RESEARCH EMPOWERING THE RESEARCHED: REFLECTIONS ON SUPPORTING INDIGENOUS TEACHER AIDES TO TUTOR MATHEMATICS

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This paper looks at the implications of decolonising methodologies on mathematics education research with Indigenous communities. It uses a study of remote Indigenous assistants being supported to become effective mathematics tutors of at-risk Indigenous students to draw implications for the application of the Empowering Outcomes research model for remote Indigenous research sites. It discusses the results of the study in terms of benefit and empowerment, and draws conclusions with respect to research designs that benefit the researched.

In 2001/2, authors Baturo, Cooper and Warren began to work in remote Australian Indigenous communities supporting teachers to enhance the mathematics learning of Indigenous students. As such, they joined the army of mostly non-Indigenous researchers who have made Indigenous people the most researched group in countries like Australia and who, generally, have brought little or no benefit to these Indigenous people or their communities. In 2003/4, aware of their limitations and realising that non-Indigenous research of Indigenous issues can be part of the ongoing oppression of Indigenous people, these authors sought out Indigenous researchers, of whom authors Matthews and Underwood are presently part, with whom to collaborate in setting up a research group that came to be called Deadly Maths. In this, the initial members of Deadly Maths were strongly influenced by L. Smith (1999) who cogently argued that non-Indigenous research of Indigenous people has been "implicated in the worst excesses of colonialism" (p. 1), continued constructing Indigenous peoples as the problem, and "frequently failed to improve the conditions of the researched" (p. 176).

Deadly Maths group. Deadly Maths was set up to undertake Indigenous mathematics-education research with the primary focus on benefitting the researched, a focus that cannot be violated even to maintain so-called excellence in scientific design. Informing this research were the two imperatives for education espoused by Indigenous people across the 16 Queensland Indigenous communities that Deadly Maths members visit − namely, that students in Western schooling learn to be: (1) "solid" (strong) and "deadly" (smart) Indigenous people who have pride in their heritage; and (2) successful people in terms of enhanced employment and life chances. The Deadly Maths projects are embedded in decolonising methodologies (L. Smith, 1999) and attempt to incorporate her seven cultural positions, namely: (a) to have respect for people, (b) to present

yourself to the people face-to-face, (c) to "look, listen … speak" (p. 120), (d) to share and host people and be generous, (e) to be cautious, (f) to not trample over people's dignity, and (g) to not flaunt your knowledge. Deadly Maths projects also recognise G. Smith's (1992) *Empowering Outcomes* model that addresses the sorts of questions that Indigenous people want to know in ways that empower these people; and *Mentoring, and Power Sharing* models through having Indigenous researchers on all projects and collaborating with Indigenous Community members as equal partners.

This paper. This paper reflects on these decolonising methodologies with respect to a project (funded by Australian Research Council Linkage grant LP0562352) to support Indigenous teacher assistants (ITAs) to tutor more effectively Indigenous students at-risk with respect to mathematics. It discusses the study's design in terms of the Empowering Outcomes model for remote Indigenous research sites, discusses the results of the study in terms of benefit and empowerment, and draws conclusions with respect to research designs that benefit the researched.

DECOLONISING METHODOLOGIES AND REMOTE COMMUNITIES

The education of Australian remote Indigenous students is inherently unjust (Warren, Cooper & Baturo, 2007) with the lowest retention and performance rates in Australia's school system particularly in mathematics (Queensland Studies Authority, 2004; 2005; 2006). This is due to social factors (Fitzgerald, 2001) such as racism, poverty, remoteness, unemployment and welfare dependence, and education systemic issues (Matthews, Watego, Cooper & Baturo, 2005) such as culturally disempowering forms of teaching, curriculum and assessment, particularly the use of Standard English which is, at best, a second language for Indigenous people. Due to remoteness, there is a scarcity of resources and services, and schools are generally staffed by inexperienced non-Indigenous teachers with little Indigenous education knowledge who, in turn, are supported by ITAs with little training in what and how to teach. As well, the relationship between the non-Indigenous teachers and the ITAs has, in general, led to the further disempowerment of the ITAs within the school. For remote Indigenous communities, the continued low educational performance of their children is a major issue and one for which there are only a few examples of success (e.g., Sarra, 2003) which have not been sustainable when key people have left.

