# Prominent Factors and Proposed Significant Solutions Relating to the Low Mathematics Achievement Among Indigenous Populations of Western Australia

**Derek Gulling**

## Abstract

This literature review examines the significant factors that contribute to low mathematics achievement among indigenous populations in Western Australia and the proposed solutions. All authors suggested that geographic location, or remoteness, cause significant problems for student achievement. Factors such as teacher inexperience, lack of skills, or questionable competence levels as well as cultural identities are discussed and related to poor mathematical achievement. In response to these factors causing low mathematical achievement, several significant solutions are offered to address the poor achievement results. These solutions emphasize the importance of group work and creating heterogeneous groups that allow students to connect to one another in a meaningful way. Moreover, maintaining cultural identity by using the home language is important to interactions amongst students and teachers. Finally, utilizing multiple entry points as a means to properly educate each student emphasizes placement into learning situations that require cooperation, creation of constructive ideas, and critical thinking.

*Derek Gulling is a Senior Adjunct Instructor of Mathematics at West Liberty University, West Virginia, U.S.A.*

Education officials have long been interested in the achievement of students given unique situations. One particular concern is the achievement of western Australian indigenous peoples. In this context, the term 'indigenous peoples' refers to the aboriginals of western Australian including those peoples who inhabit the Torres Strait. Furthermore, the terms indigenous and aboriginal are used synonymously in the articles reviewed.

Recent studies indicate an existing gap in achievement in the subject areas of math, science, and reading between indigenous students and non-indigenous students (Cresswell, Greenwood, & Lokan, 2001). Due to this gap, Australian education officials are greatly concerned with understanding the roots of the problem to facilitate an effective response. This literature review analyzes the significant causes of the growing achievement gap afore mentioned between indigenous and non-indigenous students' mathematical achievement and identifies proposed significant solutions that promote a resolution to that scoring gap.

## Significant Factors Causing Low Mathematical Achievement Scores

Given that the indigenous student population in Australia's education system exhibit lower achievement in mathematics classes than non-indigenous students, discussion focuses on the significant factors contributing to this problem. All authors in this literature review agree that geographic location, specifically remoteness, is a prominent factor contributing to the decline in achievement. However, the authors each present differing opinions on how remoteness causes decline in achievement. Studies by Zevenbergen, Grootenboer, Niesche, and Boaler (2008) conclude that students in remote schools perform poorly in comparison to students who attend schools in metropolitan or urban areas. Zevenbergen, et al. (2008) also indicate that the mathematics achievement of indigenous students has been declining steadily over a period of

time. This decline, according to Zevenbergen et al. (2008), is solely caused by the remoteness of these schools and the physical distance from mainstream education. In a separate article, Jorgensen-Zevenbergen, Grootenboer, and Niesche (2009) suggest that remoteness in the context of communication is the primary reason that indigenous students struggle with mathematical achievement. The physical distance between remote schools in western Australia to populated areas that include well developed schools strains the ability for professional conversation between teachers at their respective institutions (Jorgensen-Zevenbergen et al., 2009). This lack of communication hinders the exchange of successful ideas, strategies, and outcomes between professional teachers, thus inhibiting collaboration between colleagues. Alternately, Matthews, Howard, and Perry (2003) indicate that remoteness is a prominent factor, however, these authors cite healthcare and socioeconomic status as prominent factors; not necessarily physical distance alone.

Matthews et al. (2003) assert that remoteness causes deeper issues related to poverty and poor healthcare. Remote regions often have inadequate health facilities and limited financial opportunities that are normally present in metropolitan settings. Supporting that claim, healthcare and poverty are factors related to the decline in achievement and were prominent among indigenous populations more so than non-indigenous populations (Australian Human Rights and Equal Opportunity Commission, 1995). The combination of these aspects deepens the issues caused by physical distance alone and substantiates Matthews, et al. (2003) claim. Also, in a study done by Jorgensen-Zevenbergen, Grootenboer, and Sullivan (2010), the issue of physical remoteness and isolation was further complicated by aspects such as health and education making them key components of the struggling achievement in math (Jorgensen-Zevenbergen, et al., 2010). Like Matthews et al. (2003), Jorgensen-Zevenbergen et al. (2010) claim poor health

and lack of education are prominent issues among several groups in the world and are generally well accepted as factual reasons for declining achievement. Here, lack of education refers to a failure of the education system rather than lack of educated parents, teachers, or administrators.

