

The Maths in the Kimberley Project: An Overview

Richard Niesche
Griffith University
r.niesche@griffith.edu.au

Peter Grootenboer
Griffith University
p.grootenboer@griffith.edu.au

Robyn Jorgensen (Zevenbergen)
*Nyangatjatjara Aboriginal Corporation and
Griffith University*
rjorgensen@nyangatjatjaracollege.org.au
r.jorgensen@griffith.edu.au

Peter Sullivan
Monash University
Peter.Sullivan@Education.monash.edu.au

The poor mathematical achievement of remote Indigenous students continues to be a significant educational issue. The Maths in the Kimberley project seeks to implement an innovative pedagogical reform in six remote Indigenous schools to explore reforms that may lead to improved outcomes for Indigenous students in mathematics. This paper reports on the data collection phase of the project and identifies key areas of success and others of concern.

The Maths in the Kimberley project is now in its final year of implementation. This symposium paper reports on the data collected so far and provides a brief overview of the data analysis in the two following papers. The aim of the project is to trial an innovative pedagogical model in mathematics education in six remote Indigenous communities in the Kimberley region of Western Australia. The classroom teacher has been identified as the critical factor in addressing educational reforms (Boaler & Staples, 2008; Hayes, Mills, Christie & Lingard, 2006) so this project has its focus on the teaching practices in the remote schools as the basis for reforming the teaching of mathematics. The pedagogical models used are based on the work of Boaler (Boaler, 2008; Boaler & Staples, 2008), Burton (2004) and the Productive Pedagogies model developed in Queensland (Lingard et al., 2001). These models and the approach used in the Maths in the Kimberley project have been detailed elsewhere so will not be discussed here (for example, see Jorgensen, Grootenboer, Niesche, & Lerman, 2010; Jorgensen, Sullivan, Grootenboer & Niesche, 2009; Zevenbergen & Niesche, 2008).

Data Collection

Members of the research team have visited the Kimberley region regularly to provide support and professional development sessions, and to collect data. However, the great distance of the research site from the researchers meant that much of the support and data collection was also undertaken remotely. A mixed method approach was employed, but the small sample size limited the scope for quantitative analysis. Five modes of data collection were employed: (1) a questionnaire; (2) video-tapes of classroom lessons; (3) interviews with teachers and principals; (4) field notes; and (5) student testing and interviews.

The focus of this paper is the results from the lesson video tapes scored against the inclusive pedagogy model. The following papers in this symposium use the same data and also qualitative data to further discuss elements that have and have not been working from the model.

Results

The following table shows the mean scores from the classroom lesson observations.

Table 1:
Video data mean scores

Inclusive Pedagogy Dimension	2008 (n=16)	2009 (n=16)	Change 2008-2009
Higher order thinking	2.6	3.4	+0.8
Depth of knowledge	2.4	3.5	+1.1
Depth of understanding	2.3	3.4	+1.1
Substantive conversation	1.9	2.5	+0.6
Problematic knowledge	1.4	3.0	+1.6
Metalanguage	2.3	3.0	+0.7
Knowledge integration	1.3	1.6	+0.3
Background knowledge	2.3	2.9	+0.6
Problem based curriculum	2.1	3.6	+1.5
Connectedness other maths	1.4	1.3	-0.1
Connectedness other curriculum areas	1.1	1.1	0.0
Connectedness beyond school	1.4	2.8	+1.4
Student direction	1.3	1.4	+0.1
Social support	3.0	3.2	+0.2
Academic engagement	3.0	3.6	+0.6
Explicit criteria	2.7	3.1	+0.4
Student self-regulation	3.6	3.5	-0.1
Inclusivity	1.0	1.6	+0.6
Narrative	1.3	2.8	+1.5
Active citizenship	1.1	1.3	+0.2
Assessment for learning	1.9	2.8	+0.9
Multiple pathways	2.0	2.5	+0.5
Multiple entry points	1.6	1.8	+0.2
Quality interactions	2.6	2.5	-0.1
Roles defined	1.7	1.8	+0.1
Group work	2.5	2.5	0.0
Teacher as facilitator	2.4	3.0	+0.6
Use of home language	1.0	1.0	0.0
Multi-representational	2.1	2.6	+0.5
OVERALL	1.9	2.5	+0.6

These comprised of videotapes sent in by teachers and some tapes made by members of the research team while visiting schools. Lessons are scored from 1-5 based on the inclusive pedagogy model. To illustrate the scoring, a score of 1 means the pedagogical aspect was

not evident in the lesson and a 5 mean the pedagogy was a central and significant part of the lesson (for more detail see Zevenbergen, Niesche, Grootenboer, & Boaler, 2008).

To further investigate the video data, the pedagogical dimensions were categorised in two ways based on their overall mean score and how much their mean scores improved over the two years. Dimensions with a mean score greater than 2.8 were noted as relatively high, and those with a mean score less than 1.8 were noted as relatively low. A score above 2.8 indicates that the pedagogical dimension was fairly regularly a significant part of the lesson, and a score below 1.8 means the dimensions was rarely observed and/or not a significant feature of the teaching. If the mean score for a pedagogical dimension increased by 0.9 or more over the two years, then it was categorised as 'improving', and if it increased by less than 0.2 then it was noted as 'not improving' (see Table 1). The results of this data analysis are shown in Figure 1 below:

Summary

The data represented in Table 1 and the analysis in Figure 1 indicate that there are aspects of the model that have been readily adopted by the teachers as well as some elements that have not been taken up. The research team were pleased to see that the intellectual quality dimensions scored highly and also improved over time. However, of significant concern are the group work and use of home language elements that scored low on the scale as well as not improving. One of the aspects that has been emphasised by the research team was the notion of group work. As is discussed in the following symposium paper, this element has particular contextual and cultural issues that may need further examination. The use of home language in the classroom also warrants further exploration as a number of teachers have remarked that the students are already using their home language in the class. The inclusive pedagogy model used in this project involves the students reporting back to the class their findings and this is done in Standard Australian English. The teachers have been encouraged to explicitly allow the students to discuss the mathematical reasoning in their home language but this has met with resistance from some teachers. While elements of this model have proved successful in other contexts, there are clearly spaces for re-examination of the model in this remote Indigenous context.

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