Empowering outcomes research with Indigenous people is post-positivist and qualitative in nature and requires persistent face-to-face contact (L Smith, 1999). This is fiscally and physically challenging in remote communities because of their isolation − even with air travel, and their limited and irregular facilities and services. Air travel can take two days, requiring connections to be made between regional and local airlines (that often fail to meet their timetables). Shops have limited opening hours (food may have to be carried by researchers on the plane), accommodation is restricted to a few highly in-demand school cottages, and email is very slow. However, face-to-face contact is crucial to building collaborative relationships in which there can be "two-way" sharing of ideas

and joint researcher-TA activity to improve Indigenous students' mathematics performance.

As argued by L Smith (1999), cultural sensitivity and humility are important for acceptance and success in Indigenous communities. Western expectations that research visits take priority over other daily events and that timetables and structures developed in Brisbane will be adhered to in the remote community is not respecting local culture. Furthermore, it is important not to apply non-Indigenous perspectives to Indigenous student attendance and behaviour in classrooms as low attendance and confronting behaviour is a product of cultural resistance of Western schooling (Matthews et al., 2005) as well as students meeting their family and cultural obligations within the community (looking after siblings and attending funerals). As Partington (1998) argued:

> As a consequence of the treatment they experience in the classroom - even from the first day of school – many Indigenous students become alienated and start on the path that ends only when they drop out of school. They do not become alienated voluntarily but as a consequence of the way they are treated. (p. 19).

Australia's schooling system remains largely Eurocentric in structure and curriculum. Indigenous teachers and ITAs "are not given input into the strategic plans of the school" (Matthews, Howard, & Perry, 2003, p. 11) and "are denied access to facilitators and services that other teachers take for granted" (MCEETYA, 2000, p. 16). The way in which Indigenous students learn, their languages, cultures and values, are not respected within this environment. In particular, mathematics is not contextualised into Indigenous culture which is perceived as primitive and simplistic (Matthews et al., 2005). Where no real attempts have been made to reverse this, Indigenous teachers and ITAs cannot mediate between Community and school often resulting in half of the students being absent each day (Fitzgerald, 2001). This can severely affect most types of "scientific" research; for example, it makes pre-post testing and persistent observation problematic.

Empowering Outcomes research is not so troubled with the perceived uncertainties of Indigenous Community life; with its focus on community benefit, it takes the existing situation as the starting point for collaborative activity. Thus, the involvement of Indigenous researchers and community members in looking at problems they feel are important enables research to advance (although, as will be discussed later in this paper, sometimes not with the "scientific" structure wanted by many editors). For Deadly Maths, decolonising research approaches were particularly important in reducing difficulties in interviewing Indigenous students who were reluctant to answer direct questions. As Barnes (2000) noted, Indigenous students "may find it difficult to respond to questions or display knowledge in the presence of adults or other persons in authority. This may be misinterpreted as ignorance or resistance" (p. 9).

Once a respectful relationship is built, students feel able to talk freely, particularly to Indigenous researchers.

TEACHER ASSISTANT STUDY

One focus of Deadly Maths projects which has attracted strong Indigenous support has been collaborative work with untrained ITAs to improve their (and the researchers') abilities to tutor at-risk Indigenous students in mathematics (Baturo, Cooper & Doyle, 2007). The study discussed in this paper occurred in two remote Queensland sites (referred to as Junction and Kanoona) where the Professional Learning (PL) activities were undertaken and involved four local Indigenous communities (Junction, Ooting − Site 1; Kanoona, Beachall at Site 2). Altogether, 10 TAs were involved in this project − 7 females; 3 males; 8 Indigenous, 2 non-Indigenous.

At each PL site, a non-Indigenous and an Indigenous researcher worked with four Tas to provide PL with respect to addition and subtraction (meaning, mental computation strategies, and algorithmic procedures). All participants were provided with 5 booklets of addition and subtraction tutoring materials which they were asked to trial in the weeks following the PL sessions. Data were gathered by: (a) observations (video-taped) of the PL sessions, (c) interviews (audio-taped) with the TAs before, during and after their tutoring trials of the addition and subtraction materials, and (d) TAs' records of their tutoring trials with Indigenous students.

Professional learning sessions and tutoring trials. Junction/Ooting's PL sessions were held in a regional city which has one plane flight a day. Kanoonga required two days of flying, but by driving a hired four-wheel drive vehicle from the regional city, the travel time each-way was reduced to one day. By travelling Sunday and Friday, four days were available for the PL sessions for both groups. As the next visit by researchers was in two months, the tutoring trials with the booklets meant to follow the PL sessions had to be undertaken by the TAs with only phone support by the Indigenous researcher.

