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Welcome to the twenty-fourth edition of *Learning Communities* for 2019. After several special issues over the years, I am pleased to be able to present our first open issue.

This issue covers a range of topics from VET policy, Indigenous education, Indigenous perspective, Yolŋu cosmology, impact of weather on perinatal outcomes, and ‘special’ education policymaking.

In an opening article, “The changing balances of equity, control and market choice in the Indigenous vocational education and training sector”, Don Zoellner and Anne Stephens discuss VET policy and associated changes impacting on the delivery of VET to Indigenous Australians over the past 40 years. Based on review and research of reports and articles on equity, VET and their relevance to Indigenous Australians since the introduction of the Technical and Further Education system in the mid-1970s. Zoellner and Stephens address how the changing priorities in training policy have perpetuated inequity of access and benefit from vocational education and training, contrary to the original conception of a national post-secondary technical and further education system for Australia.

Gregory Smith & Michael Michie’s “Towards an understanding of Indigenous perspectives through the eyes of pre-service science education students” presents an analysis of ‘Indigenous perspectives’ as presented by pre-service teachers of science education using network visualisation, concept maps or mind maps. The connections between Western science knowledge, Indigenous knowledge and knowledge application elements of the visualisations represent student constructed understandings or perceptions. Smith and Michie findings demonstrated network analysis presented Indigenous perspective as a complex web of interrelated Western school science and Indigenous knowledges and may provide the possibility for a reconceptualisation of Australian Science curriculum.

‘Two-way’ teaching and learning is a summary expression for a diverse pedagogical approaches and has a long history in the Northern Territory in relation to remote Indigenous education. The third article, “Too many ‘two-ways’? Gäwa is a two-way school: clarifying approaches to remote Northern Territory Indigenous education” by Ben van Gelderen presents qualitative research from the Yolŋu ‘homeland’ community at Gäwa in north-east Arnhem Land as Indigenous first-language case-study. In his article, van Gelderen clarifies the various ‘two way’ approaches by comparing current community aspirations with historical policies and applications of ‘two-way’ terms across the Northern Territory, such as Indigenous perspectives, Indigenous learning-style, team-teaching, bilingual education, ‘bothways’ education and domain separation.

Cosmology is a very broad concept, covering the origin of all matters and their inherent properties and relationships. The article by Ben van Gelderen et al., “Warramiri Yolŋu cosmology: an introduction”, explores Indigenous cosmological theories and practices. Focusing on the relationship of Aboriginal cosmologies and public policy, the metaphysical realm of definitions, interacting with systems of ontology, epistemology and axiology. It highlights local perspectives and narratives from the homeland community at Gäwa, as well as emphasizing on the commitment to transdisciplinary, generative and ‘both-ways’ research methodologies in Yolŋu communities.

The fifth article, “Discursive mélange and multiple dilemmas: navigating New South Wales ‘special’ education policymaking” by Jessica Chong examines some of the challenges observed when there is a call for more inclusion and neo-liberal reform within NSW educational policymaking. Chong aimed to deconstruct the complexities involved in the process of ‘special’ education policymaking in NSW with a focus on departmental challenges and the dynamics of external influences. The article argues the Australian government has supported school marketization and a strategic performance-based reward
system that has widened the social divide instead of mitigating the influence of students’ background on educational outcomes.

The sixth and last article in this open edition provide a change of scenery. Remote arid Australian towns are homes to many Indigenous women who prefer an outdoor lifestyle and have poor perinatal outcomes. The article by Supriya Mathew et al., “Midwife observations on the impact of hot weather on poor perinatal outcomes in central Australia: a qualitative study”, reports midwives’ observations on the effects of hot weather on poor perinatal outcomes in a central Australian town. It discussed quantitative analysis of preterm birth and temperature data indicating higher risks to preterm births among Indigenous women in central Australia. The article highlights the importance of cultural training for midwives and their role in alerting pregnant women to take precautionary measures during summer periods.

I hope the articles in this issue deliver interesting, insightful research and findings to our readers. Perhaps it motivates further discussion on the topics. I hope you enjoy reading them.

Lastly, I would like to thank the contributors and those who had assisted in the production of this issue and their patience as we brought the issue to press.
The changing balances of equity, control and market choice in the Indigenous vocational education and training sector

Don Zoellner & Anne Stephens

Keywords: VET; Indigenous; public policy; markets

Abstract

The rationales and related programs for delivering vocational education and training to Indigenous Australians have seen significant change over the past 40 years, with several influential reviews marking policy pivot points along the way. Commencing with the 1960s Martin Review, the implementation by governments of selected recommendations have led to structural reforms and the creation of public policy instruments to monitor, regulate and control access to vocational training. These activities have heavily impacted Australian Indigenous people for whom certificate level qualifications are disproportionately the highest level of post-school education held. In the ‘thin’ markets of regional Australia, in particular, the authors of this paper argue that the changing priorities in training policy have systematically perpetuated inequity of access to, and benefit from vocational education and training, contrary to the original conception of a national post-secondary technical and further education system for Australia. Marketisation of the training sector and the transfer of funding responsibility from the public purse to the individual student/worker have produced low rates of employment and high training attrition rates for Indigenous people. We argue that this arises from a fundamental shift in the meaning of equity itself which morphed from being considered a social good into an economic calculation.

Introduction

In Australian public policy deliberation there is an easy, uncritical acceptance of a particular social condition in regional and remote populations; one that depicts a complex, spiralling pathway of poverty, related social disadvantage and endless searches for solutions. The rhetoric links vocational education and training (VET) to economic and social development. Recent research (Ackehurst, Polvere, & Windley, 2017, p. 3) points to the continued appeal to Indigenous learners in remote areas that supports an earlier observation that the VET sector:

has an important role in addressing the diverse needs of Indigenous learners and thereby in making a significant impact on Indigenous educational disadvantage. Its strengths are based on its ability to accept adult students who have not completed secondary education into lower-level programs, and to offer a pathway through to higher level programs and qualifications, and, ultimately, into employment. (Helme, 2007, p. 454)

Through the years there have been significant increases in the participation of Indigenous people in the VET sector. According to Helme (2007, p. 453), there were approximately 3,300 students in the mid-1980s. In 1996 this number had grown to 10,900, and by 2013, was 32,900 (National Centre for Vocational Education Research, 2014, table 10). In a continuing demonstration that VET is regarded as the sector-of-choice for Indigenous people, by 2017 the number of students increased to 84,500 against the trend of an overall national decline of students enrolled in government-funded courses by nearly six per cent (National Centre for Vocational Education Research, 2018, p. 6). Part of VET’s attraction is often
attributed to its provision of a ‘second chance’ for those ‘failed’ by school education (Helme, 2007, p. 454) and the relative ease of access to VET in remote communities, particularly when compared to higher education (Ackehurst et al., 2017, p. 3).

VET is, however, criticised for being poorly coordinated, non-client-centric and not brokered in real place-based, developmental opportunities (Forrest, 2014, pp. 158-162). Against a post-colonial backdrop, training is implicated in the transmission of dominant cultural hegemony (Bourdieu, 1979, p. 142). Like the formal schooling sector for remote Indigenous children, when high VET enrolment rates and low course retention is coupled with high unemployment, VET is regarded as a costly problematic (Forrest, 2014, p. 166). It is reported that two critical questions remain unanswered:

*whether the current VET system is compatible with the values and aspirations of Indigenous communities; and how the system can adapt to provide training is culturally relevant to unique communities and their local employment opportunities.* (Ackehurst et al., 2017, p. 13)

Public policy changes over the past 30 years have seen priorities shift from government delivery of VET to the marketisation of provision accompanied by funding changes to economic and social programs that have perpetuated inequity of access to, and benefit from, education. Current policy settings are quite contrary to the Kangan Review’s (Australian Committee on Technical and Further Education, 1974) original conception of a post-secondary technical and further education system. This national inquiry’s foundational premise was that social equity throughout Australia could be achieved by providing equitable access to training and further education. It was believed that by removing the barriers to entry each Australian resident would be able to acquire the appropriate skills and knowledge to enable participation in the workforce and thereby contribute to the growth of the country’s economy.

Pivoting on the perception of choice, this was a project of self-improvement to be supplied through recurrent education and training provided by state-owned Technical and Further Education (TAFE) colleges. This was a non-market solution; government-funded and delivered education would bridge the gap between the skills available in the labour market and the needs of an increasingly globalised, high technology economy. The low achievement rates of Aboriginal Australians in the mid-1970s were to be addressed by the provision of better access to training (Australian Committee on Technical and Further Education, 1974, p. 17). Today, the policy environment is very different. There is a strong emphasis upon individual choice and participation chosen from a marketised training sector. However, for regional and remote Aboriginal and Torres Strait Islander Peoples the linkages between training, further study and employment are disjointed leading to low rates of employment and high training attrition rates (Ackehurst et al., 2017, p. 6; Guenther & McRae-Williams, 2014).

The successive policy shifts that have taken place since the Kangan Review reveal a continual modification in the meaning of equity itself. Equity is an instrument for determining what counts as persuasive and rational knowledge. As a pivotal theme in the vocational training discourse, equity has often been used to justify the ascendancy of particular policies that provide the architecture of the system. The changes in Australian public policy positions mirror larger contestations over the distribution and access to public goods and services. Government-funded post-secondary training progressively shifted from the Kangan-era public monopoly over provision to a contestable market and a major transfer of funding responsibility from the public purse to the individual student/worker.

In 2017, 52.3 per cent of the 1.2 million government-funded students were in enrolled in TAFE and other government providers and 45.6 per cent were either enrolled with community education or other [private] registered providers (National Centre for Vocational Education Research, 2018, p. 5). Marketisation and privatisation have shifted the policy rationale for increasing the skills levels of the population from being framed as a pure public good in the name of national wellbeing to a private benefit that serves individual advancement (Productivity Commission, 2011, p. 58). In other words, there has been a rebalancing of the equation that links who benefits from and who pays for vocational education and training.

This paper is the result of a document review of reports and articles selected for their attention to equity and VET and their relevance to Indigenous Australians since the advent of the Technical and Further Education system in the mid-1970s through to the creation of training markets in which both public and
private providers compete for government funding. We examine these shifts beginning with the Martin Review (Committee on the Future of Tertiary Education in Australia, 1964) and finish with the current Indigenous Advancement Strategy (IAS) (Department of Prime Minister and Cabinet, 2014). The authors draw upon Wolf’s (1993) theory of non-market and market failure and trace the policy shifts where the meaning of equity was altered over the decades and what this has done to affect the perception of choice in terms of equitable access in a market for service provision and selection of training available in regional and remote Australia. Significant changes in national policies and their related programs can have a disproportionate impact on the Aboriginal and Torres Strait Islander Peoples who live outside of the major population centres due to cessation of support for training linked to self-determination and programs responding to locally determined priorities linked to culture, country and place. Indigenous residents report that programs are poorly targeted and divert significant resources into compliance reporting to funders and the frequent preparation of tenders to multiple, unrelated funding pools (Queensland Productivity Commission, 2018, p. 6). It is our central thesis that increased prevalence of conceptions of equity that are defined in economic terms (rather than social good) has facilitated changes in policies that have reduced/eliminated culturally appropriate local decision-making and ownership of the education/employment nexus in favour of priorities and programs determined by central government agencies.

**Market theory and interpretation of equity**

Wolf (1993) provided a comparative analysis of the provision of goods and services through dualistically opposed market and non-market mechanisms. His definition of non-markets generally refers to government delivery but also includes the activities of not-for-profit organisations, philanthropic foundations, universities and religious organisations, but for clarity, we will use the term government and non-market interchangeably. Just as the theory of market failure serves as a useful corrective to the notion of perfectly functioning markets, Wolf (1993, pp. 12-13) asserts that his theories of non-market failure expose the limitations of the implicit concept of perfectly functioning governments. Both markets and non-markets demonstrate predictable and serious shortcomings. Having to choose market-based or government interventions ‘may be simply a choice between the disagreeable and the intolerable’ (Wolf, 1993, p. 90). The current vocational education and training public policy-making environment is not a binary choice between markets and governments, but rather a matter of altering the balance of different combinations of the two, frequently based on of multiple, competing priorities that include consideration of budget constraints, equity, employment, social welfare programs and levels of ideological purity.

In advocating for a more comprehensive theorisation of government failure, Wolf (1993, pp. 5-6) used public choice theory and its economic foundations of self-interest and rationality (Self, 1993, p. 4) to emphasise that ‘the self-interest of politicians and bureaucrats is an important factor in understanding non-market processes’. He was concerned with human tendencies to ignore organisational inertia, tradition and standard operating routines, even though these contribute to government failures. Yet, the public’s financial support for health and education is in part based upon arguments of market failure in privatised systems and that distributional equity is best provided by government for moral, social and ethical benefit (Adamson, Astrad, & Darling-Hammond, 2016). It follows that some of the value of government provision of health and education will accrue to individuals in receipt of these services. Wolf (1993, p. 19) proposed that public policy decisions were mostly concerned with distributional issues, that is who gets the benefits and who pays, rather than efficiency issues, that is, how large are the benefits and costs.

The public provision of VET, particularly in regional and remote Australia, has been justified in the past on the basis of these distributional arguments and so-called thin markets. The Productivity Commission (2012, p. 57), has stated that ‘there are a number of rationales for government intervention in the market for VET services, including to overcome market failures relating to the broader community benefits of education and information limitations about quality and benefits of education’. Government interventions have favoured particular constituents or targeted identifiable groups for improvement. The public provision of training in support of business and industry has been heavily promoted by lobbyists (for example, Lilly, 2016), legislators and political leaders (for example, Kemp, 1998) demonstrating the success of a long-term and consistent effort on the part of industry to minimise their own direct expenditure on vocational education and training (Business Council of Australia, 2017; Fraser, 1996).
Likewise, advocates for so-called equity groups consistently argue the case for continued or increased government funding for education and training (Griffin, 2014; Griffiths, 1996; Lim, Gemici, Rice, & Karmel, 2011; McIntyre, Volkoff, Egg, & Solomon, 2004). Indigenous people are generally included in the equity groupings that have variously included youth, migrants, non-English speakers, women, the unemployed, remote residents and those with disability. With the introduction of mandatory reporting of national training data in the mid-1990s (Australian Committee on Vocational Education and Training Statistics, 1993) it became possible to monitor the government-funded VET participation and outcomes of these various groups at the population level. The commencement of Total VET Activity reporting by all training providers (National Centre for Vocational Education Research, 2015), allowed equity group VET study with private providers to be added to the knowledge base. Finally, the mandatory use of the Unique Student Identifier (USI) allows members of equity groups to be monitored at the individual level (VET National Data Strategy Action Group, 2010). The introduction of the rather Orwellian ‘training entitlement’ (Gillard, 2012) uses a combination of measures of disadvantage and the USI to control access to government subsidised VET. These surveillance methods also are in place to determine when any given individual reaches the upper limits of their entitlement so that they can be barred from the publicly-funded courses and sent into the self-funded private training market.

When a government-funded program is seen to fail, politicians are rewarded if they respond swiftly by ‘publicising a problem and then instigating action as an ostensible remedy’ (Wolf, 1993, p. 67). Wolf also laments that non-market activities may be authorised despite their ‘infeasible objectives’ and he warned that ‘distributional inequality’ is present in both market and government responses (p. 79). In the post-secondary training sector, there has been a renewed appetite to shift the balance towards an even greater degree of free-market orientation that transfers vast amounts of public funds into private profit through competitive bidding for government contracts and student loan schemes as part of this turn to the market (Yu & Oliver, 2015). The VET FEE-HELP mechanism was used by some unscrupulous training providers to recruit regional and remote Indigenous students and saddle them with loan repayments for courses that were variably unsuitable, unlikely to be completed and/or of low quality (Bita, 2015). In responding to what can be described as a public policy disaster, the Australian Government Education Minister announced a replacement loan scheme to rectify the worst excesses of the original program (Saccaro & Wright, 2018).

Equity, according to Wolf (1993, p. 93) has multiple definitions depending upon one’s political, religious and paradigmatic view; he lists six definitions that have been used over the past 25 years to assist in developing and implementing policies based on the acceptance of different definitions of equity in ways that suit an evolving economic, marketised discourse:

- equality of opportunity (i.e., access)
- equality of outcome
- equality of a perfect outcome
- a categorical imperative to govern the behaviour of others as a general maxim
- horizontal equity (treating equally situated people equally)
- vertical equity (treating unequally situated people appropriately unequally)

Equity as defined by equality of access, outcome, variations on positive or negative discrimination and, as a mechanism of social control, can all be identified in the policy documents scrutinised here. The definition of equity used in the 1974 Kangan Report was a combination of equality of opportunity and vertical equity - treating unequally situated people appropriately unequally in order to improve accessibility to appropriate training for each individual. This was predicated on an ideology that supported access as a right of citizenship based on social justice imperatives and the desire to design the perfect outcome from the definitions above. Today, at least two of Wolf's definitions of equity can be found in the Indigenous Advancement Strategy. Vertical equity is observed in the stated intention to move towards equal outcomes in the area of employment by halving the gap between employment outcomes between Indigenous and other Australians by 2018 (Abbott, 2015, p. 2). A horizontal notion of equity justifies the strategy’s allocation of public funds to training providers through the competitive grant application process in a quasi-market (Department of Prime Minister and Cabinet, 2014, p. 5).
Tracing equity: 40 years after Kangan

Successive post-Menzies Australian Governments made increasing interventions into schooling and post-secondary education and training. The Martin Report of *The Committee on the Future of Tertiary Education in Australia* (1964) sought to address the lack of speciality technical colleges and proposed that higher education should be available to all citizens according to their needs and capacities. This report reflected Wolf’s vertical equity view; one which treated unequally situated people appropriately unequally. The Martin Report saw education as a public investment yielding economic benefits through national skill-building. The result was a new system of colleges of advanced education, established by the Commonwealth Government. State governments were given responsibility for their management. According to Polesel and Teese (1998), this change of direction in policy and responsibility sharing between the Commonwealth and the States reflected both a need to increase the prestige of advanced technical education and a fiscal imperative to broaden the base of public revenue for industry training, although technical education remained the full funding responsibility of the states until 1975 (Klatt & Polesel, 2013). The Australian Government ‘assumed full responsibility for the funding of higher education from the states’ in 1973 (Noonan, 2016, p. 3).

By 1974, under the Whitlam Government, it had become clear that the Australian workforce was lacking sufficient technical skills to meet the emerging needs of a rapidly changing and increasingly globalised economy. *The TAFE in Australia: report on needs in Technical and Further Education* (which became known as the Kangan Report) was commissioned to deal with ‘the confusion of institutional eccentricity’ of the chronically disparate and cash-strapped state training systems (Whitelock, 1974, p. 269). This landmark report is credited with the creation of an identifiable vocational training sector and policy framework of what had become known as TAFE – technical and further education (Goozee, 2001, p. 27). The Kangan Report drew heavily upon the work of bodies such as the International Labour Organisation and the Organisation for Economic Cooperation and Development (for example, see Faure et al., 1972) and recommended (Australian Committee on Technical and Further Education, 1974, p. xxiii) that the emerging national training system meet the needs of individuals by providing for:

> the betterment and development of individual people and their contribution to the good of the community. Technical and further education should be planned accordingly. Emphasis on the needs of the individual should lead to easier access to learning, to better physical conditions for learning, to suitable student and teacher amenities, to welfare facilities, and to the highest standards for health and safety in workshops and laboratories.

The report placed an emphasis to the notion of recurrent education for post-school citizens. This meant that opportunities for technical and further education should be available to people of all ages regardless of previous education, location or employment status and give priority to the needs of the individual as a person. Development as a member of society, including non-vocational and social skills, was considered to be as important as the acquisition of technical learning. TAFE should create environments in which ‘self-motivated individuals can reach their vocational goals and in which motivation may be regenerated in people who have lost it’ (Australian Committee on Technical and Further Education, 1974, p. xvi). The Kangan Report was unambiguous: ‘Universal access is a matter of equity’ and should be seen as a ‘fundamental right of the individual to prepare to earn a living within the social and industrial framework of society’; similarly no person should be deprived of an opportunity for post-school learning ‘because of distance between his (sic) place of residence and an appropriate institution of learning’. (Australian Committee on Technical and Further Education, 1974, p. 85)

This became known as the *Kangan philosophy* (Hermann, 1982, p. 21) in which equity was equated with both of Wolf’s vertical equity and equality of opportunity (access); the provision of education, training, specialist facilities and appropriately targeted support services was seen as a government-funded responsibility.
Aboriginal and Torres Strait Islander Peoples and VET

The Kangan Report’s definition of equity being in the form of every resident’s education for personal and community benefit as well as human capital building prompted questions concerning the design of TAFE systems and the impact on the beneficiaries of the system. The review placed Aboriginal and Torres Strait Islander Peoples into a broad category of ‘minority groups’ and then treated these original Australians as an ‘ethnic group’ for purposes of policy and programs (Australian Committee on Technical and Further Education, 1974, p. 17). The TAFE system would be asked ‘to make special efforts to ensure that ethnic groups are not denied access to TAFE because of communication problems’ and that 10 per cent of a specific purpose recurrent funding grant be used ‘to develop facilities to alleviate barriers to access discouraging ethnic groups’ (Australian Committee on Technical and Further Education, 1974, pp. 86-87). This simplistic linkage of equity to access [of opportunity], eventually lost favour in mainstream Australia with the realisation that ‘an approach based on principles of equity can perpetuate the very inequalities and injustices it is trying to overcome’ (Teasdale & Teasdale, 1996, pp. 16-17).

An open market and private training providers

The Kangan Report’s authors did not envisage a market in which training providers would compete against each other and their conception of TAFE guided public vocational training policy until the early 1990s. Yet the seeds for a significant change in policy direction were planted in 1987 under the leadership of the Federal Education Minister, John Dawkins, who had amalgamated training into the Commonwealth Department of Education. This move represented a significant shift in the Australian political left, from the progressive or centre left, to the emerging influence of neoliberal economic rationalism (Morsy, Gulson, & Clarke, 2014, p. 449). The education narrative was being rewritten. Education was now being cast as an instrumental tool for individual advancement in the service of economic development (Morsy et al., 2014, p. 445). The rationale for public funding of VET as a public good associated with the building of citizenry was jettisoned in favour of a powerful new discourse of private benefit. This policy position has been uncritically adopted by all federal governments post-Dawkins (Zoellner, 2013, p. 145).

The Australian National Training Authority (ANTA) was established in 1992 and revolutionised the Australian VET system with competency-based standards of nationally recognised vocational qualifications in an industry-led system (Goozee, 2013, pp. 354-356). Its emergence was however a product of a significant dispute between the Commonwealth, state and territory governments over the responsibility for VET delivery and funding (Australian Senate Employment Education and Training References Committee, 1995). ANTA leveraged its concentration of policy-making and Commonwealth funding to produce a new national training system with an increasingly contestable training market of private and public providers which would be required to negotiate with industry for the provision of fee-for-service training; both could access public funding (Goozee, 2013, p. 410). The idea of a contestable training market had been introduced into the Australian policy rhetoric in the Deveson Report (Taylor, 1996). Deveson (1990, pp. 9-11) argued for the removal of TAFE’s monopoly on the provision of government-funded qualifications on the premise that competition maximises responsiveness and hands responsibility for the choice of provider for students and employers.

The 1996 report, Pathways to where? Aboriginal and Torres Strait Islander participation in vocational education and training, anticipated that a ‘far reaching policy shift – from equity to Indigenous rights’ would have a major impact on the delivery of VET (Teasdale & Teasdale, 1996, p. v). This report was highly critical of the statistical summaries used to measure Indigenous participation in VET. Such techniques, it claimed, reinforce disadvantage and structural racism that systematically restricted Indigenous access to educational opportunities (Helme, 2007, p. 452). Almost 20 years after the Kangan Review repeatedly noted the absence of vocational education data that would allow for the ‘confident analyses of trends’ (Australian Committee on Technical and Further Education, 1974, p. xviii) the Australian Vocational and Education Training Management Information System Standard (AVETMISS) had imposed a tightly prescribed, compulsory national reporting mechanism on all training organisations that issued formal qualifications and it has been progressively updated in order to inform political and ideological priorities of the day (National Centre for Vocational Education Research, 2010). Its collection of easily quantifiable indicators, (i.e., enrolments, completions, attendance, expenditure) informs interventions such as
the Indigenous Advancement Strategy while excluding qualitative social indicators of discrimination, dispossession of land and cultural obligations. The aforementioned introduction of Total VET Activity reporting and the USI have only served to increase the scope of monitoring on a limited range of measures while continuing to ignore many of the issues that are important priorities for remote Indigenous residents (Ackehurst et al., 2017, p. 11). Some of these statistically invisible primacies include local language preservation, land rights, links to family, cultural obligations and customary economies (Altman, 2009, p. 9).

Pathways to Where? (Teasdale & Teasdale, 1996, pp. v-vi) recommended the adoption of a rights-based interpretation of equity that would lead to a perfect outcome in Wolf’s list; it stated that there ought to be:

**increasing emphasis on Indigenous autonomy and self-determination in the management of VET programs… the control of VET for Indigenous Australians will increasingly be in their own hands. VET should become part of a more integrated and inclusive approach to community education that is open to all adults regardless of age or prior schooling. Aboriginal and Torres Strait Islander people should be encouraged to redefine the concept of VET. Teaching should incorporate Indigenous wisdom and learning and be more experientially based.**

The report tangentially noted that opening up of the VET market also offered the potential for private training providers, including those controlled by Aboriginal and/or Torres Strait Islander Peoples interests, to access public funding: ‘A number of localised providers also have responded to the expressed wishes of Indigenous people. The Institute for Aboriginal Development in Alice Springs and Tranby College in Sydney are two examples of institutions that are particularly valued by Indigenous people’ (Teasdale & Teasdale, 1996, p. 24). Indigenous controlled training organisations provide a real option for Indigenous students. However, the precarious nature of funding that result from the constantly changing policy environment and micro-management-type control of funding contracts limits the full potential of their reach into the training sector to better service the perceived needs of Indigenous Australians in a culturally appropriate manner (Zoellner, Stephens, Joseph, & Monro, 2016).