According to Jorgensen-Zevenbergen et al. (2009), another important factor for declining achievement is due to the role of the teacher. Specifically, the authors describe the teacher's role in the reformation of issues related to access and performance in mathematical topics. Here, the teacher's role is to provide adequate access to mathematical resources. The authors are vague on defining exactly what those resources might be, but one could assume the linguistic use of resources refers to material resources and not financial or administrative. However, the role of the teacher has always been to prepare the student in any way possible for success in any academic field.

Another factor based around the role of the teacher in the declining achievement among indigenous populations is that most teachers at indigenous schools are new or recent graduates and lack skills appropriate to teaching a student population of diverse cultural and linguistic backgrounds (Jorgensen-Zevenbergen, et al., 2009). It is important to address the differences in culture, whether those differences are dialects, beliefs, or customs. Failing to understand and cope with these differences can result in confusion, low motivation for students to succeed, and also frustration between educators and students. The teachers simply do not possess the skills to effectively implement strategies designed for these students since many of these teachers recently graduated from a university that taught education according to mainstream Australia. These teachers essentially find themselves disconnected from the needs of their students. This disconnection is an obvious realism that must be addressed to appropriately resolve the social conflict between students and educators.

Similarly, Jorgensen-Zevenbergen et al. (2010) cite the teachers' lack of experience as a negative aspect in remote areas. However, no definition is given to define lack of experience. Contextually, one could substantiate a claim that lack of experience refers to the inability of the teacher to implement effective teaching styles. Perhaps, in this statement, Jorgensen-Zevenbergen et al. (2010) are citing an overall lack of experience, such as a relationship between newly graduated teachers, their inability to effectively deliver classroom instruction, or their inability to socially connect with their students.

An additional factor for decline related to the teacher is the ideology that new graduates are often unable to provide adequate guidance services to students that a more experienced faculty member would be able to provide (Jorgensen-Zevenbergen et al., 2009). In this context, guidance refers to the ability of the educator to direct the student to academic success through strategies acquired through experience. These strategies may be anything from 'pep talks' on a bad day to tutoring students in an academic field. The lack of experience to provide guidance is related to the cultural disconnection. It is difficult to provide adequate instruction when disconnection and the inability to guide students serves to promote confusion and uncertainty.

Furthermore, this study indicates that there may be a lack of content knowledge of incoming teachers that obstructs successful teaching of the content to aboriginal students. (Jorgensen-Zevenbergen et al., 2009). If the teachers are not competent in their knowledge of a subject area, it is probable that success of students in the subject area will be modest, resulting in lower achievement than a student who may have had a more competent instructor.

Last, very high teacher turnover is influencing math achievement scores (Jorgensen-Zevenbergen et al., 2010). The consistent replacement of teachers does not allow for proper growth and relationship formation to occur at a sustainable and effective rate. This changing of

teachers also does not allow for academic relationships to form as well, thus, further hindering achievement possibilities.

Uniquely, Matthews et al. (2003) suggest that factors within aboriginal identity are the main cause for decline in achievement. A significant issue for students is the inability to associate with their aboriginal identities or their 'aboriginality'. As stated by Matthews et al. (2003), "Identity is the basis upon which Aboriginal students grow, develop and relate to those about them, including their teachers." (p. 4). The reference to aboriginal identity further extends to the use of the home language in class as a strategy for future success in raising achievement. Home language is a language spoken by the aboriginal peoples of a non-English origin.