The PL sessions incorporated 10 PL principles (Baturo, & Cooper, 2004; Baturo, Cooper, & Doyle, 2007) which encompassed mathematics and pedagogy, professional development, and social principles. The sessions thus focused on activities that would develop structural rather than procedural knowledge; they were designed to provide the TAs with the same level of material as preservice teachers.

The *content* focus of the PL/booklets was on: (a) building conceptual meaning for the two operations within both set and length models using games and activities to connect different representations (materials-diagrams, language, symbols) using the approaches of Payne and Rathmell (1977) and Duval (1999); (b) covering three strategies for computation, namely, separation (adding/subtracting in place-value positions), sequencing (adding/subtracting parts of second number to the first) and compensation (changing both numbers to make computation easy yet maintain equivalence); and (c) developing abilities to both interpret and construct real-world problems using the part-part-total concept and forward, backward and comparison stories.

The *pedagogic* focus was on: (a) concept and strategy development; (b) relating operations to the everyday world of the student (contextualisation); and (c) making out-of-school knowledge legitimate within school; getting answers was de-emphasised. The

TAs were encouraged to have high expectation of themselves and their students. The pedagogy was based on a mixture of social constructivism and the holistic interactive Indigenous learning approaches espoused by Grant (1997). The extent the above was attempted can be seen in two aspects of the teaching (Cooper & Baturo, 2008): (a) local issues were used for context, including an Indigenous card game learnt from assistant A1 which was used to teach computation; and (b) compensation was connected to identity by showing that equivalent computations involve adding/subtracting numbers equivalent to zero.

Trialling each of the main tutoring ideas with students directly after the ideas were covered in the PL sessions was part of the plan, but this was not possible. For the Junction-Ooting TAs, the PL sessions were in a regional office and no students were available. For the Kanoonga-Beachall TAs, one-and-a-half days of the PL sessions available had to be cancelled for a funeral; all remaining time was assigned to covering the main ideas in the materials. This meant that the TAs had no experience at all of using the booklets with students when they returned to their classrooms.

Findings from TA interviews. Interviews were conducted by the Indigenous researcher over the phone with nine of the twelve TAs, three from Junction-Ooting (classified as J1, J2, J3) and six from Kanoonga-Beachall (K1, K2, K3, K4, K5, K6) (the other TAs had left their Communities). These interviews were transcribed and combined with observations of the PL sessions. These data were analysed in terms of commonalities in the TAs' responses. This section describes the central ideas from these data on perceptions of the PL and trials.

<u>Empowerment/confidence</u>. All the nine TAs stated that they felt empowered through the learning experiences in the PL sessions and tutoring trials, and felt confident to teach mathematics. In particular, they remarked on being able to return to their classrooms with knowledge of what to do. In one case, the TA said she took over the teaching of an area of mathematics. Examples of responses were:

J1   *… now I have different ways of actually, like in case they are not getting in one way of teaching it I actually have something to go back on…I can change it to simplify it*
J2   *Yes I am [more confident]. I have the Deadly Maths by myself and I do that by myself while the teacher is in the classroom*
J3   *… the different ways you have are better than the ways we sort of put it together … and the kids are sort of getting the work.*
K2   *The other teachers have seen me doing and showing the teacher I am with, when it does come to maths I take over and do a bit of the games with them with the maths sheets*
K4   *… how to start from scratch basically to give the kids more of an understanding … she [the teacher] will say 'can you do this?' and I can say 'oh how about we do this'*

<u>Knowledge/Relationships</u>. All TAs felt that they had gained important knowledge that they could share with the students in their community. They liked the PL sessions because, as J2 stated, *you get to see other people from other places and know who they are*. In particular, they liked the sharing and they appreciated their differences:

J1   *… everybody has got their say in this didn't work or that didn't work, or I did it this way … then everybody has their own thing. If you came to our school it would be just me and [J2] and we don't really see what the other people have been doing and what their outcomes are too. If you have the group then it is better. Everybody then knows what's going on. [J4] is out there but she's not Indigenous and we are different to her. We probably teach in a different way to her.*

However, they also felt that the experience would be improved with more attention to applying this knowledge in tutoring students, particularly their students. As K5 stated, *it is really hard to try and do it with someone else's kids, at least our kids know us*.

All TAs felt that good relationships had been built with researchers and were very comfortable speaking with the Indigenous researcher in particular. However, K2 felt that there could be more face-to-face and phone contact.

