indigenous students within the district. Staff at the district education offices ranked submissions based on their knowledge of the local context and forwarded their recommendations to the AGQTP team based at central office for endorsement.

---

Figure 1 provides an overview of how AGQTP projects have been funded in WA government schools.

Figure 1: Implementation framework for accessing ATQTP funding in WA government schools

It was intended that individual teachers would identify their own action-learning question, the physical resources required and their professional development needs. Each project was expected to use a team approach while a member of staff, trained in the action learning process, facilitated the work of the project team/s. Progress and final action learning reports were submitted on-line where an external evaluation team could harvest the data. Strong links are maintained between the AGQTP team at central office, district office staff and AGQTP school-based action learning projects.

The theory of action learning

Action learning, as implemented in the WA Australian Government Quality Teacher Programme, was based on the following adult learning principles:
Learning through Action

- many adults prefer to be supported in directing their own learning
- adults have a rich experience base that can serve as a resource to inform further learning
- readiness for learning among adults is influenced by their need to know or do something in relation to their workplace
- learning is facilitated more effectively when adults work together to support one another in their learning

(*AGQTP Implementation Strategy and Guidelines for government schools in Western Australia, p. 3*).

Teachers were provided with a framework for implementing their action learning projects (see Figure 2). This framework described a process that encouraged teachers to reflect throughout their project on the effects of their professional growth. It emphasised that the improvement of teachers’ professional practice was more likely when teachers were working together on real, work-based problems.

**Figure 2: Model of action learning used in AGQTP in WA government schools**

![Diagram of the action learning cycle](image)

Key features of this action learning cycle are as follows:

- teachers decide how their project will run
- teachers are able to focus on issues that are important and that are relevant to them
- trained colleagues work with school-based collegiate groups
- teachers are reimbursed for some of their research time
- participants reflect on and record their participation in the process, (e.g. teachers’ written stories (personal case studies), reflective journals, AGQTP reports written by facilitators.)
Context of the WA case study

This case study includes examples of each of the following professional development strategies cited in the AGQTP Implementation and Strategy and Funding Guidelines for government schools in Western Australia document 2000–2001, (p. 6).

- collegiate groups
- training workshops
- mentor relationships
- work shadowing
- peer support and collaboration
- in-service courses
- research and writing.

This case study examined seven AGQTP school-based action learning projects in WA Department of Education and Training primary schools. The manager of the AGQTP selected the schools and each project focused on literacy. Twenty-nine classroom teachers from these seven schools (four metropolitan, three country) participated with school-based teacher leaders co-ordinating each project.

The scope of this case study has been broadened and strengthened because three of the schools selected for this study completed AGQTP school-based action learning projects in 2001. Teachers at these schools took the opportunity to continue their AGQTP action learning research focus into 2002 using ACER research project funding to monitor effects on student learning outcomes. These schools provided a context in which links between student learning outcomes and teacher professional development over a longer period of time could be examined for the case study.

Four of the seven schools in this case study cater for students from low socio-economic backgrounds, have transient student populations and have high Aboriginal and English as a Second Language (ESL) student numbers.

Teachers from these schools commented that they have to deal with a parent population that has many problems that impact on their students, including domestic violence, lack of English competence, drug and alcohol abuse. However, many teachers liked the challenging working environment and felt valued there.

_Let me say I love working here and having been here so long (12 years), I have become trusted in the community and know many families well. This is extremely important to our Aboriginal and Vietnamese parents._

The other three schools (two metropolitan, one country) cater for students from relatively stable, modest to middle income families with low or no indigenous students and ESL students.

_The school community is mostly of middle class, family background and enjoys an excellent reputation in the area. Many of the staff have been at the school for a period of at least 15 years. There is minimal teacher movement and permanent teachers fill most positions._

Each school had students with disabilities including those with behavioural problems requiring medication. Some required assistance from teacher aides.
Key features of the professional development strategy

As mentioned earlier, action learning is the preferred approach to professional support and development through the AGQTP in WA government schools. There was no prescribed method of implementing action learning in schools and teachers had considerable autonomy in the development of their projects.

The AGQTP Implementation Strategy and Funding Guidelines for government schools in Western Australia list three key steps in the action learning process elements:

- development and implementation of a plan of action
- description of the effects of the action
- evaluation and reflection on the whole process.

It was intended that teachers, teacher co-ordinators, principals and district and central office staff would all play a role in supporting the school-based action learning projects. The local context also determined how the action learning process would be implemented. Formal and informal contact was established and maintained with the project co-ordinators by district office staff. In most cases the district leader facilitator in action learning at district office was a Curriculum Improvement Officer, providing many opportunities for integrating the AGQTP projects with other curriculum support.

The Teachers’ Learning Support Network website provided ongoing practical support for teachers and project co-ordinators. This website provided all teachers with access to educational research, teacher experiences from the AGQTP school-based action learning projects and web links to other resources. Access the URL at: <http://qtp.eddept.wa.edu/ifs/files/public/tlsn/Start/Action%20Learning%20Resource>.

The provision of this web support coincided with Department of Education and Training initiative of providing laptops to teachers on a buy-back scheme. Many teachers in the AGQTP action learning projects took up this offer. This case study provided strong evidence that teachers were using their laptop computers productively and creatively for the benefit of their students and their own professional growth. Few teachers in this case study reported using the Teachers’ Learning Support Network, the main reasons appeared to be due to issues with accessing the internet, and their keenness to spend any available time using their computer on things more directly related to their classroom teaching.

ACER funding to support data gathering for the case study enabled teachers participating in this case study to come together (12 teachers in the metropolitan district and 17 in the country district) to share their ‘teacher stories’. These meetings provided useful insights for the case study, and added an extra dimension to the AGQTP for these teachers. These sessions provided productive and formative teacher-to-teacher sharing opportunities and the chance for teachers to formally share their ‘stories’ with other teachers, principals, district and central office staff. Both seminars were organised and facilitated by district and central office staff involved in the AGQTP. They provided valuable information about the progress of the action learning projects.

Delivery mode, structure, span, duration

The four broad components of the action learning cycle (Plan, Act, Describe and Reflect) were found in all of the schools in the case study. Professional development strategies included a range of activities that teachers could use at any stage of the action learning cycle. Methods for providing the professional development included training facilitated by external presenters as well as peer mentoring, visits to other classrooms, informal and formal collegiate meetings and visits to other schools.

Despite the variety of delivery models chosen, one practice was common across schools. Regular collegiate meetings provided a professional venue for teachers to share experiences and resources. The distinction is made here between collegiate and other school meetings. The collegiate meetings were held exclusively to discuss the
AGQTP actions and were not used for other school matters. Trained teacher leaders from each school facilitated these sessions. Most teacher leaders were deputy principals, although one principal and several Level 3 Classroom Teachers also acted in this role.

Each teacher’s action learning question was connected to the research question from each school’s AGQTP application. A range of professional development models and strategies were then utilised to assist the teachers in their professional learning.

Professional development strategies were delivered by external presenters or managed in-house by using the expertise of teachers on the school staff. There were formal and informal opportunities for colleagues to use the ‘train the trainer’ model to share information with their peers. This provided opportunities for teachers to both learn and to consolidate their own learning.

It is clear that action learning, as used in the AGQTP in government schools in Western Australia, was a very flexible strategy for promoting professional development. Teachers were given considerable autonomy in deciding how they could undertake their own research. This teacher-centeredness allowed for a wide range of approaches to be used, although all participating teachers followed the same action learning process:

- planning
- acting
- describing
- reflecting.

Some teachers chose to work together, often with teachers in the same year level or in team or tandem teaching situations. Some teachers preferred to work alone. All teachers had a role at the collegiate sessions where they shared their experiences. A number of teachers cited their team teaching/tandem teaching relationship with a peer as very important in their action learning project.

The teachers felt they were ‘learners’ in the action learning process and many compared their own feelings and initial nervousness with that of their own students when starting something new. They realised they needed a supportive environment ‘to provide a safe starting point for sharing ideas, issues and concerns’. ‘The collaborative sessions we had as a AGQTP group were very important as confirmation and sharing of what I was doing.’

All schools involved in the 2002 AGQTP projects in WA government schools scheduled their action learning projects to begin in Term 1 and finish early in Term 4. Staff from each district office and from central office also played a role. District office staff trained the teacher co-ordinators in the action learning process at the start of the school year. This frequently followed their own training, which was given by the AGQTP team based in central office. District and central office staff maintained formal and informal contact with the schools throughout the project. Formally this was done through the writing of progress and final reports and informally at collegiate meetings, by phone and email.

Teachers responded positively to the opportunity to evaluate and reflect on their AGQTP projects in more depth using up to $5000 teacher relief provided by the ACER project. This funded time was used for teacher interviews, collegiate meetings and for teachers to undertake the case study data collection requirements. Currently up to 20 per cent of AGQTP funds can be used for teacher relief, for example one school received AGQTP funding of $6,000 and involved twenty teachers. Of this allocation, $1200 was available for six days of teacher relief. The school topped up this amount with $4000 funds providing twenty more days of teacher relief. This combined funding provided each teacher with just over one-day teacher relief each to work on their projects.

54 The Level 3 Classroom Teacher initiative recognises and rewards exemplary teachers in WA government schools using a rigorous selection process. When this report was written there were 400 Level 3 Classroom Teachers K–12.
Gathering data

The following broad research questions were used for the ACER project

- What changes in practice and student learning outcomes have occurred?
- What changes can be attributed to the Professional Development program?
- What is it about the Professional Development program that has contributed to this?
- What school factors influenced the outcomes of the Professional Development program?

Methods of data collection

Data was collected in three different ways. First, the ACER researcher gathered information both formally and informally at each school throughout the case study. Each school site was visited at least twice during the research period. Interviews were conducted with each teacher (duration 40–60 minutes). Time was also spent in each school with the teacher co-ordinator and principal and with informal visits to classrooms. Additional visits to some of the schools were necessary. These visits were needed to clarify the intended research focus and to consult with participating teachers. Fax, email and telephone contact with the teacher co-ordinator was also used throughout the project.

Each selected school was extremely busy with a range of other initiatives and efforts were made to dovetail the ACER case study into this busy schedule without too much disruption. This was facilitated by the development of links with the AGQTP teacher co-ordinators at each of the seven schools. The AGQTP trained teacher co-ordinator at each school provided regular and efficient contact between the researcher and the teachers. Each co-ordinator received training at the start of 2002 at their local district education office in the action learning process and was well respected by their peers. They facilitated collegiate meetings held at least twice a term and acted as a resource for teacher queries about the AGQTP projects. These meetings provided opportunities for information to be channelled both ways, to and from the researcher.

The teachers also provided a considerable amount of data about themselves, collected during the project. The quality and quantity of this information can be attributed in part to the provision of teacher relief and the opportunity for the teachers to meet regularly at their school for collegiate meetings facilitated by the teacher co-ordinator.

This data included:

- feedback from the collegiate sessions, including excerpts from teacher journals and reflective sheets throughout the year
- completion of a questionnaire at the end of the research period
- teacher written stories that described their research question, their teaching context, and reflections on changes in practice supported by samples of student work and
- end-of-project sharing sessions (one for teachers in all metropolitan schools, one for teachers in all country schools).

Second, data used in the ACER case study was collected from students on two occasions using:

- Attitudinal surveys (seven schools)
- Developmental Assessment Resource for Teachers (DART) (five schools)
- Longitudinal Literacy and Numeracy Study. (LLANS) (one school)
- International Benchmark Test (IBT Science) (one school)
- Rowe Behavioural Rating Inventory (all schools)
At the end of the case study, the ACER Student Survey was completed by participating teachers in all seven schools for their own students. Teachers collected samples of student work and kept anecdotal records throughout their Learning through Action AGQTP projects.

