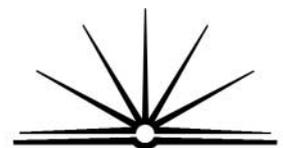
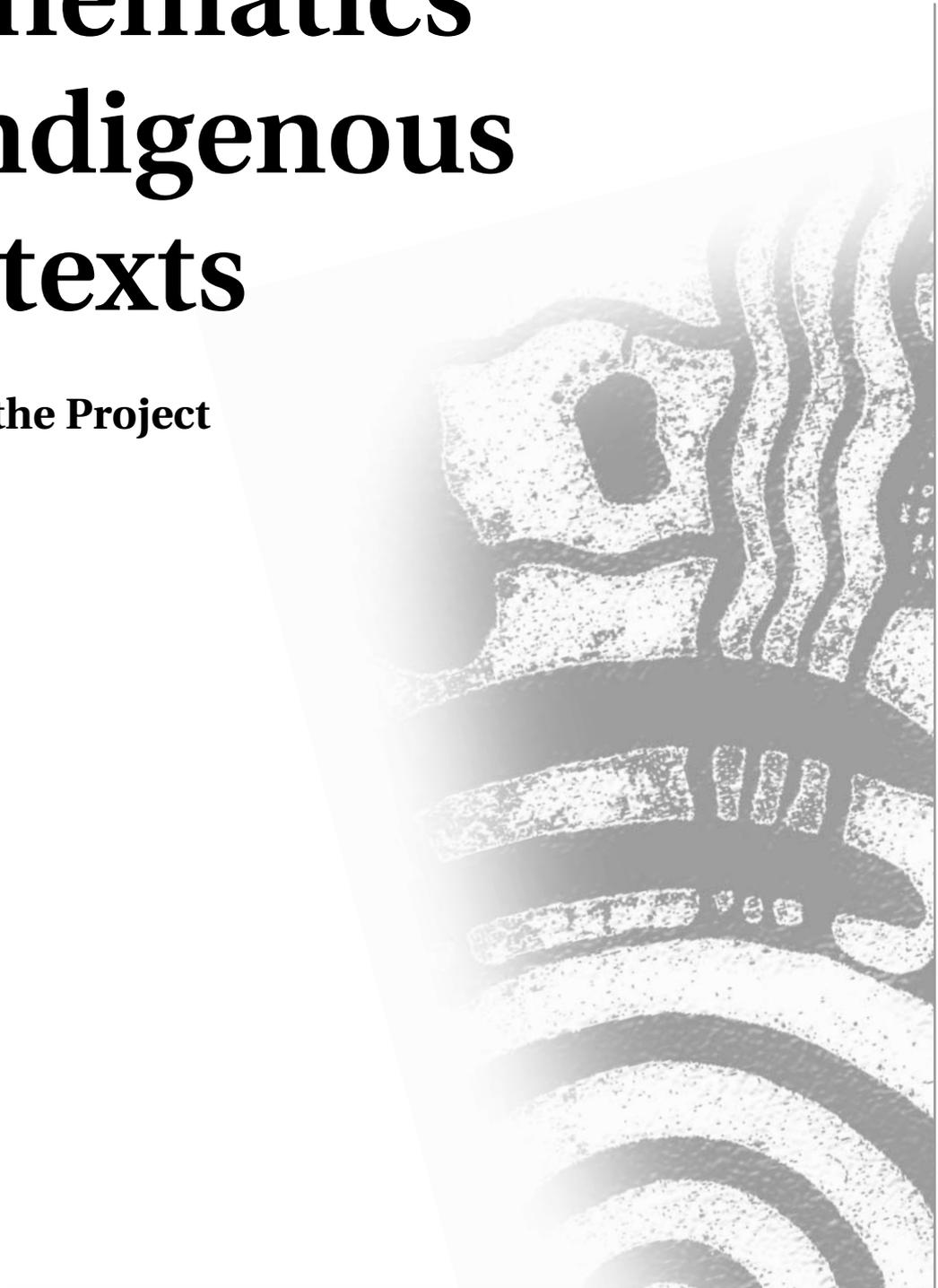


Mathematics in Indigenous Contexts

Report on the Project



BOARD OF STUDIES
NEW SOUTH WALES

MATHEMATICS IN INDIGENOUS CONTEXTS

A three-year longitudinal report on a project to improve the numeracy skills of Aboriginal students by the Aboriginal Curriculum Unit of the Board of Studies NSW.