The Teasdales’ (1996, p. 24) report expressed the concern that an open training market which diminishes the public provider might limit the provision of lifelong learning opportunities for Indigenous people disproportionally:

**Of all post-compulsory education providers, TAFE, the public vocational education and training provider, has the highest enrolments of Aboriginal and Torres Strait Islander people. Many TAFE’s ability to establish programs in remote areas, as well as in rural and urban centres, is very advantageous to Aboriginal and Torres Strait Islander groups. By responding to the perceived needs of potential clientele in a particular context, TAFE has the opportunity to service Aboriginal and Torres Strait Islander students optimally. However, TAFE is the largest VET provider, and so has the highest enrolments. It is this extensive state and territory network across the nation, together with its ability to establish appropriate programs that gives TAFE the potential to provide even stronger and more relevant educational pathways for Indigenous Australians in the future.**

Recommendations to engage VET as an instrument towards self-determination for Indigenous Australians ran headlong into the neoliberal rationale and its related new public management-style of policy implementation. Using contractual arrangements to control the activities of training providers, governments were able to justify withdrawing from direct service delivery and contracted away responsibility for the outcomes (Hill & Hupe, 2002, pp. 110-112). In particular, the former secretary of the Australian Government’s Department of Prime Minister and Cabinet agreed with Wolf that a market versus government power struggle is too simple; because the government uses managed markets ‘to turn the apparently independent activities of free agents into instruments of government’ (Keating, 2004, p. 4). Given that the ultimate goal of most public policy is to regulate or influence the behaviour of the population (Australian Public Service Commission, 2007, p. 1) through mechanisms described as ‘government at a distance’ (Miller & Rose, 2008, p. 34), the aspiration for government-funded VET
programs to be an instrument of Aboriginal and Torres Strait Islander Peoples’ self-management was never likely to progress past the recommendation stage in the face of the national policy priority given to the marketisation of vocational education and training (Guthrie & Clayton, 2018).

The political instrumentalisation of VET: a tool for national economic objectives

The first national strategy for the training sector by ANTA (1994), Towards a Skilled Australia, specified the state and territory roles in a restructured and competitive training market by developing detailed training profiles for each jurisdiction that prescribed course enrolments and delivery locations. The profiles allowed the Commonwealth to monitor the use of funding for both recurrent and infrastructure spending while the strategy centralised the choice of course offerings and sought to match training delivery to industry and skill national shortages in preference to locally determined priorities. In recognition of the costs associated with providing training in remote areas, the potential impact on choices of training available and to ameliorate the likelihood of market failure, the profile allowed for differential funding in so-called thin markets, i.e., greater support for TAFEs was provided on the basis of meeting ‘community service obligations’ (Fitzgerald, 1998, p. 20).

The 1990s and 2000s witnessed a rapid period of economic reform and further paradigmatic shifts. With changing global trends and the growth of supranational institutions, the VET system was under increasing pressure to address economy-wide problems. But the movement away from Kangan’s public provision did not come without concerted and spirited attacks by commentators who decried the distancing of VET from its recurrent, lifelong learning roots laid out in the original report (Marginson, 1993, 1997). Billett (2010) warned of the social perils of abandoning the traditions of ‘adult education’ in favour of strictly defined utilitarian applications of technical education. Likewise, Wheelahan (2008, 2011) deplored the lack of theoretical knowledge contained in the Australian application of competency-based training and assessment accompanied by the continual downgrading of the professional teaching functions that had progressively taken place in the VET sector since the creation of ANTA. As the mainstream system shifted away from less tangible educational goals of the individual learner towards a system driven by competitive economic imperatives, what would be the impact felt on Indigenous Australians residing in country characterised as thin markets?

Partners in a learning culture: Australia’s national Aboriginal and Torres Strait Islander strategy for vocational education and training 2000-2005 (Australian National Training Authority, 2000) was the next major report to alter the course of VET policy for the Indigenous training sector. The strategy was open to the ‘development of a broader, more competitive training market’ (p. 30), but acknowledged that Indigenous VET provision was still dominated by state government-funded TAFE providers. The policy also enabled one of the Dawkins-era seeds to flourish - the notion of obligation. The public good view of individual learning shifted to an onus on the individual to undertake training for employment. The strategy (p. 6) stated that:

All Australians experience severe penalties if deprived of a learning culture and if excluded from life’s opportunities, including work. Aboriginal and Torres Strait Islander people experience this loss more than most Australians as a result of historical discrimination, ongoing disadvantage and a rapidly changing contemporary Australia. Education and training specifically, and lifelong learning more generally, must be at the cutting edge of economic, social and cultural development for Aboriginal and Torres Strait Islander Australians in the new millennium.

In terms of equity, it was being redefined again into the desire to govern the behaviour of others (Wolf, 1993, p. 83). Politically, equity was now being used to instil a ‘learning culture’ in industry (Australian National Training Authority, 2000, p. 82) in what has become an exclusive welding of VET to economic outcomes. This linkage serves to erode the real choices of occupational training for Indigenous people residing in regional and remote regions (Ackehurst et al., 2017, p. 11) by using the VET sector for the purposes of fulfilling mutual obligations to society at large (Quiggin, 2013, p. 60).

ANTA's (2000, p. 7) vision for VET for Indigenous Australians was to renew and share:
The changing balances of equity, control and market choice in the Indigenous vocational education and training sector

Don Zoellner & Anne Stephens

In effect, ANTA's national strategy re-inserted the active social policy of lifelong learning, but within the limited utilitarian goal of leading to employment. The introduction of an Indigenous learning culture recast equity in terms of validity and fairness, which was conditional on economic consideration that tied traditional culture to modern employment and training markets. This was seen as the solution to a range of social inequalities experienced by the Indigenous population that had become reduced to seven easily quantifiable ‘closing the gap’ targets that generally relied upon existing statistical gathering mechanisms such as the AVETMISS (Abbott, 2015, p. 5). This move ended the previous decade’s commitment to self-determination and styles of program development that recognised both culture and place. ANTA was unilaterally abolished in 2004 (Noonan, 2016, p. 7). The Howard Coalition Government, in order to exert greater levels of ministerial control over the VET sector post-ANTA, did not instigate another national VET strategy for Aboriginal and Torres Strait Islander Peoples.

Vocational training for Indigenous learners was subsumed into the Rudd Government's whole-of-government Closing the Gap agenda in 2007 (for example, see Carapetis, 2010) and specific programs were operationalised through National Partnership Agreements (NPAs) between the state, territory and federal governments (Council of Australian Governments, 2009). NPAs stipulated the quantum and scope of Commonwealth funding dedicated to vocational training (see Council of Australian Governments, 2008, 2012). Agreements contained specific references to targets of the same mechanistic and reductionist nature that had been criticised by Teasdale & Teasdale (1996) and others (for example, Altman, 2009). NPAs were intended to resolve the problematic and quantified sets of disparities, or gaps, between the general population and Indigenous people. Reducing these gaps through the provision of carefully targeted programs – a type of vertical equity that treats unequally situated people differently - was in use as was an ever-increasing contracting out of government programs to private providers (National Centre for Vocational Education Research, 2016).

From the Productivity Commission to the Indigenous Advancement Strategy: the era of individualisation

The Productivity Commission's (2012, p. 39) investigation into government funding and regulation of the VET sector found that the benefits from training participation are both 'private' and 'public'. The private advantages, in alignment with Becker’s (1993, p. 17) human capital theory, are measured in terms of higher remuneration or other job-related benefits directly aligned with increased levels of education and training. The public gains associated with education, are less tangible but include innovation, better health, social cohesion, support for a functioning democracy and reduced criminal activity (Productivity Commission, 2012, p. 59). The civic benefits of education and training are typically attributed to participation in primary and secondary education yet VET has the capacity to 'remedy the foundation skill deficits of some learners might also generate significant benefits of this type' (Productivity Commission, 2012, p. 60). In distant echoes of the Kangan philosophy, the Productivity Commission also noted that governments typically consider access to VET inequitable in a free market. Unlike Kangan, however, the Productivity Commission (2012, p. 19) unequivocally supported further marketisation of VET.

The Commission anticipates that, over time, there would be a gain in moving from a
regulated and supply driven system to a demand driven contestable market, provided quality is maintained. In fact, with improved information to prospective students and employers, and stronger auditing and validation of course outcomes, improved quality should result over time. And there could be cost savings at constant quality. For illustrative purposes, assuming a 2 per cent improvement in the efficiency of delivering services in the publicly-funded VET sector (estimated to be about $7.5 billion in size); this would be equivalent to about $150 million in 2010 dollars. A more efficient and flexible VET sector would be expected to also improve the functioning of the labour market (through faster retraining and better matching of people to vacancies).

The former Prime Minister Abbott’s revised approach to the Close the Gap policy collapsed 150 separate programs from across a range of government agencies into five thematic categories and explicitly linked program funding to the broad policy intention of ‘getting Indigenous Australians into work’ (Department of Prime Minister and Cabinet, 2014, p. 3). One result is that Indigenous vocational training policy came under the auspices of the IAS (Guenther, 2017). This Indigenous Advancement Strategy placed full faith in the ability of market-driven approaches to achieve the desired outcomes with the bulk of grant funding allocated through ‘open competitive grant rounds’ (Department of Prime Minister and Cabinet, 2014, p. 5). By Wolf’s (1993) standards, the IAS is an example of non-market activity, regardless of the Australian Government’s attempts to extract greater efficiency from Indigenous programs using competition between providers. The types of activities to be funded and the outcomes desired were centrally determined by government. At best, the IAS has created a highly regulated quasi-market for the allocation of public funds through strictly enforced legal contractual obligations that are driven by ‘the capacity of governments to manage markets in pursuit of their ongoing policy ideals’ (Keating, 2004, p. 175).

The IAS is not a policy promoting self-determination, neither does it comment on the community and cultural benefits of Indigenous vocational education and training expressed in the Kangan philosophy. The outcomes of the IAS were those ‘identified as the priorities of government, not the intended beneficiaries of programs’ (Altman, 2014, p. 109), particularly for people living in remote areas who are subject to quite specific targets described in the IAS. The long-standing preference for recurrent or lifelong learning, as a project of continuous personal improvement, is removed from consideration. Instead the focus of funding is on the immediate and short term; specified as ‘activities that support employment outcomes for Indigenous jobseekers, including retention at 26 weeks’ (Department of Prime Minister and Cabinet, 2014, p. 11). The ongoing obligation to undertake a project of self-improvement by constantly retraining has been replaced by a minimal requirement to stay in any of sort paid employment for six months.

The IAS is a bi-partisan social policy that attempts to increase market-like responses to the overwhelming disparity experienced by Aboriginal and Torres Strait Islander Peoples. The centrally pre-determined goals include, and are not limited to, increased private home ownership on Indigenous land, agreements to improve school attendance, employment and safer communities (Department of Prime Minister and Cabinet, 2014, p. 17). Yet the reality for those Indigenous Australians residing in the thin markets of remote Australia is that open market choices have always been limited. The opportunities to select from a well-priced range of services they feel to be appropriate to their circumstances are fewer than urban areas. But the ideal for choice is now absent from the IAS. The IAS compounds the present lack of choice people have by failing to respond to individual or even local community priorities in favour of centralised control of residents’ behaviour through the use of contractors. Furthermore, the concept of equity for Indigenous people disappeared entirely from the strategy. The only reference to equity relates to how the Department of Prime Minister and Cabinet will treat applicants for grant funding in open competitive bidding (Department of Prime Minister and Cabinet, 2014, p. 5). From Wolf’s perspective, the definition of equity implicit in the IAS treats unequally situated people unequally.

The Competition Policy Review: Final Report (Harper, Anderson, McCluskey, & O’Bryan, 2015) was the most recent piece of public policy calling for the marketisation of previously non-economic sectors to be commissioned by the Abbott/Turnbull Governments. It was the first major national examination of the role of competition in the Australian economy since the Hilmer Report in 1993. Where Hilmer had ignored competition in the provision of human services, the Harper Report recommended that markets be designed for the delivery of human services because they will provide ‘greater diversity, choice and
responsiveness in government services [and] can both empower consumers and improve productivity' (Harper et al., 2015, p. 24). These future markets should be developed based on a ‘presumption of choice’ by citizens and in yet another ironic twist, resource allocations should take into account equity of access, universal service provision and minimum quality (Harper et al., 2015). The advocates for these new public management styles of service provision do not allow for even the possibility that markets may not provide the best solution for the delivery of public services; past failures (such as in VET FEE-HELP) are attributed to ‘inadequacies in the contract specification rather than fundamental flaws in any contractual model for service delivery’ (Keating, 2004, p. 95).

Conclusion

Wolf (1993, p. 160) maintained that government solutions display just as many problems as do markets. The current default policy preference for delivering public services by open competitive tendering produces a situation where it appears that the worst of both markets and non-markets exacerbate pre-existing sets of inequities. Governments, by definition, can only bring their forces to bear to redistribute capital and resources to redress the inequities of opportunity and outcome that accumulate when markets are given free reign. However, the restorative capacity of the IAS interventions is arguable, and no matter how well intentioned, the remedy may be as bad, or even worse, than the original complaint.

In our view, the culmination of progressive policy shifts to the marketisation of the VET and the creation of the IAS have erased the presumption of individual choice for Indigenous people in favour of central government preferences. Indigenous residents of remote communities still do not experience high completion rates of formal qualifications or the related improvements in employment outcomes (Ackehurst et al., 2017, p. 1). The endurance of market-based solutions, predicated upon an unquestionable linkage between social outcomes and the economic imperative of paid employment, has easily migrated to the centre of resource allocation decisions since the seed was planted by Dawkins. The result has altered the fundamental objective of education from a communitarian project of individual self-improvement to private personal benefit. Paradoxically, the design and conduct of the IAS moves in exactly the opposite direction. With the categorisation of Aboriginal and Torres Strait Islander Peoples as a ‘Priority Population Group’ (Department of Education and Training, 2015) and outsourced contractors bidding for Commonwealth funds in response to ministerially determined criteria and reporting requirements, this is not a place where individuals exercise the discipline of the market. The advocates for market-based approaches run head-long into those who see value in the ability of governments to give effect to political and philosophical ambitions. This clash has served to even further marginalise Indigenous peoples’ long-held desire for place-based solutions to social and economic problems facing their communities.

While choice, which plays out at the core of markets, has always been more limited in rural and remote settings, the ideal of choice was not entirely absent from the policy settings prior to or since ANTA. Yet the continued reforms of the VET sector over 40 years and the erasure of the local/individual choice of training by provider and/or course content, has culminated in today’s confused policy mix. There is a grave risk that this version of equity and the quasi-market-based solution of the IAS will widen the gaps that have been identified for closing.

What does this situation say about the demand for VET training by Indigenous people in remote and regional communities across Australia? Do they exercise the same discretionary choices concerning access to quality training provision as people residing in more heavily populated urban and city centres? Australian public policy is confused because high level statement of intent often suggest support for training services to be available as envisaged in the Kangan philosophy of the 1970s. For example, lifelong learning is still recognised as ‘a more important means of securing rewarding employment’ (Harper et al., 2015, p. 24), yet the introduction of training entitlements places a life-time cap on the amount of publicly supported training any individual can receive. In thin competitive markets, unscrupulous training providers can sign people up to low quality courses in order to extract the maximum profit while exhausting and individual’s entitlement. Equity defined as access and a need for continual retraining, is also about the choices people have on where to do training – not necessarily through a host of providers, but a stable, non-market institutional setting that can efficiently identify and respond locally to needs, workforce gaps and changing tastes and interests of individuals seeking rewarding employment opportunities.
The shifting balance between equity, control and marketisation of the sector has also been about resolving the tension between who benefits and who pays for training. This long-standing conflict between the various jurisdictions and the VET system’s institutions has clearly had an impact on the Indigenous people living in the remote areas. The determination of successive policies to develop functional competitive markets across the sector has come at a cost not only to the primary motivation for participation in terms of recurrent education but has reduced the value of training that is recognised as having tangible educational goals that produce both positive individual and the social outcomes. When cost transference to the individual from the responsibility of government to deliver, real choice, equity of access, relevance and community determination has been effectively erased, the question remains, for how much longer can training be the solution?
References


Towards an understanding of Indigenous perspectives through the eyes of pre-service science education students

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Abstract

This paper presents an analysis of ‘Indigenous perspectives’ as presented by 150 pre-service teachers of science education. They were presented with an open ended task that required them to choose a concept or topic in school science, and then incorporate their understanding of an Indigenous perspective relative to their chosen science concept. The demonstration of their science concept Indigenous perspective used network visualisation: concept maps or mind maps. Here the connections between Western science knowledge, Indigenous knowledge and knowledge application elements of the visualisations represented student constructed understandings or perceptions.

The concept maps and mind maps were analysed in a staged process. Firstly, grouping of visualisations based on concept representations to uncover themes, and then using Network Theory, each theme was statistically analysed, concluding in an ‘all’ concept meta-analysis. This analysis was undertaken to mathematically developed models of concepts links. The analysis demonstrated six overlapping and interrelated areas of Western school science themes: seasons and weather, astronomy, plants, animals, use of natural resources, and ecology. The network analysis presented a complex web of interrelated knowledge constructs. This complex web of interrelated knowledge was within and across the six themes. Such findings indicate an Indigenous perspective is a relational construct inclusive of Western science knowledge, Indigenous knowledge and knowledge application. It also reflected the place-based nature of Indigenous knowledge.

This study presents an Indigenous perspective as a complex web of interrelated Western school science and Indigenous knowledges. Such complex representations provide the possibility for a reconceptualisation of Australian science curriculum where science education is an interrelated human endeavour interacting with the natural world and where two worldviews coexist with one informing the other.

Introduction

An Indigenous perspective is a term introduced to school science by the Australian Council of Federal, State and Territory Education Ministers in December 2010. The introduction, fore-grounded in the Shape of Australian Curriculum: Science (National Curriculum Board, 2009) indicated that the Australian science curriculum “will provide opportunities for students to develop understandings of aspects of Indigenous cultures” (p.10). This then became the cross-curriculum priority, Aboriginal and Torres Strait Islander histories and cultures (Australian Curriculum, Assessment and Reporting Authority, ACARA, 2011), where school students are required to “develop an understanding that Aboriginal and Torres Strait Islander Peoples have particular ways of knowing the world and continue to be innovative in providing significant contributions to development in science”. All Australian states and territories had agreed to implement the Australian Curriculum: Science (ACS) by the end of 2014 (ACARA, 2011). However, there
have been various levels of curriculum implementation and modification by states and territories. In considering the place of Indigenous perspectives, anecdotal evidence indicates that the implementation is at best superficial, and at worst tokenistic and stereotyped, if at all.

Indigenous perspectives are, in general, presented as a collection of Indigenous understandings that relate to topics that are taught in subjects in the Australian Curriculum, in this case the focus is science. The rhetoric in the Australian Curriculum goes further in the suggestion that Indigenous perspectives are related to Indigenous worldviews or ways of seeing the world. In the science subject area there is an acknowledgment that there are substantial differences between the Western scientific worldviews and Indigenous worldviews (Michie, 2015).

As science educators, this research was designed to gain an understanding of Indigenous perspectives in Western school science using pre-service teacher’s perceptions, to better inform our pre-service science education teaching. We recognised the importance of Indigenous knowledge in our university science education curriculum. This point was highlighted in the Review of Australian Higher Education (Bradley, Noonan, Nugent & Scales, 2008) where they acknowledge the importance of Indigenous knowledge in the ‘academy’ of university discipline knowledge. The way forward in developing our understanding was to have students present their perceptions by constructing concept or mind maps as one of the unit (subject) assessment items. Subsequently, the concept maps were analysed using a network analysis approach (Borgatti & Halgin, 2011) to elucidate the emergent relationships and the complexity of the students’ understanding.

We acknowledge that perspectives are cultural, so that both Indigenous and science perspectives are steeped in culture (Aikenhead, 2001). We recognise that the focus of our research may suggest a Western neo-colonial view of school science and while this possibility is accepted; the goal of our research was to understand our students’ perspectives, so we might modify the pedagogical approach, so as not promote asymmetrical imbalances in the relationships between cultures.

Concept and mind maps

Concept and mind maps are visualisations that represent relationships between concepts. These relationships are indicated by directional or unidirectional lines linking the concepts (Novak & Gowin, 1984; Nesbit and Adesope, 2006; Novak & Cañas, 2007). The relational structure reveals point-in-time perceptions of the constructor, and is therefore unique, as it reflects “his/her experiences, beliefs and biases in addition to his/her understanding of a concept” (Kinchin, Hay & Adams, 2000, p.44), or in other words a ‘mental model’.

Such maps can be considered as part of the wider category of knowledge maps also known as cognitive maps, semantic networks or visual organisers, all of which represent a mental model of the relationships between nodes: concepts (O’Donnell, Dansereau & Hall, 2002). Our study uses the terms concept and mind map within the broader cognitive map category.

Cañas (2003) points to the use of maps as a technique for eliciting knowledge sectors such as education, government, and business to “reveal expert-novice differences, knowledge elicitation with experts, to support design of new technologies and in software-assisted knowledge acquisition” (p.40). In education, maps have been used as a tool to demonstrate the changes that occur in student conceptual knowledge structures (e.g. from novice to expert, integration of new knowledge into existing cognitive structures). Quantitative scoring methods have been established based on concept map components, validity of links and structures (Novak & Gowin, 1984), and to describe the comparisons of students’ maps to those of experts (Ruiz-Primo & Shavelson, 1996). Maps constructed by students using a set of predetermined concepts have been used in assessment practices (McPhan, 2008). Maps construction provides before-after indicators of cognitive development (Kinchin et al., 2000) where the level of networked complexity demonstrates an increasingly complex of understanding.

Concept and mind maps are used in the context of our study as a tool to disclose the emergent understanding and internal models of pre-service teachers of science. The maps constructed, presented
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and externalised through visualisations of web associations. This adds another category to the list of educational uses above (Novak & Cañas, 2007), as it focuses on eliciting the individual understandings of novice pre-service teachers of science, and then uses network analysis of the collective perceptions of students’ mental models of Indigenous perspectives.

Indigenous perspectives

The idea of an Indigenous (or Aboriginal1) perspective in the Australian science curriculum can be traced back formally to the Hobart Declaration (MCEECDYA, 1989). Among the Common and Agreed National Goals for Schooling in Australia was listed: “To provide students with an understanding and respect for our cultural heritage including the particular cultural background of Aboriginal and ethnic groups” (p. 1). This led to the state and territory education authorities setting up positions and committees relating to implementing this goal which became known informally as Indigenous perspectives. The idea of Western school science and the Indigenous culture became a part of what are known as cross-curriculum perspectives, with little consideration of how this goal could be implemented. Subsequently, the Hobart Declaration has been rewritten and renamed twice (as the Adelaide Declaration in 1999, followed by the Melbourne Declaration in 2008) and in both cases the emphasis on Indigenous knowledge has been reinforced (as has participation in the education process of Indigenous students and their parents). One of the cross-curriculum priorities in the overall Australian Curriculum is referred to as Aboriginal and Torres Strait Islander histories and cultures (ACARA, 2011). The curriculum then also included a category to encompass knowledge, skills, behaviours and dispositions called General Capabilities, of which one was Intercultural understanding. These are often combined and are known informally, and continue to be referred to in schools, as Indigenous perspectives. Indigenous perspectives in this context have morphed into a collection of Indigenous knowledge that relates to topics taught in school science. The latest version of the science curriculum speaks only of Aboriginal and Torres Strait Islander histories and cultures as a cross-curriculum priority. Here there is recognition of long standing scientific knowledge traditions and developed knowledge about the world (ACARA v8.2, 2015). The underlying understandings of the Indigenous worldviews or ways of seeing the world – knowing, doing and being – seem to be somewhat obscured.

The original rationale for the Indigenous perspectives was to increase non-Indigenous students’ and teachers’ awareness and knowledge of the Indigenous world (Michie, 2002). This has been expanded to focus on the effective education of Indigenous Australians as well, and is exemplified in the Primary Connections curriculum resource materials which aim to address teaching school science to Indigenous students (Bull, 2008). In Canada, there are examples of Aboriginal perspectives being used in the science education of Aboriginal as well as non-Aboriginal students (Aikenhead et al., 2014). Indigenous perspectives differ from culturally relevant and culturally responsive pedagogies as they are situated within the Western school science curriculum as content rather than pedagogy.

In the past there has been references to relevant Indigenous knowledge in science texts but these were considered to be stereotypical and pejorative (Ninnes, 2000), a situation which needed to be rectified. There also had been continuing discussion about the role of Indigenous knowledge in Western science, with some scientists and philosophers of science considering the two to be incompatible for a variety of reasons (e.g. Matthews, 2009). Other scientists, particularly some African scientists (e.g. in Semali & Kincheloe, 1999), and groups of science educators interested in cultural studies (Aikenhead & Ogawa, 2007), have identified the need to bring the two sciences more closely together in both Western science and in school science. The positioning of Western science and Indigenous knowledge has again been awakened through the Inspiring Australia report, Indigenous Engagement with Science: towards a better understanding (Inspiring Australia, 2013), where there is a recognition that “Australia’s Indigenous knowledge systems are by their very nature complex holistic and interdisciplinary systems that cannot be viewed merely as potential subsets of Australia’s Western knowledge system” (p. 5).

In considering the two worldviews, it is possible to identify some general differences between Western science and Indigenous knowledge.

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1 In the Australian context, Aboriginal and Torres Strait Islanders have been jointly referred to as Indigenous Australians, which gives rise to the descriptor, Indigenous perspectives.
1. Whereas Western science suggests it is universal, Indigenous knowledges are multiple and local or place-based and include location-specific knowledge, content and language. Indigenous is used here to encompass a variety of knowledges held by individual tribes or language groups according to their locality but not necessarily sharing the same content. As a consequence, the term Indigenous can be replaced by localised identifiers, e.g. Maori science, Yolngu science.

2. Although similar to each other in nature, though not necessarily in content or context, often Indigenous knowledge is homogenised and made to seem inclusive of many or all Indigenous peoples.

3. Indigenous knowledge usually refers to particular environmental and landscape knowledge and contains elements that refer to the people’s relationship to the land, to its creation and its ongoing management.

4. Some Indigenous knowledge is considered particular to a group such as men only, women only, Elders or sacred and may not be shared with others.

5. Indigenous knowledge is considered holistic rather than broken into separate knowledge disciplines. Indigenous science is a Western construct of that part of Indigenous knowledge relating to Western science content and reflecting Western science’s universalism rather than the Indigenous localism. The concern of some Western scientists that Indigenous knowledges may include the ‘spiritual’ and from this viewpoint is an issue for positivistic science ontology. The term Traditional Ecological Knowledge (TEK) is used to describe Indigenous environmental knowledge which again varies between localities.

6. The Indigenous perspectives as seen in the school curriculum are also a Western construct and their subdivision over the learning areas reflects the Western division of knowledge rather than a place-based holistic approach.

Snively and Corsiglia (2001) expressed Traditional Ecological Knowledge as how “Indigenous science interprets how the local world works through a particular cultural perspective” and “oral culture peoples may be thought of as specialists in local Indigenous science” (p.10, our emphasis). Van Eijck and Roth (2007) considered the difference between Western scientific knowledge and TEK, again identifying TEK as a local knowledge. Although they considered that the two knowledges were incommensurable and irreducible to each other, and that scientific knowledge is expressed in a universal format (e.g. language, terminology), they realised that often it needs to be related to a localised context, a feature of TEK.

