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Reforming pedagogy in remote Indigenous contexts

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The performance of Indigenous students in Australia is a serious educational and social concern. Indigenous students in remote areas are at particular risk of performing poorly, a problem which is exacerbated by the tyranny of distance and geographical isolation. National testing has shown that the poor performance of this target group has been consistent and enduring (MCEETYA, 2006). There is an urgent need for reforms to promote academic success for Indigenous students.

One such attempt is a new, four-year project to improve mathematical learning by Indigenous students in Western Australia's east Kimberley region. The project involves six schools, ranging in size from 30 to 250 students, all based in self-governing Indigenous communities. The schools are working with a team of academics led by researchers from Griffith University. The industry partner is the Association of Independent Schools of Western Australia, and researchers

from Monash University, London South Bank University and Sussex University will also participate. The project is funded through the Australian Research Council's Linkage Scheme.

The project has three key features:

1. the implementation of a reform pedagogy that has been informed strongly by national and international research
2. the implementation of an assessment-for-learning strategy, in which teachers identify what students know and then build curriculum interventions from this point
3. the development in remote areas of sustainable educational communities, in which teachers can access resources and support despite their isolation, as a means to end the high turnover of teachers in these traditionally hard-to-staff areas of Australia.

In this paper, we discuss the reform pedagogy that is central to the approach of the project.

Reform pedagogy: an inclusive approach to teaching

The project applies the reform pedagogy known as Complex Instruction, which was developed, implemented and evaluated by Stanford University. The approach was also documented in Boaler's studies of 'Railside' school in California (Boaler 2008; Boaler & Staples, forthcoming). This school, Boaler noted, went from being the poorest performing in the state to achieving results above the state average in approximately four years. Complex Instruction draws on key research around learning and pedagogy. The current project integrates this research literature with literature on Indigenous learning preferences (Christie 1985; Christie, Harris & McClay 1987; Eckermann 1988, 1994; Harris & Malin 1994), incorporating aspects of Indigenous learning and pedagogy within its reform approach.

The project also draws on the elements of Productive Pedagogies (QSRLS 2001) to inform and evaluate our position on quality learning environments. However, we recognise that the Productive Pedagogies strategy has some limitations in relation to mathematics. As such, we have extended the Productive Pedagogies framework to include the explicit features of the reform pedagogy upon which the project draws (Zevenbergen, Niesche, Grootenboer & Boaler 2008).

The resulting pedagogy has a number of features. Here we outline a few of its key elements.

Working as a mathematician

Fundamental to our approach is the principle that high levels of challenge in mathematics learning are critical in fostering students' intellectual development. We draw extensively on the work of Burton (2004) who studied research mathematicians to uncover their ways of working. These ways of learning are

quite different from the practices found in traditional school mathematics, and Burton strongly advocated that schools shift towards the practices of mathematicians in order to create better learning opportunities for students. Often the curriculum delivered to students from disadvantaged backgrounds is impoverished and informed by incorrect or deficient models of learning. The approach we advocate recognises the limiting effects of low expectations on learners, and aims to foster rich mathematical understandings in a group that is often underestimated.

Group work

Boaler's studies on Railside, noted above, showed the value of structured group work in which students took assigned roles that were integral to the progression of the whole group. It is the group's responsibility to ensure that all members understand the mathematical ideas before summoning the teacher to demonstrate their knowledge.

Use of home language

Students in our six participating schools are encouraged to use their home language to negotiate mathematical meanings and understandings. Often the cognitive load created through working in a second language limits the potential to develop new meanings. The work coming from the South African context, where students work in multilingual contexts, has shown that enabling learners to negotiate understandings in familial languages is enabling. Similarly, in Boaler's Railside study, it was found that students could engage more actively in developing conceptual understandings when they were able to code switch between their home language and mathematical language (Boaler, Lerman & Zevenbergen, forthcoming).

Reporting back

A key feature of the project is the reporting back stage of the lesson. In this phase, students report back on their group activity. This approach is aligned with the literature on Indigenous ways of working where there is a greater sense of community and not of individual achievements. Further, the reporting back phase encourages the explicit language associated with mathematical concepts and processes so that students are encouraged to speak and represent mathematical ideas in Standard Australian English (SAE). This process is designed to create strong learning opportunities for the development of a meta-language in relation to mathematics.

Multidimensionality

Drawing on the notion of multiple intelligences, the Complex Instruction approach recognises that students learn and think in a range of different ways. Similarly, the research on Indigenous ways of knowing suggests that Indigenous students may learn and represent their thinking in ways that are distinct from those valued in standard school practices. As such, the approach we are using encourages teachers to adopt practices that will allow students to represent their ways of thinking and knowing in forms that are appropriate for

them. At this stage, we expect that the project will reveal ways of knowing specific for Indigenous students that are not part of Western traditions.

Summary

The project is in its first year. We are currently working with teachers to adapt the reform pedagogy to the needs of remote Indigenous students. During the development process and in subsequent years we will continue to monitor and change the reform pedagogy to identify the features that contribute most to a successful approach to mathematics for Indigenous students.

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