1 Introduction

1.1 The project

The following is an introduction to the *Mathematics in Indigenous Contexts* project. It outlines its theoretical underpinnings and the first three phases of its development. The initial two phases saw a growing understanding of the many issues shown to impact on long-term improvements in Aboriginal student numeracy acquisition. The third and current phase of the project involves the piloting in schools of research into contextual mathematics units and developing learning environments that sustain active Aboriginal community involvement in schooling. The evaluation of the current project will inform the possibilities and directions for future work to be undertaken in this mathematics project.

The Board of Studies NSW (the Board) has the legislative mandate to develop syllabuses across the key learning areas (KLAs) from Kindergarten to Year 12. These syllabuses are developed in accordance with the Board's syllabus development process. This process,¹ which sets out in detail the manner in which this work is to be undertaken, also outlines the additional support documents that the Board will provide to schools and systems² to assist in syllabus implementation. The support documents for K–6 differ from those that are developed for Years 7–12. These additional documents are an important part of the syllabus package provided to schools.

Teachers have consistently requested that the Board provide extensive support for the implementation of syllabuses. Current Board practice is to engage experienced teachers to assist in the development of teaching and learning units, annotated student work samples, assessment tasks and advice to parents and principals. The Board is aware that while many teachers would like to access more of these quality support document materials at the time of syllabus implementation, it is also acutely aware that school systems have the jurisdictional mandate for school curriculum and any associated training and development for teachers to support new curriculum initiatives.

1.2 Background

During 2000 the Aboriginal Curriculum Unit (ACU) took a new direction for its activities by identifying its primary curriculum focus and purpose. It sought to re-position itself as a more effective primary partner across all branches of the Board through the co-development of

¹ The process is available on www.boardofstudies.nsw.edu.au

² These include the Department of Education and Training, the Catholic Education Commission and the Association of Independent Schools.

inclusive curriculum that meets both the specific learning needs of Aboriginal students, and provides relevant Aboriginal perspectives across the curriculum. This deeper engagement identified what teachers saw as a weakness in current Board activity – that is, that it did not provide specific, grounded advice to teachers on curriculum alternatives that challenged the existing education paradigms on Aboriginal education (which to date have failed to raise the performance of Aboriginal students) – and aimed to assist schools in the improvement of learning outcomes for Aboriginal students.

The recent review and development of the NSW Years K–10 Mathematics syllabuses provided a timely opportunity to reflect on research into the numeracy development of Aboriginal students and identify key factors that affect their low levels of achievement. This was in line with a clear decision of the Board to ensure that syllabus outcomes should be accessible to all students.

In 1999 ACU initiated the commencement of a multiphased research and support document project to address the issues of poor numeracy outcomes for Aboriginal students. The first phase of the project entailed the Australian Council of Educational Research (ACER)³ being commissioned to write a literature review that canvassed issues on the poor numeracy acquisition of Aboriginal students. This paper provided a framework for a research project on the attributes of effective K–6 teaching and learning programs deemed to be responsible for improved numeracy outcomes. The summary of these case studies, *How we learn what we need to know* (2000), was made available to 400 NSW primary schools with significant Aboriginal student enrolments.

A second paper commissioned from ACER in 2001 initiated the second phase of this project. This phase ran concurrently with the initial review and re-development of the new Mathematics K–10 syllabuses. The paper by Frigo and Simpson (2001)⁴ highlights the learning needs of Aboriginal students and the role that centrally developed curriculum could play in improving the numeracy outcomes of Aboriginal students.

Early in that year ACU sponsored the Aboriginal Numeracy Forum to look at the recommendations made in Frigo and Simpson's (2001) paper as well as other issues related to the Board's current activity in K–10 Mathematics. This paper and the Forum provided invaluable advice in regard to the need to re-think the role and purpose of support documents, especially those aimed to assist teachers develop effective curriculum and teaching strategies for sustained improvements in Aboriginal student numeracy outcomes.

Recommendations from the Forum suggested that syllabus support documents needed to include advice about:

- the teaching of mathematical language being explicit within the classroom setting. Teachers need to be shown how this can be achieved through appropriately developed curriculum documents
- developing different pedagogical models that aim to build the mathematical confidence of students

³ Frigo (1999): http://www.boardofstudies.nsw.edu.au/aboriginal_research/index.html#numeracy_a

⁴ Frigo and Simpson (2001): http://www.boardofstudies.nsw.edu.au/aboriginal_research/index.html#numeracy_b

- working with Aboriginal communities to develop effective strategies for home learning and tutoring
- different assessment methodologies that demonstrate a wide variety of work samples.

Previous consultations in the earlier phases of the project had clearly identified that teachers wish to have the Board more actively involved in the implementation phase of syllabus roll-out. The Forum highlighted the need for schools to be given greater assistance in tackling issues of educational disadvantage brought about by lower levels of student achievement of literacy and numeracy outcomes.