Finally, some school administrators provided the ACER case study with a range of standard information regularly kept by the school. This included standard testing results at the Year 3, Year 5 and Year 7 for the WA Literacy and Numeracy Assessments (WALNA).

Implementation of the ACER research project

The AGQTP Manager selected the seven schools for the ACER research project. Four of the schools were located in one large education district in Perth and the other three schools were located in one large town in a country education district. Geographical location appeared to have considerable impact on the way each school managed its Learning through Action AGQTP project, particularly the delivery of the formal and informal content-based professional development component.

The clustering of the three country schools in the same town facilitated the efficient collection of data. Visits to each school were made at the beginning and end of the case study as well as a visit for the ‘teacher story’ sharing session. The three schools had existing collegiate links with each other and with the district office staff.

They shared much of the content-specific professional development component of the Learning through Action AGQTP projects.

The staff at these schools jointly attended sessions after school for two main reasons:

- lack of relief teachers in the town prevented large numbers of staff to attend professional development sessions during the day
- cost of bringing external presenters to the country town (travel, accommodation, fees) encouraged sharing of costs between schools.

These practical necessities fostered strong collegiate links among teachers in these three country schools. Teachers from these schools met voluntarily on several occasions to share experiences and resources. The teacher co-ordinators at each of the three country schools also had strong links with the key AGQTP person at their local district office (which was located in their town). The AGQTP officer was familiar with each Learning through Action AGQTP project. She actively supported the three schools through visits and by organising training sessions with facilitators. She also met with groups of participating teachers on other occasions in her role as a curriculum improvement officer.

The four metropolitan schools involved in this case study were spread across one large education district. Some strong collegiate links were already in place across these schools. Teachers from three of the four metropolitan schools had shared professional experiences in the form of visits to other schools during the research period. The experienced AGQTP officer at the local district office acted as a resource for the teacher co-ordinators, and met with them at district office during the year.

The willingness of the teachers to cooperate with the ACER research project in gathering data appeared to increase as the year progressed. Teachers were initially wary of the increase in workload as they were advised at the beginning of the project that they would be interviewed at least twice and expected to collect samples of student work and administer baseline and end of project assessments. Several reported they were ‘told to do it’ and some admitted they were reluctant starters. One teacher referred to it as ‘healthy professional development—you know it is good for you but you don’t really like it!’ However, the comment at the end of the case study from this teacher was ‘It has been the best learning for me this year, it has really made me think!’ The $5000 was used well in these schools to support data gathering and collegial interaction.

ACER research project participants

Twenty-nine teachers cooperated with the ACER research project. Seventeen teachers came from three country schools and twelve teachers from four metropolitan schools. Twenty out of the twenty-nine teachers in the case study had been teaching for over ten years. Fourteen of these had been teaching for over twenty years, and two had taught for over thirty years. This range of experience was not surprising as the Australian Government
Quality Teacher Program targeted teachers who had completed their formal training more than ten years ago. The remaining group of nine teachers who had been teaching for less than ten years included casual teachers, and those re-entering the profession. Six of these teachers were located in the country and three in the metropolitan district. Each of these teachers was actively mentored by at least one experienced teacher in their school.

Four teachers who had been teaching for more than ten years chose to take on a peer-mentoring role in their school as part of their action learning. Three had been formally acknowledged as accomplished teacher leaders having gained rigorous Level 3 Classroom Teacher status. The fourth teacher had never applied for this status. Three more Level 3 Classroom Teachers participated in the case study as teacher co-ordinators. One of these Level 3 Classroom Teachers had acted as Learning through Action AGQTP project co-ordinator in 2001 but had opted in 2002 to be a participant in the school’s AGQTP project.

Support and follow-up

Schools used a range of methods to support action learning.

- Practical support was provided at the system level. Many teachers in the case study schools had just received new laptop computers, having taken up the offer of leasing them from their employer. This resulted in the inclusion of electronic evidence of student work in the teachers’ action learning records.
- Practical support was available at some schools where administrators provided groups of teachers with shared duties other than teaching time to encourage planning and sharing of ideas and resources.
- Some presenters made visits back to the schools during the year to follow-up and to support teachers. Most schools bought and used linked support materials.
- Collegiate meeting time was valued and visits to other schools were encouraged and facilitated.

Learning through Action AGQTP projects at seven schools

The Learning Through Action AGQTP projects at the seven schools in this case study had many features in common, including the operational delivery, which involved teachers, school based teacher co-ordinators, principals, AGQTP district and central office staff. However, each Learning through Action AGQTP project was also unique due to the differences in staff, students and current priorities. The action learning projects became even more individualised as each teacher in the AGQTP then took the opportunity to explore an aspect of their school’s research focus and related it to their own teaching and students. The robustness of the Learning through Action AGQTP project is examined using brief descriptions of action in each school.

School 1: Davis Primary School

Davis Primary School is in a low socio-economic area in the metropolitan area. In recent years, this school has had considerable success in raising literacy levels. However, the high degree of student mobility and frequent erratic attendance levels has required efforts to be sustained to maintain these improvements. The rise in literacy levels has been measured in a range of ways including the results of the Western Australian Literacy and Numeracy Assessments (WALNA) undertaken each year in all government schools with students in Years 3, 5 and 7.

A major factor that has contributed to the success of this initiative has been the concerted, whole school approach in using literacy strategies like Cooperative Reading. This has been supported by ongoing efforts to enable the teaching staff to be more confident users of these strategies by providing them with opportunities for attending sessions to increase their knowledge and skills.

The Learning through Action AGQTP project undertaken in 2001 provided some teachers with the opportunity to explore work-based problems with a focus on reading. The school was invited by the AGQTP Manager early
in 2002 to continue the action learning process with several teachers who had not participated previously. One teacher was new to teaching and the other was returning to teaching after a break.

Development and implementation of a plan of action

An experienced teacher who had participated in the 2001 action learning project at the school co-ordinated the 2002 project. Time was allocated and teacher relief funds provided time for the two teachers and the teacher co-ordinator to meet to share ideas and experiences throughout the project. The work based problem they chose was how to get their students used to working in groups, and how to increase teacher and student knowledge and understanding of the Cooperative Reading reading strategy. They planned to do this by monitoring the use of metalanguage by themselves and their students. They felt this would enhance their own teaching practice and the learning outcomes of their students. The action learning process allowed them to alternate between action and critical reflection.

Plan of action for 2002

The decision was made to focus on:

- Collegiate meetings throughout the year
- Observation sessions of another teacher using Cooperative Reading strategies with their own class
- Observation sessions of their peer facilitator using Cooperative Reading strategies with their own combined class.
- Journal writing
- Collection and annotation of student work, school assessments and anecdotal records
- Provision and use of resources (Cooperative Reading Resource file and books)
- Peer facilitator available in support role.

As part of the ACER research project, teachers agreed to conduct before and after testing using the Developmental Assessment Resource for Teachers (DART), the Rowe Behavioural Rating Inventory and an Attitudinal Survey for reading. Each teacher also completed a student survey at the end of the project for students in their class.

The effects of the action plan

The collegiate meetings gave teachers time to discuss their action learning project. The first meeting early in the year resulted in the teachers deciding to work together on the action learning project. They decided to do this as they had already combined their classes and were working in a team teaching role. Each teacher kept track of what they were doing and thinking through their reflective journals. They drew on comments from these during their regular meetings and for their end of project ‘teacher story’, where they reflected on the changes in their professional practice and considered possible links to their students’ learning. The teachers also selected and annotated a range of student work that indicated changes in what their students could do. The peer facilitator provided ongoing support in terms of availability, expertise and interest in the project.

The meetings were interspersed with observation and actual teaching sessions. The teachers began by watching other Cooperative Reading classes in action. Practical experience was then gained in team teaching sessions, working with their own class, with some sessions observed by their peer facilitator. This provided the teachers with a range of opportunities to observe and practice Cooperative Reading strategies. A support handbook provided the teachers with the concepts that underpinned the theoretical orientation of the strategy.

Student testing of student work took place throughout the project. DART Forms A&B (reading) and attitudinal surveys were given at the start and end of the project. The teachers also collected samples of student work, which they annotated with comments indicating changes in student learning outcomes.
Effects of the action learning on teachers

Increased knowledge has led to increased confidence

The teachers felt empowered by the fact they could plan their own research questions and had time shape them to meet their own needs. They valued the opportunity to work together, supported by a mentor with some paid teacher relief. The regular meetings provided opportunities for them to share their successes and to search for solutions to problems related to teaching Cooperative Reading. It also provided them with a supportive environment to consider broader modifications or changes to their practice. The reflective process that took place throughout the project in the form of formal and informal discussions and through writing journals was extremely important as it highlighted any changes in their practice and understandings that had taken place. The teachers commented that their participation in the project had put them back in the role of being a learner and they had learned new ways of learning how to learn.

I found the process overwhelming in first term—there was just so much to learn. I often wondered how the students felt when they were confronted with all this new information. I started the year teaching cooperative reading fairly confidently… but I very soon got to the limit of my abilities and I felt like I was foundering.

(Extracts from teacher journal)

AGQTP has led to interest in exploring more educational issues

The teachers found that their research topic, investigating group work and the use of metalanguage in Cooperative Reading opened many doors to broader professional issues. Links were made to other parts of their teaching and their teaching philosophy. They became interested in learning more about a range of educational strategies linked to the work they had been doing—Blooms Taxonomy, the Curriculum Framework and the use of First Steps.

Both teachers have really embraced the Principles of Teaching, Learning and Assessment from the Curriculum Framework. Their classroom is now seen as an example of best practice in terms of Collaborative Teaching and Student Centred Learning and will be used as a model within the school and for visiting teachers.

(Extract from teacher co-ordinator’s notes)

What changed for the students?

Increase in the use of metalanguage

There was an increase in the metalanguage of the students and their ability to discuss critically their reading skills in their after reading reflections. Also, in the first attitudinal tests the students wrote about their reading in very simple terms.

I am a good reader because I practise a lot.

Now students are able to write about their reading in terms of how the individual roles have helped their reading.

I like code breaker because I like to find hard words and I like looking in the dictionary—it tells you the meaning.

(Extract from a teacher journal)

Students who came from classes where they had been doing Cooperative Reading the previous year began the year very strongly. This was because they were doing tasks that they were very familiar with. However, as they progressed onto new ideas, many struggled to come to grips with those ideas. It is telling that they continued to be strong in the role of Discussion Manager as this remained virtually unchanged.

(Extract from a teacher journal)
Increase in confidence and positive attitude

The students commented they felt more confident doing new things, but when the buddy system was stopped, some student performance dropped particularly when asking and answering questions. However, each student still had the skills and confidence to remain working independently. Overall, student participation in discussion increased and they were able to demonstrate an understanding of the text through the answers they gave to the other students and the questions they asked.

Some gender differences noted

A gender difference was noted in student reading performance between fiction and non-fiction. The teachers both commented that some students found the technical language of non-fiction difficult where others preferred the very structured, factual aspect of non-fiction. In the main the girls find fiction easier and the boys prefer non-fiction.

(Extract from a teacher journal)

Increased value placed on using different assessment practices

The majority of the students had moved forward but this was not always evident in their work samples. However it could be seen in the anecdotal data gathered for their Individual Education Plans and the First Steps Continua.

(Extract from a teacher journal)

Broad positive impact of teaching strategy

The following extract from a teacher’s journal indicates positive changes in student behaviour that have been noted both inside and outside the classroom.

The learning and continual practice of the social skills required for Cooperative Reading has flowed on into all classrooms and playground activities. These social skills are an integral part of not only our class charter but also our curriculum.

(Extract from a teacher journal)

The Learning through Action AGQTP provided the two teachers (one new to teaching and the other returning to teaching) with the opportunity to be mentored by an accomplished peer (Level 3 Classroom Teacher) over a sustained period. Their action learning project gave them confidence and skills to move towards a more student centred, outcomes focused classroom. They trialled a range of different ways of monitoring student progress and intend to continue developing their skills in this area.