PL sessions/Tutoring trials. The TAs valued the support provided by the researchers and that it had been provided in community; they felt that the structure of PL sessions was appropriate for discussing ideas but not for applying ideas to tutoring. The TAs liked the resource booklets − *they were very useful … like ready to go … and when you read it you add more information for … the better way to teach the kids* (J1); *they* [students] *all liked it and they would run to it when they had free time* (J4). This led to requests for more games and activities in future booklets. The TAs also liked the contextualisation − *it just surprised me of what you can use and how to use it … you can just use the things in your own school and around the classroom* (J5). However, not everything was appreciated − J1 and J2 felt that the separate session on theory given at Junction-Ooting (and not at Kanoonga-Beachall) needed to be integrated into the activities.

School support/Student improvement during trials. School support depended on the assistants' school and teacher, and lack of support from some schools/teachers inhibited the tutoring trials. Some assistants were not able to tutor the mathematics (addition and subtraction) from the PL sessions in their classrooms, while others were supported or partially supported. Assistant A1 was assigned to Prep Year so her tutoring did not cover operations. This variation in support can be seen in the three responses below:

J2   *…. like every time we come back and I told her that we were going to try this and see if it works with the kids and stuff like that and she was OK, you know, she would just say 'if you think it is going to work, then do it'.*

K5   *… I haven't really put it* [tutoring program] *into practice … only when we came back in the beginning, the first two weeks after the training, we were able to do things with kids.*

K6   *No* [could not tutor the program] *… it's just a bit hard when you have got teachers that have their own agenda.*

Only four (J2, J4, K1 and K4) of the nine assistants interviewed were able to trial the tutoring of the addition and subtraction material. However, their results were encouraging; students' mathematics outcomes appeared to improve. J2 described her success with the number board, *they didn't really realise how easy it* [computation] *was like if you started at a number and wanted to add 10 more you could just jump down 10*

and 1 over and 2 back. J4 referred to her pre and post testing which she said showed *that they become very good at it*. K1 declared, ... *they are moving up levels in their maths*, while K4 felt she had success in co-teaching with her teacher.

Relationships with their teachers were particularly sore points with Indigenous TAs. To attract teachers to the remote communities, the state Education Department has a point system that means that a remote community teacher can transfer to any school after two years and most do. As J1 said when asked how about her Community, *the only thing that changes in* [Junction] *is the teachers*.

DISCUSSION AND CONCLUSIONS

The study described in this paper is a typical Deadly Maths project using L. Smith's (1999) decolonising approaches, namely, and G. Smith's (1992) Empowering Outcomes research model. The focus is on benefiting the TAs and, in the long run and of paramount importance, benefiting the students. For this reason, the researchers visit the Communities, set up relationships with the TAs that promulgate sharing of ideas (e.g., the card game that is the focus of Booklet 4 – Cooper & Baturo, 2008), and limit intrusive data gathering (e.g., no pre-post tests on TAs' mathematics performance were given as this might inhibit building relationships: another disempowering process).

The feedback from the TAs is that the study worked at their level; they felt: (a) empowered in the classroom, (b) supported as Indigenous educators using contextualised mathematics (Matthews et al., 2005), and (c) happy to continue working with us. However, trialling with students was ambivalent; many assistants were not given the time to trial the ideas even though this aspect of the study had been negotiated with the schools beforehand, but those that could, appeared to have success. The structure of the materials was also acceptable.

Deadly Maths will continue the work with the TAs at the sites in 2008 with multiplication, division and fraction material. As a consequence of this study, the work will focus more on tutoring students in classrooms and on including the TAs as co-managers and co-researchers in the trials (the Sharing Power research model).

J1   *No I think just the group gathering first until I can get it implemented into working with the staff, teachers; then I could ask you to come and see how or if I am doing it right.*

In conclusion, three implications are evident. First, the TAs have shown that they are solid and deadly and have the potential to be the major sustainable provider of quality mathematics education to Communities into the future. Second, such quality beneficial outcomes require compromise with regard to data gathering and a focus on relationship before data; there has to be a way that such research can be accepted in prestigious journals. The development of ways to publish findings from decolonising projects is one aim of Deadly Maths. Third, L Smith's (1999) arguments apply equally to research on all disempowered peoples in Australian society. For these peoples, it is the opinion of the Deadly Maths researchers that the only acceptable research methodologies are those whose prime purpose is to make the disempowered active participants and beneficiaries of the research outcomes.

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