1.3 Project summary of the initial 3 phases

Project phases	Strategies and outcomes
Phase 1 1999/2000	Commission paper from ACER <i>Resources and teaching strategies to support Aboriginal students numeracy learning</i> (1999). This paper underpinned the writing of case studies <i>How we learn what we need to know</i> (2000), a study of effective teaching strategies that were seen to improve student learning outcomes
Phase 2 2001	Commission second paper from ACER <i>Research into the numeracy development of Aboriginal students: Implications for NSW K–10 Mathematics syllabus</i> (Frigo & Simpson 2001). This paper and the Aboriginal Numeracy Forum highlighted a range of issues specific to the development of the new Mathematics Syllabus K–10 and their associated support documents.
	Initial planning for the implementation of the K–6 Mathematics in Indigenous Contexts project. The primary focus of this project was to improve teachers’ understanding of the numeracy-learning needs of Aboriginal students, to develop innovative curriculum using contextual mathematical concepts, and to deeply engage Aboriginal parents in the processes of learning.
Phase 3 2002–2003	Implementation of the K–6 Mathematics project in two schools, setting up learning networks of teachers, parents and mentors in the development and implementation of contextual mathematics units. Collection of research data. Part 2 of this phase will develop a Training and Development website to outline critical paths taken in schools and make available the school-developed units of work, assessment strategies and student work samples.

2 Project Rationale

2.1 Project rationale for all three phases

The matters that informed the rationale for the development of this project are set out below.

Low attainment in foundational skill areas such as English literacy and numeracy can significantly contribute to lower overall achievement, non-engagement, poor attendance and lower retention levels for Aboriginal students in later years of schooling. The successful attainment of numeracy skills enables individuals to participate successfully in schooling and beyond; into the world of work, and in the wider community. Even though specific numeracy programs have been implemented, Aboriginal students have continually under-performed in comparison to their peers when assessed in the Basic Skills Tests (BST Years 3 and 5) and SNAP (Years 7 and 8). This, along with similar results in literacy tests across the same time frame, provides a significant indication of Aboriginal student disadvantage.

An acceptance of the perception that the lower achievement of Aboriginal students is largely to be found in aspects of their life experiences might lead to a conclusion that it is outside the scope of a syllabus document to improve outcomes for Aboriginal students. However, the small body of research in this area suggests that when culturally inclusive curricula and pedagogy are adopted by schools and teachers and delivered in a way which accounts for the diversity of student backgrounds and starting points, and when formative assessment (which is culturally and contextually appropriate) is used to rigorously monitor student progress, the achievement of Aboriginal students improves significantly (Frigo & Simpson 2001, p 1). These views were echoed in the *National Indigenous English Literacy and Numeracy Strategy* (2000) [NATSIP] when it was noted that:

‘... Indigenous people can reach comparable levels of literacy and numeracy to other Australians and should be given every opportunity to do so ... [and] partnerships between communities and government showed that the factors that impede Indigenous students can be overcome and rapid progress made.’ (NATSIP – a summary, 2000, pp 1–2)

A number of critical issues, which had come to light during the initial phases of the *Mathematics in Indigenous Contexts* project, were mirrored in another ACU project on Aboriginal student aspirations.⁵ Research in this project found that family environments as defined through improved educational opportunities, provided students with significant positive social capital. This in turn was seen to improve student opportunities through heightened parental aspirations for their child’s future as well as providing a focus for their expectations on the education system to provide the quality of education necessary to assist Aboriginal students achieve these aspirations.

A second major finding from this project further emphasised the critical importance of families. It was demonstrated that students’ perceptions of the support that their parents were able to bear, through family education and the positive social capital that came through bonded relationships between parents and children, impacted to provide self-images that supported the pursuit of higher education and employment aspirations.

⁵ Lester, (2000): http://www.boardofstudies.nsw.edu.au/aboriginal_research/index.html#acap_a

The research based on the trialling of curriculum resources highlighted what Aboriginal educators had long recognised as a key factor in the continuing alienation of Aboriginal students from school. While the policy rhetoric supports Aboriginal parent and community involvement in schooling, little had been done by education systems to make this a reality.⁶

As the next phase of the project was being conceptualised it was determined that one of its central themes was to look at processes for practical engagement between schools, teachers and parents in the development, implementation and evaluation of school-developed curriculum. These improved relationships were seen as having the potential to play a significant role in building community capacity, by challenging both the negative view about schooling often held by Aboriginal students and the views held by schools about Aboriginal students' capacity and willingness to learn and to engage in schooling.