Finally, the study also states that parent intimidation and cultural beliefs can also impede the ability to learn mathematics. Parents may feel intimidated that their children know more than they do, suggesting that some parents may be unwilling or unable to help with homework due to embarrassment or lack of skill. Alternately, parents may feel that the study of mathematics itself is irrelevant to their child's interests. Furthermore, frustration among Aboriginal parents remains high and could also affect the learning achievement of Aboriginal students if the parents cannot help with mathematics homework (Matthews et al., 2003). These factors combined can arguably cause a decline in mathematics achievement.

## Synthesis of Factors Causing Low Achievement Scores

To better understand where scholars agree and disagree, a summary of these authors' perspectives in this review highlights similarities and differences between their points of view. First, the issue of remoteness is a prominent factor for all authors, yet each author contributed differing opinions on the idea of isolation and remoteness. Moreover, another similar factor

involved the lack of teacher experience and high turnover rate among teachers of Aboriginal populations. Two authors mentioned in this paper discussed this factor at length, Jorgensen-Zevenbergen et al. (2009) and Jorgensen-Zevenbergen et al. (2010).

What was most surprising were the lack of similarities between the three articles written by Jorgensen-Zevenbergen et al. (2008, 2009, 2010). Each article listed is written mostly by the same authors; each article is authored by Jorgensen-Zevenbergen and Grootenboer with a few differences in co-authors. Moreover, the articles were published only a year apart. Yet, there are key differences in position. For example, in Jorgensen-Zevenbergen et al. (2009), the authors discuss an additional factor not included in the other articles. The factor causing low achievement, according to the authors, is the lack of skills of incoming teachers. This is a bit different from other factors such as new graduates' lack of experience. The definition of lack of skills is the difference between the three articles. In actuality, it could be assumed that lack of skills could equate to lack of experience. The argument may seem tedious but the vague definition is indeed in need of a better, more concise, explanation. Furthermore, there are instances where lack of experience is defined in one setting but not in another.

An additional problem related to teaching is discussed by Matthews et al. (2003) and connects lack of resources to low achievement. This factor is not present in other articles. A definitive argument for lack of resources is certainly present given studies suggesting poor health and below average education systems can be attributed, at least in part, to low socioeconomic status among these regions. Therefore, lack of resources would greatly inhibit teachers to provide quality instruction and student ability to receive the instruction.

Finally, threatening the aboriginal identity, as suggested by Matthews et al. (2003) and Jorgensen-Zevenbergen et al. (2010), produces a problematic situation where mainstream culture

is adopted and the minority culture is replaced. Students who speak minority language cannot embrace a proper relationship with the teacher. This lack of relationship has detrimental effects of the ability to address issues with that particular child's learning and success in mathematics as a whole. As noted in other situations, it is interesting that the lack of aboriginal identity is mentioned by Jorgensen-Zevenbergen et al. (2010) and is not discussed as a problem in other articles written by the same authors.

## Proposed Solutions to Raise Mathematical Achievement Levels

Discussing the significant factors causing low achievement score has but one purpose; to promote discussion of feasible solutions. The proposed solutions discussed by articles included in this review provide the potential of being an excellent practice. Further research is needed to study the implementation of these proposed solutions as well as their effectiveness.

A solution supported by Jorgensen-Zevenbergen et al. (2008, 2009, 2010) and Matthews et al. (2003) suggests that group work is a key component to a successful solution. Specifically, Jorgen-Zevenbergen et al. (2010) suggest that heterogeneous group work and collective responsibility can improve the low achievement scores. These authors believe that heterogeneous group work shifts the onus of responsibility from the teacher to the group of students (Jorgensen-Zevenbergen et al., 2010). This shift allows group members to be responsible for each other thus, in theory, promoting learning and peer support. If a student is unable to correctly respond to a question posed by the instructor, the responsibility of teaching that student falls upon the other group members. Moreover, Jorgensen-Zevenbergen et al. (2010) continue, "In line with a collective responsibility philosophy, there is no concept of a student failing or being left behind, and it is the role of the group to ensure that everyone is able to understand the work required"

(p. 5). Related, Jorgensen-Zevenbergen et al. (2009) imply that encouraging interaction among peers and deep learning within a group structure are also plausible solutions because this approach focuses on peer dependence and peer support.