In discussing Aboriginal science Christie (1991) considered that “it is the context itself which provides the crucial information we are to learn” (p. 29). Invoking the environmental trope, ‘Think globally, act locally’, Christie considered that Indigenous local knowledge is an important factor in ecological sustainability. A number of scientists, particularly those working in ecology with Indigenous peoples in locations worldwide, have come to see the value of the two aspects as not necessarily incommensurable but having some useful compatibility (Semali & Kincheloe, 1999). Lowan (2012) provides examples of programs in Indigenous environmental science which strengthen and advance it “for the benefit of both Indigenous and non-Indigenous peoples alike” (p. 79). Such compatible knowledge has been visualised using Venn diagrams that depict in the intersection the common ground associated with Western science and Indigenous knowledge (Michie, Anlezark & Uibo, 1998).

### Mapping and Indigenous perspectives

As already outlined, an Indigenous perspective in western school science is not based in Indigenous culture, so in the main is considered to be abstract based visible or invisible properties, whether essential or superficial (Safayeni et al., 2005). This study provides visualisations constructed as a web of associations, recognising prior knowledge, experiences and personal understandings, as it is likely that concepts of Indigenous perspectives are unfamiliar to pre-service and possibly practicing teachers of science. More specifically, the label Indigenous perspective can have implications for the teaching of science where teachers will need to engage in processes of reconceptualisation that will generate an “ongoing creation and re-creation of the web association” (Davis, Sumara & Luce-Kapler, 2015, p.81). The reconceptualisation will require a conscious re-working of meanings constructed using the official knowledge of the Western school science curriculum. Such re-structuring of official knowledge will challenge teacher pedagogical code and practice, with modification of personal, collective and culturally
constructed meanings of the teaching of science (Bernstein, 2000).

The pedagogical code indicates classrooms propagate knowledge and practice through distributive rules that are culturally based. These distributive rules depend on constructed recognition and realisation rules of the culture. In Bernstein’s earlier work (1971) he notes that “curriculum defines what counts as valid knowledge, pedagogy defines what counts as a valid transmission of knowledge and evaluation defines what counts as a valid realisation of the knowledge on the part of what is taught” (p. 85). This statement has direct implications for the incorporation of Indigenous perspectives in teaching of science on two levels. Firstly, in Western school science codes are constructed through rules of recognition and realisation about knowledge, pedagogy, reconceptualising pedagogic practices in the teaching of school science. Secondly, in considering codes as culturally based, Indigenous perspectives are based in Indigenous cultures just as the science curriculum is based in Western cultures. It follows that through the pedagogical code, teacher recognition and realisation will evoke contexts in their pedagogical practice that are “inseparable from the concepts of illegitimate and legitimate communication, and presupposes a hierarchy in forms of communication” (Bernstein, 1990, p.15). These codes are “tacitly acquired and select and integrate relative meanings” (p.14) and “culturally determined positioning devices” (Bernstein, 1990, p.13). So, if the corollary is true that the rules of recognition and realisation define what is or is not western school science. Indigenous perspective is not based in the Western culture, so where does an Indigenous perspective fit in science classrooms?

This paper positions the purpose of the concept and mind maps as individuals' visualisations of their constructed knowledge (Kinchin, 2011). Thus, all representations are valid and may vary considerably because a particular person's knowledge about a given topic is constructed differently. Each represents its creator's personal knowledge (Cañas & Carvalho 2004). The individual student maps represent a point-in-time construction of the students' cognitive structure as illustrations of conceptual understanding of new emergent knowledge (O'Connor, 2012). The concept and mind maps provide an externalising of Indigenous perspectives as related to a Western school science concept(s) by elicited knowledge relationships within a student's perceptual framework (Kinchin, 2011). The maps are the personal understandings and subjective interpretations of an Indigenous perspective.

**Network theory and mapping**

Network theory refers to the characteristics and mechanisms that interact within network structures to yield particular understandings (Borgatti & Halgin, 2011). A network consists of a set of nodes along with a set of links between them. The links are “interconnected through shared endpoints to form paths that indirectly link nodes” (p. 1169). Concepts are considered to be nodes and the patterns in concept and mind maps are created by the links in the network. The network describes a unique structure of relationships between the nodes. These complex relationships can be better understood using mathematical modelling and visualisation.

The links constitute a binary relationship between two nodes, and one node may have many links or binary relationships with other nodes to develop a web of association. Similar situations are found in the ‘family of networks’ such as: knowledge networks, social networks, semantic networks, mind maps and concept maps. The links can be directional or unidirectional to represent that relationship between nodes. However, in concept maps the nodes are concepts and the links are propositions that represent a point in time cognitive model of understanding.

**Methodology**

Our research is a mixed methods study imbedded in pre-service teachers of science “experiences, perspectives and histories” (Lewis & Ritchie, 2003, p. 3) of Indigenous perspective in Western school science. Firstly, we undertook a qualitative study where we considered pre-service teachers of science’ perceptions of Indigenous perspective as related to a school science concept. The perceptions were presented as concept and mind map visualisations. The visualisations provided an opportunity for different ideas, mental models and prior knowledge to externalise “a complex holistic picture” (Creswell, 1998, p.15) represented as a knowledge network. Subsequently, the visualisations were quantitatively
examined using network theory based mathematical modelling to uncover complex interrelationship presented in the visualisation data.

Data collection

The data in this research were collected using a concept or mind map open-ended task that provided an exploration of pre-service teachers’ of science views of western school science concepts and Indigenous perspectives. The task was described as: “In this activity you will use a concept/topic from any science area (strand/outcome) and using aspects of Indigenous perspective(s), develop a concept or mind map of this concept/topic containing the Indigenous perspective(s)” Data was collected over two years from 150 students.

The concept and mind maps were initially examined by the two researchers using a number of criteria, including Indigenous perspectives, science links, number of subtopics in the first tier, hierarchy (or morphology), illustrations and relationships.

Results

The first aspect of the results centres the morphology of the concept and mind maps. Morphology describes the shape of the visualisations and reflects the level of complexity of understanding of the constructor. The complexity of representation can be demonstrated in the frequency of the type of concept map morphology, as presented in Table 1. As indicated in Table 1, the majority of students (80.6%) used network and repeated spoke morphologies in preparing their visualisations.

Table 1: Frequency of visualisation morphology

<table>
<thead>
<tr>
<th>Type of concept map</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Chain</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>2a. Basic spoke</td>
<td>5</td>
<td>3.4</td>
</tr>
<tr>
<td>2b. Spoke with chains</td>
<td>23</td>
<td>15.3</td>
</tr>
<tr>
<td>2c. Repeated spokes</td>
<td>98</td>
<td>65.3</td>
</tr>
<tr>
<td>3. Network</td>
<td>23</td>
<td>15.3</td>
</tr>
</tbody>
</table>

The complexity of the concept maps impressed the researchers, particularly considering students have presented sophisticated morphologies: network and the repeated spokes. We concur with Kinchin (2011) that “networks are associated with meaningful learning” (p. 99). These students indicated a depth of knowledge regarding Indigenous perspectives that exceeded our expectations and the networks reflected the interrelatedness which is a feature of Indigenous knowledge (Semali & Kincheloe, 1999). However, we disagree with Kinchin (2011) regarding spokes, particularly repeated spokes. He considered spokes as offering limited insight which may be the case in their basic forms, whereas in their repeated morphology they provide a deeper understanding although not as complex or interrelated as a network.

The emergent knowledge presented in the concept map below (Figure 1) presents a complex view of weather and seasons. This visualisation was considered by both researchers to be the most complex example. It demonstrates the complex relationship between patterns, seasons, plants, animals, symbols and stories, with specific reference to an Indigenous language group. Its morphology is a network, exemplified by cross links at a number of levels and between levels, and is considered to be hand-drafted. The graphics that were used were also selected by the student.

The mind map (Figure 2) demonstrates a complex understanding using repeated spoke morphology relating to Aboriginal Astronomy. This depiction of Aboriginal Astronomy links together sun, moon, planets and stars through story and legend.

These two examples presented are but a few of the 150 visualisations that demonstrate a ‘point in time’ interrelated conceptual representation of Western school science topics from the ACS content descriptions and Indigenous knowledge.
Figure 1: Seasons and Weather Concept Map, using network morphology

Figure 2: Aboriginal Astronomy Mind Map, using repeated spokes morphology
Analysis

The 150 participants in the open-ended task presented individually-constructed visualisation depicting their understanding of the relationship between a science concept and Indigenous perspectives. The visualisations were analysed, with the understanding that the methodology enables the presentation of a diverse number of student perspectives. The analysis provided an opportunity to develop a shared conceptual framework that represented shared meaning while preserving the individuality and diversity (Trochim & Cabrera, 2005). The analysis progressed through three stages to ensure the preservation of the relational structures of the visualisations. The relational structures refer to the centrality of concepts, number of links, density of connections and inter-category links theoretically grounded in network theory (Stautmane, 2012).

The following analysis is presented in three levels: identification of central Western school science themes, Western school science themes network analysis and meta-network analysis.

Level 1: Identification of central Western school science themes

In level 1, using the central concepts in each visualisation, a process of identification and categorisation was used by the researchers to identify central science themes. The visualisations were then grouped. This initial analysis uncovered six school science themes: Seasons and Weather, Astronomy, Ecology, Plants, Animals and Use of Natural Resources (Table 2). These are the terms used in the ACS (ACARA, 2015). The category ‘Others’ were rejected as they did not meet the task requirements.

Table 2: Frequency of school science themes.

<table>
<thead>
<tr>
<th>School science theme</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of Natural Resources</td>
<td>44</td>
<td>29.4</td>
</tr>
<tr>
<td>Seasons and Weather</td>
<td>37</td>
<td>24.7</td>
</tr>
<tr>
<td>Ecology</td>
<td>28</td>
<td>18.6</td>
</tr>
<tr>
<td>Animals</td>
<td>12</td>
<td>8.0</td>
</tr>
<tr>
<td>Astronomy</td>
<td>11</td>
<td>7.3</td>
</tr>
<tr>
<td>Plants</td>
<td>9</td>
<td>6.0</td>
</tr>
<tr>
<td>Others</td>
<td>9</td>
<td>6.0</td>
</tr>
</tbody>
</table>

Level 2: School science themes network analysis

Stage 1: Identification of concepts.

The six themes having been identified were analysed to determine the scope and range of the concepts that were presented in each of the school science themes. This was achieved firstly by using the word cloud approach to provide a frequency visual presentation of the terms for each of the identified science themes. An example using the theme Seasons and Weather is presented in Figure 3.
This word cloud provided representation of the concepts and frequency present in the Season and Weather theme. A scan of the terms presents a diversity of terms the used to represent seasons and weather. They included plants and animals with specific examples; Indigenous and Western season names; and weather related activity for example storms and humidity. However, this approach did not recognise the interrelationships: ‘what is connected to what’ aspect within the visualisations, within a theme or across all themes. A network based approach was used in identifying the relational links between concepts found in individual concept maps across each identified theme.

**Stage 2: Concept-concept links**

In stage 2 each school science theme was analysed using a statistical network package called ORA-NetScenes. ORA-NetScenes is a dynamic meta-network assessment and analysis tool developed by the Centre of Computational Analysis of Social and Organisation Systems (CASOS) at Carnegie Mellon University. This package is based on the principles of network theory and mathematical modelling that recognises nodes, maintains links and generates network visualisations (Carley, Pfeffer, Reminga & Storrick, 2013).

Each of the school science themes was analysed using ORA. Firstly, this process required the concepts and the link relationships to be aggregated and converted into an Adjacent Matrix. The matrix is a square concept-by-concept (i=j) matrix where the presence of a dyadic pair links are recorded as a ‘1’ and ‘0’ no link. This process of aggregation and maintenance of the concept-concept link representations was completed for each science theme, and the resultant dyadic pairs then saved as CSV files for further analysis using ORA. This process produced six matrices, one for each science theme. Each matrix indicates a concept-concept relationship for that theme. It is at this stage the ORA statistical package was used to visualise the matrix, while maintaining the concept-concept dyads.

The network theme matrices were analysed individually to develop network visualisations and the statistical metric of centrality. Centrality in this analysis presents a measure of the connectedness of the nodes, such that the nodes that are ranked high on this metric have more connections to others in the same network. Two values are calculated by the software, an unscaled value which is simply the number of connections between concepts, and a relative value of comparison for all nodes in the network (maximum value=1). The choice of centrality provides an opportunity to identify the most important nodes within the network (Everett & Borgatti, 2005).

Seasons and Weather network (Figure 4) is an example of a generated network visualisation, a result of the ORA analysis and visualisation. This process was repeated for all the school science themes to generate six network diagrams.
The network visualisation for Seasons and Weather (Figure 4) presents the 43 node entities, where the nodes with high centrality values tend to be in the centre of the network. Other nodes with few links are located towards the periphery; the measures of centrality reflect this finding.

In the Seasons and Weather network, the top five centrality ranked nodes at first glance present neither Indigenous nor Western school science perspectives, as seen in Table 3. However, in cross-referencing with the word cloud for Seasons and Weather (Figure 3) there was extensive use of Indigenous season names in the student’s original concept maps. The combination of Indigenous and season names into the label ‘season names’ was done to manage the matrix size. The use of the term ‘season names’ can represent use of both Indigenous season names and Western season names. The two most connected concepts are season names and characteristics (relative values of 0.131 and 0.127 respectively, with 33 and 32 links each). In considering the next five ranked nodes – patterns, rain, human activity, temperature and food animals – there are some indications of a mixture of Western and Indigenous perspectives or knowledge.
Towards an understanding of Indigenous perspectives through the eyes of pre-service science education students
Gregory Smith and Michael Michie

Table 3: Seasons and Weather centrality

<table>
<thead>
<tr>
<th>Rank</th>
<th>Central Concepts</th>
<th>Centrality</th>
<th>Number of links</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>season names</td>
<td>0.131</td>
<td>33</td>
</tr>
<tr>
<td>2</td>
<td>characteristics</td>
<td>0.127</td>
<td>32</td>
</tr>
<tr>
<td>3</td>
<td>seasons</td>
<td>0.107</td>
<td>27</td>
</tr>
<tr>
<td>4</td>
<td>signs of change</td>
<td>0.095</td>
<td>24</td>
</tr>
<tr>
<td>5</td>
<td>observations</td>
<td>0.091</td>
<td>23</td>
</tr>
</tbody>
</table>

The network (Figure 4) presents a decentralised network visualisation of the interconnectedness and is the key to understanding the pre-service teacher of science interpretations of Indigenous perspectives and Western school science. Put another way, we know the most connected concepts (centrality or central concepts), but the question remains: What are these central concepts connected to? The answer comes from following the links in the visualisation. So, these connections through the network paths provide an emergent representation of seasons and weather as an Indigenous perspective.

The centrality data (Table 3) indicates that the five central concepts have total link numbers ranging from 33 to 23; these include multiple links. Analysing the network paths from the most central concepts presents an opportunity to construct an emergent picture of science education student perspectives of Western school science and Indigenous perspectives. For example, the central concept of ‘signs of change’ demonstrates linkages (network path links) within the network (Table 4). The network path links suggest that the theme of seasons and weather, as an Indigenous perspective is something more than looking at weather maps, measuring the temperature and rainfall².

Table 4: Signs of change links

<table>
<thead>
<tr>
<th>Central Concept</th>
<th>Network Path Links</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs of change</td>
<td>Animal types, temperature, animal reproduction, rain, wind, plant types, storms, characteristics, patterns, traditional knowledge, season names, plant growth, insects, rain, human activity, observations, animal behaviour, flowers, animals, food</td>
</tr>
</tbody>
</table>

To further investigate the interrelationships between the science presented in the Western school curriculum and Indigenous perspectives, a science theme centrality comparison (Table 5) was developed. The comparison uses the top 10 ranked centrality nodes from each of the six science themes.

2 The other five themes were analysed using the same methodology. These have been omitted here; however the authors are willing to share these visualisations.
Table 5: Science theme centrality comparison

<table>
<thead>
<tr>
<th>Theme Networks</th>
<th>Astronomy</th>
<th>Ecology</th>
<th>Plants</th>
<th>Seasons &amp; Weather</th>
<th>Use of Nat. Resources</th>
<th>Animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>beliefs</td>
<td>land</td>
<td>food</td>
<td>season name</td>
<td>food</td>
<td>animals</td>
<td></td>
</tr>
<tr>
<td>patterns</td>
<td>animals</td>
<td>medicine</td>
<td>characteristics</td>
<td>animals</td>
<td>hunting</td>
<td></td>
</tr>
<tr>
<td>stars</td>
<td>habitat</td>
<td>seasons</td>
<td>seasons</td>
<td>plants</td>
<td>food</td>
<td></td>
</tr>
<tr>
<td>moon</td>
<td>land</td>
<td>trees</td>
<td>signs of change</td>
<td>medicine</td>
<td>insects</td>
<td></td>
</tr>
<tr>
<td>relationships</td>
<td>stories</td>
<td>administrating</td>
<td>patterns</td>
<td>land management</td>
<td>dreaming</td>
<td></td>
</tr>
<tr>
<td>seasons</td>
<td>ceremony</td>
<td>leaves</td>
<td>rain</td>
<td>seasons</td>
<td>skins</td>
<td></td>
</tr>
<tr>
<td>stories</td>
<td>diversity</td>
<td>seeds</td>
<td>human activity</td>
<td>fire</td>
<td>fire</td>
<td></td>
</tr>
<tr>
<td>dreaming</td>
<td>food</td>
<td>gathering</td>
<td>temperature</td>
<td>gathering</td>
<td>art</td>
<td></td>
</tr>
<tr>
<td>food</td>
<td>art</td>
<td>eucalyptus</td>
<td>food animals</td>
<td>kangaroo</td>
<td>kangaroo</td>
<td></td>
</tr>
</tbody>
</table>

This table presents a number of the terms/concepts that are repeated in two or more of the themes. These are indicated in bold and italics are used to highlight the terms considered to be potential Indigenous knowledge. The comparison of the identified centrality measured top 10 concepts and terms indicates interrelatedness across the science themes. This interrelatedness is further investigated as a meta-network.

Stage 3: Meta-network visualisation

A meta-network is defined as a representation of a group of networks (Carley et al., 2013) that aggregates all node links from the identified six school science themes into one network: the meta-network. Visually this is a very complex and is not presented here, however the centralities represented in the meta-network were also calculated and are displayed in Table 6.
Table 6: Meta-network centrality

<table>
<thead>
<tr>
<th>Rank</th>
<th>Concept</th>
<th>Centrality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Food</td>
<td>0.059</td>
</tr>
<tr>
<td>2</td>
<td>Seasons</td>
<td>0.053</td>
</tr>
<tr>
<td>3</td>
<td>Animals</td>
<td>0.053</td>
</tr>
<tr>
<td>4</td>
<td>Land</td>
<td>0.030</td>
</tr>
<tr>
<td>5</td>
<td>Ceremony</td>
<td>0.029</td>
</tr>
<tr>
<td>6</td>
<td>Stories</td>
<td>0.026</td>
</tr>
<tr>
<td>7</td>
<td>Dreaming</td>
<td>0.023</td>
</tr>
<tr>
<td>7</td>
<td>Land management</td>
<td>0.023</td>
</tr>
<tr>
<td>7</td>
<td>Plants</td>
<td>0.023</td>
</tr>
<tr>
<td>8</td>
<td>Fire</td>
<td>0.022</td>
</tr>
<tr>
<td>9</td>
<td>Art</td>
<td>0.021</td>
</tr>
<tr>
<td>10</td>
<td>Medicine</td>
<td>0.020</td>
</tr>
</tbody>
</table>

The centrality here indicates a high level of interconnectedness between many nodes, some of which are inclusive of Western and Indigenous knowledge while others are exclusively Indigenous. This interconnectedness would suggest that an Indigenous perspective from the pre-service teacher perspective is a network of Indigenous and Western school science curriculum knowledge.

To further investigate this claim the meta-network was reduced in complexity by developing a ‘sphere of influence‘ visualisation constructed from the five most central concepts from each theme. Everett and Borgatti (2005) validates this approach by suggesting that centrality is a local property in a network, and within a sphere of influence network the centrality is the same as the network. The sphere of influence network visualisation for the meta-network is represented in Figure 5.

Figure 5: Sphere of influence network

This representation reinforces the notions of interrelatedness between the Western school science and Indigenous knowledge.
Discussion

The student visualisations have demonstrated complex interrelationships between school science and Indigenous perspectives through the six school science themes: Seasons and Weather, Astronomy, Ecology, Plants, Animals and Use of Natural Resources. Network analysis of the school science themes demonstrates these six themes are interrelated within and between themes. The interrelationship presented by the pre-service students indicates a strong interdisciplinary sense of aspects of the school science curriculum.

The Australian Curriculum: Science (ACS) presents content as Science as Understanding in four sub-strands: Biological, Chemical, Earth and Space, and Physical Sciences (ACARA, 2015). The content is then dissected by year level. Another strand of ACS describes Science as a Human Endeavour.

The Seasons and Weather network represents a system approach, where plants, animals, Indigenous knowledge and human activities are linked to characteristics, patterns, signs of change and observations. The network analysis brings together Biological Sciences (with its focus in living things and the environment: external features, growth, life cycles, structural features, physical conditions) and Earth and Space Sciences (with the concept of change – daily, weather, seasonal – observable over time on land and in the sky). The linking presents a decentralised network of interconnected concepts that join together the Science as Understanding sub-strands of Earth and Space Science and Biological Science into a relational view of the world that provides pedagogical space for interactions across the sub-strand boundaries. This pattern is repeated across the other five theme networks. In addition, in Chemical Sciences, natural and processed materials and physical and chemical changes are represented across Plants, Animals, Use of Natural Resources and Ecology networks.

The themes also represent a view of Western school science as Science as a Human Endeavour (ACARA, 2015), where the students' understanding of science and Indigenous perspectives seeks to 'improve their understanding and explanations of the natural world'. The emergent networks derived from the pre-service teachers of science, demonstrate a conceptualisation of the natural world as connection between the disciplines based knowledge of science, the physical world, the human world and a sacred world of Indigenous ways of knowing and being.

The meta-network constructed from all the themes presents a decentralised relational knowledge visualisation that makes no distinctions between the disciplines based knowledge of western school science, the physical world, the human world and a sacred world. The premise of Indigenous perspectives as relational knowledge was tested through the sphere of influence. This visualisation again reinforced notions of connectivity through a decentralised network.

In considering space science, as an example, the ACS content descriptions (ACARA, 2015) present space science as observable changes in the sky, Earth's rotation causing regular changes, predictable phenomena on Earth, including seasons and eclipses, are caused by the relative positions of the sun, Earth and the moon. However, the analysis would suggest a wider conception space science that includes Biological and Earth sciences where the sun, moon and stars linked to beliefs, patterns, characteristics and change with recognition of the centrality of ceremony, land, human activity, seasons and food, plants and animals. The two representations are not diametrically opposed, but intertwined through notions of human endeavour.

The depiction of this aspect of the meta-network suggests a more holistic interdisciplinary view of the natural world. What is clear is that students’ perceptions present a decentralised knowledge network that links school science concepts, Indigenous knowledge and culture.

The ACS presents pre-service science education students with compartmentalised curricula and maintains the reductionist view of knowledge of science. There is however, a space that develops in the current curriculum that allows pre-service students and teachers to consider the relationships between the moon, sun, beliefs, seasons, insects and medicine, as evident in the sphere of influence network. This space is the 'overarching ideas'.

The overarching ideas of science as presented in the ACS (ACARA, 2015) are key aspects of a scientific view of the world that bridge knowledge and understanding across the disciplines of science. There
are six of these ideas: patterns, order and organisation; form and function; stability and change; scale and measurement; matter and energy; and systems. The notions of bridging knowledge across the science disciplines provide a space for pre-service and practicing science teachers to reconceptualise the official knowledge in the school science curriculum and so the possibility of validating a holistic view of discipline-based knowledge of science, the physical world, the human world and a sacred world of Indigenous knowledge.

The six theme networks and the meta-network constructed from student concept maps present an interconnected approach to curriculum. Where knowledge is connected in ‘not so clear’ boundaries between school science and Indigenous knowledge is evident. This system of interconnections can be exemplified by examples from the meta-network, for example; between insects and seasons there are links, but the path links also connect with medicine, environment and animals. Such path links, from a pre-service student perspective indicate a direct association between these concepts/knowledge or more broadly earth science, biology and ecology to use a reductionist view. This research presents concepts and knowledges as a part of a connected curriculum system that provides for a more holistic view of the school science curriculum.

The overarching idea of patterns, order and organisation, stability and change along with the fundamental science principles of observations, patterns, characteristics and signs of change are strongly represented in the links demonstrated by the pre-service students. The students present a relationship between Indigenous knowledge and school science based in a borderless intercultural view of the world. The research indicates that concepts like observation, patterns and signs of change are not the prerogative of reductionist school science, but are a more systemic holistic principle of the human engagement with the world.

What is also recognised is that the themes relate to the human endeavour and place in the world where local contexts, knowledge of place provide an over-arching link to the world. This is in contrast to the universality attributed to science knowledge presented in the current science curriculum. The relationships uncovered in this research develop a holistic focus that presents an interpretation of how the world is relational and more particularly, how the local world can be understood.

**Conclusion: understanding of Indigenous perspectives**

Examination of the networks developed from the pre-service teachers of science provided us with a refreshing view of the students’ understandings. Some of the visualisations provided complex and sophisticated Indigenous perspectives, nuanced through the structure of the visualisation itself. Students apparently considered Indigenous perspectives beyond the stereotypes encountered previously (e.g. Ninnes, 2000), as exemplified by the measures of centrality and high levels of linkage between the six themes that bring a richness of connectivity to Western school science knowledge with concepts of Indigenous knowledge and culture.

That the students identified only six areas of school science is not considered a limitation but rather the realisation that Indigenous perspectives in the science curriculum do not apply across all content description. There are content descriptions where Indigenous knowledge can and should be examined, and that it should not be tokenised or stereotyped through attempts to be forcibly integrated, a situation also recognised by Aikenhead et al. (2014). What is notable is that the topics chosen related to the local and every day: place-based knowledge, rather than universalised Western school science topics. Also, there was no engagement with the stereotypical physics topics such as gyroscopes and boomerangs, or levers and spear-throwers.

There is little evidence that the pre-service teachers of science education have taken a ‘two disparate’ worldview position that has been previously outlined. Some students did present their visualisations as a binary school science and Indigenous knowledge perspective. However, the majority of the students perceived an Indigenous perspective in science education as an interrelated human endeavour interacting with the natural world where the two worldviews coexist with one informing the other.
References


Towards an understanding of Indigenous perspectives through the eyes of pre-service science education students

Gregory Smith and Michael Michie


Too many ‘two-ways’? ‘Gäwa is a two-way school’: clarifying approaches to remote Northern Territory Indigenous education

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Keywords: two-way education; Yolŋu ‘bothways’ philosophy; bilingual education

Abstract

The expression ‘two-way’ teaching and learning has a long history in the Northern Territory in relation to remote Indigenous education. However, it is not applied with any degree of consistency; the term ‘two-way’ functions as a summary expression for a diverse array of pedagogical approaches. This article presents qualitative research from the remote, Yolŋu ‘homeland’ community at Gäwa in north-east Arnhem Land as Indigenous first-language, case-study data. It also aims to disambiguate ‘two way’ models as current community aspirations are compared with historical policies and applications of ‘two-way’ approaches from across the Northern Territory. These include Indigenous perspectives, Indigenous learning-style, team-teaching, bilingual education, ‘bothways’ education and domain separation.