The matter of contextualising the learning experiences of students had been raised in the initial phases of the project. This had been suggested as a means of teaching mathematics in a way that is recognisable to students and builds on the mathematical knowledge that Aboriginal students use outside the classroom. The *National Statement on Mathematics for Australian Schools* (1990, p 24) stated that 'students are more likely to respond positively to the experiences they have in school if they feel that those experiences relate to the lives of their communities'. For use in this project, contextualisation is defined as finding ways of providing experiences and strategies in which students can gain meaning and develop the appropriate language that enables them to extend their skills in Western mathematics (Frigo 1999, p 14). It was agreed that the project should provide teachers with the opportunities to develop programs from this contextual standpoint.

2.2 Preliminary project planning for Phase 3

Planning included a SWOT analysis that identified the following issues:

Strengths

- ACU commitment to assisting schools to improve learning outcomes for Aboriginal students.
- Board commitment to the concept of inclusive curriculum and cross-curriculum content.⁷
- Previous work had focused on the need for deeper activity in this area.
- The parallel review and development of the *Mathematics K–6* and *7–10 Syllabuses* and associated support documents.
- Internal and external support for ACU to initiate and manage the project, including access to syllabus writers.

Weaknesses

- Aspects of the project are beyond the Board's role of responsibility under the Education Act in developing extensive, broad-based syllabus support documents.

⁶ Although parent involvement was seen as being critical to the implementation of the Aboriginal Career Aspirations Program (ACAP), few participating schools demonstrated a capacity to substantially engage with parents, even though many acknowledged the positive role that parents could play.

⁷ A range of outcomes designed to be interwoven across the mandatory curriculum.

- While the Board appeared to have a good working relationship with the peak Aboriginal community organisation (AECG) there was no previous history of a project having been developed in this manner.
- Board policy discourages production of support documents which may be misconstrued by the systems as being professional development programs.

Opportunities

- Current policy and program vacuum in school systems in respect to the development of contextualised mathematics teaching units.
- High-level interest from the peak Aboriginal education advisory body (AECG) for work to be undertaken.
- Acknowledgement that current mathematics curriculum and teaching practices have not improved overall numeracy outcomes for Aboriginal students.
- Significant support from key academic staff.

Threats

- Fears from key school systems personnel that this project could be interpreted as interference in their domain.
- The potential lack of engagement by systems would make the transition of findings to the broader schooling community difficult, thereby diminishing the value of the developed materials.
- Aboriginal parent/community research phobia and mistrust of the promises often made to them about the value of research to communities and the benefits that such research would have for them.

These issues were factored into the development of the project, and provided a focus for the development of linkages with a broad set of stakeholders. Matters raised in this analysis were also factored into the development of the Project Definition Statement and project outcomes.

2.3 Key issues from the Rationale

The key issues encompassed in the Rationale comprise:

- low student attainment of numeracy skills as measured through BST in Years 3 and 5
- low student and community educational aspirations and expectations
- limited understanding by teachers and schools of the particular needs of Aboriginal students
- low expectations of Aboriginal parent/community desire to be involved in the education of their students
- limited understanding of the capacity of schools to be a key player in community capacity building
- the need for the Board to be informed on the uptake and engagement of schools with its new mathematics syllabuses.

2.4 Phase 3 project objectives

These key issues informed the development of the following project objectives:

- to increase awareness among teachers of the teaching and learning needs of Aboriginal students in need of additional support in their numeracy learning
- to demonstrate of the capacity of contextually developed school-based Mathematics programs and assessment practices to meet the learning needs of Aboriginal students in need of additional support in numeracy learning
- to develop stage-appropriate units of work that reflect and demonstrate a range of teaching and learning, and assessment practices which will assist Aboriginal students to demonstrate their numeracy understanding
- to develop clear links between schools, parents and community that support effective teaching and learning practices and encourage them to become active partners in school curriculum development and delivery, and so assist students become active numeracy learners.

This project promotes as one of its goals the involvement of teachers and parents in the early planning processes, to provide opportunities for each group to develop effective and positive learning relationships. It is anticipated that this will lead to an understanding of the learning needs of students, and heightened awareness of the key role that parents play in supporting and being closely involved in their child's learning.

This is particularly relevant to schools in locations that have a high turnover of teaching staff. In such schools, the role of the Aboriginal Education Assistant (AEA) and Aboriginal Student Support and Parent Awareness (ASSPA) committee is vital as they can provide support for the continuity of programs. This has clear implications for the implementations of programs, and for parents and AEAs who are often denied the very training that would assist a school's long-term commitment to successful programs.