Furthermore, another discussion purports that introducing and assigning tasks within the group promotes equal participation (Jorgensen-Zevenbergen, 2009). This concept is certainly valid if done correctly and may give group members a feeling of importance or self-worth within the class. However, it may be difficult to assess how successful this approach would be. The effects of responsibility and titles vary greatly from student to student and could cause problems in interactions between peers. Thus, the only viable solution would be to ensure that all participants in the group have equal responsibility and everyone has been assigned a task. Ensuring equality is and would be a difficult task and would require an experienced instructor. Interestingly, the concept of task assignment is strictly that of Jorgensen-Zevenbergen et al. (2009).

Matthews et al. (2003) offer a similar idea concerning group work. These authors generalize the concept by arguing that a group of peers working collectively towards a particular solution is a worthwhile and effective method. Matthews et al. (2003) offer no different approaches to how group work should be designed, thus implying similarities between Jorgensen-Zevenbergen et al. (2010) and Jorgensen-Zevenbergen et al. (2009). Furthermore, Jorgensen-Zevenbergen et al. (2008) portray group work as an affirmative method to increase achievement using responsibility and peer interaction.

A second prominent solution offered is the use of multiple entry points and multiple dimensions of teaching. For instance, as noted in Jorgensen-Zevenbergen et al. (2010), implementing diverse mathematical concepts that cater to a wide range of mathematical

backgrounds and interests promotes thinking and learning mathematically. Furthermore, Jorgensen-Zevenbergen et al. (2010) suggest that these entry points lead students to explore alternative ideas and opinions subject to the intellectual and mathematical abilities offered in the group. Figuratively speaking, these entry points intentionally cause students to venture into situations requiring cooperation, understanding, and ultimately, creative thinking.

In the article written by Jorgensen-Zevenbergen et al. (2009), the authors include multiple entry points as a method for improving low achievement in mathematics. They state that it is necessary to include multiple entry points to avoid having a student feel alienated from the rest of the group (Jorgensen-Zevenbergen et al., 2009). In order to teach to the entire class, the teacher must utilize multiple entries (pathways and representations) to tend to the diversity of learning present in the class. Some learners are auditory whereas others are visual or kinesthetic. Thus, offering multiple teaching techniques and tasks can meet all of these different learning styles and avoids alienating a student for his or her specific learning style.

According to Jorgensen-Zevenbergen et al. (2008), in order to achieve equitable pedagogies, multiple entry points are essential as listed in the rubric for equitable pedagogies (for further reading, please reference p. 4-7, Jorgensen-Zevenbergen et al., 2008). One can assume that multiple entry points in this circumstance are similar if not equivalent to arguments made in other works written by these same authors.

Another widely accepted solution by Jorgensen-Zevenbergen et al. (2008, 2009, 2010) and Matthews et al. (2003) is to maintain cultural identity while teaching these students. Despite the agreement among authors, each author has a slightly different view of how this solution is attainable. Jorgensen-Zevenbergen et al. (2009) suggest that in order to maintain cultural identity, the instructor must use the home language while teaching in place of the majority

(dominant) language. Furthermore, Jorgensen-Zevenbergen et al. (2009) state, "Students are encouraged to negotiate meaning in their home language, but must report their findings in Standard Australian English." (p. 283).

Jorgensen-Zevenbergen et al. (2010) also agree that the use of home language is important to solving the problems causing low mathematics achievement scores. Jorgensen-Zevenbergen et al. (2010) state, "This approach reduces the cognitive load demanded in switching and translating between languages, and thus frees cognition and interaction to enable greater possibilities for meaning making." (p. 6). It would certainly seem plausible that cognitive abilities would be better able to focus on learning mathematics if that ability was not strained between deciphering language while managing new mathematical content.