Introduction

In the Northern Territory, 110 out of the 151 Department of Education schools are situated in remote or very remote areas, 44.4% of the student population is Indigenous, 48.8% come from a language background other than English (Department of Education, 2016) with over 100 distinct Indigenous languages functioning as first languages (Northern Territory Government, 2017). Historically, educational approaches have often been associated with the expression ‘two-way’ teaching and learning. Although in the Northern Territory the phrase ‘two-way’ is a rich source for research, both in terms of pedagogical theory and practical implementation, it is also a confusing and contested domain. A crucial complication concerns the fact that in the academic sphere, quite different approaches to teaching utilise the same ‘two-way’ epithet. Indeed, even in meta-data analyses, confusion around ‘two-way’ is evident. The Menzies Health Report (Silburn et al., 2011) notes at least four completely different meanings for the term ‘two-way’ and opens with an extensive (and at times overlapping) glossary of relevant terms. But even it asserts that ‘the term ‘Both-ways’ has been used for some time in the Australian context as a synonym for ‘Two-way’ (Harris, 1990)’ (Silburn et al., 2011, p. 24), thus conflating ‘bothways’ education and domain separation (Harris’ book) into one concept. As will become apparent, these are related but distinct ‘two-way’ approaches. A similar example concerns a ‘grey-literature’ report regarding Indigenous pre-service teacher education where it was asserted that ‘the term two-way education and both-ways education have been used interchangeably throughout much of the literature and have in essence the same meaning’ (Bat & Shore, 2013, p. 9). Although the first statement is undoubtedly true, the second is clearly not; ‘bothways’ has a rich and complex intercultural meaning not apparent in various other ‘two-way’ iterations. Thus, this paper will present qualitative findings from research at Gäwa and link these local responses to a process of disambiguation between the various ‘two-way’ approaches. It is hoped the findings and clarification process might facilitate further empirical, action-based, case-study, first-language research so desperately needed (Silburn et al., 2011, p. 25).

Context and positionality

In 2009-2010, I lived at Gäwa, a small (40-50 resident) Yolŋu homeland community on Elcho Island, north-east Arnhem Land. Gäwa is an ancestral estate of the Warramiri clan of the Yolŋu conglomerate
and is situated at the northern tip of the island, a rough 70 km drive from the township and ex-Methodist mission of Galiwin’ku. In the 1990s, a movement to literally return-to-country arose where Warramiri Elders and their kinship networks cut a road through the bush and progressively established water supplies, houses and a school to enable their traditional, intergenerational transmission of culture and language to continue (Nungalinya College, 2017). It is an inspiring story of vision, resilience and persistently fighting for educational equality (Harris & Gartland, 2011). Despite the age of declining resourcing and funding for bilingual education (Devlin, Disbray & Devlin, 2016), Warramiri Elders’ great passion is for their children to retain their traditional heritage whilst also receiving a full ‘mainstream’ education (Guthadjaka, 2013). As a balanda (white) teacher, I began teaching from what I knew of EAL/D best practice, utilising the (then) new Australian Curriculum, but was also encouraged to incorporate local language and cultural knowledges as both balanda staff and Yolŋu explicitly informed me; ‘Gäwa is a “two-way” school’. In essence, the current research is a reflection on my five-year journey to ascertain what (in theory and practice) that sentence really means. Back in 2009, I was quickly drawn into team-teaching with Elder Kathy Guthadjaka, incorporating Warramiri and Djambarrpuyŋu (the Yolŋu lingua franca of the area) into the curriculum. I came to deeply appreciate the depth and vitality of Warramiri ‘Language and Culture’, and marvelled at the resources Guthadjaka had researched and compiled to pass on this knowledge. Over the years 2011-2016, we began collaborating on the theorising and structuring of the ‘Warramiri website’ to both house these resources and reflect on how Yolŋu may take up or resist/reposition digital technologies (van Gelderen & Guthadjaka, 2017). As is customary with long-term involvements, I was also adopted into the Yolŋu kinship system at Gäwa and was expected to take the reciprocal rights and responsibilities seriously. Thus, in becoming connected to the Warramiri-Djambarrpuyŋu yothu-yindi1 dynamic, in all of life (including research), I was bound to both honour Yolŋu methodologies and social dynamics whilst utilising my skills and expertise to further community aims; a form of ‘double participation’ (Christie, 2013b, p. 54). Furthermore, some bias is evident in my positionality as I lived and worked at Gäwa in 2009 at the height of the controversy surrounding the Department of Education’s ill-fated ‘first four hours in English’ regime (Devlin, 2009), and this time undoubtedly tainted my approach to the literature review of previous departmental policies and funding decisions. Also, during the research period I began employment at Charles Darwin University, but maintained strong links with the Northern Territory Christian Schools (NTCS) system which officially oversees the Gäwa school. However, despite being aligned with the overall philosophy of NTCS and appreciating the autonomy the system offered at Gäwa, I was also cognizant of the fact that no formal policies existed around language and cultural pedagogies, leaving the community in a potentially vulnerable position, depending on the understanding and preferences of future generations of balanda teachers. Therefore, from a multi-layered insider/outside positionality, the research aim was to formally record community members’ philosophies and pedagogies concerning ‘two-way’ education, both to directly shape the website formation and to assist the creation of formal school policies so future balanda teachers could best partner with the Gäwa community in maintaining their educational priorities.

Literature review

The expression ‘two-way’ teaching and learning is used to connote a diverse range of approaches to pedagogy, curriculum content, language use and organisation of schools in the remote, Indigenous education sphere. Despite its popularity, it is now probably ubiquitous to the point of losing genuine analytical value and, at worst, has degenerated into summarising almost any bureaucratic attempt at ‘cross-cultural consultation’ in Indigenous communities (Ford & Klesch, 2003, p. 33). Nevertheless, a number of distinct approaches can be identified with direct relevance to the Gäwa community.

Indigenous perspectives

In 2018, ‘Indigenous Perspectives’ is somewhat of a mis-nomer as the official ACARA (2010) terminology has been altered to ‘Aboriginal and Torres Strait Islander histories and cultures’. This is certainly an

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1 The ‘mother-child’ kinship is fundamental in the Yolŋu patrilineal, exogamous clan system. Adopted as son to Elder Kathy Guthadjaka, I was Djambarrpuyŋu affiliated, not Warramiri, but ‘there is always a connection between a yolŋu yothu and its yindi, there is always a connection between a yothu piece of land and its mother land’ (Manika, Đurruwutthun, & White, 1989, p. 19).
improvement, although the substantive content and positioning remains unchanged, and as of 2013 (when the research began) ‘Indigenous Perspectives’ was the term utilized. Although not deemed a ‘two-way’ approach, the ‘cross-curriculum’ priority area is the national standard and expectation and is therefore worthy of initial consideration. As one of the three ‘cross curriculum’ priorities, Indigenous Perspectives is a mandatory aspect of the curriculum, but only as relevant to other subject areas such as History and Social Sciences, English, Maths etc.; it ‘is a priority, but it is just not a priority when the main priority is to shape up a national curriculum that will be accepted by all the stakeholders’ (Nakata, 2011, p. 1). Notwithstanding the long connection to bilingual schooling and other initiatives, over the last decade the Department of Education (DoE), Northern Territory policies have enacted this more ‘one-way’ approach. Having softened from the mandatory ‘first-four-hours-in-English’ (Devlin, 2009), in the early years of this decade there was still an emphasis on English being predominantly used as the instructional language in the ‘prime time’ (first four hours) and Indigenous first languages only used to support this English teaching through ‘introducing’ concepts (DET, 2011a, p. 2). If a specific community wished their children to be literate in their own language, the Department supported this by allowing use of school facilities ‘after hours’ (DET, 2011a, p. 2). Post the Wilson Report (2014) prevailing DoE policies are not as available and/or are still in development as part of the Indigenous Education Strategy, 2015-2024. However, the full breadth and depth of the Australian Curriculum is now mandatory and it has been argued that the English literacy, standards-based reform platform has re-established a Foucauldian ‘regime of truth’ in the Northern Territory of Indigenous identity as disadvantage (Vass, 2013). Gäwa is one of the very few non-Departmental, remote schools and therefore does not fall under its policy jurisdiction. Its isolation, small size and independence undoubtedly shields the community from some of the impacts of this rhetoric, but new balanda teachers are not immune to the prevailing ‘definition of educational success measured by comparison of Indigenous and non-Indigenous scores on standardised literacy and numeracy tests’ (Disbray, 2016, p. 237). Furthermore, as alluded to, new balanda staff are almost always drawn from larger southern cities, conversant with the ACARA expectation, and typically from Christian school environments whose theological underpinnings may not support integration of Indigenous culture into curriculum development. Suffice it to say, any ‘two-way’ teaching and learning approach may challenge established beliefs and pedagogies, again demonstrating the need for explicit research on Gäwa community aspirations.

Indigenous learning style

Two way teaching is characterised by the incorporation of more “Aboriginal way” pedagogy, including more negotiation, collaborative group work, problem solving, integration and hands-on activities. (Education Department of Western Australia et al., 2000, p. 10)

Once again, in 2018, the term Indigenous ‘learning style’ has become contentious to the point of abandonment, and ‘culturally responsive pedagogies’ (CRP) are much more relied upon (Perso & Hayward, 2015). However, it is relevant background to the research at Gäwa as the approach still has some national application2 and the historical theory behind much of this definition of ‘two-way’ education is to be found in Harris’ (1984a) early work at the Yolŋu community of Miliŋinbi. A pedagogical framework slowly evolved which positioned the Indigenous and ‘western’ approach as quite opposed to each other, requiring teachers to rethink their own deeply held (but culturally determined) beliefs about teaching. In fairness, a learning style appreciation was never intended to replace scaffolded teaching patterns which involved bridging across to more formal ‘western’ styles (Harris, 1984b). Nevertheless, the concept came under increasing attack as academics argued that the paradigm created stereotypes and eventuated in political disengagement (Nicholls et al., 1998). Nakata (2002) also questioned the binary nature of the ‘western’ versus Indigenous style duality, maintaining this was the major cause of policy ‘headache’. After all, how can schools possibly pursue cultural maintenance and parity of mainstream outcomes if the one detracts from the other? A generally accepted consensus (What Works, 2011) is that there is no distinct Indigenous learning ‘style’, just as there is no distinct Indigenous ‘culture’. Nevertheless, the reimagined interpretation of the Indigenous ‘learning style’ approach as culturally responsive pedagogy still asks teachers to alter their own teaching methods by aligning them with the most appropriate practices

2 Yunkaporta (2009) argues that there is much synergy between ‘high’ Indigenous and Western teaching and learning approaches, and his ‘8-Ways’ approach is popular in schooling and tertiary education settings.
to effectively teach Indigenous students; learning to build pedagogy informed by local, traditional methodologies.

Team teaching

The Two Way Approach occurs when representatives of both Aboriginal and non-Aboriginal people are involved in the education process, providing a balanced or Two-Way perspective on all aspects of schooling. (Bevan & Shillinglaw, 2010, p. 13)

Team-teaching is not a theoretical position as such, but an attempt to use the practical, daily realities for the greatest impact on student learning. In most Northern Territory remote schools, there is both a qualified teacher and another responsible adult, usually a local community member, working in each class. Names include Assistant Teacher, Teacher Assistant, Teacher’s Aide, Tutor and Indigenous Education Worker depending on qualifications and school preferences. But the common factor is the presence of two people working side by side; literally a ‘two-way’ dynamic. Thus, team-teaching can be used in conjunction with approaches as diverse as First-Four-Hours-English, to full bi-literacy. Despite this variety, there is significant historical precedent concerning team teaching and bilingual education (Devlin, Disbray & Devlin, 2016). Indeed, in the decade preceding the formal adoption of bilingual education in the Northern Territory, many Mission schools employed local Teacher Aides with associated recognition and in-service training (Harris, 1975) to assist in classroom teaching. And after the call from Kinslow-Harris (1968) to value the ‘vernacular’, the approach was officially endorsed as foundational to the pilot bilingual programs of the early 1970s; time was set aside each day for planning, with explicit acknowledgement that the qualified teacher would also ‘need help in understanding and achieving competence in his/her role as teacher educator and in establishing supportive relationships with the Aboriginal member of the team’ (Watts, McGrath & Tandy, 1973, p. 36). Later, it was the work of Beth Graham (DEET, 1986) who built on this model, outlining the three distinct phases; Planning together, Teaching together and Learning together. In time, team-teaching became another approach linked to the phrase ‘two-way’.

Bilingual education

In the Northern territory, the terms ‘bilingual education’ or ‘Two-Way’ learning are used for ‘mother tongue medium’ programs, that is, programs where children are taught for the first few years of school by teachers, or teams of teachers who use the children’s home language to teach them. (Simpson, Caffery & McConvell, 2009, p. 9)

As we have seen already, the bilingual approach is certainly not the only concept referred to as ‘two-way’ learning. Nevertheless, this does remain the most dominant and controversial definition. Undoubtedly, this is due to the Northern Territory government’s decision to formally change the name from ‘Bilingual Education’ to ‘Two-Way Learning’ following the recommendations of ‘Learning Lessons’, the 1999 review of Indigenous education (Collins & Lea, 1999). Thus, it is not surprising that for many, bilingual education is synonymous with ‘two-way’ education. But to be precise, even within the bilingual approach there are a number of models, depending on whether first language literacy is incorporated or only oral language development, and whether (and how) a ‘step’ model is implemented; with teaching in English gradually increasing in percentage each year as the language of instruction (Devlin, 2011). Indeed, as a specific area of historical educational research, it is a powerful example of the interplay (or lack thereof) between government policy development, pedagogical theory and actual data/evidence supporting rationale for change (Devlin, Disbray & Devlin, 2016). But for present purposes, we must leave aside this theoretical framework, the complexities of language maintenance vs language revival and whether there was any justification to downscale support (Devlin, 2009; 2010, Simpson, Caffery & McConvell, 2009). However, it is important to note that Yolŋu communities have a long connection with advocacy in this area. Milinjinbi, Yirrkala and Galinwamku, coming out of relatively Language-friendly Methodist Mission policies (Berndt & Berndt, 1988), and aligning with their own multilingual kinship structures3, established formal bilingual

3 Traditionally, Yolŋu first learned their mother’s language as an infant and then progressed to their father’s (and own) language which was always from the other moeity (duhuwa or yirritja).
schools in the early 1970s (McKenzie, 1976). Indigenous educators speaking various Yolŋu languages were early supporters in maintaining that Language learning was a top priority (Manydjarri, 1973; Bakamana & Djuwandayŋu, 1978). Shepherds College at Galwin’ku (only 70km from Gäwa) retains a step-model approach. The Annual Operational Plan 2011 recorded a clear teaching goal as ‘improvement in reading and writing in Yolŋu Matha’ (DET, 2011b, p. 2). To this end, the Literacy Production Centre (LPC) is a key component of such a strategy, producing resources in Djambarrpuyŋu for use as class texts and individual readers. The issue is complicated by the fact that there are many Yolŋu languages spoken at Galwin’ku and ‘in response to the community’s desire for their young people to learn Yolŋu languages other than Djambarrpuyŋu’ (Hall, 2016, p. 315), separate ‘dialect’ programs have functioned sporadically since the late 1980s. In fact, this specific need was one of the reasons Gäwa school was established in the first place and became a key focus of our ongoing research with the website; that Warramiri could live and learn on their ancestral estates, maintaining a distinct Warramiri identity (Guthadjaka, 2013).

‘Bothways’ education

Two-way in the sense of an exchange between Europeans and Aborigines involved... the ‘two-way’ alternative here is based on the concepts of a two-way flow in reciprocity and exchange between groups. (McConvell, 1981, p. 62)

Although the formal Bilingual education policy was the most well-known, from the early 1980s there were moves to establish an even more radical platform; an intercultural school system. In fact, the first academic mention of the phrase ‘two-way’ in the Northern Territory context (as above) had this deeper epistemological exchange idea in mind. To some extent the concept was introduced in contrast to bilingual education and was positioned as a ‘grassroots’, Indigenous initiative (Wearne, 1986). A ‘two-way’ school would involve learning the ‘three Rs’, but would also focus on the passing on of traditional language and cultural content knowledge. Moreover, the school would acknowledge existing Indigenous epistemologies and processes of negotiation; ‘knowledge will only come together if there is respect for our knowledge and where Aboriginal people are taking the initiative, where we shape and develop the educational programs and then implement them’ (Wunuŋmurra, 1989, p. 12). This challenge of genuine integration seems to have evolved independently in a number of Northern Territory locations and was taken up academically in the late 1980s by Indigenous educators. Many reiterated the concept of ‘two-ways’, utilising traditional understandings to reveal local metaphors describing the mixing of two cultures and learning philosophies. Yolŋu leaders often took the initiative and spoke in public forums and articles about gaṉma (Marika, Ngurrwuthun & White, 1989), galtha rom (Marika-Mununggiritj & Christie, 1995), garna (Marika, 1990), nathu (Yunupingu, 1994), to name some of the most famous. Such works are deep and profound considerations, worthy of their own individual analysis (Christie, 2007). But as an inadequate synthesis, they are concerted attempts to both engage with western educational frameworks, but to attain balance by appropriating such frameworks into the pre-existing Yolŋu epistemological and inter-clan, moiety and kinship relational processes, all to create spaces to design and implement curriculum. It was ultimately a question of power: ‘what we want is BOTH WAYS education- balanda and Yolŋu ways- but we want Yolŋu to have control over both sides of the curriculum’ (Yunupingu, 1989, p. 4). Thus, Yolŋu educators have been clearly advocating ‘a bicultural or ‘bothways’ education for aboriginal children’ (Lanhupuy, 1988, p. 3) for many years, the metaphors highlighting not just that both knowledge and cultural systems are represented in the curriculum, but that they are integrated together into a holistic, synthesised learning environment. ‘Bothways’ also focusses on the power dynamics of decision making; emphasising a practice of relational discussion, negotiation and consensus to all matters of school curriculum, pedagogy and language use. It is surely a paradigm for working within the ‘cultural interface’ (Nakata, 2007), where critical analysis of both Indigenous and ‘western’ knowledge traditions is key, of providing ‘language and tools for navigating, negotiating, and thinking about the constraints and possibilities that are open’ (Nakata et al., 2012, p. 133). Thus, ‘Bothways’ ‘two-way’ education is more than giving a space for Indigenous concerns to enter the curriculum; it is a negotiation of the curriculum itself as an intercultural domain. At Gäwa, the ‘Bothways’ philosophy has been consistently reaffirmed by Guthadjaka who has shared her own, Warramiri clan-based metaphors in various academic forums (Guthadjaka, 2010; 2010b; 2012; 2013).
Domain separation

A last twist is found in Harris’ book *Two-Way Aboriginal Schooling* (1990). He argued that even in functioning bilingual schools, the ‘hidden curriculum’ of mainstream education undermines Indigenous values and norms in a range of ways. Furthermore, the two domains of Indigenous Knowledges and ‘Mainstream Culture’ are so different, there was need for ‘separate places for teaching, separate bodies of content and separate teachers for each culture domain’ (Harris, 1990, p. 14). It was certainly never intended as a one-size-fits-all framework, but a delineation which would allow Indigenous educators to pursue important community goals, while mainstream teachers could focus on the mandated curriculum without any misgivings. Thus, schools overall (comprised of classes, teachers and timetables) would function as two, distinct ‘domains’. Despite being broadly researched, the ‘domain separation’ approach was criticized as over-stepping the original ‘two-way’ intercultural approach (McConvell, 1991; 1994). However, Noel Pearson advocates for something quite similar as part of his Cape York Institute: students to ‘orbit’ between the two worlds of their Indigenous roots and the Mainstream, the practical strategy for schools to establish a ‘domain (to) be called “Class” (to) be clearly separate from another domain, “Culture” and that early morning to early afternoon be dedicated to explicit instruction in basic numeracy and literacy’ (Pearson, 2009, p. 71) via the ‘Direct Instruction’ model. Following this initiative, the ‘Direct Instruction’ approach was rolled out to nineteen remote Indigenous schools in the Northern Territory in 2016. Whether schools also maintain/reinvigorate the ‘Culture’ domain remains the moot point in terms of ‘two-way’ applicability.

Methodology

The methodological framework was inspired by the fact ‘Indigenous peoples have the right to establish and control their educational systems and institutions providing education in their own languages, in a manner appropriate to their cultural methods of teaching and learning’ (United Nations, 2008) and relied upon the critical Indigenous qualitative research field, mandating the genesis, accountability and evaluation of any research be undertaken by the local Indigenous participants (Denzin, Lincoln & Tuhuiwai Smith, 2008, p. 2). But even within the Northern Territory context, profound language and ontological/cosmological differences exist between Indigenous communities. Fortunately, in this regard, significant work has been undertaken by Christie and others in collaborative research with Yolŋu communities specifically, over many years at Charles Darwin University^4^. We relied explicitly on the methodological framework generated through these research projects. As a synthesis, key principles included notions of *transdisciplinary* research across knowledge systems, acknowledging that all research in Indigenous contexts is characterized as ‘some of this and some of that at the same time’ in terms of Indigenous researchers and non-Indigenous ‘negotiating rules of engagement, evidence and validation’ (Christie, 2006, p. 81). Research must be *generative* in terms of contesting ‘the role of judging observer…(instead) the researcher is an engaged observer, and works to generate change practices through the research position’ (Christie, 2013, p. 3), and socially *conscientious*, as ‘the academic tradition comes with its sealed package of epistemic criteria based upon reason. But Yolŋu often judge truthfulness in research through other criteria to do with... agreement in good faith’ (Christie, 2009, p. 32). The essence of the approach exhorts researchers to take seriously and accommodate local Yolŋu methodology as part of the research process itself. This may make the research more complicated, but ‘this messiness is something to be accepted and examined; it is productive’ (Christie, 2006, p. 82). Therefore, it was crucial to maintain and reflect upon the Warramiri Elders’ explicit instruction around genuine community consultation (which involved each and every adult resident of Gäwa community, including *balanda* teachers), as opposed to more typical ethnographic expedient, purposeful or even probability selections (Freebody, 2003, p. 78). However, conversely, we needed to abide by the maxim of Yolŋu decision making concerning the ‘right people talking to the right people in the right place at the right time in the right order’ (Christie, 2013b, p. 49). Thus, though there were various interviews throughout the project, it was not a foundation of ‘epistemic equality’ (Christie, 2013b, p. 49); the meetings with Kathy Guthadjaka as acknowledged

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Warramiri educational expert and Elder, James Wäluŋ Bukulatjpi (Ceremonial Custodian) of the Warramiri, and the wuḻman (‘old man’) of the Wangurri were paramount. Practically, I have chosen to represent this in the findings by foregrounding a quote from Guthadjaka, Wäluŋ or wuḻman, then reflecting on the shared nuances or lack of alignments with the other Gäwa community members.

Another important application of this framework was to conduct all the interviews in specific clan Yolŋu languages, even when my language skills were largely only in English and Djambarrpuyŋu, because ‘sticking to your own language is a sign that you are taking your ancestral responsibilities seriously and can speak on behalf of land’ (Christie, 2013b, p. 47). Subsequently, the interview process was slightly more stilted, but having lived with almost all of the Yolŋu participants over a number of years in a very small community, such code-switching, multilingual conversations were normal practice. The process of transcription and translation (undertaken by me with Warramiri Elders and Yolŋu Studies lecturers’ support) was lengthy, but crucial in honouring first-language priorities. The process also necessitated later conversations, reformulations and informal meetings at Gäwa and Darwin; thus embodying another key principle; ‘to work slowly and allow new ideas and practices to emerge here and how, and grow slowly through mutual respect and a history of shared experience’ (Christie, 2009, p. 32). From the generative viewpoint, the on-going work (begun in April 2017) of assisting the current balanda teachers/ principal in implementing the priorities and vision outlined in the research is perhaps most important of all, and is referenced where appropriate throughout the subsequent sections. Practically, the research involved interviewing and recording twelve adult community members at Gäwa (and five Elders from closely related clans) in July, 2013 as semi-structured interviews. Overall, the methodological process was envisaged as a ‘two-way’ process itself whereby Yolŋu and western-academic traditions were honoured, both to precisely position the pedagogical emphases for future teaching practice at Gäwa and to establish terminology to facilitate further transdisciplinary research in remote Indigenous Australia. Ethics clearance for the research was obtained through the Charles Darwin University Human Research Ethics Committee in 2012.

Data and discussion

Indigenous perspectives

Guthadjaka: This is what Yolŋu are seeing-balanda see education one way and Yolŋu another way. They (Yolŋu) don’t see just one way that is separate, just like that. It can be taught at home, or it can be taught at school- the same knowledge. It’s important they learn in the heart, not just the mind. If you teach just the mind, it separates you. If you are taught how to feel on the inside about your home, people, how to help people, then your family will truly grow.

The interview questions were designed to be as broad as possible to allow individuals to focus on their passions. And it is clear that the priorities are broad for what education truly entails, and that Warramiri children are to be taught holistically. Or positioned the other way around, there is an implied concern that mainstream balanda educational practice forces a dislocation for Warramiri children. This dislocation is literal in the sense of compartmentalising school versus home, and also figurative in relation to ‘head’ knowledge versus the ‘heart’. There is also a form of progression revealed in that children who are taught identity (about your home, people) and an ethical framework (how to help people) will then succeed and prosper (your family will grow). In one sense there is nothing new in these statements as Guthadjaka and other experienced Yolŋu have contrasted Yolŋu and balanda educational philosophies in the past during ‘Teaching From Country’ sessions (Christie, 2010). However, this fundamental positioning of education with identity and heritage is a crucial foundation and was certainly supported by other community members who spoke of quality education as:

Working together, both helping, the spirit and the mind, getting wiser, growing up with knowledge.
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Having kids understand who they are, where they come from and value that… that are proud of that… that they understand who they are because of their relationship back to their homeland and their people.

(There should be no) big, ugly division between life at school and life at home. I think there should be a blending of things… and I think it’s healthy that they should. People think that it’s ok to live their lives in departments and we don’t want to see that happening with our kids.