2.5 Phase 3 outcomes and performance indicators

The outcomes and performance indicators for Phase 3 include:

- increased teacher awareness
- improved community and parent engagement with school
- improved student acquisition of numeracy skills
- trial, review and delivery of the support document and associated annotated work samples to schools on the Board's website
- production of a web-based support document to assist teachers in the implementation of the *Mathematics K–6 Syllabus*. This document will demonstrate effective school-based curriculum that engages Aboriginal students in learning mathematics and supports improvements of their numeracy skills. This document will include:
 - a description of the process (planning, development, implementation and evaluation) from each school, as well as visual and audio data and teacher and mentor journals
 - units of work from each teacher
 - assessment advice using a variety of culturally appropriate devices
 - annotated work samples showing student achievement of syllabus outcomes

- advice to schools in respect to the integration of parent /community support for school programs.

3 Project Description

3.1 Phase 3 project description

Site selection

The project began with the identification of schools in late 2001 for commencement of the project in 2002. These sites were to be representative of different geographical locations and demographics.

The following school attributes were considered essential:

- Aboriginal students
- staff open to developing partnerships with parents in the development of curriculum
- teachers prepared to look at their current curriculum practices
- staff open to an in-depth investigation of current teaching practice and structures
- school was prepared to implement the new *Mathematics K–6 Syllabus*
- school and staff open to direct involvement of mentors and Board staff.

Though the research team had sought to have three school research sites, one of these withdrew late in the planning phase and it was agreed that the project would go ahead with two schools. These were:

- 1 Walhallow PS: a P5 school, population 30 students, 2 full-time teachers plus additional fractional staff. The school is approximately 100 km south of Tamworth; and
- 2 Crawford PS: a P1 school, population 800 students, 42 full-time teachers plus additional staffing entitlements. The school is located in the western suburbs of Sydney.

Use of mentors to assist schools

An essential element of support to schools came in the form of peer mentors. These teachers were selected for their knowledge and expertise in primary mathematics teaching. As well, all three teacher ‘mentors’⁸ who held executive positions in their own schools had either been very involved in the writing of the new *Mathematics K–6 Syllabus* or had assisted in the gathering of work samples in an earlier Board project. Mentors were paired with teachers in target schools and provided ongoing support.

⁸ The term mentors is used to denote those additional staff, both teachers and university personnel, who worked with schools and teachers on this project.

The role of mentors is similar to that envisaged in the Action Research paradigm, in that they act as ‘critical friends’ and become actively involved in the work being developed. Modelling was also critical, as the mentors were able to draw on their teaching experience to assist in this task. The role was developed to allow both parents and teachers to take ownership of the units and the processes that had developed. The project provided funds in the form of school relief days for classroom teachers and teacher mentors. A small budget was made available to each school for the employment of relief staff to enable teachers time to meet, plan and undertake activities to support the project.

A second level of mentorship provided by the university research team also supported the project. Three university staff were invited to join the initial steering committee. They had expressed an interest in investigating both how schools forge learning partnerships with Aboriginal communities, and the professional support structures that assist in the development of effective primary mathematics programs. They played active roles with schools and teacher mentors and took a significant part in the overall assistance provided to schools with teacher mentors.

3.2 Phase 3 data collection

All participants were asked to keep a learning journal of their participation. These were to become part of the overall data which would inform the progress of the project. The Board also purchased digital video cameras for use in each school to record project activities and were loaned to schools for that purpose. All journals, videos and still photographs were intended to provide the website with a rich source of teacher and student data. These would also assist in providing evaluative feedback to the team for future projects.

3.3 Timeline and associated processes

Date	Action	Outcome
Term 4 2001	Identification of schools, outline of project developed in line with Board policy.	Mentors selected. Contracts offered to schools and mentors. Steering committee meeting held to discuss project objectives and implementation. Discussions undertaken with universities to determine their willingness to participate.
Term 1 2002	Steering committee meeting and project planning. Discussions with Interactive Design Group (IDG) at the Office of the Board of Studies to ascertain the design brief for website and seek advice on video data collection. Teacher and university mentors briefing, outlining roles and responsibilities.	Teachers and mentors explored their own motivations for project involvement. These meetings proved to be critical, especially in being able to engage parental support.
	Distribution of draft syllabus and documentation of project expectations of teachers and schools.	Collegial partnerships enhanced through these meetings. These bonds between teachers and mentors proved to be a critical issue for the success of this project.
	Initial visit to schools to meet teachers and community members. Mentor visits to schools and initial planning with teachers.	Galvanise school support and discuss the merits of the project with teachers, administrators and AEAs.
Term 2 2002	Mentor visits and initial unit planning. Teachers continued planning and developing programs. Collegial networks formed as teachers networked with each other and mentor/s.	Mentors played a crucial role in questioning teachers about ongoing planning, understanding of the issues related to Aboriginal students and parents exploring notions of inclusive pedagogy.
	A Sharing Day was held in Sydney with teachers, mentors and community members. Schools report on initial activities that they had undertaken such as a Maths Fun Day and a Maths Tabloid.	This provided an opportunity to pause and reflect on the progress to date, to open up debates about sustained curriculum change, and the forming of learning partnerships with parents. Key players discussed their involvement and identified issues at that stage of the project.
	Additional mentor visits to school to assist in completing units.	Mentor visits assist in finalising the development of units. Mentors critiqued the units, looking closely at their contextualisation, examining links to the new syllabus (especially engagement with the learning outcomes, and assessment procedures).