Finally, Jorgensen-Zevenbergen et al. (2008) also suggest that the use of home language helps students overcome low achievement scores in mathematics. The students may use their home languages to determine meanings and grasp content, then during feedback, the students can translate and report in English (Jorgensen-Zevenbergen et al, 2008). In this way, students encounter material initially in the language that is most comfortable for them.

Interestingly, Matthews et al. (2003) also cite the need to maintain cultural identity but do not cite the use of home language as means to do so. They instead suggest that the role of mathematics in maintaining cultural identity is overlooked by those who teach and develop the curriculum. In order to maintain cultural identity in mathematics, Matthews et al. (2003) imply that there is a need to explore the Aboriginal beliefs regarding mathematics. Furthermore, the Aboriginal beliefs regarding learning the science of mathematics need recognition as some sub-cultures or tribes regard learning in vastly different manners than dominant cultures.

With reference to maintaining identity, it is worthwhile to note a specific suggestion that teachers should be culturally aware of their lesson plans, tests, and other classroom academic components used to instruct students (Jorgensen-Zevenbergen, 2009). However, teachers in these situations will be instructing students from multiple cultures or tribes and creating lesson plans based upon this ideal may be challenging. One must consider how likely a culturally homogenous classroom is going to be, primarily because these same authors determined a significant factor contributing the low mathematics achievement scores is the cultural diversity in the classroom.

Similar to the support for culturally based lessons, several authors comment on the relationship between instructor and student. For example, Jorgensen-Zevenbergen et al. (2010) state that for successful mathematics instruction, teachers must be supportive in their interactions among students to promote healthy comprehension. According to Jorgensen-Zevenbergen et al. (2010), this supportive interaction is already documented among a growing number of teachers. This optimistic data suggests that this component is already in place. However, if all but one teacher supports strong interaction between teacher and student, there still exists an opportunity for a lower achievement for that particular class.

Furthermore, Matthews et al. (2003) also state that supportive relationships strengthen mathematical ability. These supportive relationships are positive and reinforced by a strong commitment to success (Matthews et al., 2003). Evidence of this thought can be found in the following quote, "Aboriginal students respond best when there are positive personal relationships with teachers…Teaching methodologies that include strong teacher-pupil relationships reduce competition, restrict verbal communication, limit direct questioning and emphasize practical experience and group co-operation…" (Matthews et al., 2003, p.3). There exists a strong support

for positive interaction among teacher and students regardless of the specific cultural characteristic present. Even in majority culture, this positive interaction is needed for successful development of knowledge. Changing the environment of teaching does not change the necessities and underlying practices of teaching.

Finally, there is strong support for a new approach to mathematical thinking. Jorgensen-Zevenbergen et al. (2010) provide details for this new approach using complex tasking. The following excerpt from Jorgensen-Zevenbergen et al. (2010) outlines the effectiveness of complex tasking,

> They have shifted from a predominately rote and drill learning approach, to using more tasks that are rich and somewhat complex (relative to the age of the learners). This has been a strong change in the teachers' practice as they have come to see that the students are capable of learning complex mathematics with appropriate scaffolding. For the participating teachers, there has been a strong shift from deficit, low level thinking of learners to a view that sees Aboriginal learners as capable and confident. (p. 8).

The method of using complex tasking is also found in Jorgensen-Zevenbergen et al. (2008) who suggest that complex tasking provides an opportunity for deep learning through rigorous mathematical tasks. No specific definitions were stated for the type of complex tasking, however, it is inferred that complex tasking refers to structured and defining concepts that allow students to think critically and perhaps ‘outside of the box’.

**Synthesis of Proposed Solutions to Increase Achievement Levels**

This literature review has presented information pertaining to possible solutions to factors causing a low achievement score in mathematics among Australian Aboriginal peoples. While information presented by the authors has similarities, there are also some notable differences.