School 2: Monroe

This metropolitan primary school has a student population drawn from mostly middle class families. Many of the staff had been at the school for more than fifteen years. The school was successful in gaining AGQTP funding in 2002 for an action learning literacy project involving seven staff. Three of these teachers were interviewed as part of the ACER case study.

Development and implementation of a plan of action

The plan of action began several years earlier in 2000. It developed as a result of a visit by one of the deputy principals and several teachers to another school (Davis Primary School) to see Cooperative Reading strategies in action.

I was in awe at the level of engagement, interaction and ability of Year 7 students who worked collaboratively in group situations. I shared my observations with several key members of staff and they too were keen to observe these processes in action. Shortly afterwards they visited Davis Primary School, attended Professional Development sessions after school (Cooperative
Learning through Action

Reading) and the seed was sown. Two new staff members and a return from secondment of another teacher provided the opportunity to try something new. Thus the submission for AGQTP2002 was entered into. I approached seven staff members, discussed requirements and got a commitment on their part to implement the program.

Details of this commitment included:

- Attendance at monthly meetings
- Keeping a journal
- The willingness to run a minimum of 4 x 4 week block of time allocated to Cooperative Reading

(Extract from the teacher co-ordinator’s journal)

Plan of action for 2002

The decision was made to focus on:

- Collegiate meetings throughout the year incorporating teachers’ reflections on their practice
- Professional development about the use of Cooperative Reading strategies provided by external presenter
- Journal writing (optional)
- Collection and annotation of student work, school assessments and anecdotal records
- Provision and use of resources (Cooperative Reading Resource file and books)
- Peer facilitator available in support role.

As part of the ACER research project, teachers agreed to conduct before and after testing using Developmental Assessment Resource for Teachers (DART), Rowe Behavioural Rating Inventory and an Attitudinal Survey for reading. Each teacher also completed a student survey at the end of the project for students in their class.

The effects of the action plan

These regular meetings provided the project with a reflective framework. They were facilitated by the deputy principal who had attended facilitator training sessions at district office at the start of the year. The format and frequency of the meetings encouraged the teachers to continue to reflect on the aspect of Cooperative Reading they had selected to investigate.

Three of the teachers had attended out of school professional development sessions in 2001 on the Cooperative Reading strategies and had used these strategies in their classes in the second half of 2001 with varying degrees of success. The two most common difficulties were that the children did not know how to work in groups and they had presented the information on Cooperative Reading too quickly to their students, resulting in everyone finding the process difficult. Their shared experiences with the process supported other teachers starting early in 2002. Each teacher received a Cooperative Reading resource file. This outlined the social constructivist theory of learning underpinning Cooperative Reading, based on the understanding that children construct language knowledge through talking and interacting with others.

Effects of the action learning on teachers

Teachers began to think more about their practice supported by colleagues. The teachers found professional, collegiate relationships developed as a result of each teacher in the group trying the same thing in their classrooms at the same time. These relationships stimulated ideas and action beyond their Cooperative Reading project. The regular facilitated meetings played an important part in the action learning process as they provided a framework for reflecting on practice as well as using it as a time for sharing practical ideas and resources. Using extracts from their journals at these sessions provided them with material for collegiate conversations.

The use of journals has provided a wonderful record of teacher’s successes and issues. At our meetings, they have provided a springboard for discussion as to what actually happens in the classroom. One teacher stated she would use this journal as a planning document in 2003.
(Extract from teacher co-ordinator journal)

The meetings had a unifying effect on the team. All of the teachers completed a reflection sheet at each collegiate meeting and these were used to scaffold discussion from all participants. Some teachers also kept journals, which they also used in these sessions.

The development of professional language led to a deeper understanding of student centred learning. The teachers found that by working together they could share practical ideas and develop a professional language to talk about what they were doing. This was supported by the Cooperative Reading resource, which provided them with the teaching philosophy underpinning the reading strategy.

The teachers noted that having the time to have regular professional conversations with colleagues encouraged them to link past professional development they had done with what they were doing and to share ideas and expertise wider than Cooperative Reading strategies. Teachers began looking at their whole approach to teaching and thinking of ways to make it more student-centred. The three teachers who were interviewed as part of the ACER case study also participated in the making of a video on the AGQTP action learning process. This experience, although daunting for the teachers, provided rich data for this case study as well as acting as an additional reflective tool for the teachers involved.

What changed for the students?

Students learned how to work in groups. Most of the AGQTP teachers reported their students did not have the skills to work in a group at the start of the year. These skills were needed to allow Cooperative Reading strategies to be successfully implemented. They were found to be not only important but also transferable. Other teachers commented that the students became more interactive and supportive of each other in other situations like in Physical Education classes and in the playground as their group skills improved.

Students developed Cooperative Reading metalanguage. The teachers found that there were benefits in each teacher using the same metalanguage with their students, allowing them to become more confident and experienced in Cooperative Reading strategies the following year. Students who had started Cooperative Reading in 2001 found learning new aspects of Cooperative Reading easier the next year.

Students saw their teachers as prepared to try something new. The teachers were aware that their students saw them as learners as well at times, especially in the implementation phase of Cooperative Reading. The teachers were sometimes outside their comfort zone when trying to use a more student centred approach.

The three teachers were energised by their participation in the Learning through Action AGQTP. They all were experienced teachers, open to challenges and new ideas. They found it exciting working with their colleagues on the same thing using action learning. In the past, they felt that good ideas they had tried and used, had rarely become tried adopted by other staff members at the school as it was hard to get them to ‘come on board’. Reasons given were constraints of time, attitudes of other teachers and the opportunity to share past innovations. The sustained collegial aspect of action learning plus the support of their teacher co-ordinator were noted as catalysts for the positive outcomes noted in 2002.

School 3: Carvan Primary School

This metropolitan primary school draws its students from families with a low socio-economic status. The low socio-economic status of the school community affects greatly the planning of this school. The programs operating in the school need to recognise that the students attending the school can be affected by factors of ethnicity, Aboriginality, low family income, dysfunctional home environments, low parental expectations of educational outcomes, a high degree of social and emotional issues in their lives and instability in tenure in their enrolment in their school. Cultural diversity is a major factor. The student population comprised of 20% Aboriginal, 20% ESL of which 10% is Vietnamese.

(Extract from teacher co-ordinator journal)

In recent years the school has developed an early intervention program to support students at risk in the early years. The AGQTP literacy action learning project undertaken in 2001 provided some teachers with the opportunity to use AGQTP funding to explore work based problems associated with this initiative. The school was invited by the AGQTP Manager early in 2002 to continue the action learning process with a literacy focus
on early intervention programs with four teachers with Pre-Primary Year 1 and Year 2 classes. Three of the four teachers had been teaching for more than seventeen years and more than eight years at the school, and one was in her fifth year of teaching having started her career at the school.

**Development and implementation of a plan of action**

Two experienced teachers co-ordinated the action learning project. The teacher co-ordinator had attended action learning training at district office in 2001 and the other was a literacy specialist. Four teachers participated and were interviewed as part of the ACER case study.

Two teachers, team teaching in a combined Pre-Primary /Year 1 class opted to work together on the same research question- investigating the development of language needed by children to work collaboratively, to express themselves and to take control of their own learning in a combined Pre-primary Year 1 classroom. They attended external professional development sessions on Learning Centres and Learning Contracts.

The other two teachers worked individually with their peer mentor, the Literacy Specialist, on the use of the Literacy Net strategies. They worked separately on the same research question investigating the impact of an on-site literacy specialist on their Literacy teaching. Professional development sessions consisted of ‘in-house’ observations of teaching strategies in action with their peer mentor.

Time was allocated and teacher relief funded for the teachers to meet to share ideas and experiences throughout the project however their literacy projects developed in several different ways.

**Plan of action for 2002**

The decision was made to focus on:

- Collegiate meetings throughout the year
- Journal writing and use of reflection sheets
- Collection and annotation of student work, school assessments and anecdotal records
- Peer facilitator available in support role.

The Pre-Primary /Year 1 team teaching pair included attending seminars on developing ‘Learning Centres and Learning Contracts’ in their action learning project.

The Year 1/2 and Year 2 teachers included observation sessions of the Literacy Specialist using ‘Literacy Net’ strategies in their class with their students in their action learning projects.

The Year 1 teachers used the ACER assessment tools—Longitudinal Literacy and Numeracy Study (LLANS). All teachers used the Rowe Behavioural Rating Inventory with a selected group of students from each class. Each teacher also completed a student survey at the end of the project for students in their class.

**The effects of the action plan**

Two distinct action plans were implemented.

1. The Pre-Primary/Year 1 teachers planned their project together, attended external professional development sessions and then worked together to implement Learning Contracts and to develop Learning Centres in their classroom.

2. The Year 1/2 and Year 2 teachers worked individually with their peer mentor in their own classrooms watching then teaching different Literacy Net strategies with opportunities for reflection and review. All teachers shared collegiate sessions throughout the project and were supported by the teacher co-ordinator and peer mentor.
Effects of the action learning on teachers

The importance of knowing the theoretical background behind the approach. The teachers found that action learning encouraged them to link theory with practice. This not only deepened each teacher’s understanding about her own practice but also ‘made it easier to explain the strategies to others knowing more about it myself’.

I don’t do enough higher order thinking myself! This was good for me to do this.

(Extract from a teacher journal)

The opportunity to ‘stand back’ was valuable. Teachers with a peer mentor found it was very empowering to be able to see different strategies being implemented.

The opportunity to witness different teaching strategies being implemented is valuable. Without this program with the specialist teacher some of these strategies may never have been tried. It was helpful to be able to stand back and observe the children interacting during the lesson (both with one another and with the teacher).

(Extract from teacher journal)

Peer support was very important.

The opportunity to work with a peer teacher always provides a feeling of encouragement and support for what you are doing—i.e. you are on the right track. It reinforces thoughts, ideas and activities you may be using and serves to remind you of things you may have overlooked or forgotten.

(Extract from a teacher journal)

Successful transfer of strategies to other learning areas. Teachers found the strategies they used, for example—‘Think Pair Share’ could be used successfully in all learning areas.

The reflection and collegiate sharing sessions focused on the need to make the language of learning explicit. Following up on a collegiate session with other teachers, one teacher noted in her journal that she realised she needed ‘to be more explicit in her teaching, making more of the environmental print all around her in the classroom’.

What changed for the students?

Increased development was noted in a number of areas. As this was a disadvantaged school, the teachers were particularly pleased to note increased development in these important areas.

Problem solving, independence, risk taking, self esteem, peer tutoring, higher order thinking, cooperative learning, decision making. It has taken us quite a while to get to this place, but the more we discussed and reflected the better they got. They really are quite honest in their assessment of themselves.

(Extract from teacher journal)

This school provided an insight into action learning in an early intervention program. All four teachers interviewed were teaching in lower primary classes (Pre-Primary to Year 2). Each was experienced and committed to working with disadvantaged students. All were used to sharing ideas and their classes with others including ESL specialists, Literacy Specialists, Bilingual assistant and Aboriginal Islander Education Officer. However, the action learning project provided the teachers with a new way of interacting with each other over a sustained period of time.

The opportunity to share experiences and to discuss the theory behind what they were doing was considered very productive by the teachers. This was explored further in their reflective journals leading up to the writing of teacher stories which, were shared at the end of the project.