Thus, for Warramiri Yolŋu, education is vital to identity formation, based on the foundation of an integrated, holistic, and whole-of-child commitment. However, there was never talk of a single, generalised Indigenous ‘perspective’, or even for Elders to talk beyond the scope of their own Yolŋu clan, let alone concerning a generic Indigenous standpoint. Indeed, even Wangurri Elders who had been specifically asked by Warramiri Elders to be interviewed, made comments such as ‘You have the ‘old man’ out there at Gäwa. You have all you need to know!’ highlighting the point that due to the highly complex and regulated kinship system, Yolŋu are ‘keen to avoid being held responsible in any way for the management of, and particularly the access to the resources of others’ (Christie, 2007b, p. 33).

Indigenous learning style

Wuḻman: If they (balanda) come in and learn, that’s good. They shouldn’t come in and take-over. If you build the foundation on rock… I built my school like this and when balanda came, they have to work with us and learn.

The wuḻman’s quote emphasises that the new balanda must ‘learn’, but taking in the surrounding conversation, he was mostly referring to ‘learning how Yolŋu learn’. In a similar fashion to the drop-off in ‘learning style’ terminology in academic writings, he did not position this in opposition to balanda, but more highlighted how an appreciation of individual students’ experiences pre-formal schooling and an understanding of their home learning environment was still crucial information for teachers’ classroom planning and practice. Other Gäwa community members did not comment much in this area but referred me to how they had made recommendations for new balanda teachers on this topic previously. Areas highlighted in 2012 included the need to ‘get to know them (the students) very well. There should be much involvement and loving, long-term relationships… teachers also need an understanding of how our manners and customs should function so that they can recognise when the rules are being broken’ and that corresponding ‘raypirri (discipline) should be spoken often and on the spot at every opportunity’ (Guthadjaka, 2012). There was also an emphasis that ‘art is a good place for us to get involved in the school and for building self-esteem and encouragement’ and that ‘we feel at home when we are outside… kids who struggle with long classroom hours could be helped with practical things like Junior Rangers or workshop experience’ (Guthadjaka, 2012). Thus, at Gäwa, the emphasis is again relational focussed, involving appropriate behavioural management, inside-outside classroom balance and contextualised learning approaches.

Team-teaching

Guthadjaka: I want that to happen, for there to be teamwork, to plan together the balanda teacher and the Yolŋu teacher. The balanda will help the Yolŋu Assistant planning, not the teacher working by himself. That’s what bilingual is- both roads, both ways.

From Guthadjaka there is a clear aspiration for team-teaching (as defined in the bilingual era) to be reinvigorated (both roads, both ways), undoubtedly because she was a long-term teacher in previous decades. Balanda teachers and principal expressed a willingness, but also frustration/lack of knowledge as to how, practically, to build this capacity.

Having aides in class is great, just changes so much of what you can do and achieve… I think that’s vital.
We’re always trying to put out the feelers… because they need training, you know. If you’re going to be an aid in the classroom; ‘You want to be in the classroom? Way, yaka manymak!’ (No, no good!) But once they come in for activities, like I had open classroom if you will, with people coming in there, it’s not such a threatening place.

We can’t accomplish this thing that we’re hoping to accomplish on our own, it’s just not going to work without commitment from community and good aides in our classroom space. Not just someone who comes and is around, but who engages in a meaningful way to bring that aspect of community into the classroom. And to assist us to know what we’re talking about to work with it. All those layers that we don’t understand.

The issue of teacher assistants and training is a complex one, and the small numbers of community members at Gäwa is a significant challenge in this area. Encouragingly, the Gäwa Christian School, 2018 Annual Action Plan appropriately responds to this need, investing significant professional development funds into ‘training options for Yolŋu staff… so they can be confident in leading small groups and co-leading whole class lessons… working toward building teaching teams: allocate time, seek commitment from all staff’ (Gäwa Christian School, 2018).

**Bilingual education**

The lack of historical consensus regarding bilingual education was reflected in the responses from Gäwa. Significantly, everyone (both balanda and Yolŋu) supported bilingual education in some form, but how it should practically look was quite varied, and even Guthadjaka seemed unsure of what was the optimum model:

Guthadjaka: Well, it could be 50/50, bilingual can be like that. Or it could be English when they reach... I don’t know nowadays what the percentages are supposed to be. Maybe K (principal) could ask the community; what is the new policy going to be, what path should we take? Bothways or one-way? One way dominant and the other small?

There was a range of responses from other Gäwa interviewees:

**Bi-literacy is a goal that you would set, an end goal. That in the end, kids would be able to read and write just as effectively in their own language as in English.**

For writing at school, reading and writing: Yolŋu Matha. Most kids can talk Yolŋu Matha, but it is important to have Yolŋu Matha learning; reading and writing.

First, start with Yolŋu Matha- should be at home all the time and the school. Then, as you grow, you step into English to get more education.

First the English, with the Yolŋu Matha at home. At home he can learn Yolŋu Matha, at school he can learn English.

Thus, clearly no consensus on bilingual/bi-literacy approaches, even from such a small homeland community. This topic is worthy of its own separate analysis, and, in fact, the area is significantly complicated by the fact that Warramiri literacy (as opposed to Djambarrpuyŋu) is also the aim of Gäwa Elders. We have canvassed some approaches to balancing the Warramiri, Djambarrpuyŋu and English literacy demands elsewhere (van Gelderen & Guthadjaka, 2019), but to demonstrate the further level of complexity of multilingual education in Indigenous communities, some last words from Wäluŋ: 

The kids are only speaking one language, Djambarrpuyŋu, not Warramiri yet. This is a concern. They should be transferring over to Warramiri, both in school and in everyday life. Like having two ‘books’. Often my grandchildren don’t understand Warramiri, they are just Djambarrpuyŋu speakers and sometimes they ask me, ‘Why do you speak Warramiri?’
(Laughing). Yes, the school should do it like that, having Warramiri books.

‘Bothways’ education

As mentioned, Guthadjaka has long championed a Warramiri ‘bothways’ approach, so it was no surprise to record comments from her and others along these lines. Indeed, it was where a clear passion and interest was displayed in interviews:

Guthadjaka: (At school) They should learn the Yolŋu way, about caring for the land, looking after people, respecting the teachers and the other children and whatever other little law there is that they need to know.

Other Gäwa interviewees were also explicit, offering various specific examples:

We need to teach our culture, boys hunting with spears, girls going for shellfish first and then into the bush for yams and other food there. The Elders out there (at Gäwa) they have the knowledge... It’s good to have both; balanda teaching English, Yolŋu teachers teaching Yolŋu.

Yes, cultural aspects; dancing and painting and totems...where they come from. Learn all that in school. Later, when they grow up, the children know and they have to teach their own children the same way.

They should be learning the songs and the stories. They should be taught whatever belongs to there... Wäluŋ should be teaching what belongs to the land at Gäwa.

Yes, all (aspects of) ‘culture’, everything in the school!

Arguably, at Gäwa, the ‘bothways’ intercultural education philosophy can be viewed as the capstone concept for ‘two-way’ education with the other approaches as necessary preconditions. That is, the localised perspective/foundation highlights the holistic nature of Warramiri identity and education which informs a specific teaching and learning ‘style’ emphasis dependant on local child-rearing and traditional methodologies. Turning this from theory to practice is greatly aided by a team-teaching approach whereby local teachers truly plan activities and co-teach classes, a bilingual approach formally utilising this process for teaching First Language and literacy. Finally, the ‘bothways’ philosophy relies on all the aforementioned and enters into the contested space to negotiate curriculum and to integrate traditional knowledge and decision-making processes from whole-of-community priorities. Significantly, proceeding from discussions concerning these research results (and for the first time in the school’s history), in 2018 Gäwa aims to ‘develop a clear, local articulation of what ‘both ways learning’ means in philosophy and practice for our school (in English, Warramiri and Djambarrpuynu)...this will be articulated in the website, staff handbooks, job descriptions and curriculum documents’ (Gäwa Christian School, 2018).

Conclusion

‘Two-way’ terms Indigenous Perspectives, Learning Style, Team-Teaching, Bilingual Education, ‘Bothways’ Education and Domain Separation are not necessarily commonly utilised in research reports. Also, even after such a process of disambiguation, approaches can potentially blur together in practice, depending on school-based contexts. However, clarifying the historical and policy foundations behind each approach certainly aided our research at Gäwa, enabling a triangulation process to identify community aspirations and facilitate further generative policy work to proceed. At Gäwa there exists a desire for all levels, besides domain separation which was not mentioned in any way, despite the small homeland context which would make it quite feasible. Warramiri Yolŋu are emphatic; they desire holistic, but linguistically diverse, integrated education practices to build strong identity. Of course, this is not a new aim: ‘throughout the last 40 years Yolŋu have said consistently that they want their children to learn
both ways, Yolŋu and Balanda’ (Hall, 2016, p. 307). However, it is hoped that the current research will enable balanda policy makers and teachers to better understand and implement this message. As a concluding personal reflection, I am acutely aware that balanda, (with their research, and their policies) come and go; since the interviews, the two balanda teachers and principal at Gäwa have moved on after four years’ service, and this is actually a lengthy tenure for remote, Northern Territory contexts. On the other hand, the Warramiri connection to Gäwa is incredibly long and consistent. But individual Yolŋu also pass away, the wujman from the Wangurri clan the very day after he generously shared his thoughts with me. Out of respect, and due to its powerful summation (and subtle rebuke), I give the last word to him:

You have to decide about what I said earlier, about the teaching, when I’m gone. New generation, new children. They should be learning at home first, and when the school comes, they can work together…. If we have good policy, it will stay there. People won’t come and ask me, it’s already in place.
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Too many ‘two-ways’? ‘Gawa is a two-way school’: clarifying approaches to remote Northern Territory Indigenous education

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Warramiri Yolŋu cosmology: an introduction

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Introduction

Even within the western academic tradition, cosmology is a complex and contested domain; fields of science, philosophy and anthropology all utilise the term in particular ways, to highlight specific concerns. Interactions with Indigenous cosmological theories and practices further stretch and challenge any attempt at an inclusive definition. For present purposes, we have positioned this introduction to Warramiri Yolŋu cosmology in the metaphysical realm of definitions, interacting with systems of ontology (reality, what/how of existence), epistemology (truth, what/how of knowing) and axiology (ethics, what/how of value). Regarding Indigenous cosmologies, Keen offers a helpful distinction: ‘Cosmology' means the body of concepts and doctrines about the origins and properties of the world and its inhabitants. ‘Cosmogony' refers specifically to doctrines about the origins of things’ (Keen, 2004, p. 210). Whilst clarifying the definitional sphere of the term for this paper, it becomes readily apparent that cosmology is still a very broad concept, covering the origin of all matter and its inherent properties and relationships. By this understanding, almost all ethnographic terms utilised by twentieth century *Balanda* (white) researchers such as kinship, creation ‘mythology’, totemism etc. can potentially be incorporated into a discussion of Aboriginal cosmology. However, this paper is located within a specific research project, namely ‘Aboriginal Cosmology: what this means for women and gender public policy’1 and functions as both an initial literature review for the project and a forerunner for the methodological principles pursued throughout. Furthermore, to ensure meaningful, generative outcomes, the small Warramiri community at Gäwa was chosen to situate the research project, thus very broad issues of cosmology have been given a specific locale as a focus. Overall, in honouring the commitment to transdisciplinary and ‘bothways’

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1 Australian Research Council Discovery Indigenous Programme funding code (IN170100020).
research methodologies in Yolŋu communities, we focus on local perspectives and narratives from the homeland community at Gäwa to outline an introduction to Warramiri cosmology.

**Methodology**

*For a Balanda who can only learn from books, this is not enough. They can’t get the real meaning of Yolngu life from books because the social and religious aspect of life is so diverse, that sometimes, we can only learn about one side of the story, or one aspect of the Yolngu ontology, but there are other areas, so diverse, that all fit in one whole universe… (Anthropologists) had the privilege of learning about our life. But they wrote it down and recorded it as if it were from a fairytale, as if it were dead… (and) presented the knowledge in a box, like a coffin with the name “dreaming” on it. It was like a dead corpse in a box delivered to the wider society.* (Marika-Munuŋgiritj, 1991, p. 22, 24)

This significant quote from renowned Yolŋu educator and philosopher, Marika-Munuŋgiritj, raises immediate methodological challenges for our introduction to Warramiri cosmology. Firstly, many of the ‘classic’ texts which have engaged with Yolŋu cosmology and could inform this paper, are the specific anthropological works she critiques. Secondly, she squarely raises the question of whether there is any value for *Balanda* in such literature informed introductions; ‘they can’t get the real meaning of Yolngu life from books’. Lastly, she alludes to the difficulty of comprehending the Yolŋu cosmos overall, the interconnectedness of the various elements necessitating a holistic (and therefore detailed and lengthy) approach. Indeed, Rudder, who spent decades living and learning at Galiwin’ku, reflected that ‘it is extremely difficult if not impossible to take any single element of the Yolŋu cosmos and examine it in isolation. No part of the cosmos exists in isolation but all are related in many directions to other parts. Each specific identified element becomes the focus of a set of relationships which links other elements as part of the overall network; each of these in turn links to other elements and this pattern of interrelated elements continues without boundaries or limits’ (Rudder, 1993, p. 26). Nevertheless, we believe that some form of basic introduction to the history and cosmology of the Warramiri will enable the *Balanda* members of the research team to best analyse and apply their understanding for positive outcomes in relation to gender, women and public policy, which is the ultimate focus of the project. Indeed, as Marika-Munuŋgiritj advises in the same work, *Balanda* researchers should use ‘their learning to help Yolŋu in their battle for cultural survival… (to) provide help for the future development of Yolŋu’ (Marika-Munuŋgiritj, 1991, p. 25), and we believe that an appropriate literature review should facilitate this priority. However, the question remains; how to conduct a literature review that engages with the inherent challenges outlined above? In this regard we argue that an appropriation of some elements of the ‘bothways’ educational philosophy and the transdisciplinary and generative research methodologies as developed by Christie and associates at Charles Darwin University with Yolŋu collaborators over many years is highly appropriate2. Indeed, as has been noted in relation to Yolŋu research methodology from a community development project at Galiwin’ku, that ‘the act is primary, whether it be gardening, or talking about a garden… there is no difference between the correct ways to do negotiation, and the correct ways to do gardens’ (Christie, 2013b, p. 52), then, we argue, ‘doing a literature review’ should attempt to also follow these ‘correct ways’, as possible. Thus, some of the guiding principles for our ‘bothways’ literature review have been modelled on key themes from long-standing collaborations with Yolŋu researchers and are summarized in brief:

- Foreground the local, Warramiri perspective. In particular, we utilise extensive quotes to retain the specific language and imagery utilised by Warramiri Elders, if possible in Warramiri language itself; ‘sticking to your own language is a sign that you are taking your ancestral responsibilities seriously and can speak on behalf of land’ (Christie, 2013b, p. 47).

- Avoid generalising, even with regard to an overall Yolŋu cosmology, as ‘every Yolŋu claims

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and celebrates their identity through (their) land-based language and culture complexes... you can only tell your own story...(with a) focus on particular themes, concepts, viewpoints etc., at the expense of others’ (Christie, 2004, p. 5). In fact, the aim is to build ‘shared understandings around particular cases, rather than a general theory of what’s going on… the ambiguity of the situation may help everyone to rethink or renew’ (Christie, 2013, p. 10).

- As alluded to above, the review should be part of a ground-up, generative process, ‘we are activists, and as such our work is useless if it does not address the public problems of people’s life ways’ (Christie, 2013, p. 11). In this case, the substantive project analysing and advocating for quality public policy in regards to women and gender issues is the rationale for the review.

- Reject notions of ‘epistemic equality’ as Yolŋu dismiss ‘the idea that anyone can potentially know anything, and everyone knows in the same way…they also rejected the assumption that everyone does or can know the same things in the same way’ (Christie, 2013b, p. 49). In this instance, although Warramiri Elders at Gäwa routinely involve all community members in decisions (e.g., Guthadjaka, 2012), as ‘each participant occupies an expert opinion… and communication entails building shared understandings among positions’ (Christie, 2008, p. 41), the Elders themselves assume the role of speaking on behalf of the community and are the ones quoted.

- Maintain, where possible, a narrative focus because ‘beginning with a story plunges us to the core of the work involved in philosophy and dialogue, already enmeshed in detail’ (Verran & Christie, 2011, p. 24).

- Overall, explicitly acknowledge that the ‘transdisciplinary’ nature of Indigenous research will provide only partial satisfaction to either party’s knowledge traditions. Particularly, ‘non-Indigenous academics must guard against any attempt to exhaustively define Indigenous research (for to do so would in itself be an act of colonisation or appropriation) or to claim all its results. We can never know fully’ (Christie, 2006, p. 80).

Thus, we will not attempt to categorize Warramiri Yolŋu cosmology by topics (time, space, birth, relationships, death etc.) nor will we focus on cosmogony narratives per se, but will foreground (largely unpublished) conference presentations and formal speeches by Elder Guthadjaka and/or local Gäwa and Galiwin’ku narratives which shed light on Warramiri metaphysical foundations. Below are assembled a number of stories and texts which form the basis of the paper. Support from reflections from past Warramiri Elders, such as Burrumarra (already in the public domain), will also be considered, and previous studies (by Yolŋu and Balanda) which have engaged with Yolŋu metaphysical categories will be referred to in a ‘bothways’ fashion. Our ultimate hope is that out of the interplay of these sources, new understanding may emerge: ‘our experiences may not provide many take-home messages for others in similar contexts beyond those they know themselves. They may however strengthen the resolve to work on research truth and method as both fundamentally local’ (Christie, 2009, p. 33).

Context and positionality

Compared to many Yolŋu clans, there is a significant body of work on the specific cosmology of the Warramiri; the yirritja clan of the coral reef and the deep sea (Burrumarra, 1977).
This is almost exclusively due to the charismatic figure of David Burrumarra. In a lifetime spanning pre-Mission contact, all the way through to the 1990s debates on reconciliation and republicanism (McIntosh, 1994), Burrumarra contributed heavily to the incredible transformation of Yolŋu society in this period. It is well acknowledged that his life and work ‘had a marked impact on the history of Arnhem Land’ (Williams, 1994, p. 121). Furthermore, he actively courted anthropologists, linguists, missionaries, teachers and psychologists in a concerted attempt to both understand the new Balanda culture and, crucially, to help Balanda understand and appreciate Yolŋu. Throughout this process he organised for much sacred/secret ‘inside’ knowledge of Warramiri to be made available to the general public. These were often highly controversial moments, and Burrumarra’s initiatives (reflections on identity) serve as integrated exemplars of a Warramiri cosmology, outlining the Warramiri belief that they, amongst the existing yirritja clans ‘have a mandate for mediating relations with outsiders’ (McIntosh, 1997, p. 43); of negotiating the interplay between traditional cosmology and public policy directives.

Burrumarra’s ‘vision of the future in which the world will be as it was, but with Aborigines having all the conveniences of the twentieth century’ (McIntosh, 1994, p. 27) including access to and learning of traditional Warramiri land and culture, bilingual education and Christianity simultaneously, was just becoming realised at the time of his passing. For, around the same time, Guthadjaka, following the instructions of her clan-father, and supported by various kinship relations began the process of establishing Gäwa homeland, a significant Warramiri ancestral estate on the tip of Elcho Island, as a settled community. It is an inspiring narrative of practical perseverance, resilience and partnership (Baker, Gargulkpuy & Guthadjaka, 2014; Nungalinya, 2017). As of 2018, Gäwa community is well established, with its own permanently staffed school (Gäwa Christian School), (mostly) all-weather road, airstrip, barge landing and registered Aboriginal Corporation to support micro-enterprise development. In the educational sphere in particular, Guthadjaka readily acknowledges that she has continued the work of Burrumarra (‘we all have leaders and my leader was David Burrumarra’; Guthadjaka, 2018c) through both sharing Warramiri cosmological foundations and leveraging support from educational institutions and organisations who share like-minded goals to enhance the Gäwa community. She has recently been recognized for decades of contribution to community development at Galiwin’ku and Gäwa, and

3 Guthadjaka (Gotha) is the Senior Australian of the Year, for the Northern Territory, was awarded an MBE for services to education and community development and an honorary doctorate from Charles Darwin University, all in 2018.
in education explicitly, for elucidating bilingual and intercultural, Warramiri cosmological implications for policy and practices. It is a number of her formal presentations and speeches in receiving these accolades that we draw upon. Building on Burrumarra’s theorizing, she has also shared various ‘metaphors’ to outline the foundation of negotiated balance and mutual progress between pairings such as community-school, teacher-student, English-Warramiri. These include key concepts such as lonydju’yirr (being side-by-side), rrambaŋi marŋgithirr (together learning) and gumurrkunhamirr (establishing relationship) which have been analysed elsewhere (van Gelderen & Guthadjaka, 2019a).

Ben van Gelderen lived and worked at Gäwa and was inculcated into the Warramiri ‘bothways’ educational philosophy through team-teaching with Guthadjaka. Throughout the last decade they have collaborated in designing the Warramiri website to house digital resources for the transmission of traditional Warramiri language and culture, and have co-authored a number of presentations/papers based on community research at Gäwa on homeland ‘on country’ education and ‘bothways’ approaches (van Gelderen & Guthadjaka, 2019b). Ben was adopted into the gurruṯu kinship system as Guthadjaka’s son, and believes this was highly strategic. It established him as a ‘caretaker’ for Warramiri interests at Gäwa, but without any direct land affirming rights, positioned him to listen, learn and respect Guthadjaka’s perspective, and most importantly, allowed him the freedom of a ‘child’ to ask simple questions when he should know better by now! In short, although Ben still feels inadequate to understand and convey Warramiri cosmology, he is confident, after a number of years of iterative conversations and interactions, that he (in conjunction with the co-authors) can assist in structuring Warramiri sharings for other interested Balanda to be introduced and better appreciate the Warramiri cosmology.

Land axiology

Guthadjaka’s first published academic text emanated from her work with the ‘Teaching from Country’ program. In a summary session for the initiative, she shared her understanding of the vital connection to country in a child’s growth into identity. Some excerpts:

<table>
<thead>
<tr>
<th>Ga manymak. Dayi nuli djamarrkuli Yolŋunyndja ᵃnulhajla wanaŋur ga marŋgithirr, ᵃnul dhu djanawan’ nahun nhanŋu muka’yirr ga marparŋdhirr nului dhu marŋti.</th>
<th>Okay. So, when the Yolŋu children learn on country, they are safe inside themselves, and confident to go forward.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dunhi nhakun walal marrngi, wanaŋaw, wanaŋaw walal marrngi, ga wataw, ga gapuŋur, nhaha dhu ᵃurruthirr, ga nhaha dhu ranjirrithirr, bili wanaŋur walal ga marŋgithirr ᵃnhili banydjila, ga ᵃnayinyi marŋti walalan ᵃnulhulan wurrunjirr maŋgithinyaray.</td>
<td>So you see, they know the land, they know the land and the breezes, and the water, what time the tide will be in, when it will be out, because they are learning on country, and he grows with them, by means of that learning.</td>
</tr>
<tr>
<td>Ga dhuwandja nhakun Balanda teaching, ga dhiyalal yanara’nur gapuŋur walal ga nhina, ga dhipuŋur walal ga educationndja marram, wanyang yan, dhipuŋur bili, dhuwal ga gapu, nhakun dhuwandja Balandaw gapu marŋti, dhuwal ga marŋtjiny ga walanlajga dhiyalal djurryurr gapu yaka full gapu, nyumukuniny walal ga marram, maŋgikunhawuy.</td>
<td>But in Balanda teaching, they are sitting in the water tributary, and getting education from there, just from the one source, like it’s the Balanda spring flowing here, so they just get a little trickle, not a full stream, they get a little knowledge.</td>
</tr>
<tr>
<td>Dunhi one nhawi picture, ga dhuwal rarakal dhawu gurrupan wanganydhul old man Mäpurun’ŋur nui ga dhawu lakaram, dhuwandja nhakun buku’wu nana, ga wakulungul nui dhiyal nhina malany, gadaŋ, ga gapu nui marŋti dhupal, bala dhawatthurr nui ga gapu dhipuŋurdja.</td>
<td>That’s one picture, and here is a story given to me by one old man from Mäpuru, from around there are hills there, with the mists and spider’s webs, and the water goes to there, and then the water comes out from here.</td>
</tr>
</tbody>
</table>
Making fresh water in all the little branches belonging to the various clan groups, to there, and continuing on, to there, and they meet, the fresh and the salt water. That’s it.

They meet, and those different tribes receive learning, this one and this one and this one, Yes, all the different Yirritja waters, like for the Madarrpa people, the Warramiri, the Gandaŋu, Meliway, many many clan groups, they get water from here, not just one water.

So, the water runs, and at the sea, it places its feet down. Standing with its foundation.

But that picture I showed you before, the students are without foundations. Crying there to each other, just like the scriptures say; ‘By the rivers of Babylon’, getting the teaching, when they were crying together, and the government says: ‘Okay, give us a story’.

And the children say: ‘How can we sing a song in this place, here singing in a strange land, we can’t sing or tell a story or teach, because that law of the (Balanda) water has taken it.’


In 2013, as part of community research into the ‘bothways’ philosophy of education at Gäwa, Guthadjaka also shared a re-working of the classic ‘Djuranydjura’ tale concerning ‘Macassans’ visiting Yolŋu lands for trade.

This is the Djuranydjura story; the Macassans came here and built their houses and they said: ‘Do you want blankets?’

‘No, I have paperbark’

‘Do you want some shoes?’

‘No, I have my feet.’

‘Do you want rice?’

‘There is food for me in the bush. I am looking after the land, so the land will take care of me’.
There are many Djuranydjura stories, Macassan stories. Like the Balanda, as they come in, their thinking is to build something here, in the Yolŋu community. But they don't ask first “What do you need?” It’s just like they are bringing new ideas, from the ‘mainstream’. And they end up failing, feeling bad, packing up their things and leaving. And they leave because they had come with their own thinking. And here, when Balanda come into the school with a new law, they need to talk backwards and forwards, bring ‘both ways’ communication first. And then we can move together.