Date	Action	Outcome
Term 3 2002	Mentor visits and discussion of draft teaching and learning unit/s. Discussion of initial implementation. Teaching commenced during this term. Student work samples collected for use in the larger Mathematics K–6 project.	Close relations had been developed between teachers and mentors. These meetings led to further refinements of the teaching units and provided opportunities for teachers, mentors and parents to meet and discuss their participation.
	A second Sharing Day was held in Sydney with teachers, mentors and community members. Final visits on implementation and discussion with teachers and parents.	This meeting was more structured to ensure data collection of key research issues. This day was partially celebratory as this phase of the project came to an end.
	Collection of all work samples, journals, video recordings and photographs.	Second mentor visits, aiming to observe the teaching of the units and assist in the data collection (videoing, student work samples, interviews).
Term 4 2002	Collation and organisation of materials for the website. Discussions with mentors of materials to be used via protected URL for online discussions with mentors and project team.	Steering committee to view collected materials and to sketch out web design. Liaison with IDG on web development and support documents.
Term 1 2003	Draft for website. Consultation. Collaborative research paper written by the Office and university mentors.	Project uploaded to Board website. Refereed paper submitted for publication. ⁹

3.4 Project description

Planning

The planning stage involved meetings between the teachers and mentors to clarify project outcomes, provide information about the new syllabus, make decisions about the focus of the units of work, and determine strategies for involving parents and the community in the project. Relief days provided an opportunity for teachers to undertake additional planning. This proved critical as the interaction between teachers and mentors developed a deeper understanding of the issues related to Aboriginal education, the new mathematics syllabus, effective strategies for curriculum development, teaching practices, and institutional practices that have inhibited effective teaching practice. Initial planning in both schools included teachers and the school Executive looking at a range of data that might inform them on issues related to the reasons for the apparent numeracy weaknesses of Aboriginal students. This analysis included looking at BST results as well as in-school assessments and work samples.

At Crawford, collaboration with the AEA provided the catalyst for participating teachers to attend an Aboriginal Student Support and Parent Awareness (ASSPA) program meeting for the first time. This became the turning point for the project and an opportunity for the partnership between the teachers and the parents to begin. It established trust and

⁹ [Details of published paper to be advised]

cooperation and led to the in-class-tutoring program¹⁰ being extended to support the teaching and learning of mathematics, initially in Stage 2 and then for the whole school. The teachers developed a concept map for their units and discussed these with the ASSPA members who contributed additional ideas. The teachers also invited their students to add ideas. The concept map framed the teachers' development of their units and acted as a focus for the sequencing of learning for each unit.

At Walhallow, the planning stage provided opportunities for community members to come into the school and observe student participation in mathematics activities. The teacher (principal) and mentor held several planning meetings and the units were planned around an environmental mathematics theme. This was to form part of a larger integrated unit of work developed from the Science and Technology syllabus. It became clear that events that occurred in the community impacted greatly on the school and the students. Several community members and the AEA together with personal approaches by the principal were significant in bringing community members into the school. A classroom discussion on 'respect' was held between students and the elders as part of the NAIDOC celebrations. This also contributed to encouraging the community to come into the school for other curriculum activities. While the community did not contribute to the development of the unit of work they were supportive and involved in many of the activities.

Implementation

At Crawford two teachers began their implementation stage with great enthusiasm; however the third teacher who focused on Number experienced difficulty due to timetabling issues. These student groups for mathematics were frequently cancelled and group composition changed. After consultation between the mentors and other teachers it was decided she should begin the unit with her home class even though it would mean the unit would not be completed until early Term 4.