In summary, the PD has greatly influenced my teaching in the classroom. It has given me strategies in collaborative learning and has been a springboard for me to generate an abundance of my own ideas. I have been challenged and inspired to create new learning opportunities for the children, which have proved to be highly valuable and effective.
Teachers found both general approaches (Learning Centres) and the use of specific strategies (Word Hunt) had led to observable, mostly anecdotal changes, in student outcomes. The most common comment was that there was a noticeable increase in student self esteem. This had led to increased confidence and on-task, risk taking in class. Teachers felt action learning process benefited them too as they had time to ‘try things out’ and to have the chance to talk about it with other teachers over time.

School 4: Curtis Primary School

This school is located in the metropolitan area and has a relatively stable student and staff population. There is a strong sense of community in the suburb and parents are involved in the school and wider community activities. Three experienced middle primary teachers (each having taught for more than sixteen years) were interviewed although a number of other teachers were involved in the 2002 AGQTP project. The focus was on using Cooperative Reading strategies to enhance reading in the middle and upper primary classrooms. The school principal co-ordinated the action learning project.

Development and implementation of a plan of action

The development of a plan of action began when two of the three teachers interviewed visited another school in 2000 to see Cooperative Reading in action (Davis Primary School). This stimulated interest in the Cooperative Reading strategy and led to the application for funding from the AGQTP in 2002.

Plan of action for 2002

The decision was made to focus on:

- collegiate meetings throughout the year
- professional development in the use of Cooperative Reading strategies provided by external presenter
- visits to other schools to see Cooperative Reading in action
- use of reflection sheets
- collection and annotation of student work, school assessments and anecdotal records
- provision and use of resources (Cooperative Reading Resource file and books).

As part of the ACER research project, teachers agreed to conduct before and after testing using Developmental Assessment Resource for Teachers (DART), Rowe Behavioural Rating Inventory and an Attitudinal Survey for reading. Each teacher also completed a student survey at the end of the project for students in their class.

The effects of the action plan

Early in 2002, 21 teachers at the school attended a professional development session on using Cooperative Reading strategies delivered by an external presenter. The three interviewed teachers also visited another school in mid-2002 to see Cooperative Reading in action (Monroe Primary School), which they found extremely useful. Two of the interviewed teachers opted to work together as they had already begun doing so the previous year. In 2002, they had combined their classes for Cooperative Reading, Science, Health and Mathematics. The other interviewed teacher worked with this pair and found this helpful as the pair had started the Cooperative Reading strategies towards the end of 2001 as a result of their visit to Davis Primary School and had more practical experience in using it. The principal arranged collegiate meetings during the project and encouraged teachers to work together when possible.
Effects of the action learning on teachers

AGQTP was a catalyst for change. The team teaching partnership of two of the interviewed teachers arose directly out of the challenge of starting the use of Cooperative Reading strategies in their classroom. It began as a practical response to managing the reading process, but developed into a transforming professional experience. Both teachers (both over 20 years experience) stated that by opening their doors’ for the first time, it had revitalised their teaching. They were honest about their own and their team teacher’s professional strengths and had incorporated these into their teaching schedule.

There is division of labour. My partner does the up front work (in reading) with the children—i.e. reads the story. I do the preparation... we work well together and share ideas and adapt things as we go along.

They reported they would not have tried it if they had not visited another school together to look at Cooperative Reading in action. The content professional development provided the hook to engage the teachers and the flexible nature of the action learning allowed the teachers to visit another school, which provided them with the time, support and confidence to try something different.

Collegiate links made learning a new strategy easier. The other teacher commented that:

The most useful professional development this year after the general overview on Cooperative Reading (with external presenter) was to see it in action at my school and another and have the wonderful unconditional support of two colleagues at school who were refining the strategy in their classrooms having started in 2000. I learned from them and followed their lead but moved the children way too quickly. I have since toned things down a bit and am moving more slowly. I set goals with the children and we’ve decided on a system for Cooperative Reading. I won’t change the routine now until we all decide that we’re ready for a change. Most of the children are enjoying the opportunity to build their skills and understanding which the approach offers and to move thorough the levels of novice, beginner, competent, professional and expert.

(Extract from a teacher journal)

The different levels of experience in the use of the Cooperative Reading strategy appeared to strengthen the action learning as more experienced teachers were able to assist those with less experience.

What changed for the students?

Student-centred approach led to more student consultation. The student-centred nature of Cooperative Reading has led teachers to consult with the students more often enabling input from the class to shape how Cooperative Reading was implemented.

One teacher commented:

We had a class meeting and the students said they had never enjoyed Cooperative Reading and did not want to do it. We came up with a plan whereby the students completed Cooperative Reading for 2 weeks on and 2 weeks off. They were more than happy to try this. However it was a slow process to motivate the students generally through a lack of reading novels and my inexperience.

(Extract from a teacher journal)

The three teachers developed strong collegiate links with each other during their 2002 Learning through Action AGQTP. The visits to other schools and discussions with each other were seen to be the affirming and were noted as the most useful aspects of their projects. Two of the teachers had found the move towards more student centred, outcomes focus resulting from their work with Cooperative Reading which they started in 2001 had resulted in a rejuvenation of their teaching. They found working together sharing Cooperative Reading sessions had led to a more team based approach in other learning areas which they found good for them and their students.
School 5: Griffiths Primary School

This school is located in the country. It has students from a wide range of socio economic circumstances with an indigenous population of around 12 per cent. It has a staff turnover of around 30 per cent per year. It successfully attracted AGQTP funding in 2002 for a shared science project with another country school.

Six teachers ranging from Year 1 to Year 7 were interviewed out of a larger group of fifteen AGQTP teachers. Four of the teachers interviewed were very experienced and had been teaching for at least ten years. Two were Level 3 Classroom Teachers. The remaining two teachers had been teaching for less than five years with one new graduate starting work in 2002. The teacher co-ordinator was the acting deputy principal.

Development and implementation of a plan of action

The AGQTP funding for the school was allocated for developing teacher competencies in the science learning area by utilising best practice strategies. The emphasis will be working collaboratively as critical friends to achieve the outcomes. The school had undertaken a literacy-focused AGQTP project in 2001 and planned to build on this experience in 2002. Collegiate groups were established and support networks put in place to mentor new members of staff at the start of the project. The plan was to introduce teachers to practical strategies in stages using an external presenter. Time was allowed in between formal professional development strategy sessions for teacher implementation before meeting again for group sharing sessions with teachers including some from other schools.

Plan of action for 2002

The decision was made to focus on:

- Collegiate meetings throughout the year (at school and with other schools)
- Use of reflection sheets
- Collection and annotation of student work, school assessments and anecdotal records
- Provision and sharing of teacher made and used resources
- Collaborative approach using others in the group as critical friends to achieve the outcomes
- Professional development strategies provided by external presenter (science focus).

As part of the ACER research project, the Year 6 teacher agreed to conduct before and after testing using International Benchmark Test for Science. All teachers used the Attitudinal Survey using the Primary School Science Questionnaire (Rennie, L.J., Hackling, M. and Goodrum, D, 1999) and the Rowe Behavioural Rating Inventory. Each teacher also completed a student survey at the end of the project for students in their class.

The effects of the action plan

The AGQTP did not start until the beginning of Term 2 as the teachers decided to wait until after the external professional development science presentation to plan their action learning research questions. None of the teachers at the school was confident about teaching science so there were no ‘in house’ experts. This differed from the other six schools where there were teachers with a range of expertise on the action learning topic. The teachers were extremely motivated by the science focus professional development session and kept the momentum going with a collaborative sharing session held a few weeks later as well as regular collaborative school based meetings. The Attitudinal Survey of Science (Rennie et al., 1999) supported teacher planning and was used in its original form or adapted for younger years. The base line results began a process of identification of areas where changes in teaching could to be made. One example was the copying of notes from the teacher. Base line information revealed 40 per cent of children were copying notes in science at the start of the AGQTP but were not copying notes at all at the end of the year. The teachers reflected that these changes were a result of a combination of an increase of confidence in teaching science and a more student centred approach. This indicated some big shifts in practice for each of the teachers.
Effects of the action learning on teachers

Teachers became more confident in the teaching of science. Teachers were encouraged to draw on their own best practice from other learning areas and apply this to the teaching of science. Peer-modelled sessions provided the context for these strategies and collaborative meetings allowed for sharing and discussion.

The collaborative sessions with other teachers were helpful in showing me I was heading in the right direction from seeing what they were doing and through the favourable comments they gave regarding my work.

I feel I was in the right place at the right time as a result of the changes that the AGQTP has made to my teaching. Professional development sessions, collaborative sessions with other schools, continual reflection and discussions with colleagues have enabled me to move from a jumbled approach to teaching of science with no specific focus on investigations to developing a deeper understanding of the science learning area and the skills children need to be able to achieve the outcomes. I have implemented teaching strategies and developed and refined learning activities to enable the children to demonstrate progress and develop a greater awareness of what science is.

Teachers saw that aspects of science needed to be explicitly taught and not always integrated into other learning areas.

I came to realise that integration of learning areas was hindering my students’ ability to identify science as a separate learning area. Improved the learning outcomes of my students by providing the integrated learning experiences but was now also able to allow the students to recognise real science

(Extracts from teacher journals)

What changed for the students?

Students developed scientific language and understandings.

I noted in my journal in August that the children were following directions better and had increased their scientific language. Through focussing on developing questioning skills in other learning areas I noted that the children now asked in-depth questions and hoped this would move through to their investigations to questions what and why they did things.

As a result of explicit teaching, continuous modelling and opportunities for practice (after 2 terms) the children were able to follow a simple framework for conducting an investigation.

None of the teachers in this Learning through Action AGQTP had previously taught science with confidence. This differed from all of the other schools, where there was a range of experience and expertise. The robustness of action learning was demonstrated as each teacher reported the sustained blend of subject specific training, action and opportunities for reflection over the year had provided them with confidence and skills in science. The attitudinal surveys indicated that the students had responded positively to the more student centred discovery approach. Staff changes at the principal level during the year did not impact on the action learning project due to strong teacher co-ordinator leadership.

School 6: Mirren Primary School

This school is located in a large country town. Around 75 per cent of students are drawn from families who own or are purchasing their own homes and 25 per cent of families are renting or come from caravan parks in the intake area. Parent and local community involvement is high.

The school received AGQTP project involved in the AGQTP funding in 2001 for a literacy project and was invited to participate in the ACER case study in 2002. This was because the 2001 project investigating the *Four Roles of the Reader* (Luke and Freebody) was delayed and not completed in 2001 and was being completed in the first part of 2002.

Six middle childhood teachers were interviewed. All of the teachers were experienced and had been teaching for more than ten years with four in the group teaching over twenty and one teacher having taught for 30 years. The teachers were very busy in 2002, working on a number of whole school initiatives. A frequent comment was that time was an issue when it came to opportunities to share with colleagues.
This was complicated further by some staff changes including a change of principal, long service leave being taken and illness. Reading was timetabled at the school in a block of time, which also influenced the AGQTP project as teachers worked with streamed groups not necessarily their own students for relatively short periods of time each week. It became clear that teachers preferred working with their own students for the AGQTP projects as they knew the students well and could follow aspects of their professional growth at different times in different teaching situations. However shared non-teaching time for different year level teachers provided collegiate time for planning and sharing in sub groups of teachers.

Development and implementation of a plan of action

The 2001 AGQTP project continued to be implemented into 2002. This allowed the teachers to learn the *Four Roles of the Reader* strategies in two parts over two calendar years with two different classes. The ACER researcher entered the action learning process at the start of 2002, midway through the project. The same external presenter who began the process in 2001 presented external professional development strategies early in 2002. Teachers then met at key points in the project for collegiate sharing sessions.

Plan of action for 2002

The decision was made to focus on:

- Several collegiate meetings throughout the year
- Use of reflection sheets at meetings
- Provision and use of resources (*4 Roles of the Reader* Resource file and support materials)
- Professional development strategies provided by external presenter

As part of the ACER research project, teachers agreed to conduct before and after testing using Developmental Assessment Resource for Teachers (DART), Rowe Behavioural Rating Inventory and an Attitudinal Survey for reading. Each teacher also completed a student survey at the end of the project for students in their class.