And s/he changed language there (at Nanjańyburra homeland, next to Gäwa) from Gupapuyŋu to Warramiri because of the breeze. S/he said: ‘I’m going to stay here at Nanjańyburra because it was the wind that brought me this way’... Yes, we need the wind of the Spirit as a cleansing for us. (van Gelderen & Guthadjaka, 2019a, p. 252)

Space does not permit a detailed analysis of Guthadjaka’s sharings, and we wish for them to speak for themselves. However, at the broad level, it is clear that a profound educational philosophy is espoused, that a foundation for all learning is being situated upon one’s ancestral estates; an ‘on country’ and ‘through country’ homeland fundamental. It is interesting to note that this focus is contrasted to Balanda practices of only receiving a ‘trickle’ of knowledge, inside the classroom walls, compared to exposure to the full streams which stem from traditional interactions of the various Yolŋu clans. This theme of the deep sea Warramiri water and the complex interactions with the fresh water’s journey has also been outlined further in terms of cosmological lessons for conflict resolution and governance among Yolŋu clans (Guthadjaka, 2015). Furthermore, from the Djuranydjura narrative we learn of the reciprocal relationship with such ancestral estates (I am looking after the land, so the land will take care of me), and that there is an expectation that Balanda will enter into some of the same kind of negotiation and balancing of priorities (need to talk backwards and forwards, bring ‘both ways’ communication first) that is characteristic of Warramiri agreement making. Suffice it to say, the story of Gäwa and the local school situated there is a living embodiment of the pre-eminence of land (and sea) in the Warramiri axiology; the value and ‘rightness’ of caring for it, of learning on and through it and of learning from it for other interpersonal and interclan relationships. In this regard, there are strong parallels with the work of Marika-Munuŋgiritj who centres her ‘Yolŋu Djaliki Cosmology’ (Marika-Munuŋgiritj, 1991, p. 20) on the image of djalkiri, which ‘literally means foot or footprint, but it symbolises the foundation, where the human being actually comes into contact with the land, his or her environment. The hidden meaning is our core, or foundation’ (Marika-Munuŋgiritj, 1991, p. 18). Indeed, her words resonate with Guthadjaka’s:

From the Yolŋu perspective of the land we learn from the start of its fundamental importance and how we learn to value the land for the abstract, deep and common knowledge that is derived from the land, giving us meaning and identity. The spiritual, religious and social order of connectedness to the land gives us meaning and identity through the knowledge of understanding everything that is linked to one another. (Marika-Munuŋgiritj, 1991, p. 22)

In line with the methodological framework pursued, we now broaden out the lens to incorporate other Yolŋu and Balanda theorists. Many of Burrumarra’s initiatives had as their foundation a desire to further Balanda appreciation of land (and sea) rights of Warramiri and other Yolŋu. He was nicknamed the ‘father of Aboriginal sea rights’ (McIntosh, 2015, p. 224) and in his famous ‘Flag Proposal’, Burrumarra constructed a new ‘national’ flag design, with sacred Warramiri images (of riŋgitj ancestors) but also including the Union Jack, as the sacred symbol of the Balanda (Figure 2). Burrumarra spoke of the flag initiative as a ‘Treaty’ proposal; a path of reconciliation:

Birrinydjii in the past dictated that we must honour him and follow his law...Today, people live as one group...We live by a new law. Our histories have merged. (McIntosh, 1999, p. 75) 4

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4 Burrumarra’s collaboration with McIntosh forms the most significant academic literature concerning Warramiri cosmology. Biographical essays of Burrumarra (McIntosh, 1994), evolved into a detailed doctoral thesis (McIntosh, 1997), a monograph concerning Warramiri cosmology in the context of the Australian reconciliation movement (McIntosh, 1999). Lastly, a string of articles directly inspired by his work with Burrumarra, but enhanced by recent archaeological and historical discoveries has been published; Between Two Worlds: Essays in Honour of the Visionary Aboriginal Elder, David Burrumarra (McIntosh, 2015).
A further, pertinent symbolic example occurred at a press conference held during Burrumarra’s own funeral in 1994. The *Manbuyŋa ga Rulyapa* proposal was released (to alter the Land Rights Act (NT) whereby Indigenous ownership only extended as far as the shoreline⁵), outlining a plan for joint management of the Arafura Sea (where significant Warramiri ancestral stories lie through the whale and other beings); ‘to see both Aboriginal and non-Aboriginal knowledge combined in the management of the sea and for the Warramiri and other Aborigines to progressively reassume responsibility for various levels of its care, based on customary law’ (McIntosh, 1997, p. 34). In the same era, Goŋḏarra also summarizes the profound ethical, reciprocal responsibilities by explaining ‘the land is my mother. Like a human mother, the land gives us protection, enjoyment and provides for our needs-economic, social and religious’ (Yule, 1980, p. 8). However, the remainder of the ‘My Mother, the Land’ booklet demonstrates how this is a generic metaphor largely for the benefit of Balanda; various mala (clan) leaders outline the complex, overlapping, interconnected responsibilities towards land emanating from the *gurrutu* kinship system (with associated historical/political caretaker roles) determining ethical responsibilities to speak (or not to speak) on behalf of, and care for, numerous, very specific portions of land. Of course, all Yolŋu ceremonial performances comprise of both land and sea song series (Magowan, 2001), and the interaction of salt and fresh water, sea currents and wind, moon etc. are particularly powerful exemplars of the overall Yolŋu cosmological emphasis of diversity within unity; ‘co-substantive essences allow groups and individuals to identify themselves as distinct yet united’ (Magowan, 2001, p. 32). Or as Tamisari notes: ‘Yolngu repeatedly remarked to me: ‘We are the same’, or ‘we are on the same line, share the same songs and dances and the same sacred objects, yet we are different’. As the Yolngu refrain goes ‘one and many, together and alone, close and far apart (wanggany ga dharra; rrambangi ga gaana, galki ga barrkuwatj respectively)’ (Tamisari, 1998, p. 260).

Thus, there is clearly a nuanced and continually re-negotiated, lived-out ‘tension’ between the clan and the whole Yolŋu cosmos (as alluded to in Guthadjaka’s water story) in relation to land. Indeed, as with many Aboriginal cosmologies (from a strict cosmogonic point of view), the land *pre-exists* the great, shared creation narratives such as the Djan’ka’wu (*dhuwa*) and Wawilak (*yirritja*) sisters. Creation is never *ex nihilo*, or as Williams quips: ‘And then there was the word’ (Williams, 1986, p. 27), signifying both the land’s eternal, pre-existence, but also the vital role that Yolŋu give words, especially names, in the cosmology that validates people’s rights in land’ (Williams, 1986, p. 27). The ultimate impact of these unifying, holistic creation narratives (with associated song, dance and artistic symbols) are land-affirming rights, coupled with a kinship system whereby everyone is connected to everything in the cosmos through

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⁵ The issue of sea knowledges and rights will undoubtedly be of increasing importance to Warramiri interaction with public policy as the the people of the coral reef and the deep sea (Burrumarra, 1977). However, presently the famous ‘Blue Mud Bay’ High Court decision confirms Yolŋu sea rights applies only to the *intertidal* zone.
the moiety affiliations. It is a ‘logic of meaning that specifies transformations of time and agency, so that cosmogony, cosmology, and ontology are embedded in a single matrix’ (Williams, 1986, p. 22). However, the Yolŋu cosmology is not a static, uncontested domain. For example, early anthropologists focussed significantly upon the Djan’kawu ceremonial song-cycle, (as allegedly the ‘most important of all rituals relate to Djanggawul’ (Berndt & Berndt, 1954, p. 10) and when noticing differences in observations, considered them regional variations (Yirrkala versus Miliŋimbi) or omissions, ‘apparently most of the beginning of the Djanggawul myth was unknown to Warner’s informants’ (Berndt, 1953, p. 49). However, later anthropologists convincingly demonstrated that substantial differences in the basic Djan’kawu narrative were known and common place between clans: ‘the central and apparently unique event occurred at the country of the person relating the story, but people were of course aware that details told by others were incompatible… Yolŋu did not appear to seek a unitary vision of the world’ (Keen, 1994, p. 61). Such clear and sustained examples of difference do not necessarily create disharmony, but, rather, elucidate a Yolŋu epistemological/cosmological principle of multiple realities: ‘two or more groups possessed a form in common such as the programme of a complex ceremony... but each could include specific elements of its own, and each attached different significance to its sequences of dance and song. They could thus co-operate in a performance while each retained its particular identity, ancestry and connections with country’ (Keen, 1994, p. 38). In a similar fashion, although clan country is vital to the Yolŋu cosmology, it is not as stable and unilaterally defined as early anthropologists suggested: ‘Yolŋu contested the definition of country, as well as rights over it… people sometimes competed for control of country, each trying to make his or her accounts of its significance prevail’ (Keen, 1994, p. 102). Thus, although many narratives are shared between Yolŋu clans; unique, relative perspectives are tolerated and, in fact, celebrated and negotiation concerning differing claims to rights of land is significant.

Such a conclusion brings us back to the importance of local, Warramiri perspectives and so we briefly outline two local stories which interact with the pre-eminent land axiology:

Stories

In her address upon receiving her honorary doctorate in October 2018, Guthadjaka shared the following story:

Long, long ago, when the spring tides surged on stormy seas, an octopus and a stingray found themselves in the small fresh-water hole at my homeland Gäwa. The stingray and the octopus thrashed about, arguing over the waterhole. They eventually tired of this, settled down and reached agreement. Now, the stingray is very smart at finding his way, even when the waters are muddy. We call him Guṉdjurru and he is very knowledgeable. The octopus is also very smart and can reach in or out to handle many things at the same time. They decided together that the octopus would sit in the hole as guardian and the stingray would swim in and out on the big spring tides and so they went their separate ways in peace.

Now, to understand this story, you will need to know that my people identify themselves with these animals. The octopus and stingray represent the two Warramiri clans. Long, long ago, two brothers, one at the head of each clan, made big trouble for each other. When they came to the water hole at Gäwa, they remembered that their totems had made peace in that place. Today, their descendants live together at peace in the homeland they share. Sometimes we visit the waterhole just to remember to accept one another with all our differences… We feel most comfortable in our own fields of work, yet we do not thrive in isolation. We thrive when we live and work together across many fields, in agreement and cooperation. Our connections, agreements and friendships are vital to our prosperity as a nation that highly values education.

I would like to quote from Isaiah 11:6 from the Bible:

6 Identities must be preserved and fore grounded in the production of knowledge which depends crucially on identifying, acknowledging, and actively maintaining the differences of language, dance, art, etc., among various contributing totemic groups’ (Christie, 2004, p. 5).
Djupalim ŋarru wakinŋum, maḏakarritjma wuŋgan ga bodjinya wäyin lëmma barkthu yaki rrambahin nyinay, wakalŋin barkthu nyin, ga yothuyu bulik’yum ga läyinthum ŋarri yaki rrambahin mulmum ŋukay, ga yolŋun yumurrku barkthu yaki banya djäkam wäyin’kum mala.

Then the wolf shall be a guest of the lamb, and the leopard shall lie down with the young goat; the calf and the young lion shall browse together, with a little child to lead them.

(Guthadjaka, 2018b)

The issue of negotiation of land rights amongst the ‘branches’ of Warramiri at Gäwa is of crucial concern; it is a long and fascinating story which is briefly alluded to here by Guthadjaka. However, the important issue, in sharing with Balanda, is not the detail of the conflict or how exactly it was resolved, but that resolution was achieved and that the land itself (through the much older story of the stingray and the octopus) facilitated the outcome. In the negotiation process, in the coming together of differences, peaceful progress was made with an ultimate goal of life on the Gäwa homeland; in such progress we thrive.

A second, recent story comes from community life at Galiwin’ku, with Guthadjaka as one of the Yolŋu researchers involved. In short, a proposal by the international Community Supported Agriculture (CSA) was put to the Northern Territory government to establish a community garden in Galiwin’ku. The Charles Darwin University Yolŋu Aboriginal Consultancy Initiative was tasked to undertake community research on local opinion about the garden possibility. From many years of experience, Christie and the team were committed to ‘transdisciplinary’ research (Christie, 2006) ‘which did not compromise the methods or epistemologies of Yolŋu knowledge making’ (Christie, 2014, p. 58). The resulting methodology is briefly described:

Firstly, a group of six Yolŋu consultants were chosen, ‘all connected through webs of kinship to each other, to the whole population of Galiwin’ku and to their various ancestral estates on the island and on the mainland’ (Christie, 2014, p. 58). Nevertheless, the consultants all agreed that Buthimaŋ who had run a banana plantation for many years and was considered the expert Yolŋu gardener should be talked to initially. He advised them to ‘think about the land first’. Each piece of land belongs to particular people, managed by particular other people, and everyone has one kind of relation or another to every named place. When we listen to a new idea, Buthimaŋ said, we need to begin with the connections we already have’ (Christie, 2013b, p. 47). As Christie highlights, this was not just a matter of courtesy to the existing gardener, but the process of the ‘right people talking to the right people in the right place at the right time in the right order’ (Christie, 2013b, p. 49); it was fundamentally a rejection of the notion of epistemic equality, as alluded to in our Methodology section. Although the community was to be consulted, due to kinship relationships, not everyone’s voice would carry the same authority; ‘everyone is related to Buthimaŋ and to his land, but in many different ways’ (Christie, 2013b, p. 50), or expressed more fully, ‘wherever the garden is placed, the old people made clear, the land belongs to someone. The way that people relate to the vegetables would be understood in terms of their kinship links to that land and its owners’ (Christie, 2014, p. 60). Christie conludes that the Yolŋu researchers turned technical ‘community’ questions (how many people would support the concept, was $30 reasonable to sustain the business, where should it be positioned etc.) into ‘a collective moral problem... embracing the difficult, complex and authoritative work of listening to everyone differently’ (Christie, 2014, p. 50).

For present purposes, we argue that it was a clear example of contemporary re-negotiation and re-enactment of cosmological principles founded on the pre-emince of land determining theoretical and practical processes to a small-scale public policy issue. In the end, though there was general agreement that a community garden akin to the Mission days would be a good idea, consultants reported back that it had to be properly negotiated and built on what was already established. That is, ‘while the government essentially wanted the Yolŋu to predict what a viable community garden would be like, the Yolŋu were concentrated upon how we could work towards a community garden together in good faith’ (Christie, 2013b, p. 51). Sadly, the garden never progressed beyond the research phase, the holistic cosmology; ‘the staggeringly complex interrelatedness of Yolŋu life, land, and history’ (Christie, 2014, p. 61) proved too much for government decision makers and the project was abandoned.
**Inside/Outside epistemology**

Perhaps to understand the complexity of the ‘garden’ story, government *Balanda* needed some introduction to the broader epistemological foundation, that land is profoundly connected to knowledge and truth. We return to Guthadjaka’s session from ‘Teaching from Country’:

| Ñunhi dhu ñanyany lungurrmay boy’yun, ñayiny dhu bitjan ‘Yakay, yal’yurra ñarra dhika’, bitjan ñayi li. | When the north easterly blows, he will say ‘Ahhh, I’m feeling cool and relaxed’, he says. |
| Lungurrma ga djalalthaŋ manda wata ñunhi gurrum’ manda, balanyaray. We need that, nhakun, teaching limurr dhu mârram. | The north easterly and the south westerly are gentle winds. You see, we need that, we get teaching from them. |
| Ga manda Dhuwa manda wata, bârра, ga dhimurru, ñunhi rin’rin’rin’. Bapmaram walal dhu, dry-ku mula nhaltjan, ga stil ñunhi li ga ñora, marrgiinkunawuy limurrn, ga buju ñayi li dihyar lâkaraŋ dhàwùu, mayail’mirr dhàwùu, ga ñayi dhu djamarikuli pick up ñunhiyì, beŋur nyumukuniny’nur. | And the two Dhuwa winds, the westerly and the easterly are rough. They buffet and dry things out, but still there is knowledge there for us, and so it tells its story, full of meaning, and the story will be picked up by children, from when they are very young. |
| Nñakun mārma’ ga layer ñorra, wàŋgany inside, ga wàŋganydja outside. | You see there are two layers, one inside, and one outside. |
| Märrgithirr walal dhu wàrarruluy wàhùu, ga buju dìjìwà’ walal dhu märrgithirrh dìhyàldja, metaphor-ŋur ga buju gurrutu ga dhàwùu ñunhlìyi. | They will learn the outside story, and they will learn the inside one too, through the metaphor, its kinship and stories. |
| Yaka yàn mulkurwu ñanydja dihyak ñayanuw, birribirrìwu, màrnu, ñayì ñunhi li dhuwàndja mârram, manda dhu yuwàlkh nhànhamiri, ga gurrutuy màrriŋjî jìŋga’yùnmìr. Ga balanyì. | Not just for the head, but for the inner being, the spirit and for good faith, if he gets it, the inside and outside will truly come together and help each other through the perspective of kinship. |

*(Guthadjaka, 2010, p. 30-31).*

The key concept expressed in this excerpt is the revealing of the ‘layers’ involved in Warramiri growth into knowledge. It is sometimes referred to as the *inside-outside* dynamic: ‘the inside:outside distinction is an all-pervasive one in Yolngu culture. Almost everything has an inside and an outside form or can be divided into inside and outside components’ (Morphy, 1991, p. 78). In his exegesis of Yolŋu art, Morphy elaborates on this Yolŋu standpoint which flows from ‘a worldview in which everything ultimately stems from ancestral power and ancestral design… an underlying metaphysical basis’ (Morphy, 1991, p. 83).

In essence, reality is comprised of both ‘outside’ expressions and experiences and ‘inside’ sources of power (usually connected to ancestral design (*minyti*) and objects (*ranga*) initiated by ancestral-beings (*wanjarr*)), and truth is a layered continuum based on ever-increasing sacred/secret revealings or levels of understanding. As an epistemological foundation, ‘the ancestral world extends into the everyday world, the inside flows into the outside. Outside forms are in a sense generated by inside forms and are not separate from them’ and thus, ‘certain things are secret because they are powerful rather than the other way around’ (Morphy, 1991, p. 80, p. 95). Guthadjaka refers to this in at least two ways. Firstly, she takes up the example of the winds to demonstrate that there is an ‘outside’ understanding of directions and extents, which impact on hunting and other homeland life-choices, but there is also the ‘metaphor’ as to what the winds teach about ‘kinship and stories’. It is not necessary for *Balanda* to understand these metaphors (and often it is excluded explicitly), but the layered nature of knowledge is the vital distinction. Secondly, Guthadjaka highlights how learning is therefore both for the ‘head’ and *for the inner being, the spirit and for good faith*; another connected layering of truth. And clearly, the wind is only one small example, relating back to the vitality of living and learning on ancestral estates to experience all the land’s teachings. Or as Rudder argues: ‘as all named things in the outside world are transformations of elements of the inside of reality, then the whole cosmos and every discrete element of it becomes an unbounded vehicle of religious knowledge’ (Rudder, 1993, p. 61).
As we shall see below concerning Guthadjaka’s sharing of the djunwirr, although the inside-outside dynamic is most obvious in terms of levels of meaning of clan narratives (dhäwu) with restrictions applying to women and uninitiated men, it is not limited in application to discussion of Yolŋu religious substance and power. As Morphy notes, it ‘can be used as a logical schema that can be applied to many situations, for example, to formulate an argument, to put forward a proposition, or to attempt to grasp the essential structure of something’ (Morphy, 1991, p. 80). Indeed, its potential to integrate other cosmological systems and accommodate change is of profound importance. For example, Williams records an old man at Yirrkala asserting that the ‘Macassans’ were expected by Yolŋu when they first appeared because when the ancestral beings were investing the world with meaning ‘spirit-macassans had appeared. They brought with them in spirit form the “real” Macassans would later bring and explained their use to Yolŋu... (thus) the cause of change can be attributed retrospectively and the integrity of the cosmos sustained’ (Williams, 1986, p. 28). In a similar vein, Bos, in his dissertation on the adoption of Christianity amongst Yolŋu and the Christian ‘revival’ at Elcho Island in the late 1970s specifically, follows through the inside-outside dynamic literally as links of logical suppositions, concluding ‘that which is new and true is simply a revelation of what has always been’ (Bos, 1988, p. 371). Indeed, the inside-outside dynamic is a powerful force for social harmony and adaptation of Yolŋu to the incredibly rapid change their social structures have been forced to accommodate over the last century. As Rudder concludes:

The Yolŋu Cosmos is a viable and living structure, which while as the Yolŋu say of it that it “is unchanging” yet it is capable within that “unchangingness”, of constant adaptation to changing circumstances and experiences while at the same time providing stability and a secure perception of identity through that change. (Rudder, 1993, p. 33)

More recently, in relation to religion (2005), science (2003), homelands (2008) and, in particular, evolving funeral practices (2012, 2016) the Morphys have begun to expound a more general theory of ‘relative autonomy’ whereby ‘both within Yolngu society and in its articulations with the encompassing world, this autonomy has always been relative rather than absolute... rather than becoming “intercultural,” Yolngu systems and subsystems remain relatively autonomous. They change in response to external pressures while maintaining their own distinct trajectories’ (Morphy & Morphy, 2013, p. 177). Indeed, there is a provisionality even within the inside-outside dynamic in that changes over time naturally occur; ‘the content of the categories changes: what was once restricted becomes public and what was once public becomes restricted’, and ‘a particular interpretation is inside only until one has been told a further interpretation that is said to be more inside’, and content and form issues can separate ‘what may be restricted is knowledge that a painting was done, not knowledge of the painting itself’ (Morphy, 1991, p. 76, p. 78).
Stories

Figure 3: Gàwa Christian School logo

We have briefly looked at the story of the fresh-water hole at Gàwa, as shared by Guthadjaka. However, it is pertinent to note that when Ben lived at Gàwa in 2009-2010, this story was not widely shared, the literally ‘inside’ jungle area of Gàwa was generally considered a no-go zone for Balanda and he knew of the story, but only due to its visual representation on the school logo (Figure 3). During 2013, the school did have an ‘excursion’ to the fresh-water hole and a version of the story was shared by the ‘old man’ of the Warramiri, Ceremonial Custodian, James Wäluŋ Bukulatjpi. Recently, in October 2018, Ben returned to Gàwa to record some further community research on the history of Warramiri interactions with sea-faring outsiders over the centuries. Wäluŋ again suggested we visit the water-hole and he explained the presence of the djambaŋ (tamarind) tree, which had come from a seed from Milijinbi and purposively planted near the fresh water as a reminder of the ‘Macassan’ trade period. In talking to the school students, and the researchers, he also hinted at some further stories relevant to the water hole, including references to the enigmatic walitha-walitha (little people) and some fighting/trouble that had occurred nearby. What was most interesting was when Wäluŋ paused and asked a well-respected Balanda (who had been adopted into the Warramiri clan in the early 1970s) whether he should tell these particular stories to the children... Wisely, the experienced Balanda preferred no opinion either way, and we left to explore some further local sites of historical interest. Thus, the episode demonstrates the clear inside/ outside dynamic of secret/sacred definitions changing over time, of age and maturity as relevant factors, and of the emerging dynamic of technology altering the process of the intergenerational transmission
of cultural stories. As Wäluŋ has stated in relation to a graduation ceremony as part of the Warramiri cosmology project:

The times are changing. Our old people have passed away, that's why I say it’s time to write down the stories—so the new generations will not lose them. We have paintings that tell our stories (and I teach my own children to understand some parts of the paintings, but some parts are secret.) Ceremony tells the story with symbols and dance that everyone can enjoy, but still some things are restricted. The understanding is not given in video or audio for everybody, although everybody can watch and dance, not everybody will understand. I want the understanding recorded on paper, so it is not lost when I die... The more an older person understands the meanings, the more they will value them. I hold the stories of the Duck and the Whale because the old people trusted them to me. But still all Warramiri use the stories; they are partly preserved by use.

A second pertinent example concerns women explicitly and leadership roles in modern Yolŋu society. The inside-outside dynamic is often predicated upon the exclusion of women to access ‘inside’ objects, images and narratives. Indeed, there is a narrative justification for this exclusion from some of the ‘big’ dhäwu (stories), such as the Djaŋka’wu sisters, who had their sacred objects stolen by men, who ‘seized control of certain ultimate manifestations of the inside, which thereby gave them the power to act in ritual’ (Morphy, 1991, p. 97). This is a fascinating area for analysis concerning the interplay of cosmological beliefs and current practices for a number of reasons. Firstly, even in the 1970s, there was ambiguity around women’s exclusion to ‘inside’ knowledge and power. Morphy records that women still extensively utilised the dynamic as ‘a logical principle for talking about the world, and they gain access to things that are inside relative to other things’ and, in fact, also partook of the layering of secret/sacred; ‘women in particular gain increasing access to restricted knowledge according to their age, status and interest they show in ritual matters’ (Morphy, 1991, p. 96, p. 76). More profoundly, there were hints (likely ‘inside’ interpretations of some of the big dhäwu) of an identity connection between ‘inside’ and women as a cosmological fundamental. Thus, Morphy records Narritjin often claiming “really women are the inside”... referring both to the fact that inside meanings often refer to female things, (and women)... as generators and sources of power’ (Morphy, 1991, p. 97). Williams concurs from her land rights fieldwork at Yirrkala, as senior men explained ‘that the profoundest and most sacred meanings of many of the spirit-beings are female or else have an important characteristic (or property or activity) that is associated with women’ (Williams, 1986, p. 50).

Guthadjaka notes the importance of the Warramiri decision in the 1980s in relation to the mala (clan) town council:

My leader was David Burrumarra... none of the other clans had a female on their group. David Burrumarra... he chose me to be on the council to represent women, but there was no other women to represent their clan. (Guthadjaka, 2018c)

In fact, it was not Burrumarra’s first foray into ‘re-adjusting’ male/female power roles, as the (in)famous Memorial of the 1950s, where scared emblems had been put on public display (as discussed below), saw many women rush to the bush, fearing death as punishment for viewing their clan’s sacred emblems. Indeed, it is undoubted that the impact of the large-scale adoption of Christianity was a distinct, epistemological challenge to the gender restriction of the inside-outside dynamic. In particular, protestant, evangelical Methodism with its emphasis on the ‘priesthood of all believers’ ensured early women missionaries taught (adult) Sunday school classes and preached in formal church services (McKenzie, 1976; Kadiba, 1998; Wearing, 2007). Keen is explicit on the historical adaptation that occurred: ‘the move towards inclusiveness through Christianity threatened to erode the power of the older men, which rested on the constitution and control of secret religious knowledge and practices, for Christianity challenged the very separation of ‘inside’ and ‘outside’’ (Keen, 1994, p. 287). How exactly this adaptation evolved in terms of Yolŋu women’s involvement in public decision making seems to have also depended on the localised Mission leadership approaches, and thus some regional differences are apparent. Williams notes at the time of her fieldwork that ‘women do –and must- participate in religious activity and political decision making, and that senior women are expected to act as leaders and are admired for being strong. Not all Yolŋu men share this view of the importance of women’s public roles,
however; Keen (personal communication) says that men at Milingimbi expressly deny it’ (Williams, 1986, p. 51). Whereas both Keen (1994) and Bos (1988) argue that the Mission leadership style at Galiwin’ku had a profound impact as a necessary precondition for the further gender-equitizing Christian ‘revival’ of the late 1970s. Of course, the pertinent question remains as to how the inside-outside dynamic has altered and/or continues to impact public policy regarding Yolnu women in present communities.

**Multiple ontologies**

From her prepared acceptance speech for Senior Australian of the Year, 2018 (Northern Territory), Guthadjaka relied on djurwirr (Great bowerbird, Chlamydera nuchalis) nesting practices:

**Figure 4: Djurwir**

1. **Ancient generations of djurwirr made their nests from sticks and grass and decorated them with shells and pebbles. They kept a special pattern for their nest.**

2. **Today the colors and content of the decorations have changed. Some keep colored glass, some like green, some like blue—some even keep a mobile phone and a bit of cash handy. Everything is mixed together and the bird is living in two worlds, filled with mixed treasures from old and new.**

3. **There are guardians and protectors outside – to stop theft of the treasured knowledge, but this can also protect and manage too much impact from outside influences and/or not acknowledging the authority of the guardians.**
4. Not everything is accepted and the pattern has not changed. Djurwirr keeps a clear pathway and line of vision from its nest.