Visits from the mentors provided opportunities to refine the units as they were being taught. Issues that were impacting on the work of the teachers had been identified and mentors provided suggestions and strategies, several of which were structural and required extensive discussion with the Executive and staff. (A number of these issues were discussed as part of the 'sharing day'). The in-class tutoring program proved to be very successful and led to the parents expressing increased confidence in working with mathematics and being able to provide support for their children at home. Teachers had individually developed units of work with assistance from the mentors. A competitive element between the three teachers added a further dimension to their development. Parents were able to participate through the in-school tuition scheme. This appears to have worked well for both the parents and students.

At Walhallow there was ongoing support from the mentor and Board personnel; however, several events and issues within the community impacted on the school and needed to be addressed. This caused some delay in program implementation. The drought also had an

¹⁰ A program funded by the Department of Education, Science and Training to replace after-school homework centres that involved parents working in the classroom as tutors.

impact on the tree planting program and bush food garden. The Mathematics part of the environment unit was well under way at the time of the ‘Sharing Day’. A further visit was planned for the end of the Term 3. The development of this unit flowed from an integrated Science and Technology unit. The numeracy aspects were embedded into the learning outcomes and taught as part of the environmental science project over the course of that term.

• **Assessment**

Pre-testing of student knowledge was undertaken as part of the Crawford units. At Walhollow, analysis of previous BST results, in conjunction with in-school assessment, indicated the need for further development of the students’ knowledge and skills in the measurement strand. Strategies for monitoring progress were used.

3.5 Initial evaluation of project objectives

Project Objectives	Project Strategies	Evaluation
<p>To increase awareness among teachers of the teaching and learning needs of Aboriginal students in need of additional support in their numeracy learning. The purpose of increasing teacher awareness is to highlight the critical role of teachers in lifting student numeracy understanding.</p>	<ul style="list-style-type: none"> • School analysis of BST and school assessment results for all/Aboriginal students. Schools and teachers to look at identifying areas of learning gaps 	<ul style="list-style-type: none"> • The facilitation of meetings and learning networks between teachers and parents proved to be the biggest single influence on teachers gaining an insight into the issues related to educational success for Aboriginal students
	<ul style="list-style-type: none"> • Critical discussions with staff and school executive on understanding of issues of Aboriginal education 	<ul style="list-style-type: none"> • There were many misconceptions that needed to be dispelled. These included: <ul style="list-style-type: none"> <input type="checkbox"/> parental interest in education <input type="checkbox"/> parent aspirations <input type="checkbox"/> Aboriginal student understanding of numeracy concepts <input type="checkbox"/> importance of mathematical literacy
	<ul style="list-style-type: none"> • Meetings with AEA / ASSPA committee to ascertain issues of mathematical learning 	<ul style="list-style-type: none"> • The critical and often undervalued role of the school AEA in facilitating and leading parent interest in participation in school activities
<p>To demonstrate the capacity of contextually developed school-based Mathematics programs and assessment practices to meet the learning needs of Aboriginal students in need of additional support in numeracy learning. The prime objective of this project is to provide examples of effective school-developed teaching, learning and assessment of numeracy practices.</p>	<ul style="list-style-type: none"> • Teacher / mentor discussions on the holistic nature of contextual Mathematics programming • Discussions in teams of the links between achievement of syllabus outcomes, pedagogy and assessment. Discuss and demonstrate examples of assessment for learning • Teaching teams develop context-based units 	<ul style="list-style-type: none"> • Teachers had little understanding of the nature or purpose of contextual learning. Examples were provided to initiate discussions between mentors and teachers. Existing practices were hard to break, especially when change was not actively supported by in-school supervisors • Teacher involvement in project was not matched with complementary school-based T&D

Project Objectives	Project Strategies	Evaluation
To develop stage-appropriate units of work that reflect and demonstrate a range of teaching and learning, and assessment practices which are conducive to Aboriginal students being able to demonstrate their numeracy understanding	<ul style="list-style-type: none"> • Collaborative development between teachers, mentors and parents of contextual Mathematics units of work • Discussion and collaborative development of bank of assessment items specific to units • Teach units 	<ul style="list-style-type: none"> • A variety of approaches were trialled by teachers. Teacher interest and collaborative support between members of the learning teams appeared to be significant. Students involved in unit development. Greater knowledge, understanding and teacher confidence impacted on the quality of the units of work • Further work is required to assist teachers to lift their own expectations of Aboriginal students mathematical abilities • Schools, teachers and parents need to explore programs which assist students develop long term expectations of them
The development of clear curriculum links between schools and parents / community which support effective teaching and learning practices and encourage them to become active partners in school curriculum development and delivery and so assist students to become active numeracy learners	<ul style="list-style-type: none"> • Facilitate meetings between AEAs, ASSPA committees and teachers. • Discussion of school and community-based issues, between school, teachers and mentors • Facilitate collaborative development and implementation of units of work 	<ul style="list-style-type: none"> • Even with increased understanding about the role that parents are able to play in lifting student performance, their direct involvement and active participation were somewhat problematic • Sustained strategies supported by school Executive needs to be instituted • Active support from school Executive is essential to sustain parental interest

3.6 Summary of Phase 3 project outcomes

Students

- teaching and learning is more relevant to them
- students' confidence in mathematics is greatly improved
- students are able to contribute to the development of learning activities
- students are supported by parents and community members at school and at home.