The effects of the action plan

This school began their AGQTP literacy project in 2001. The focus of the project was the *Four Roles of the Reader*. There were delays in getting the AGQTP project started and only part of the external professional development component was delivered in 2001. The remainder was delivered in Term 1 2002. The teachers commented that this reading strategy was suited to partial delivery over time with two roles being studied at a time. They liked this method of delivery as it allowed them to practice and gain confidence with one part of the strategy before commencing the second part.

Effects of the action learning on teachers

*I found the AGQTP to be very beneficial because it moved me further along the continua of understanding of links to Student Outcome Statements, and provided me with greater confidence to take risks in teaching reading. Provided me with the tools for teaching reading more effectively and efficiently. The AGQTP has provided me with more information allowing me to develop more depth and breadth in what and how to teach reading.*

What changed for the students?

*Students are more focused on the text analysis area in that they are asked to write critically about topics. Students were more actively involved in the learning activities and were keen to reflect on their learning and share ideas. They were able to apply new ideas/ strategies to understand a variety of texts (novels, newspapers, plays, articles, magazines).*

The action learning project at this school was interesting as the training component of the action learning project was delivered over two school years (end of 2001 and start of 2002). The opportunity to undertake training in this way was seen by the participating teachers as ‘the way to go! We did not get information overload and it
gave us and the kids time to try things out in-between’. Stable staffing levels at the school allowed the teachers
to complete the project in this way. Teachers noted improvements in student reading as a result of the
scaffolding provided to the students in the form of classroom posters, worksheets and training in group-work
skills. Staff changes at the principal level during the year did not seem to impact on the action learning project
due to strong teacher co-ordinator leadership.

School 7: Hepburn Primary School

This school is located in a large country town. It has a changing student population. In recent times, the number
of government rental houses has increased in the catchment area, and this has resulted in increased enrolments
of children from low-income families. The number of indigenous families in the area is also increasing. In 2002,
the indigenous population increased from 29 per cent to 36 per cent in seven months. The average time staff
remain at the school is four years. Five teachers, teaching from Year 1 to Year 7, were interviewed for the case
study.

Development and implementation of a plan of action

The plan for the 2002 AGQTP project was to address literacy skills through an integrated curriculum approach
with specific links to Science, Technology and Enterprise and Learning Technologies. Teachers were
encouraged to select areas of interest from two sub-groups allowing some teachers to participate in both student
centred learning, and assessment/evaluation. An opportunity for teachers to attend a range of professional
development sessions delivered by external presenters was made available. Regular collegiate meetings were
planned for at least twice a term.

Plan of action for 2002

The decision was made to focus on:

- Collegiate meetings throughout the year
- Use of reflection sheets
- Provision and use of a range of resources
- External professional development opportunities but not whole school approach—teachers could
  select from a range of options.

Learning targets will be achieved through the investigation and research of best practice
strategies and organisational structures employed by other schools, catering for a diverse student
population in meeting literacy outcomes.

(Extract from AGQTP application)

As part of the ACER research project, teachers agreed to conduct before and after testing using Developmental
Assessment Resource for Teachers (DART), Rowe Behavioural Rating Inventory and an Attitudinal Survey for
reading. Each teacher also completed a student survey at the end of the project for students in their class.

The effects of the action plan

The AGQTP professional development program began in Term 1 2002 as the teachers worked together in
groups of three or four on a particular research question, such as: Will multiple intelligences activities improve
reading? How can active, authentic learning be assessed? They formed two sub-groups focused around student-
centred learning, and assessment/evaluation. Professional development sessions and meetings were held after
school and on weekends due partly to the difficulty in getting relief teachers during school time. Teachers were
able to participate in either or both groups. The teachers attended externally provided professional development
sessions about the use of Multiple Intelligence activities in the classroom, the use of the Literacy Net and the
Four Roles of the Reader.

Regular collegiate meetings were held after school. Teachers found these meetings stimulating, and described
them as ‘verbalising time’, used to discuss their ideas and experiences. They also valued the opportunity to
undertake the collection of data in the time made available by teacher relief. They found this time provided a valuable opportunity to distance themselves from the classroom, and to allow them time to think more about how things were going. Support from the experienced teacher co-ordinator contributed to the reflective process.

**Evaluation and reflection on the whole process**

Teachers found action learning triggered ‘big picture’ thinking. Teachers found their action learning questions triggered ‘big picture’ ideas and thinking. Each teacher sub-group began their AGQTP project with a focus on a narrow action learning question. However, as the year progressed, they began to think about and discuss the broader implications their investigation could have on their general teaching practice. One example came from the assessment/evaluation group. The opportunity to examine links between assessment and student learning outcomes led to the group thinking of ways of incorporating more outcomes focused assessment practises into their teaching. ‘I am aware of the narrow focus of some of the assessments I use—for example, Waddington’ (standardised test).

**Effects of the action learning on teachers**

Teachers felt they needed more time for action learning. Many of the teachers reported feeling that they needed time to practice and refine what they had learned this year. ‘I feel I have had information overload—I will take next year to consolidate’

> I found it practical, reaffirming and new. The AGQTP has been a great collaborative tool allowing me to glean some new ideas from my colleagues. But it has been most importantly allowed me to feel more secure in the knowledge that my pedagogy is accepted practice and given me the time and opportunity to reflect on my own strengths and weaknesses so that I can improve my performance as a teacher in the 21st century.

Teachers found that the structure of action learning helped them consolidate some of their understandings of recent curriculum change. One teacher who had recently returned to teaching found her participation in the AGQTP project had consolidated her learning in a number of areas.

> I feel that the Curriculum Framework, and the Student Outcomes Statements in terms of planning and assessing have all come together for me. I can see and apply the ‘planning circle.’

Another teacher found that the more student centred approach had broad implications for her teaching: ‘I now have a better understanding of integrating assessment/tracking/self assessment into the learning cycle.’

**What changed for the students?**

Changes noted in attitude and performance. Teachers noticed changes in student attitude to, and performance in reading. They were able to support these observations with evidence using annotated work samples and anecdotal records.

> What excited me was the reaction of my class to reading lessons—‘can’t we have a bit more time? We haven’t finished yet, this is fun working with partners’. I was heartened by this final comment ‘This is hard’ from the ‘hardest case’ in my room. He hardly ever committed himself to any work at the start of the year. He was extremely overt in his opposition to authority or any reasonable requests to confirm. After this utterance, he proceeded to complete the activity to the best of his ability and within the required time.

Teachers also were able to quantify improvements in reading with one teacher using the Reading Recovery levels to support her professional judgements: ‘At the beginning of the year they could read books at Reading Recovery level 5: now they can read at Level 14.’

Other teachers noted changes in their student learning outcomes.

> I can confidently say that my class has progressed from being basically very good technical readers to very capable text users and integrate their reading skills into other learning areas by being text users. This is evident by the progress noticeable in their workbooks and their ability to use their reading skills
to prepare presentations on given topics, writing reports and demonstrated reading behaviours characteristic for Level 2 and 3 readers.

The action learning project at this school consisted of several smaller projects, each with a common theme of literacy. Teachers were free to choose to work on either or both of these. This approach led to collegiate sharing sessions where each teacher contributed ideas and experiences while working on different issues. The robustness of the action learning model was demonstrated as teachers found this approach productive and provided them with opportunities to ‘see if they were on the right track’. The success of this approach was seen in changes in student attitudes and behaviour, which was an intended outcome and a necessary precursor to improving literacy. Staff changes at the principal level during the year did not seem to impact on the action learning project due to strong teacher co-ordinator leadership.

Discussion

The Learning through Action AGQTP projects proved to be a particularly effective form of professional development according to teachers at the seven schools in the ACER case study. The conceptual design of the Learning through Action AGQTP projects suited the professional life of teachers, as it was grounded in their schools and allowed them to work with their own students and colleagues over an extended period. It was built on adult learning principles that acknowledged the rich experience base that teachers brought to their action learning projects. Many teachers made links from past experiences and training that had supported and enriched their learning in their action learning. All teachers commented that they had found working in groups facilitated their learning and helped them to support each other in the process.

Key features of the Learning through Action AGQTP projects that were evident in the case study schools can be grouped under four headings the system design for supporting the action learning process the schools where the action learning took place the teachers and the students who participated in each action learning project.

System design

A critical factor contributing to the success of the Learning through Action AGQTP was the training of school-based teacher co-ordinators at each district education office at the start of 2002. These teacher co-ordinators became familiar with the theory underpinning successful workplace learning, as well as becoming aware of the administrative requirements that needed to be met at key points in the project. They combined this knowledge with their understanding of the context of their schools. In this way they were able to support both their teachers and the AGQTP project.

Teachers found they were able to adapt the delivery of their AGQTP project to suit their busy working lives. Teachers tailored their professional development around their teaching to explore relevant workplace issues. By working in teams, teachers cooperated on a workplace issue or took parts of the whole and came together to coordinate their findings. This flexibility allowed teachers to work together or on their own.

Another important aspect of the Learning through Action AGQTP projects was that the cycle of professional development was sustained over time. Teachers found it valuable to have time to work through cycles of theory, practice, feedback and reflection. Although each AGQTP was scheduled to be completed in a school year, feedback indicated that for a more complete understanding of the full impact of the AGQTP projects, longer investigation was required.

Despite the availability of an AGQTP website, few of the teachers interviewed had made use of this resource. Many teachers still do not have regular access to the internet or use it as a professional resource. This is often due to constraints of time as well as availability. However, the teacher co-ordinators found it very useful, as it was necessary for them to electronically send progress and final reports.

Many teachers expressed surprise towards the end of the project when they looked back at what they had done and made the links between what they were doing and the concept of action learning that underpins the AGQTP in Western Australian government schools. Many remembered looking at the diagram (Figure 2) at the start of their project with their teacher co-ordinator, but then got on with the practical aspects of their projects, the process guided by the teacher co-ordinator. It was only towards the end of the case study when they were thinking about writing their ‘teacher stories’ that many made the connection between what they were doing in class every day, and that their professional development was linked to the model of Learning through Action.
The accountability of the school based action learning projects played a positive role in the progress of each project. There were a number of important stages in the accountability process:

- application from only committed applicants
- progress reports which included feedback from collegiate meetings
- final report which encouraged reflection and planning for follow-up action.

Schools

A number of factors at the school level facilitated successful implementation of school-based action learning projects. These included the adaptability of the structure of *Learning through Action*, support by the school administration at both the practical and professional levels and the experience and commitment of the teacher co-ordinator.

*Learning through Action* is a robust process. It was evident that each of the seven schools in the case study approached their projects differently while continuing to accommodate different school contexts, priorities, teacher personalities and interests, student groups, location and leadership. The model was acceptable in all cases.

Support by the school administration in terms of physical resources, administrative support and value placed on the action learning process were important. All action learning projects were linked to school priorities. This meant that some funding and resources to support action learning had already been allocated. Strong administrative support was present in each school although the three country schools had changes at this leadership level during the year. The experienced teacher co-ordinators remained stable at these schools and provided valuable continuity for the projects.

Submissions for funding often arose from previous staff experiences or interests. Applications for AGQTP were often reported to be the result of initial exploration by one or a few members of staff of a strategy or idea that matched the school priorities. It is interesting to note that each of the seven schools had lead-in times of up to two years where some staff members were exploring ideas or issues on the AGQTP focus prior to decisions being made about directions to take and applications for funding being made. This indicates there was strong support for the AGQTP projects in each school at the teacher level.

Action learning projects worked best when they were not confounded by other innovations in the same area. In one case, another literacy initiative was already in place. This diluted the opportunities associated with the delivery and evaluation of the AGQTP project.