5. My people are like djurwirr. Warramiri are colourful people, yet we discern. The clear path needs to be made; when you have a clear path you can organise and see clearly. Then treasured things can be kept safe and valued, and some can be shared, to give comfort or teach us valuable lessons in both worlds’ (Guthadjaka, 2018a).

In typical style, Guthadjaka’s image is appealing and memorable, but also layered. The ‘metaphor’ clearly highlights the Warramiri foundation of selective adaptation and adoption, but also alludes to the secret/sacred knowledge domain (‘treasured things can be kept safe and valued, and some can be shared’) and the ‘protective’ function of Elders (‘manage too much impact from outside influences and/or not acknowledging the authority of the guardians’) to, ultimately, negotiate the future vision (‘when you have a clear path you can organise and see clearly’). In many ways, the djurwirr image can be considered an elaboration of the lesson in Guthadjaka’s other published parable, Yuṯa Gonydjuy (The New Wax). In this true-life story, native bees began to use the tar from newly sealed roads in Galiwin’ku to make their honey. This was a mistake! The concluding section of the story reads:
Warramiri Yolŋu cosmology: an introduction | Ben van Gelderen, Kathy (Gotha) Guthadjaka, Linda Ford, James Walun Bukulatjpi, Chloe Ford, Emily Ford, Bettina Danganbarr, Pawinee Yuhun and Ruth Wallace

Bili Godthu djanalingu gunyan marimi ṅuwakurru gonydjuy’ djäma wu, mádjanal Ṉarru djäma Ṉanamamayun djanalinguway djanal Ṉayi, ga guku ga waripu malany Ṉuňatjuman bayinjuya gonydjuy’yu.

Gadadu Ḉarru marimin latjun dhäkayma.

Gadilanyamay bili nhawun Godthu gunyan Ṉalmalingu Ṉuwakurru rom. Mäŋalma Ḉarru djäma nyena, ga garyunjimi Ḉunhuń nhäwu Ṉuwakurruwu romgu.


God already gave them everything that is good, they only had to look around hard and use their own skills for making the sugar-bag, using the natural wax from the flowers that blossom in the bush. Take care of this way well and the sugar-bag that comes from the bush will be sweet and beautiful to taste.

In the same way God already gave us a good law to live by and built a foundation for our identity. In this way we can come together and live as one people. Not out by ourselves, chasing our own ideas. Let us not be like the honey bees. These days many people are very excited and influenced by new ideas and laws coming into our lives.

To me it appears that today we are so happy holding on to new ways, but already they have brought lots of confusion, and we are very frustrated in this difficult position between old and new. It is not good for us and our children. Let us go back to our ancient paths and follow our ancestor’s footsteps and work with peace and joy.

This is the end of the story about the bees.

God already gave them everything that is good, they only had to look around hard and use their own skills for making the sugar-bag, using the natural wax from the flowers that blossom in the bush. Take care of this way well and the sugar-bag that comes from the bush will be sweet and beautiful to taste.

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This is the end of the story about the bees.

Thus, Yuta Goydjuy embodies the message of the djurwirr bower that ‘not everything is accepted, and the pattern has not changed’; not all of the ‘new ways’ are productive. However, by implication of the story, Christianity itself is not one of these ‘new ways’. Indeed, it is impossible to miss the references to faith and God throughout Guthadjaka’s presentations, including the (Holy) Spirit in the conclusion of the Djuranydjura re-working, the crying by the waters of Babylon/Balanda education practices, and the lion and the lamb negotiated agreement imagery from Isaiah.
Such an integration, a synthesis of co-existant ontologies is certainly also to be seen in Burrumarra’s life and work. Back in 1957, Warramiri and Wangurri elders (with a young Burrumarra as the key agitator and spokesman) convinced a number of other clan leaders (both dhuwa and yirritja) to reveal many sacred designs, often combined with Christian iconography, on a series of carved and painted wooden posts at Galiwin’ku- dubbed the ‘Memorial’. In his fascinating monograph on this ‘adjustment movement’ Berndt attempted to unravel the complex and varied motivation behind the revealing of sacred/secret knowledge. Of Burrumarra personally Berndt surmised that:

> On the one hand he wanted change from outside with greater rapidity. On the other hand he did not want them to overwhelm his own society and culture... If this loss of identity were to be avoided then some re-orientation of traditional life would be necessary. (Berndt, 1962, p. 39)

Thus, the movement was both a political statement and a deeply spiritual one; in essence, it was a ‘conscious attempt at redefining social organisation. The Yolŋu were to be a single unified block of clans and Christianity was put forward as legitimizing the unity of Dhuwa and Yirritja moieties. As a cooperative group, the Yolŋu would be in a stronger position to voice their demands vis-à-vis the Welfare Department, missionaries, and developers’ (McIntosh, 1999, p. 70). There were also very practical benefits desired too, understood as an exchange for revealing the sacred knowledge. Burrumarra asked: ‘these are the most precious things we have (the raŋga). Why can’t we get a big school?’ (Berndt, 1962, p. 78). Interestingly,
The concept of 'bothways' in regard to synthesising Christianity and traditional Yolŋu ontologies is certainly not restricted to Warramiri Yolŋu. Goŋḏarra outlines theological arguments supporting such integration in a number of revealing texts (1986, 1987, 1992, 1996), most famously in Father, you gave us the Dreaming (1988). Practically, the outworking of such a cosmological foundation is most clearly seen in funeral practices, both now and in the past. Early anthropologists were fascinated with the 'mortuary rituals' of Yolŋu and wrote extensively on the formal ceremonial elements involved (Warner, 1937; Thomson, 1949). However, the most poignant moment in Warner's classic ethnography was his description of the death of a Warramiri man and his kinsman's last actions; the more spontaneous and personal elements of his passing (Warner, 1937, p. 404). Indeed, later works reflected on the fact that the funeral ceremonial practices/performances, the 'song cycles', were never uniform, sequenced rituals, akin to a Catholic mass, for example, but vital opportunities to reaffirm Yolŋu ontological truth. Firstly, the profound connection between named reality and identity: 'the webs of human and land relatedness— that is, the things which have built that individual, and which are identified by that name—are actually constitutive of a person's identity, and a person's death signifies a radical rupturing of the whole network of human meaning' (Christie, 1994, p. 28). And thus, the ceremonial leaders' responsibilities are to best negotiate and select and order the songs, designs and dances: 'to link particular groups of people together by reference to their land, totems and ancestral history' (Christie, 1994, p. 31). Indeed, there are various possible routes for a song journey from the ceremonial ground to the spirit place... (the one chosen highlighting) the links which the deceased had with the many different related groups who have come to say goodbye, and the love and respect in which that person was held' (Christie, 1994, p. 31).

Thus, a form of multiple ontologies was always demonstrated in the negotiation and contextualisation of ceremonial songs, in conjunction with clan leadership of both moieties, the land the actual ceremony was taking place upon, and individual personalities. The Morphys' studies of more recent funeral practices (2012) also indicate the profound combination of traditional Yolŋu song cycles and dance sequences, 'Macassan' influences, Christian iconography and speech making, and idiosyncratic elements to best capture the individual, their relation to the land and related clans and their impacts on the broader Balanda world. However, the key is to understand that the rituals:

> are not hybrid creations made up through combining elements that history has brought into contact. Rather they are the product of a regional ecumene, which has at its center distinctive value creation processes, beliefs about the nature of being, and ways of structuring action to express these beliefs and values. (Morphy & Morphy, 2012, p. 53)

Therefore, it is no so much that Yolŋu have adapted core beliefs about existence to suit new influences (hybridity theory), but the 'fundamentally recursive and incorporative' nature of Yolŋu ontology (as expressed in mortuary rituals) has enabled Yolŋu 'to adapt to new contexts and seize opportunities while appearing to carry the past with them' (Morphy & Morphy, 2012, p. 58). Thus, in returning to Guthadjaka's 'selective adaptation and adoption' from djuwirr, it would seem to be clear that the Warramiri make explicit what is a more generalised Yolŋu cosmological foundation. In considering the impact and change to Yolŋu society through various waves of contact with outsiders, culminating in yearly 'Macassan' trade voyages, the Berndts concluded that Yolŋu were; 'absorbing into their own culture certain new elements, rejecting others that could not readily be adapted to the existing pattern' (Berndt & Berndt, 1954, p. 188). Likewise, regarding the 'adjustment movement', Berndt summarized 'that we can legitimately speak of rapprochement between the alien and the indigenous: the one is in the process of being adapted to the other... inward-looking in terms of traditional integrity, outward-looking beyond the confines of linguistic unit and clan territory, cross-cultural dimension' (Berndt, 1962, p. 14). Overall, Yolŋu seem to have applied such an approach to large scale interactions in terms of incorporating the mālk (skin) system into older gurrulty kinship patterns (Shapiro, 1981) and the assimilation of Mission 'leadership' into existing conflict resolution procedures (Williams, 1987). In fact, it has been argued that a multiple ontologies foundation is characteristic of Yolŋu cosmology; that 'ambiguity and relativism' (Keen, 1994, p. 38) have long been the prevailing structural principles for both practical organizations of Yolŋu society (clan, country, leadership).
and theoretical positions (knowledge, religious communication). In this, ceremonial interactions are the profoundest enactments of the overall ontology; though groups shared a common form, it was highly differentiated:

*each could include specific elements of its own, and each attached different significance to its sequences of dance and song. They could thus co-operate in a performance while each retained its particular identity, ancestry and connections with country… (and within groups themselves) shared forms current among one public, and distinctive interpretations among a variety of less inclusive publics and individuals.* (Keen, 1994, p. 38)

In his thorough exploration of the Warramiri cosmology specifically, and the various ‘branches’ with connections to other ‘clans’, McIntosh is equally adamant: ‘identity therefore is something that is constructed for specific purposes and is a matter of agreement by all concerned, rather than something unambiguous or “fixed”’ (McIntosh, 1997, p. 24). Such a position certainly finds support from the extensive work that has developed out of the ‘bothways’ Yolŋu educational philosophy from the 1980s. Stemming from Yolŋu educators outlining a fundamental cosmological foundation: ‘there is negotiation of meanings between the two moieties, Dhuwa and Yirritja, which can be applied to negotiation between Yolŋu and Balanda cultures to find the common ground that makes up the two way curriculum’ (Wunuŋmurra, 1989, p. 13), a string of profound ‘metaphors’ were then shared from kinship structures (*yothu-yindi* connection, Marika, Durrwutthun, & White, 1989), water commingling (*gaṉma*, *milŋurr* and *bala-lili*, Marika-Munuŋgiritj, 1990) and ceremonial negotiation between clans (*garma* and *galtha*, Marika-Munuŋgiritj, 1991). In further works, the ceremonial context was particularly highlighted, and a shift from a pedagogical constructivism (which was most apparent) to an *epistemological/ontological* constructivism was argued for. Christie utilized the *garma* and *galtha* images to elucidate co-existent multiple ontologies: ‘in the playing out of the Galtha… the objective world attains reality only through the received meanings which, through negotiation, we choose to foreground the pattern of our relatedness’ (Christie, 1994, p. 33), as there is ‘no split between language and materiality. Talking, singing, crying, dancing, and painting all actively participate in the creation of new worlds as they have always done since the ancestors first talked, sang and danced the world into existence’ (Christie, 2005, p. 64). Verran also explicitly draws parallels with western-philosophical histories: ‘the concept of *garma*… a distinctive Aboriginal epistemology that has something in common with European constructivism, except that place is a crucial determinant of knowledge’ (Verran & Christie, 2007, p. 218) and ‘a *Garma* can be understood as working like a Deweyan public, called into existence by a ‘public problem’, an issue of substantial or serious significance’ (Verran & Christie, 2011, p. 29).

**Conclusion**

Mention of a ‘public problem’ is an appropriate place to conclude, for we reiterate that the function of this introduction has always been to facilitate analysis and production of appropriate public policy for issues of women and gender in the local Gäwa and Galiwin’ku region. From the *garma* image we learn that Yolŋu have long been engaging in this process themselves, balancing profound duties and responsibilities to land and sea, layers of knowledge and inside/outside power realms between clans and genders, and commitments to incorporate new realities in reaching agreements. In Balanda philosophical terms, issues of axiology, epistemology and ontology are in a perpetual relationship of negotiation, and Warramiri Yolŋu, Burrumarra and Guthadjaka in particular, seem generously disposed to share their cosmological foundations with interested outsiders. In conclusion, we share one last story as it draws together many of the themes of this introduction to Warramiri cosmology. It is a story told at Gäwa (with some humour), but mostly concerns Mayawun’pirri (Stevens Island), one of the ancestral estates of the Budalpudal ‘branch’ of the Warramiri (McIntosh, 1997) and boyhood home of Wäluŋ. The island was one of the first places to have an airstrip, built in the Mission days under Harold Shepherdson who actively encouraged Yolŋu to remain on their ancestral estates; their homelands (Baker, 2018). In his home-made airplane he would fly to the homeland family groupings, facilitate some trading arrangements and often conduct a short Christian service. By the early 1990s the 300m airstrip on Mayawun’pirri was earmarked for refurbishment by Marthakal Homelands Resource Centre. Warramiri families travelled out to the island and mowed the existing strip while a Missionary Aviation Fellowship (MAF) pilot flew out to test
the surface for compliance and future potential usage. The testing went well except that the pilot advised that making the strip just a little but longer would be greatly beneficial, larger planes could land taking more passengers and more weight. Some further clearing would be necessary, including the removal of a Pandanus tree at the end of the airstrip. After some thought, Wäluŋ told the pilot that it couldn’t be done as the Pandanus tree represented something quite important in an old story connected to Mayawun’pirri. The pilot was insistent; what could be more important than facilitating consistent access to the land, to your ancestral country? The old man chose to share some of the layers of the truth; the tree actually represents Balanda, (from a typically fascinating Warramiri story of when a Balanda and shark fought at Mayawun’pirri). Indeed, the Pandanus is the Balanda, it is the Balanda access to the land as an ontological fundamental; knock down the tree and the Balanda role in any on-going story (including the possibility of flying in planes and all that could entail) would also be gone...The airstrip was left as it was.

We hope many other positive outcomes and stories are generated from the interplay with Warramiri cosmology, women and gender into the future.
References


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Discursive mélange and multiple dilemmas: navigating New South Wales ‘special’ education policymaking

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Abstract

The article is aimed at deconstructing the complexities involved in the process of ‘special’ education policymaking in New South Wales (NSW) with a focus on departmental challenges and the dynamics of external influences. Rather than full inclusion, the NSW government has maintained a strong policy position endorsing a continuum of support services to achieve middle ground among differential parental demands. The multiple dilemmas circle around dissimilar views and preferences of various stakeholders, consequentially giving rise to a rich hybrid of ‘special’ education discourses in NSW evolving from integration, inclusion to diversity. The Australian government has persistently supported school marketization and a strategic performance-based reward system that has widened the social divide instead of mitigating the influence of student’s background on educational outcomes. The cascade of accountability induced by the federal competitive agenda has aligned the NSW Government and its schools to bid for greater academic excellence while inclusion and equity are inadvertently sidelined in policy agenda.

Introduction

In the Australian federation of six states and two territories, New South Wales (NSW) comprises one-third of the country’s population as the largest state with over 7.5 million people. Australia practises a system of parliamentary democracy and the responsibility for K-12 schooling from pre-school until Year 12 rests with individual States and Territories as stated in their respective constitutions. Federalism has enabled policy diversity and innovative measures across different states, resulting in considerable variation in student support structures. Although NSW has the lowest poverty rate of all Australian states (9.8%), a high level of social disadvantage, unemployment and crime rate concentrates in certain communities around the metropolitan and remote rural areas. The Household Expenditure Survey (HES) reveals a higher risk of hardship and poverty among households with disability (ABS, 2017b). Such deprivation extends to the Indigenous communities and it is particularly pertinent to NSW in which 33% of the total Aboriginal population in Australia resides (ABS, 2017a). The disproportionate representation of Indigenous students in ‘special’ schools and classes, and the 53% dropout rate of Indigenous groups from Year 7 to 12 have come under the spotlight (Graham, 2012). These statistics reflect the high incidence of additional needs which NSW has to deal with and education is one of the most useful tools to break the cycle of poverty among children from disadvantaged backgrounds and with a disability (Afzal et al., 2012).

The article is aimed at deconstructing the complexities involved in the process of additional learning support provision or more formally known as ‘special’ education policymaking in NSW, with a focus on departmental challenges and the dynamics of external influences including federalism and stakeholders’ demands. While other prominent literatures have touched on the trends in NSW support provision (Dempsey, Foreman, & Jenkinson, 2002; Graham & Sweller, 2011; Graham, Sweller, & Van Bergen, 2010), it is also important to build on those findings to substantiate how the local socio-political context and globally influential discourses affect the makings of these services. Discourses can bring about powerful effects as the composite political ideals, economic principles and socio-cultural values travel...
through the global space and influence education policymaking. Dale (2005) refers to the complex interactions between national education systems and these supranational influences as ‘the pluri-scalar nature of education governance’ (p. 117), where special education regulations, funding mechanism and support provision are influenced by a broad set of agents including state, market, family and community.

Educational policymaking has also become the intersection point between inclusion and neo-liberalism. Hursh (2005) describes some of the characteristic elements of neo-liberal influence on educational policies and practices, including the expansion of standardised testing, accountability measures, institutional competition, school choice, managerialism, performative steering and curricula fundamentalism. Inclusion is quite the reverse, requiring active governmental input, which is described as a process of ‘addressing and responding to the diversity of needs of all learners’ as well as ‘reducing exclusion from education’ (UNESCO, 2005, p. 13). The inclusion movement argues for the reconceptualisation of schooling in order to break down the concept of the “special” and “regular” school or classroom so that the provision of meaningful differentiated curriculum, effective teaching, and necessary support (Graham, 2006; Slee, 2011). Conversely, special education conceptualises difficulties in learning as arising from deficits in the neurological or psychological make-up of a child, which is analogous to an illness or medical condition (Skidmore, 2004). Graham and Jahnukainen (2011) argue that inclusive education is difficult in gaining traction because of the attractions that special education holds for general education policy. Special education has been misused as an attractive solution to the inability of general education in dealing with the learning problems of at-risk students. Low-performing students who fail to conform due to various socio-emotional, physical or intellectual difficulties are segregated to save schools from the additional distraction, stress and required human resource. This “productive” mode of school governance in support of special education is more compatible with neo-liberal approaches to organisational management than the philosophy of inclusive schooling endorsed by UNESCO. Thus, education provision can be increasingly fragmented as the academic pressure imposed on students and the accountability for results experienced by schools increase along with the promotion of competition within and between schools based on neo-liberal outcome-based governance. Chong (2018) highlights the importance of an inclusive education system which prioritises the intellectual, social and learning needs of the children above other performative, selective or cost-saving agenda, however the conflicting elements of the two discourses have contributed to a difficult policymaking sphere.

This paper thus examines some of the challenges that can be observed when the global call for more inclusion on the one hand and neo-liberal reform on the other hand pervades the sphere of NSW educational policymaking. What effects are produced by the intensifying competitive climate to higher literacy and numeracy attainment and school marketisation?

Methods

The ‘Russian doll’ approach (Chong & Graham, 2014) was employed within the author’s three-year doctoral research to examine the challenges involved in policy designs and the development of coping strategies through the lens of experienced policymakers. The nested model involves the examination of discursive influence, policy development and interview data by contemplating the influences from the wider socioeconomic and politico-cultural context at the macro level, analyzing discourses embedded in policy documents at the meso level, and triangulating those trends with the policymakers’ insights at the micro level. To enable a deeper view into real-time thought processes, five key policymakers from the NSW Department of Education (DoE) 1 as indicated in Table 1 were interviewed for 40–90 minutes to comment on (a) the range of learning support services available and which of these the policymakers supported and why; (b) arising trends and challenges associated with the effort to promote inclusion; (c) the impact of neo-liberal agenda on education policymaking and (d) future direction of support provision.

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1 After the research was completed, the Department of Education and Communities (DEC) has been renamed as the Department of Education (DoE) in July 2015. For consistency, DoE is used in the article.
Critical analysis of the interview data was based on Strauss and Corbin's grounded theory approach (1990) which involves manual categorisation, coding and interpretation of data sets. As Yin (1994) maintains that “data analysis consists of examining, categorizing, tabulating, or otherwise recombining the evidence to address the initial propositions of a study” (p. 99); identification of themes was conducted through multiple readings of raw data and also based on the research topic to determine emerging categories. Themes were then analysed to determine their pervasiveness across different academic texts and participants (Talja, 1999). After this, cutting and sorting ensued by grouping together answers from different participants and relevant supporting information from policy texts and other research reports. The merging of interview data and primary sources had the value of generating triangulation for each dataset. The emerging themes were then pieced together and narrated in three sections to form a comprehensive picture of the inquiry, with interview quotes inserted where appropriate to enhance data interpretation. Three main themes are identified from the interviews which are contextualized in pertinent policy development and discursive trends as based on the “Russian doll” approach; together they form the backbone of the article as detailed in the following sections which discuss actual challenges faced by NSW policymakers in the domain of learning support management and the ensuing resolution processes.

**Emerging trends: counteracting diagnosis as a funding leverage**

Eligibility for NSW special education support principally relies on the diagnostic procedure of determining students’ primary needs in one of the disability criteria (language disorder, physical disability, intellectual disability, vision impairment, hearing impairment, mental health problems or autism) to gain access to additional funding support (NSW DET, 2003). To some extent, the NSW learning support or “special” education system is still anchored in the psycho-medical paradigm with paediatrician, child psychiatrist and school psychologist or counsellor acting as the gate-keepers to ring fence specialist services based on specific assessment processes to diagnose a disability (Autism Awareness, 2018; Powazuk, 2013). While Tearle and Spandagou (2012) point out that NSW education policies are saturated with the deficit discourse characterizing the medical model, the government rationalizes that such funding mechanism ensures transparency of allocation to areas of greatest needs or those with the most significant disabilities (NSW Government, 2011b). In addition, special consideration is given in cases where a student’s disability does not fit neatly into the prescribed Disability Criteria; a range of education options is also provided including mainstream, integrated and segregated settings (NSW Government, 2011b). Categorical resource allocation enables the provision of individually targeted funding but can also act as a ‘perverse incentive’ to pin a disability category on students with learning difficulties.

The funding support mechanism – individualised funding – is predicated on a diagnosis: you’ve got to fit one of seven boxes. There are thousands of kids that have got their support contingent on that. It generates a dollar value, first and foremost, for the kid. For the school. And what does that dollar value invariably buy? A minder to take the kid away from the classroom teacher. So that becomes the trigger. (N3)

The discussion with the policymakers occurred prior to the adoption of Every Student Every School (ESES) and was instrumental in capturing their concerns in relation to the adverse effects of disability diagnosis. Prior to ESES, two funding policies introduced by the DoE are potentially conducive to the development of inclusive education - Funding Support and Learning Assistance Program. Funding Support has

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**Table 1. New South Wales interview participant codes**

<table>
<thead>
<tr>
<th>Participant Codes</th>
<th>Unit (Department of Education)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1</td>
<td>Office of the Director-General²</td>
</tr>
<tr>
<td>N2</td>
<td>Disability Programs Directorate</td>
</tr>
<tr>
<td>N3</td>
<td>Disability Programs Directorate</td>
</tr>
<tr>
<td>N4</td>
<td>Planning and Innovation</td>
</tr>
<tr>
<td>N5</td>
<td>Student Engagement, Evaluation Bureau</td>
</tr>
</tbody>
</table>

² The title Director-General was changed to Secretary in July 2015.
financed educational provisions for children diagnosed with a disability in regular classes since the mid 90s. The Learning Assistance Program (LAP) launched in 2004 drew in annual federal grants through a census-based formula to fund educational support provision for students with low support needs in basic areas of learning without the requirement of a disability confirmation (NSW Government, 2011b). Schools were entrusted with the responsibility of making optimal use of the LAP funds to obtain “training and development, additional teacher time, teachers’ aide (special) time, teacher release, transfer of duty and program coordination time” (NSW DoE, 2018) for students with mild disabilities and learning difficulties in the mainstream classrooms. Despite these positive efforts, inclusive school culture has not been successfully cultivated as diagnosis-based funding support has shown to be a much more popular choice than the needs-oriented LAP (Graham & Jahnukainen, 2011). As disability exists in a continuum, from mild, moderate to more complex or severe, stakeholders tend to undertake relevant measures to push for a confirmed disability in order for a student to be recognised as having higher support needs to gain access to the individually targeted Integration Funding Support. The initiatives to reduce disability diagnosis through such in-school remedial support has failed to be met as Graham and Jahnukainen (2011) revealed an upward trend for recipients of Funding Support but a downward trend for the LAP.

We give you the money but you’ve got to make a decision about the money (LAP). That’s much harder than ‘Oh, this kid looks different, let’s go and get him diagnosed so I can get a thousand dollars and so another thousand dollars’ (Funding support). (N3)

N3 from the Disability Programs Directorate spoke of the flat-lining trend of ‘hard disability types’ over time, yet the diagnosis of autism spectrum and mental health disorders in NSW had massively escalated in recent years. He revealed that the detection of visible physical, vision and hearing impairments was generally more objective, whereas subjective types of additional needs such as behaviour disorder, autism and emotional disturbance were much harder to confirm as ‘different standards applied subjectively, and the implications could be very different on the child’. While the proliferation of diagnosis was partly explained by the improvements in medical science, ‘hidden’ disabilities such as neuro-sensory issues increasingly grow as areas of greatest needs.

Most of the kids that we are now supporting today... during their prenatal periods and then into early life, they’ve got hidden disabilities. They don’t emerge until developmental milestones move on and they don’t reach them. Mental health disorders, those sorts of things that you know you can question whether they’re there or they’re not... So our graphs would regularly look like peaking for mental health and autism, spiking, but then the others would be tailoring away. (N3)

N3 from the Disability Programs Directorate shared that an aberrant spike was detected at the departmental level when a new autism class is set up in the region of Riverina every three months. Closer investigation revealed that a school in particular had 40% of children identified with autism due to the intervention of a new medical practitioner ‘and the clinic would result in all this’ (N3)! N3 further explained that schools are inclined to bid for disability confirmation which opened up a broader range of educational options for a child. Consequently, N1 detailed that linking disabilities with a dollar value had led to the uprising trend of ‘desirable diagnoses’.