Beginning with the discussion pertaining to group work, one can note that Jorgensen-Zevenbergen et al. (2008, 2009, 2010) and Matthews et al. (2003) agree that group work is a possible solution. Each author presented group work and defined that group work must include some faction of responsibility for group members. The same four articles also cite the need for enhanced interactions among peers and their collective work together. However, despite these similarities between works, there were prominent differences and lack of congruency. Specifically, Jorgensen-Zevenbergen et al. (2010) mention using group work as a solution but stated that the responsibility for learning rests within the group and not with the teacher. As mentioned before, the students are responsible for each other's learning. Jorgensen-Zevenbergen et al. (2008, 2009) do not mention this shift of responsibility in either the 2008 or the 2009 article. This difference is unusual and perhaps reasoning for that could be attributed to the fact that the 2008 and 2009 articles were written before the 2010 article opening up the possibility that a new thought emerged.

Uniquely, Jorgensen-Zevenbergen et al. (2009) were the only authors to note that assigning tasks within a group promotes equal participation and responsibility. In this circumstance, there are obvious issues including having an equal number of tasks to be assigned and promoting equal responsibility. The effectiveness of this solution would be determined by

the ability of the instructor to manage this equality among his or her students and groups. For this reason, this solution would need further investigation of its multiple, variable factors.

A second commonality between Jorgensen-Zevenbergen et al. (2008, 2009, 2010) and Matthews et al. (2003) is the multiple entry points approach. All of these authors agree that implementing multiple entry points for mathematical concepts to Aboriginal students would help to improve mathematical achievement scores. The difference is how to implement this solution.

Jorgensen-Zevenbergen et al. (2010) suggest that the teachers cater to a wide range of individuals and mathematical backgrounds. This multiple entry approach allows the instructor to structure lesson plans and activities that engage all learners and their learning styles (auditory, kinesthetic, or visual). Furthermore, Jorgensen-Zevenbergen et al. (2010) mention another benefit to this approach is that it allows students working within groups to explore different ideas and opinions, thus developing specific skills needed to be successful in mathematics.

In contrast, Jorgensen-Zevenbergen et al. (2009), discuss the use of multiple entry points to avoid alienation of individual students. The idea is to include all the students in structured activity that promotes equal learning.

Therefore, these inclinations to use groups and integrate multiple entry points raise a question; how can this approach be implemented? Authors indicate the desired outcomes or reasons behind using multiple entry points (all in an attempt to raise the achievement scores), however there are no specificities regarding how to implement those procedures. One could assume that these ideas are essentially left up to the teacher. However, leaving this approach to individual teachers will promote diverse instruction and it would be difficult to gauge the general effectiveness of this solution. Also, the issue raised by authors about teacher lack of experience and competence could be a mitigating factor. The use of multiple entry points to teach a lesson

or an activity is a good way to engage students, but if this is to be a plausible solution, these entry points would need standard guidelines for all teachers to follow.

Another solution that is proposed is the maintenance of the Aboriginal identity. Jorgensen-Zevenbergen et al. (2008, 2009, 2010) all agree that the use of home language is important to achievement in mathematics. In this way, students can approach new topics through a language that is familiar to them. Then, once the concept is acquired, they can translate to English. The only case against this idea would be one where there is more than one dialect among students in class which would prohibit student group work. At that point, this idea would not be as effective or realistic.

Matthews et al. (2003) offer another viewpoint concerning cultural identity. They do not explicitly state that the use of home language is necessary, despite an intense discussion within the article of the barriers of language between teacher and students. Matthews et al. (2003) suggest that the teacher must explore Aboriginal beliefs regarding mathematics because each culture is different and has different rules regarding learning mathematics. This opinion is a bit obscure. One can comprehend and believe the attempt at making learning mathematics a cultural issue, however, the article written by Matthews et al. (2003) discusses (as noted in previous sections in this literature review) the difficulties in overcoming the language barrier both culturally and mathematically. Subjectively, how can exploration into the beliefs of learning mathematics overcome the prominent issue of language barriers discussed throughout the entire article?