Teachers found their action learning projects were supported by the principles of teaching and learning in the Western Australian Curriculum Framework. This major initiative in Western Australia is currently being implemented by teachers in all WA schools and is reshaping the way teachers plan and teach. Teachers were encouraged by the discovery of this link and felt it added strength and relevance to their action learning.

Two additional factors influencing the level of implementation in schools were the number of participating teachers in each school, and the role of the teacher co-ordinator.

Collegiate links at each school were fostered and professional interest in the research topic grew between participating teachers as each AGQTP project progressed. Teachers commented that they found the regular collegiate meetings at their schools very supportive of their own teaching and professional growth: ‘We all started talking the same language. I did not feel like I was the only one getting excited about it [Cooperative Reading]’.

The teacher co-ordinators played a very significant role in encouraging and supporting teachers in each school. Every co-ordinator worked differently with their teachers. However, each one was highly respected by the group who appreciated their involvement and expertise.
Teachers

The flexible nature of the AGQTP projects catered for all types of teachers. It allowed groups of teachers to enter action learning projects with different skills and experience. The range included: teachers who were innovative, risk takers, those already experienced in a particular strategy or skill and some who were novices or previously reluctant participants or non team players. The collegiate meetings provided a base around which all teachers contributed. The impact on the individual teachers varied widely but included examples of dramatic shifts in practice and pedagogy. For other teachers, participation confirmed good practice and provided mentoring and leadership opportunities: ‘It confirmed I was on the right track.’

Details of changes of teacher knowledge and practices were recorded in teacher journals, the end-of-year teacher stories, teacher interviews and the questionnaire completed at the end of 2002 by all teachers participating in the national project. Teachers found the process of action learning gave them time to think about what they already do well as well as being challenged by something new. Teachers actively retained and valued aspects of their teaching they know are working, while becoming excited about new ideas and exploring different ways of working with students. Some teachers enjoyed the opportunity while working collaboratively in that year, to share skills and expertise with others in a peer-mentoring role.

I have been identified and asked to take a key role at my school to assist in moving teachers in the Upper Primary section along the road I had been travelling for several years. A colleague whom I have worked closely with for several years left our school. Administration requested I take our new intake under my wing and model collaborative strategies with her. This did not pose a problem, however time for collaboration is always and issue. Similarly I have worked extensively with a teacher on our staff who is close to retirement and reluctant to change. Again, time and resourcing to bring about these changes must be me.

(Extract from a teacher journal)

Teachers reported that they sometimes went backwards before they went forwards: ‘I was learning too.’ They expected that innovations implemented in 2002 would be refined and more confidently delivered in the future. Come back next year and have a look was the comment made in an interview with one teacher at the end of 2002. One teacher felt she would make more progress with the students doing [Cooperative Reading] next time. Many indicated they felt that some changes starting to show in their students at the end of 2002 would benefit the students next year, as the kids were just really getting the hang of it by the end of the year.

Each of the seven schools had at least one pair of teachers working in tandem or team teaching positions. Many teachers reported they found it extremely valuable to work with someone else in their day-to-day teaching in addition to the collegiate group meetings. They said it led to increased confidence and provided an audience to run ideas by and helped to share the load of both the AGQTP project and in their day-to-day teaching.

The impact of the ACER case study on the teachers’ knowledge and practice was considerable. Teachers found the ACER research questions and involvement gave them the opportunity to seek evidence of changes in their students’ learning and to reflect on these changes in relation to their professional development.

The attention paid by each school administrator to the ACER case study had positive effects on the teachers, as they regarded their staff participation in the case study as important. At the start of the case study, the teachers were unsure of their role in the project or what it was about. They were nervous and some were defensive at the first interview. Once the purpose of the project became clear, teachers relaxed and rapport developed between the teachers and the researcher. Subsequent meetings were friendly and honest with the teachers keen to talk about their work with their children and to show work samples indicating progress. At least two interviews were conducted but other meetings also took place including informal contact on visits to the schools and at the sharing sessions held at the end of the case study.

Teachers in the case study regularly cited a supportive, flexible administration, shared non-teaching time (DOTT) time and regular collegiate sessions as three important school factors that supported action learning.

It has meant we get time to do things together.

Collegiate meeting have given us the chance to talk about what we are doing and to share ideas.

(Extracts from teacher journals)
Teachers also found visits to other schools both stimulating and affirming. Many quoted this aspect of their professional development as the catalyst that gave them the confidence to try similar strategies in their own classrooms. Teachers felt it connected the theory to the practice and showed them how to do things in a practical, real life situation ‘warts and all!’

Involvement in an innovative program drew a focus to the area and there was a tendency to move too rapidly with both process and content. Teachers from all schools commented on the need to synchronise practice with theory for their students and to slow down. One teacher reflected on why her students were not enjoying reading, and appeared bored although she felt she was doing wonderful things with them. She asked the students and found they felt lost and confused as she was moving too fast for them to master new aspects of the Cooperative Reading strategy. She discussed this with her colleagues and found they too had experienced similar problems. Her successful counter strategy was to slow down and allow the students to practice and become more confident with aspects of the reading strategy before moving on to something new.

Students

Teachers looked for changes in student outcomes not only in the narrow context of their AGQTP action learning questions but also in more general performance. The changes noted by teachers have been found to be more holistic than specific. Teachers found the time frame of less than one year, combined with the use of specific measurement instruments has in many cases underestimated some of the impact of the changes that have taken place. As a result, most of the changes in student outcomes noted by teachers have been expressed in outcomes beyond the specific content area that was the focus of the AGQTP. Changes, often in behaviour or attitude, have been noted in other learning areas and outside the classroom. Evaluation of these social skills has been included to take in these broader aspects of change.

Teachers have used records of attendance, attitude surveys and anecdotal records including changes in student behaviour alongside more quantitative measures in noting effects on student outcomes. Teachers are becoming aware of the limitations of some previous ways they noted student progress with the move towards outcomes based education and are trying to work out new ways of monitoring progress. They were keen to try out some of the ACER assessment instruments like DART, LLANS, Rowe Behavioural Rating Inventory and the IBT for Science. They also wanted to find out the results of these tests and how they fitted into their own assessments of progress. This information will be available early in 2003 and will be shared with each participating school. Teachers often combined anecdotal information with quantitative data when discussing changes in student outcomes in their teacher stories.

One of the three Year 3 children in my non-reading group left at the end of last term. The other two boys have improved their reading and now consider themselves to be readers. They have often commented that now they can read and will volunteer to peer tutor some new additions to our class. At the beginning of the year they could read books at Reading Recovery Level 5. They can now read at Reading Recovery Level 14. These two boys have participated in the ‘support a reader’ program running in the school. These boys will need continued support during their middle primary years and one will be attending the in-school speech program next year.

If I was teaching in a similar area next year I would continue to use an Integrated Approach based on the Multiple Intelligences. I am excited about the results I’ve seen and the possibilities of using such an approach.

(Extract from a teacher story)
An extract from a teacher co-ordinator journal provides an outsider’s view of progress in student outcomes in Cooperative Reading.

I have popped into the classroom several times over their last cycle and it’s great to feel the “buy” the kids are very keen asking me to join their group wanting to tell me about their roles. They are very “on task” and engaged in their learning.

Teachers developed new and relevant ways of communicating with the students explicitly using metalanguage. The depth of understanding and use of language has been found to increase impact across school boundaries when consistently used by teachers across different years of teaching. One school in particular has had a focus on literacy and more specifically Cooperative Reading combined with sustained teacher professional development in that area for the last few years. Results using standard literacy assessments including WALNA have indicated a significant positive change.

Conclusion

Teachers with a range of different skills and experience were found to benefit from participation in action learning projects. The robustness of action learning was demonstrated with each school action learning teams comprising different combinations of teacher experience and knowledge. This ranged from most teachers having considerable knowledge and experience to one school where all teachers rated themselves low in content knowledge at the start of their project. However, most teachers commented they were able to make links to past professional learning experiences that helped them gain confidence with the content component of their 2002 projects.

One teacher wrote at the end of the year:

I have become aware of professional development that I have already completed fits in very well Multiple Intelligences, brain theory, Reggio Emilia, collaborative teaching, six thinking hats.

Another wrote:

I feel this model of professional development has had a very positive effect on my teaching. I enjoyed having the opportunity to collaborate and team-teach. The reflection sessions enabled me to look at my own teaching practice. I found this valuable and I will continue to do this.

The strategies we have used during the Action Research model of professional development reflect the principles of teaching and learning in the Curriculum Framework.

These support findings by Darling-Hammond and Ball (1998) who offer five premises that are especially pertinent to improving teachers’ learning opportunities.

- Teachers’ prior beliefs and experiences affect what they learn
- Learning to teach to the new standards takes time and is not easy
- Content knowledge is key to learning how to teach subject matter so that students understand it
• Knowledge of children, their ideas, and their ways of thinking is crucial to teaching for understanding

• Opportunity for analysis and reflection are central to learning to teach (Darling-Hammond and Ball, 1998, p. 16).

Links were made by teachers between the professional growth attributed to their participation in action learning, and the learning outcomes of their students. Teachers felt that both they and their students had certainly benefited, however, they felt that more time was needed to explore these links and to consider different ways of being able to measure these changes including student self and peer assessment. Teachers commented that the changes in student attitudes and learning often went beyond the narrow focus of their action learning projects, extending to other learning areas and in the playground.

Teacher co-ordinators played a vital role in each school’s action learning project. They provided strong leadership, were respected by their peers and were given thorough training by AGQTP staff at district office. The calibre and commitment of the teacher co-ordinators was outstanding. They provided an essential link between the researcher and each school at every stage of the ACER investigation. Staff changes at the principal level at three of the seven schools during the year did not affect the case study. This was due to the vital role played by the teacher co-ordinators and the fact that there was strong support from each school’s administration throughout the ACER case study.

Lack of time for teacher relief and length of project were cited as inhibiting factors. Teachers felt that Learning through Action AGQTP needed considerable amounts of teacher relief to allow for their planning, action describing and reflection of projects. Teachers also felt that they would have liked the action learning projects to run over a longer period. Many commented they were just beginning to notice some changes by the time the project was finished.

The ACER investigation in seven government schools of the Learning through Action AGQTP has revealed a combination of elements that provide scaffolding to support action learning. These include a strong focus on action and review and the use of groups of teachers in schools working in teams to investigate work place issues.

The opportunity for each teacher to focus on issues from their own classroom has engaged their interest in action learning. The specific accountability aspect provided a framework to monitor progress throughout each project, involving central and district office staff, principals, deputy principals and teachers. Finally, the use of groups of teachers at each school to challenge and support each other at regular collegiate meetings has proved to be the catalyst for both change and reaffirmation. Teachers have reported ‘moving on’ in terms of their approach to teaching with many commenting they have developed a more student centred approach as a result of their participation in action learning. Others have commented that action learning has confirmed aspects of their practice are working well and they ‘are on the right track’. All teachers commented on the benefits of the opportunity and time they had to examine the links between their professional learning and changes to student outcomes.

The Learning through Action AGQTP has been found to be robust and flexible allowing each of the seven schools in the ACER case study to adapt it to suit their particular needs and context.
Chapter 11

Action Research in the Teaching Futures Project

Alison Jansz-Senn and Marion Meiers

The Teaching Futures project was a system-wide Australian Government Quality Teacher Programme initiative in the Canberra-Goulburn Archdiocese, intended to lead schools to effective change. The project was based on the theme Developing Shared Vision and Professionalism and was implemented between February 2001 to December 2002 through a staged process. The four phases of the overall project involved:

- orientation and design
- training and development
- focused research and application
- review, reflection and strategic planning.

The first and second phases were completed in 2001. The focused action research phase took place between October 2001 and September 2002. The case study for this project is based on the action research phase of Teaching Futures.