Parents and community

- development of collaborative partnership with teachers to develop appropriate curriculum
- increased awareness of the importance of the role of the Aboriginal Education Assistant in the school
- opportunities to work in classrooms with students and teachers to improve learning
- increased confidence about school mathematics and how children learn
- increased confidence in their own knowledge about mathematics.

Teachers

- collaborative and cooperative planning with colleagues
- collaborative and cooperative planning with the Aboriginal Education Assistant
- development of partnerships with parents and community to develop contextually appropriate Mathematics units of work
- action learning processes can be utilised to improve teaching and learning practices that improve learning outcomes for Indigenous students
- increased understanding of the local community
- increased expectations for students in their class.

4 Analysis of Phase 3

4.1 Issues arising from Phase 3

Critical analysis of approach

- The role of leadership has proven to be critical in developing and planning this project. This proved to be a turning point as the Aboriginal Curriculum Unit increasingly seeks to develop a range of projects that push the boundaries and understanding on a number of issues pertinent to Indigenous education. ACU leadership of this project included:
 - Concept and overall vision for the project.
 - Challenging existing concepts and attitudes held by schools and teachers regarding Aboriginal parents and numeracy learning, and the dual impact that parents and schools have on the development of students' aspirations.
 - Fostering the confidence to engage with mainstream and question their capacity to improve student outcomes.
 - Management. A wide range of management skills were required to bring teams together with a common understanding of the need to tackle difficult issues. Other matters included:
 - teachers: selection and support
 - mentors: selection and support
 - budgets: tight control
 - team building: meetings at various levels to ensure whole-of-project engagement
 - strategic coordination of all factors of planning and delivery of outcomes
 - planning: gantt chart developed to assist strategic planning and management of major events and timelines
 - evaluation: gathering of a array of data and ongoing evaluation.
- Strategic planning for this project was crucial as it was fundamentally different in both its conception and implementation from other Board programs. ACU's role in planning was underpinned by a view that schools, parents and teachers needed to take ownership of the processes for ensuring better student outcomes. The Unit brought together the key players, outlined issues and outcomes, developed teaching units, and provided a small budget for the participation of teachers and mentors. Regular monitoring of work undertaken in both schools by the Project Manager meant that the project team remained informed of issues as they arose.

- The development of the various layers of joint ownership of the outcomes was a critical test of the project's success. This could not be an imposed process for its purpose was that teachers and parents needed to collaboratively interact and solve issues for each school.
- Structural issues within schools. This proved to be a challenging area for the project: an unwillingness to modify current practices within schools was difficult to contest because these practices tended to support other school policy directions. Strategies had to be devised to provide early identification of these issues and their potential impact on learning outcomes.

Critical issues in learning

- Community issues. It is naive to believe that one approach can possibly suit the diverse histories and contexts of all schools. Schools are very much living organisms which require skilful handling, especially when Aboriginal people have felt so removed from the education system. It was however salutary to note that parents constantly expressed the view that they had waited a long time to be invited to become real partners in their children's education.
- Sustaining long-term participation and change requires a long-term vision. Teachers need to be supported in the process to challenge their often-negative views of Aboriginal students and parents. They will also need continued assistance as they are guided towards becoming effective pedagogues.
- Acknowledgment of teacher's commitment. This project again highlighted the dedication and capacity of teachers to make commitments that challenge their previous professional security.

5 Conclusions

An evaluation from teachers, parents, mentors and Board staff involved in the project points to the success of the project to this point. Initial observations have led to the conclusion that there have been substantial and positive changes in curriculum development and pedagogy, parent and community involvement and increased understanding of the issues related to parental involvement and the need for continuing support to embed curriculum and pedagogic change.

- It is envisaged that the project will be developed in schools for a further year in K–6. It is planned that a similar approach will be initiated in schools in another regional location to look at the transition of students from Year 6 to Year 7.
- The approach will also be tested in the development of teaching units to test the inclusiveness of the *Science Years 7–10 Syllabus*.
- A comparative report will be written on the outcomes of the development of these support documents in terms of current practice.

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