Several authors mentioned another possible solution to the problem facing Australian Aboriginal peoples. Jorgensen-Zevenbergen et al. (2010) highlight the importance of supportive interactions between the instructors and the students. Matthews et al. (2003) elaborate by not

only advocating for supportive relationships, but also for positive reinforcement by instituting a strong commitment to success.

Last, the concept of complex tasking was discussed among several authors. Jorgensen-Zevenbergen et al. (2010) write that complex tasking, along with appropriate scaffolding, will allow students to achieve success in mathematics. The concept of appropriate scaffolding is left open to interpretation. The authors could be suggesting that with the appropriate foundation, students can achieve mathematical success (or at least enough success to lessen the gap between Aboriginal and non-Aboriginal students). Furthermore, Jorgensen-Zevenbergen et al. (2008) continue that complex tasking provides an opportunity for enriched and deep learning. However, there are no ideas discussed that include adequate scaffolding or the types of complex tasking that could work to boost achievement scores.

## Conclusion

This literature review presents information about a modern problem facing the Australian education system and the proposed solutions. There are arguments that support certain causes over another, yet it should be noted that every problem mentioned in this review can add to the severity of the issue. The factors causing low mathematics achievement among Aboriginal students in western Australia are significant and the proposed solutions offer hope for the future. This review acknowledges the challenge in defining and remediating low mathematical achievement and the use of the word ‘significant’ when discussing factors is used subjectively. From the literature, it appears that a single solution will simply not be enough to effectively raise and maintain math achievement. The struggles held by Aboriginal students will need multiple solutions to address multiple factors causing low achievement scores in mathematics.

Implementing multiple solutions simultaneously may further enhance mathematics achievement for all indigenous students. Further study of the implementation of these solutions and the effectiveness of each solution in raising math achievement will lead to greater understanding of how to best improve math achievement of the indigenous peoples of Western Australia.

**References**

Australian Human Rights and Equal Opportunity Commission. (1995). Aboriginal and Torres Strait Islander Social Justice Commissioner, Third Report 1995. Retrieved from http://www.humanrights.gov.au/pdf/social_justice/sj_report95.pdf

Cresswell, J., Greenwood, L., & Lokan, J. (2001). *PISA 2000 survey of students' reading, mathematical and scientific literacy skills.* Retrieved from Australian Council for Educational Research: http://www.oecd.org/dataoecd/29/35/33683381.pdf

Jorgensen-Zevenbergen, R., Grootenboer, P., & Niesche, R. (2009). Insights into beliefs and practices of teachers in a remote indigenous context. *Crossing Divides: Proceedings of the 32nd annual conference of the Mathematics Education Research Group of Australasia, New Zealand, 1*. Retrieved from http://www.merga.net.au/documents/Jorgensen_RP09.pdf

Jorgensen-Zevenbergen, R., Grootenboer, P., & Sullivan, P. (2010). Good learning = a good life: Mathematics transformation in remote indigenous communities. *Australian Journal of Social Issues, 45(1),* 131-143. Retrieved from http://search.proquest.com/docview/340381944? accountid=14985

Matthews, S., Howard, P., & Perry, B. (2003). Working together to enhance Australian Aboriginal Students Mathematics Learning. Paper [Key note address] presented at the meeting of Mathematics Education Research Group of Australia. Retrieved from http://www.merga.net.au/documents/Keynote_MatthewsEtAl.pdf

Zevenbergen, R., Grootenboer, P., Niesche, R., & Boaler, J. (2008). Creating equitable practice in diverse classrooms: Developing a tool to evaluate pedagogy. *Proceedings of the 31st Annual Conference of the Mathematics Education Research Group of Australasia*, 637-643. Retrieved on from http://www.merga.net.au/documents/RP772008.pdf