Action research in Teaching Futures

The Teaching Futures action research phase was developed around the following description of action learning.

Action learning is a method of work-based learning in which a group of colleagues collaborate on a project while simultaneously using the project as a vehicle for their own professional development. It thus involves working on real problems or issues in a real workplace context with real outcomes.

*Action learning aims to improve the performance and learning of both individuals and the organisation by developing the skills necessary to deal with continuing change. By reflecting on personal and shared experiences, participants are encouraged to ask new questions, examine their own taken-for-granted assumptions and look at situations in new ways.*


The Teaching Futures action learning projects were shaped by the following principles:

- a team of work-based colleagues collaborate on a common task or project
- the project addresses actual issues or problems within the workplace. These may be school or system initiated and important to the real work of teachers in classrooms—not extras or things that have been specially manufactured
- the project work involves the team in cycles of action, reflection, planning subsequent action, reflection and so on
- professional development occurs as team members share experiences and support each other while working to achieve the project task.

(The *Australian Government Quality Teacher Program Newsletter*, Issue 2, November 2001, NSW.)
All schools in the Archdiocese participated in the action research phase. Schools selected a research topic from the priority areas of literacy, numeracy/mathematics, science, and information technology. Action research focus questions were framed by each school, such as: How can we best improve the literacy levels and writing skills of Year 2 students? What improvement in student reading outcomes will be evident with the introduction of literacy blocks and the implementation of best practice teaching methods? These research questions focused on issues identified by the school and involved the work of teachers in their classrooms.

This phase of Teaching Futures, and the final phase of review, reflection and strategic planning, were designed to achieve several specific outcomes for schools in the Archdiocese: refining pedagogy, linking action research projects to school management plans, providing leadership development, enhancing teachers’ sense of professionalism and developing strategic plans for future professional development programs.

Each school developed a project plan specifying aspects of the project such as: the number of participants, duration of the research, professional development activities at the school level, timelines for activities, data gathering, resource requirements, expected outcomes and indicators of success.

In each school a Teaching Futures co-ordinator was appointed from the school leadership team to organise and support the action research project in the school. The co-ordinator acted as a mentor and guide for teachers involved in the action research project. Their depth of knowledge about teaching and learning combined with their leadership ability was intended to maintain momentum and provide support and guidance throughout the duration of the project.

A small group of teachers was drawn together to form the action research team. In some cases the team consisted of teachers working at the same year level and in the same key learning area and in other cases the team consisted of teachers who taught in different key learning areas, generally at the same year level. Some of the teachers taught in classrooms that were located close each other and others came from different staff rooms and geographic locations in the school.

Consultants and experts from outside the school were called on, when required, to provide best practice theory and strategies relevant to the focus of the particular action learning project. The Teaching Futures project manager from the Catholic Education Commission Office provided support to schools. Some teachers were able to attend professional development programs held in regional areas and some were able to visit schools that were considered to have established ‘best practice’ in a particular area of teaching and learning.

The sharing and discussion of teaching practices within and across schools provided important professional learning opportunities for the teachers involved. Teams of teachers met both formally and informally for a variety of reasons. In some cases they met to discuss data gathering techniques, to develop rubrics for assessment, to plan the next phase of the action research strategy, or to reflect on where the strategy had taken them to so far. In some schools teachers were encouraged to report on the progress of the project at staff meetings. These teachers reported that this assisted them to build their own confidence and perceptions of themselves as leaders at the school.

The Teaching Futures action research phase culminated in a conference held in August 2002 that provided the opportunity for schools to showcase aspects of the action research projects.

Gathering data

The main research questions for this study were:

- What have teachers learned from their involvement in the Teaching Futures action research projects?
- How has this learning been reflected in their teaching?
- Have the changes to teachers’ practice that resulted from the Teaching Futures action research created enhanced learning opportunities for students?
- What are the connections between the changes in teaching that have resulted from teachers’ learning and intended learning outcomes of students?
- What student learning outcomes have improved? How? To what extent?
• To what extent can improvements in student learning outcomes be attributed to the teachers’ learning from the Teaching Futures action research professional development activities?

• How does the school context influence the effectiveness of the professional development program?

The ACER investigation involved seven schools in the Canberra-Goulburn Archdiocese. Suburban, rural and coastal schools were included, some schools were co-educational and some were single-sex schools. Both primary and secondary schools were included. The action research projects in these schools were focused on the literacy and information communication technologies. Table 1 provides details about the schools and the action research projects. (Pseudonyms have been used for all references to the schools involved.)

Table 1: The schools and the action research projects

<table>
<thead>
<tr>
<th>School</th>
<th>Details</th>
<th>Action Research Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>St Fidian School</td>
<td>Primary School. Co-educational. Approx. 530 students Urban. School is approx. 20 years old. 36 ESL students. Student population varying socio-economic backgrounds</td>
<td>Literacy (Reading) in Year 1</td>
</tr>
<tr>
<td>St Columb College</td>
<td>Primary and Secondary, co-educational Approx. 492 students. Rural, predominately English-speaking</td>
<td>Literacy (Comprehension) in Year 6 and 7 students</td>
</tr>
<tr>
<td>Brahme College</td>
<td>Secondary girls school. Urban. Approx. 1004 students. School organised in year levels. Curriculum organised in Key Learning Areas</td>
<td>Literacy in Mathematics for Year 8 students</td>
</tr>
<tr>
<td>St Daniel College</td>
<td>Secondary boys’ school, approx.1600 students. Some ESL/ Suburban, some special needs students</td>
<td>ICT competencies across all KLAs for Year 10 students</td>
</tr>
<tr>
<td>St Anselm College</td>
<td>Secondary Girls School. Approx. 1195 students. Suburban</td>
<td>Literacy (Writing) for Year 8 students across all KLAs</td>
</tr>
<tr>
<td>St Edward School</td>
<td>Primary and Infants. Approx. 736 students Outer suburban. Some students from farms, 3 campuses</td>
<td>Literacy (Writing/ Comprehension) for Grade 3 students</td>
</tr>
<tr>
<td>St Basil College</td>
<td>Recently established co-educational, coastal area</td>
<td>ICT in Year 10 across all KLAs</td>
</tr>
</tbody>
</table>

Data about the structure of the action research project and the intended outcomes of the program was gathered through document analysis and interview. Teachers in the ACER research of the action research component of the Teaching Futures project were interviewed in May, August and November. School administrators, including principals, deputy principals and professional development co-ordinators were also interviewed. Classrooms were observed in some of the schools. The Teaching Futures project manager from the central office was consulted during the course of the investigation.

As part of the action research the classroom teachers gathered assessment information about their students to monitor progress. In some schools surveys were conducted by the school to identify teachers’ attitudes, resources and other project requirements. Schools developed their own rubrics for marking of common assessment tasks across KLAs. Summary reports and reflective journals were also written. This information was made available to the ACER researcher during school visits.

For the purposes of the ACER project, assessments aligned with the purposes of the action research projects were selected, and conducted in the first semester of the school year, and at the end of the school year. These repeated measures provided key information about student outcomes. The assessments included the ACER Developmental Assessment Resource for Teachers (DART) writing and reading for upper primary/junior secondary and middle primary years students, literacy assessments from the ACER Longitudinal Literacy and Numeracy Study (LLANS) for students in the second year of schooling, some Year 8 mathematics word problem tests developed at ACER and questionnaires about the frequency of use of information communication tools.
and technologies. The Rowe Behavioural inventory was used to assess changes in students’ attitudes and behaviour in the classroom.

**The action research questions**

In all the schools the research question was developed through a whole school process, taking account of school priorities. This meant that the action research projects varied considerably from schools to school. Table 2 shows the research questions for each of the schools and the numbers of teachers and students involved in the action research.

**Table 2: The research questions and the teachers**

<table>
<thead>
<tr>
<th>School</th>
<th>The research question</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>St Fidian School</td>
<td>What improvement in student reading outcomes will be evidenced with the introduction of literacy blocks and the implementation of best practice teaching methods?</td>
<td>Literacy is a whole school initiative. The action research involved three Year 1 teachers and their classes.</td>
</tr>
<tr>
<td>St Columbus College</td>
<td>Is reading comprehension affected by particular questioning styles?</td>
<td>Literacy is a whole school initiative. Action research focus is on comprehension in Year 6 and Year 7 classes—three teachers.</td>
</tr>
<tr>
<td>Brahme College</td>
<td>Investigating the use of language in mathematics for year 7–9 students</td>
<td>Focus: word problems in mathematics with year 8 students. Four teachers and their classes</td>
</tr>
<tr>
<td>St Daniel College</td>
<td>The integration of technology via an integrated approach</td>
<td>A whole school initiative. Action research focus—all year 10 teachers across KLAs.</td>
</tr>
<tr>
<td>St Anselm College</td>
<td>How can we best improve the literacy levels &amp; writing of Year 8 students?</td>
<td>Literacy is a whole school initiative. Focus—all year 8 teachers across KLAs</td>
</tr>
<tr>
<td>St Edward School</td>
<td>Will a whole school focus on the area of writing in the balanced literacy block, backed up with high quality and on-ground Professional Development, improve the writing outcomes of the student?</td>
<td>Literacy is a whole school initiative. Action Research focus – Year 3 teachers</td>
</tr>
<tr>
<td>St Basil College</td>
<td>How do students in year 10 use ICTs in different KLAs?</td>
<td>Year 10 teachers.</td>
</tr>
</tbody>
</table>

In some of the schools the focus was on areas that had already been a priority for the school over a long period of time, for example, literacy. In these schools, the action research project built on previous learning and initiatives for improving literacy outcomes. The *Teaching Futures* project provided an opportunity for these teachers, through further investigation, to deepen their understanding of the principles of teaching and learning that they had gained over a long period of time.

In other projects such as the literacy in mathematics project, the action research helped the teachers to identify areas in the maths curriculum that assisted with the development of literacy. They developed new classroom practices such as the use of grid books that allowed the students to keep records of their work. They kept word lists and included word definitions in classroom tests so that students were encouraged to use consistent language. The teachers did word problems in class more often and word problems were also included in test questions.
In some cases the action research projects tackled new aspects of curriculum such as information communication technologies. In one school the action research project began with the development of a needs analysis survey that was used to identify teachers’ needs and the changes to the curriculum that would enable them to incorporate ICT into their classrooms. The project was a stepping-stone or first step that led to the development of other projects and initiatives that will be carried out in ensuing years. In one school a Director of Technologies was appointed for the next school year to work with staff members and each Key Learning Area leader to incorporate ICT into the curriculum. In another school, there was an added investment in hardware and software so that students and teachers would have better access to computers in their classrooms.

**School leadership and support**

In each of the schools, the nature of the leadership influenced the ways in which the action research project was implemented. The leadership skills of the *Teaching Futures* school co-ordinator and their capacity to remain committed to the project affected the implementation and progress of the project at the school. In schools where there were changes to staff the action research slowed down. Support from school principals affected the opportunities that teachers had to implement the ‘action’ part of the action research strategy: time to plan, opportunities to visit other schools or to develop regional networks. Discussion and showcasing strategies and findings, for example at a regional conference, heightened the profile and importance of the project at the school.

The allocation of resources was a further influence on projects. Where funds for resources were factored into the budget the project was able to continue its cycle. Where schools were able to tap into resources offered by neighbouring schools, such as in network meetings, conferences or visits to best practice schools, teachers were more motivated and empowered to make progress.

**The action research team**

Because action research involves a team of people working together to improve their practice, the composition of the team influences the progress of the project.

In some schools the focus of the action research involved all teachers at a particular year level. In primary schools there may have been only three teachers. In secondary schools ten or more teachers may have been involved. In primary schools where the teachers worked in adjacent classrooms there were frequent opportunities for teachers to discuss and plan. In secondary schools where teachers worked across KLAs they were often geographically separated within the school and casual conversations were less likely to occur. Teachers were often teaching at the same time and therefore had limited opportunity for discussion and planning. Where teachers taught at the same year level in the same KLA and classes were streamed into low, medium and high academic levels, the teachers felt that discussion and sharing were of limited value because their students’ needs were different.

The age of the teachers, their qualifications, the number of years of teaching service and the number of years teaching at the same school also influenced the operation of the project at the school. In some projects where all the members of the team were experienced teachers, their combined teaching experience and knowledge had a significant impact on the project. In other projects such as the ICT project, the technology skills of a new graduate were significant. The new graduate was able to take on a leadership role in the project and acted as consultant and guide to the other team members.

**The projects**

Two examples of school action research provide an indication of the variety across the seven projects.

**St Fidian School: Literacy**

The aim of this project was to improve student reading outcomes through the introduction of literacy blocks and the implementation of best practice teaching methods.

Several outcomes were identified for the action research:
• the development and implementation of a timetable conducive to the incorporation of literacy blocks across all year levels.

• increased teacher knowledge and skills gained from exploring best practice teaching methods for literacy improved reading outcomes for students.

Year 1 teachers investigated the use of Guided Reading within their balanced reading program. All teachers participated in professional development activities to improve their pedagogical skills and to effectively monitor the reading development of children in their class.

The action research projects were supported by inviting visiting speakers with particular expertise to the school. The purpose of these activities was to expand teachers’ repertoire of effective teaching and learning strategies, and contribute to the development of school-wide shared pedagogical practices. Experts presented sessions on the introduction of literacy blocks, explicit teaching methods, and Guided Reading.

A visit to another school was undertaken to observe the operation of a literacy block, and to discuss strategies with other teachers. A Guided Reading resource room was established to organise reading materials for use across classes. Teachers indicated that school visits were one of the most effective professional development opportunities made available to them. Ideas observed during these sessions were shared with other staff members and incorporated into existing classroom routines.

Assessing and evaluating outcomes

At the beginning of the school year, the Year 1 teachers responded to questions about what reading meant to them and what they enjoyed most about teaching reading. They also identified their current assessment practices and challenges to be addressed.

Throughout the year at Stage Level planning meetings the entire staff discussed similar issues and at the end of the year all teachers completed evaluation forms reflecting on their changing teaching practices.

The following account indicates the achievement of the outcomes of the Teaching Futures action research at this school:

A school-wide timetable allowing for uninterrupted literacy blocks was implemented at the beginning of the year and proved to be successful in catering for the needs of all members of the school community.

Feedback indicated that all teachers were appreciative of the quality teaching time provided by the literacy blocks and as a result, this timetable format will continue.

Teachers acknowledged that the professional development activities undertaken had influenced their approach to teaching literacy and they had incorporated many specific strategies into their daily practice. A more uniform approach to conducting Guided Reading sessions is becoming evident within classes across the school.

Within the target group (Year 1), teachers found that there was a marked improvement in reading outcomes over the six-month trial period. Teachers compared the results of Running Records taken in February and July. All children improved and advanced in reading levels, according to the PM Benchmarking Kit. The average improvement was 6.3 levels, with individual advancement ranging from one level to twenty two levels over the trial period. Teachers selected 120 words for Sight-Word assessment and tested the children in April and July. The average improvement in the number of sight words recognised within that period was 33.3, with individual improvement ranging from 6 words to 90 words.

St Basil College: Information Communication Technologies

The Teaching Futures action research project at St Basil College was designed to achieve several outcomes. The development of effective teaching practice through effective innovation grounded on shared whole-school understandings and beliefs about best practice was a primary objective. The enhancement of the learning network amongst teachers, students, parents and community was identified as another objective. It was also expected that teachers’ knowledge about student learning would be expanded, and that professional
development activities would support the effective implementation of the college’s ICT plan. In addition to these broad outcomes, several outcomes specifically focused on ICT were defined:

- to set up structures to facilitate classroom change to make the best use of learning technology
- to access and use leading practice in the development and application of intranets in the classroom
- to develop KLA specific Intranets—innovative technical and infrastructure solutions that work in our school environment and can be maintained by our school resources
- to incorporate specific curriculum use of software including PowerPoint, Word, Excel
- to provide opportunities for teachers to explore related converging technologies such as scanners, digital cameras and the internet
- to provide opportunities for teachers to observe effective programs in action in other schools.

As part of the college's strategic planning for 2001–04, the incorporation of ICT outcomes into all KLA programs across all year levels 7–12 before 2004 was a planned outcome. Mapping of required ICT outcomes in Year levels and Key Learning Areas and the subsequent compilation by the ICT committee of subject-specific foci for each subject and year level were planned so that student learning could proceed in a logical, sequenced and relevant pattern from Years 7–12. Teachers would be aware of the ICT skills and outcomes that needed to be taught at each level. (By 2004, ICT competencies designated by the Board of Studies syllabi will be mandatory in NSW schools). The college strategic plan also acknowledged the need for the professional development of staff in order to facilitate relevant programming and skill development by teachers in order to maximise student learning. The Teaching Futures project aligned with the overall project plan and the College Vision statement.

The action research project at the college began when various members of staff participation in a number of professional development activities. The value of these was summed up as follows:

"These authentic professional speakers and advisors provided staff representatives with creative stimulus, reports of recent research projects that demonstrated global trends and directions and practical advice for the implementation of the research project."

Year 10 students were selected as the target group because this group would undergo external testing by the Board of Studies. The initial testing was during their half yearly examinations in May and the final testing was in early September. Because of the short time span between testing and the implementation of teacher professional development, it was assumed that there would be little or no measurable difference in student results. The outcomes would take a longer period of time to manifest themselves in our student skill development.

In this school, the action research project was incorporated into long and short term strategic planning, and was not an added extra to be explored and then forgotten. It was all-inclusive—executive, KLA leaders, teachers, parents, students were involved. The action research was focused on pedagogy.

**Students**

A review of the *Teaching Futures* action research indicated that changes in students learning were evident. Students in Years 7-12 were using computers more often in all KLA areas and with increasing competence. Student skills in internet research and use of the intranet were reflected in assessment tasks and course work. The majority of students had experienced PowerPoint lessons in most key learning areas. Senior students were developing skills in creating and delivering PowerPoint presentations.

All Year 10 students completed two tests. The results from three Year 10 classes demonstrated positive results, despite the limited time between the teachers’ professional development in ICT and the Year 10 ICT testing.
Teachers

A selection of comments made in interviews with KLA leaders and teachers in September 2002, following the Teaching Futures professional development provide a picture of some of the changes in teaching practices brought about by the project:

*We learnt how to use the digital camera so that a teacher can visit field sites, then download to Intranet. Students have access to a much wider range of sites than would be feasible through excursions. A number of sites have already been added to the Intranet. Post websites to Intranet to save students time in research given shortcuts.*

(Geography teacher)

*We reviewed our use of Power Point presentation/use of digital camera to create assessment tasks and a range of lessons. These will be incorporated into programs and tasks this year and for 2003.*

(PDHPE teacher)

*It was a great opportunity to sit down and share our knowledge and needs as a department. We learnt how to use the digital camera and the scanner to create a power point presentation for lessons in Agriculture and Food Technology. There should be more of [release time].*

(Tas. teacher)

*We viewed monologues on internet sites—download to Intranet Multi-media presentation—Stage struck -interactive discussed aspects of space/time taken by this program—needs further investigation.*

(Creative Arts teacher)

*We set up Intranet (Creative Arts sites for 7–12 courses and then added internet links relevant to current Stage 6 English Preliminary and HSC Standard and Advanced courses. Our Resource Centre staff has undertaken to add and update these sites from this point. This will save both student and teacher times and facilitates our learning and research.*

(English teacher)

*French has been a spectacular success story—I could not see the relevance of ICT for my subject. Following individual support and time from [a CEO consultant], all French classes now visit Computing labs at least weekly. More French programs are needed and Intranet sites are operating for French.*

(French teacher)

As a result of the Teaching Futures project in this school raised teacher awareness and improved confidence helped teachers to utilise computer technology to facilitate learning experiences for their students across all year levels and in all Key Learning Areas. The school’s Lite-Pro had been in constant use and the PDHPE Department had a permanent Power Point facility in their department. The computing rooms and Resource Centre had been fully booked and used by classes from all KLAs since Term 3. Intranet facilities had been set up in all subjects for all year levels and were regularly used by students in specific research and designated lessons. A significant number of assessment KLA tasks incorporated ICT outcomes.

Conclusions

In some schools the process of being involved in the ACER research project seemed to have made an impact on the implementation of the project at the school. The one-on-one interview process increased communication of information between management and teachers. Repeated interviews throughout the year served to encourage reflection by the teachers. The initial interview helped to clarify elements of the action research. The nature of the questions asked assisted teachers to make the connection between the professional development they had undertaken and the subsequent knowledge gained, changes in practice and consequent improvement in student outcomes.
For me, you, the researcher, have been the link between the professional development and improved student outcomes. You have come back again and again and asked me the same questions: how has the professional development changed my practice and how has this impacted on the students. You have forced me to reflect on this and it has helped me to think about the things I need to do and achieve.

Across the schools, changes in teacher knowledge and skills were evident. These included knowledge about:

- Guided Reading techniques
- best practice principles for teaching literacy
- literacy across KLAs (literacy in science, maths)
- increased knowledge and skill in using computers and software, for example, internet, PowerPoint, Excel, websites
- new assessment strategies in literacy
- access and availability of resources
- incorporating ICT into the curriculum.

A range of changes in teaching practice were also evident, including changes in:

- classroom organisation—Guided Reading techniques, more frequent use of group work, use of learning centres
- timetabling to accommodate literacy blocks
- consistent school-wide approaches to teaching literacy
- more explicit teaching of literacy, i.e. text types, comprehension techniques—(factual, evaluative or inferential)
- using assessment strategies and data to guide teaching
- changing assessment to measure student outcomes more accurately.
- developing rubrics for assessment
- increased professional dialogue amongst teachers within and between schools
- increased reflective practice
- more frequent and effective discussions between students and teachers
- more frequent and effective use of computers/technology in the classroom.

Changed student outcomes were observed by teachers, including:

- improved reading, writing and comprehension skills as indicated in classroom discussions and tests
- increased understanding of literacy in mathematics as indicated in classroom discussions and mathematics test results
- students were more engaged
- students had an increased understanding of what was required from them in a task, and there were better able to meet the requirements of the task
- students were more organised in their work.

Observations were made of conditions in the schools that seemed to have contributed to changes in teaching practice and student learning outcomes. One factor was the school’s commitment to professional learning. The
projects had more impact in schools where there was a shared vision about improving aspects of teaching and learning that were supported by a set of achievable goals, the provision of resources and the opportunity to monitor and review progress.

The style of school leadership was another factor. Where teachers were encouraged and given the opportunity to contribute to developing the school’s vision, there appeared to be a greater impact on student learning. Opportunities for real professional learning were also significant. Time and opportunity to learn was identified as being of crucial importance. Professional dialogue, time to reflect on student outcomes, time to network or share with colleagues and subject matter experts, mentoring and time to experiment with new ideas and practices were valued. Where there was the opportunity to improve both teacher knowledge and teaching pedagogy there was improvement in student learning.

The projects were more successful in schools where teachers were able to identify the learning process taking place in their classrooms. An understanding of how students learn and the use of assessment instruments to identify students’ needs on an ongoing basis allowed teachers to change their classroom practice to meet the explicit needs of their students. This helped teachers to confirm their own beliefs about teaching and learning. The following comment exemplifies these understandings:

*The results from the Guided Reading program have shown me what I have always known about how students learn. I knew the students were progressing but now I have a real measure of their improvements.*