Funding increase to education support goes hand in hand with the growing disability diagnosis and special education enrolment. From 1998 to 2011, official statistics by the NSW Government have revealed a significant 62% growth in the percentage of students receiving support provisions from 3.7% to 6.0% (NSW Government, 2011a), the latest data from 2016 reveals continuous increase. As shown in the graph below, support class placements and funding support provision in regular classes escalate at an even higher rate3. Students with autism or emotional disorders have disproportionately occupied the expanding support classes and special schools are increasingly accepting students identified with behavioural problems (Graham & Sweller, 2011). While the number of students with vision, hearing or physical impairments remains static, a noticeable climb is seen in the enrolment rate of students in the categories of behaviour disorder which has grown by 585%, followed by emotional disturbance (348%)

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3 Annual funding and enrolment data for all placements are unavailable from 2011 onwards from the DEC official website.
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and autism (280%). Other trends include the huge discrepancy in disability rates between boys and girls where 77% of special school enrolments are male (AISNSW Institute, 2017) and the disproportionate over-representation of Indigenous students in special education (Graham, 2012). With the categorical resource distribution structure, the choice patterns for mental health diagnosis within the two categories of cognitive and social/emotional difficulties were especially prevalent compared to physical or sensory disability (AISNSW, 2017), yet the government lacked the mechanisms to avoid those practices. In fact, there has not been an influx of children from segregated settings into support classes and regular classrooms but the reversal.

Figure 1. Enrolment percentage of students with a confirmed disability in different educational settings within NSW government schools, 2005 – 2016

![Graph showing enrolment percentage of students with a confirmed disability in different educational settings within NSW government schools, 2005 – 2016.](image)


The NSW parliamentary inquiry was tasked with evaluating the education of students with a disability or special needs in 2017 which resulted in the release of 39 recommendations, however not without some discrepancies. The report advocates to have the presumption of mainstreaming formalised, where all students should be educated along their peers regardless of any differences or disabilities, unless such arrangement is proven unbeneificial. Yet, the paradox lies in the simultaneous proposition for establishing more segregated support classes, in addition to its already rising numbers of late that is much higher than the NSW enrolment growth (NSW Parliament Legislative Council, 2017). Such trend is reported by AAIE (2018) to have occurred to satisfy parental demand for support classes but fails to mask the underlying causes, namely parents' lack of awareness of rights to inclusive education, unclear specifications of what constitute reasonable adjustments and consequently unsatisfactory learning support provision in mainstream settings, challenges in securing essential funding support due to the narrow focus on disability criteria, discriminatory school culture in a competitive milieu, and the lack of support and training for teachers.

Thus, N3 affirmed that decoupling disability assessment from resourcing is crucial to ‘avoid a national voucher scheme for disability based on individual kids, because the minute we do that, you’ve drawn a line around a group of kids and excluded a whole lot more’ (N3). Those issues expressed by the policymakers required a new strategy to detach the earmark of government funds with every identified learning difficulty. The replacement of LAP with *Every Student, Every School* comes at an opportune

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4. In the 2016 NSW enrolment figures in support classes and schools for specific purposes, highest numbers are found in the category of mild intellectual disability (5,054), to moderate to severe intellectual disability (6,200), autism (2,285), emotional disturbance (1,794) and behaviour disorder (562).
time that prevents the attraction of diagnosis for extra school funding through a fixed eligibility threshold of $6000 to curb the surge of disability diagnoses in the vast grey area between serious and mild mental health disorders. Only students requiring educational support subsistence beyond the stated amount are eligible for integration support or disability funding as determined by a paediatrician, child psychiatrist, school psychologist and/or the school’s multidisciplinary team. In addition, the intensified focus on professional teacher training and the supply of more specialist teachers as well as teacher aides to over 400 schools are aimed at improving the education of children with disabilities in regular schools to fulfill the Commonwealth Disability Standards for Education 2005. The government thus disburses more funds for schools which are located in a community with higher prevalence of disabilities as well as those at the bottom 10% of NAPLAN\(^5\) ranking in students’ learning outcomes. This new funding formula has resulted in a change of the amount each school receives, which could be an increase of financial assistance to small schools in rural localities while larger schools might see a reduction (Forbes, 2012).

In particular, the learning support specialist teachers serve as an easily accessible and useful source of pedagogic advice, consultation and collaborative teaching (NSW Government, 2011b). Distribution of such expertise in individual schools enables effective day-by-day engagement as opposed to a ‘fly-in fly-out 3rd day in July’ awareness programme which N3 described as a futile effort due to the active turnover of staff. The NSW funding support model based on the disability criteria is rationalised by the policymakers as a fair and standardised means of leveraging funding for students with the highest support needs; the subsequent addition of ESES attempts to encourage school-wide support distribution. This resonates with the rich blend of discourses in NSW educational policies detailed in the following sections as reactions and coping strategies to the dilemmas sprung from public demands and federal neoliberal framework, serving as real-time examples of the dynamic problem-solving and appeasement nature of policymaking.

**A hybrid discourse: dilemmas of opposing demands and inner ‘battles’**

Even though Australia has adopted the Salamanca Statement (UNESCO, 1994), the emphasis on inclusion has taken a back seat as the 2006 performance audit revealed that the NSW Government had not expressed a lucid stance in clarifying ‘the relative merits of enrolment in a regular class versus enrolment in a special class’ (AONSW, 2006, p. 9). A lack of clear endorsement for inclusion persists to date as the NSW Parliament Legislative Council report (2017) discusses at length the need to maintain varied educational settings, particularly in establishing more support classes although the number of support units which function as isolated “mini-schools” within mainstream school premises should be curbed.

The movement towards the integration of students with a disability commenced in the 1970s and led to a dramatic increase in the enrolment of students with a disability in state-run mainstream schools. When the enrolment in government special schools dropped by 30% in the period from 1986 to 1994 (Dempsey & Foreman, 1997), it was believed that the call for educational placements in regular neighbourhood schools by the 1988 Special Education Policy and the 1993 NSW Disability Services Act had paid off. However, McRae (1996) reported that ‘surrogate special schools’ (p. 23) in the form of segregated support classes in regular schools had mushroomed since 1986 which more accurately explained the initial decline. Although increased integration had occurred, inclusion had not. The downward trend in special school enrolments had taken a turn since 1999 and has gradually climbed up to 0.6% of total student population. This figure has been rather stable since 2005 and constitutes 14% of the special education student cohort in 2011. The increase occurred despite a 3.5% decrease in government school enrolments from 1997 to 2007. The number of support classes continues to grow ever since while special school enrolments are relatively constant (NSW Parliament Legislative Council report, 2017).

The DoE endorses the recognition of diverse needs through the maintenance of a continuum of services with the rationale that a governmental body carries a duty to a feasible extent in fulfilling requests from the general public, and to achieve middle ground amidst challenging demands. N2 from the Disability Programs Directorate reasoned that intense advocacy by parent lobbyists and political groups for regular

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\(^5\) The National Assessment Program – Literacy and Numeracy (NAPLAN) is another Commonwealth initiative which sets learning benchmarks through a nationally standardised assessment format.
schools to accommodate children with additional needs has been concurrently conflicted by opposing calls for more support classes and special schools. If the Government remains committed to the single philosophy of inclusion and dictates mainstream placements, some groups would be displeased, thus a more flexible policy position is adopted to provide what is in demand. Whereas some parents residing in metropolitan areas have a greater variety of choice in electing regular, special class or special school, this range is more limited in regional areas.

We’re beaten up by people that say, ‘We want support classes.’ We’re beaten up by another group saying, ‘Why are you still establishing support classes, because we don’t believe that you should be!’ That’s a dilemma, because I guess that is a policy position. ‘Well, that is what we are trying to be – all things to all people.’ They’re almost exact opposites, the government’s policy is that it’s about the parents being able to choose what they would like. (N2)

However, 80 support classes catering for students with mild intellectual disability have been closed which has drawn some negative reactions due to increased enrolments of students with multiple disabilities in the remaining support classes (PSPF, 2009). In response, the government states a need to optimise the use of special education services to ensure financial viability (NSW Government, 2011b). The Government is also wary that inclusion might ‘submerge’ some children with a more urgent need for support when they become ‘lost within the broader community’ (N1). Inclusion in the mainstream classroom is only viable provided that the learning needs of the children are appropriately addressed.

If the poor children are so very, very, very disabled with a really extreme disability, and need to be in a special place, make sure that all the values and principles you’d expect in a school are flourishing there. Make sure that their needs and interests are catered for... but don’t pretend these kids don’t have difficulties. (N1)

Full inclusion, by having all students taught in the mainstream classrooms, is thus not the aspiration of the Department as opposed to instilling an inclusive school culture along the ‘normalization continuum’ (N2). It becomes incumbent on the school principal to ensure that inclusive practices are well-implemented, even in special education settings such as special schools and support classes. N3 stressed the importance of providing children with meaningful age-appropriate learning experiences. A student with moderate intellectual disability should not participate ‘in a Year Nine lesson doing Shakespeare because everybody else that's 15 is engaged in this thing called Shakespeare’. The Department’s Curriculum Planning, Programming, Assessing and Reporting K-12 policy allows curriculum modification in the form of an adjusted personalised education programs which might aim for similar or different learning outcomes based on individual needs, strengths, goals and interests in order to make learning more inclusive and dignified (NSW Government, 2011b).

Yet, government special schools and support classes increasingly cater for students with emotional and behavioural disorders. The training of self-management skills for these children is not necessarily better when provided in segregated settings. Conversely, N2 pointed out that non-compliant students tend to be removed from classrooms so that lessons could carry on without disruptions, as more power has been handed to the then Director-General, or currently known as the Secretary, in transferring students with ‘potential and/or demonstrated violent behaviour’ to segregated settings (NSW DET, 2010, p. 1). In addition, segregative practices have persisted in some integrated support units which reinforce the stigma of disability and abnormality within schools, with more cases documented in the NSW Parliament Legislative Council (2017).

The way the kids in the support unit are being treated is just awful, and what this parent was saying, ‘Now, this is actually really, really damaging for everyone in this environment.’ She said, ‘Those kids in the support unit were actually better (off) in a special school.’ Her concern is that it’s more damaging for the kids in a regular class to see the way these other people with disabilities are being treated. So if it’s not done well, then you’re actually strengthening that stereotype that they’re weirdos...because they had this new outdoor area built and the message was: if kids from the special unit are in there, you’re not allowed in there. (N2)
The policymakers interviewed for this research believed that to some extent diagnosis had been used to absolve some teachers of their inability to teach students effectively, although this is not intended as a generalisation as conversely there are outstanding practices and supportive teachers across NSW schools. Instead of evaluating ways to deliver instruction that is better adapted to the learners’ needs, there is still a tendency for some teachers and other professionals to view a challenging learning situation as a result of students’ neurological deficit. The 2010 Parliamentary Inquiry launched by the NSW Legislative Council into the education provision for students with a disability or special needs has disclosed the mindsets of some schools which opt for diagnosis and labelling rather than capacity building and professional development to cope with students’ learning difficulties (NSW Parliament, 2010). The expert advisory panel formed to advise the Government around supporting children with learning difficulties also confidently highlights that students’ academic incompetence is a product of poor teaching. While some children might be able to survive poor instruction, a huge number remain illiterate because the lessons fail to take into account their learning needs. The focus seems to be on ‘getting rid of the kid’ (N2) through suspension and expulsion even in many cases where behavioural issues actually stem from a disability (PWD, 2010), and schools rarely reflect on the situation thereafter ‘because the problem’s gone’. N3 shared that there is a great variation across NSW schools in the quality of education and advice provided to local communities and the Department is aware that the NSW education system still lacks efficient intervention procedures and a strong network of support to prevent school failure and discriminatory practices.

More informed parents and communities will demand a different type of service to less informed communities. There can be an opportunity for school principals in particular to be bullies of local community parents, in terms of taking advantage of the fact that these people might not be informed, teaching upon them what they think might be or might not be good for their kid. (N3)

The following quote shows that there is also a tendency to profile a child with a disconnected list of needs according to the eligible sources of support which scatters rather than assembles related services for holistic support provision. Determining the primary disability for funding income is equally problematic as it is often the combination of a few learning needs that makes a unique support requirement. ‘Should this kid go into an autism class or an IO class (for moderate intellectual impairment)?’ This question posed by N2 reveals many dilemmas within educational decision-making and thus the Department had been deliberating a solution to such dispersed way of needs identification and support provision. Schools need to work closely with parents to consolidate the support a child needs especially as illustrated by N3 below:

If an Aboriginal kid has a non-English speaking background, comes from a low socioeconomic home and is deaf, but is gifted and talented! We fund the child’s Aboriginality, non-English speaking background and low-socioeconomic needs, disability and giftedness all separately. The resources all sort of trickle in like little streams into a pot, but the school doesn’t look at it in a holistic way.

A functional assessment tool, currently known as the Personalised Learning and Support Signposting Tool (PLASST), has been under trial which involves teachers working with parents to profile a child based on 46 items for evaluating and documenting students’ needs in various school-related practical tasks (NSW DEC, 2012). The tool responds to the call from public schools principals that the NSW education system lacks mechanisms to determine the impact students’ disabilities have on their overall learning efficiency, notably in viewing the combined needs arising from multiple disabilities (PSPF, 2009). This form of support assessment employs a broader, individualised and holistic approach to evaluating learning needs that covers communication, writing, reading and socio-emotional aspects although it is not meant for funding allocation. Clearer specification of assessment criteria also compensates for the many non-normative or objective medical categories of the previous LAP model and the detachment of mild support requirements and funding has the potential to curb the trend of over-diagnosis. Since funding is not tied to the functional assessment, thus any child can be functionally profiled to demonstrate their learning needs so that available resources can be effectively sought within the school or drawn from external help. Besides reducing bureaucracy and enhancing school-level efficiency, students who
previously failed to meet the compartmentalised disability criteria could benefit from the allocation of support. The tool is also able to show the integrated strengths and weaknesses of a child so that schools could holistically provide appropriate modifications.

While PLASST is promising as the functional assessment tool to profile learning needs more holistically, yet it is perceived to be inferior in terms of acting as a lever to attract substantial funds relative to having a firm diagnosis of disability. Medical evidence of a diagnosed disability remains a key consideration for individualised targeted funding. The parliamentary report conducted by NSW Ombudsman (2013) also highlights that public schools have much lower applications or access request filed for disability provisions compared to private schools. Further investigation reveals a complicated mesh of factors. Private schools are more proactive in garnering additional funding to satisfy the parents as customers in greater support provision whereas many underprivileged students in public schools come from less educated and poorly-resourced families without the means to consult a doctor for disability certification. In addition, low academic expectations from these students contribute to a lack of effort from school personnel in applying for disability provisions (NSW Ombudsman, 2013).

In order to improve co-ordination during policy planning and implementation, the Working Together strategy (NSW DoE, 2017) has been introduced within and between all directorates, as well as with parents, government agencies and non-government providers, in order to function as an effective organization. According to N1, issues relating to children with a disability are often indiscriminately referred to the Disability Program Consultant without prior judgment on the other curricular, health or social needs involved, as his or her disability is presumed to be the cause. The attitude of indifference is prevalent in the department when such responsibilities should fall on all educators and policymakers instead of compartmentalising their needs to the ‘special’ workforce. The ‘battles’ that exist between policy representatives from different directorates spring from a lack of understanding of the integrated function in educational service provision.

So if there’s an issue in the school, and it just so happens that it involves a young person with a disability; ‘Oh, you better ring the Disability Program Consultant.’ Now, even though it might be health care issue, or a curriculum issue, no, it’s straight to...so the focus is on the child’s disability, not on: what's the actual underlying issue here? ‘Oh, that person’s special, so there must be special people who look after those!’ (N2)

Ultimately, this strategy strived to instil the same level of understanding with regard to policy rationale, implementation needs and educational goals across all stakeholders, as opposed to having different attitudes and beliefs especially around disability issues. Embracing and effectively coping with student diversity as a common goal must penetrate all levels of the education system to gain traction. The policymaker explained that even with reasonable policies put in place, often results were not delivered at the implementation phase due to the loose connection and communication between stakeholders. N5 also shared a similar concern that policy process often came from higher authority through the request of information from various directorates and offices but feedback and decisions were seldom relayed back. Multidisciplinary collaboration has to be enhanced in NSW schools and the Department of Education and Training to jointly respond to different aspects of a child’s needs in an integrated manner. The multiple dilemmas circle around dissimilar views and preferences of various stakeholders, consequently giving rise to a rich hybrid of education discourses in NSW evolving from integration to inclusion to responses to diversity (Graham & Jahnukainen, 2011). The neo-liberal discourse predominating the political environment further adds to such complexity when NSW is subjected to federal influences which transmit through to the workings of the Department and schools.

The impetus of neo-liberalism under federal influence

At the time the [Federal] Labor government came in, they had a sort of manifesto of policies, they did stick to their guns election cycle after election cycle. They said they wanted fairer school information, and they pushed that through annual school reports, assessment programs, developing and enhancing external tests and examinations. Within
The NSW policymaking process has been linked with the former federal Labor government’s priorities to use results-based governance which has intensified since 2000 with funding being directed for ‘major enhancements relating to increased testing and performance measurement’ (DET, 2000, p. 15) and reporting to the parent-clients. While the Programme of International Student Assessment (PISA) only affected schools indirectly in the first few cycles of assessments, N3 asserted that it has now featured in day-to-day decision-making in NSW very prominently. Since the year 2000, PISA has ranked reading, mathematical and scientific skills performance of 15 year old students in participating countries and has thus provided education policymakers with an additional point of reference when reviewing domestic policies and programs. Given that NSW major agendas have always lingered on ‘attainment, retention, university outcomes and the Bradley targets’ (N4), NSW’s consistent ranking slippage in all three domains between 2000 and 2009 as well as the declining percentage rate of upper level PISA performance, which is much faster than the expanding tail, have generated serious concerns among policymakers even though Australian performance is above OECD average.

The slight slip at the upper scales of Australian students’ reading proficiency level is explained by N1 as the side effects of overemphasising basic literacy skills to the neglect of higher literacy skills. The PISA results have also raised concerns relating to the different quality standards between schools, as N5 mentioned ‘we’ve got some wonderful schools and some really struggling suburbs, but that just speaks to the complexity of the system’. Albeit ‘high expectations’ and ‘closing the gaps’ (DET, 2011, p. 8) are both targeted goals of the NSW policymakers, the focus on expanding the top two achievement bands for literacy and numeracy through NAPLAN is apparent, with the aim of securing 10% of total student population in those bands by 2012 and 12% by 2016 (DET, 2007; 2009; 2010). Students also faced greater pressure to conform to ‘a standards framework of skills bands’ from as early as 1997 (DET, 1997, p. 5) which have expanded through the federal implementation of the Smarter Schools National Partnerships, ‘making attainment as an agenda, front and centre, for us’ (N4). A reward system is in place to financially recompense beneficiary states which succeed in reaching the targeted benchmark. Local and nationally-agreed literacy and numeracy targets have been established which transcend the public sector to include Catholic and independent schools.

Priorities to support educational consumerism have not changed since the Liberal Party took over in 2013. In addition, the Gonski needs-based schools funding model (Australian Government, 2011) which was well under way to channel resources to disadvantaged students faces funding cuts in its last two years of implementation under the Liberal leadership, showing a lack of their commitment to reduce educational inequality (Dziedzic et al., 2016). A second review was undertaken in 2017 which has resulted in the publication of another review report (Australian Government, 2018) with emphasis on performance monitoring and curricular improvement, also known as the Gonski 2.0. Despite private schools being earmarked for budget cuts under the Gonski 2.0 funding deal, increased funding for private schools is again witnessed this year due to interim bonus fund arranged by the federal government to ease them through such transition, which has invited strong backlash from the public (McGowan, 2018). While the federal government rationalizes that more funding does not guarantee better results, the breach of commitment contradicts the sustaining flow of Commonwealth funds to non-government schools.

Policy intention and end products can often be contradictory. Neo-liberal governance bears an opposite effect to that of inclusion, preventing inclusion policies from exercising a more lasting influence in the school system. The standards-based curriculum framework with an outcome-based approach has not taken into account the whole broad cohort of school children even though the Department has the duty to ‘cater for the top and bottom cognitively’ (N1). N5 also commented that the focus of classroom teaching is increasingly narrowed down to the areas scoped in standardised examinations so that all students could become ‘test-savvy’ by the time they sit for Year 12 High School Certificate. The culture of performativity which has infiltrated the NSW education system has also added to the widening achievement disparity. The public policy of information transparency and comprehensive reporting of school performance have been taken to a new height with the publication of school performance aggregates on the My School website. As a federal initiative, the emphasis on literacy and numeracy benchmarks in the National
Assessment Program – Literacy and Numeracy (NAPLAN), with the comparison of like-schools results on the My School website, has contributed to increasingly heavy academic demands and superficial learning in schools (Polesel et al., 2012). Along with increased media coverage, My School has inadvertently become a resource for parental reference to compare performances when choosing schools. Lingard (2010) also underlines possible risk of the ‘potential for the ‘naming’ and ‘shaming’ of poorly performing schools’ (p.130) when the connection between disadvantaged socioeconomic background and student performance is masked behind online statistics which fail to highlight local efforts and the quality of teaching and learning.

*When you look at NAPLAN data – remember, it’s only one point in time. Two: It only assesses certain aspects of literacy and numeracy. Three: it’s not meant to be a judge of the whole quality of schooling which goes on in the school.* (N1)

Nevertheless, NSW policymakers conceive inclusion as increased participation of students with additional support needs in standardised tests such as NAPLAN (Graham, 2016). Compatible measures for this purpose include practical adjustments to test conditions and test preparation through drill exercises, although some argue that these inhibit rather than stimulate sustained meaningful learning (Luke, 2010; Polesel et al., 2012). The reporting of student performance at individual, school, regional and state levels in years 3, 5, 7 and 9 has pitted students and schools against each other in competition for academic recognition and led to the accentuation of between-school differences. Information concluded from such aggregate level data to compare schools that are categorised under the same profile of low or high socioeconomic status is misleading as they are very dissimilar in terms of student population, locality and culture. Even though value-added components such as relative effective indicators of similar schools are incorporated into the performance analysis of NAPLAN, inclusive strategies and culture are not evaluated as part of the essentials of school effectiveness. Under the intense pressure of school comparison, the indignity of unachieved standards, low ranking and school ineffectiveness are degradingly associated with low-performing students who have additional needs or from disadvantaged background (Lingard, 2010). There are also reservations about the true diagnostic value of NAPLAN.

*If you want to use it diagnostically, you don’t sit the test in May and give them the results in August. [You’d] use it the next day, the next week. Or at least in the same month.* (N4)

The effect of federal imposition on local state policies is evident. The obsession of standards and ranking in the current assessment scheme has a stifling effect on efforts to promote inclusion. Reports (Andersen, 2010; Bagshaw, 2016) have surfaced that schools request parents to keep their academically struggling children at home through formal exemption especially “on the basis of intellectual or functional disability or if they have been in Australia for less than twelve months and are from a non-English speaking background” (Gable & Lingard, 2013). Such exemptions not only result in the lack of participation and assessment profiles of students with disabilities during NAPLAN tests but more adversely have affected the level of attention given by teachers during the intensive periods of test preparation from the practice of educational triage (Gillborn & Youdell, 2000) as they are deemed lacking the potential of passing tests and raising school ranking (Hardy, 2013). Testing accommodations that are allowed under NAPLAN do not take into account the individualised learning goals of students with disabilities which are perceived as incomparable to national standards hence leading to their systematic exemption. Under the highly charged federal accountability atmosphere to meet performance targets, schools in NSW encounter enormous difficulty in fulfilling their inclusive responsibilities towards children behind their grade level of competency.

While high-performing selective and private schools emerge as the top choice in the educational market at one end, low-status schools in deprived neighbourhoods are left with a bad reputation from bottom-ranking educational performance. N1 brought up the issue of disproportionate representation of children from significantly disadvantaged areas and of Aboriginal origin in the lower achievement bands of PISA and NAPLAN, which could concentrate in a class or schools that only contained such ‘remnant hard core’ group. N4 was more concerned that those children would be perceived as ‘that kid (that) dragged us down’ in the presence of these high-stake testing. The effects are detrimental especially for students with additional support needs who become the victim of this ranking contest.
The school might want that [enrolment] figure [of students with disabilities] to look large because maybe that will be a filter for interpreting that performance. However, there may be interest in that figure being smaller, because it makes your school look like, you know, I can send my child there and they’re not going to be at risk of being in a class which will be diverted, or over-run, by these integrators. (N4)

The promotion of education as a marketplace has been taken up in NSW since the mid-1970s by directing state and federal funds to non-government schools. The era of comprehensive schools with strong social and ethnic integration through the 60s and 70s has given way to an exponential growth of private sector enrolment since 1978. Government-funded private providers now account for around a third of NSW schools which include ‘low-fee Christian schools, ethno-linguistic schools, Catholic schools, as well as high-fee selective schools, against which public schools must now compete’ (Vickers, 2004, p. 13; Private Schools Directory, 2018).

While learning support is one of the components of the productivity and social inclusion agenda in the Council of Australian Government, the private education sector and school performance assessment receive a much larger proportion of federal allocation. Under the National Partnerships, many of the listed equity programs are launched on a temporary basis without guaranteed continuation of support for the targeted students. Australia’s current centre-right political climate is evidenced by the generous funding support to non-government schools which amounts to two-thirds of Commonwealth Government funding in the federal budget 2010/11 (Harrington, 2011). The inequitable budget allocation is inconsistent with the higher funding needs of public schools which educate around 67% of the nation’s children (Bonnor & Caro, 2007). The recurrent and growing financial support given to independent schools since 2001 based on the Socio-Economic Status (SES) funding model shows federal unwavering endorsement of the neo-liberal private economy. Independent schools are ironically overfunded from 100 to 250 per cent of the school resourcing standard (SRS) in contrast with NSW public schools which receive only 89 per cent of their SRS (Baker, 2018). Public schools have reported $13,318 annual income per student compared to $20,053 per student in private schools as a result of more than 40% of continuous rise in federal and state government funding since 2009 (Singhal, 2018). There is an ongoing vicious cycle at play which revolves around principals’ moral obligation to enrol students with a disability in public schools while facing scarce funding and teachers’ struggle to meet NAPLAN performance targets in these increasingly diverse classrooms (Taylor, 2017).

Nevertheless, this contrasts with the differing priorities of the NSW Government which disburses 92.7% of its annual education budget to public schools. While public schools face high levels of accountability pressure, huge amounts of public funding have been given to autonomous private schools with no accountability strings attached and no obligation to report spending efficiency and outcomes. Disability Advocacy NSW reported that 76.8% (90,000) of students with a disability attend public schools (Powazuk, 2013). A lack of individually targeted state funding for these students in private schools was argued to have created disincentives for enrolling parents as only a meager amount of Commonwealth grant is given upon application (NSW Government, 2011a). However, the NSW government asserts that students with disabilities in Independent schools in fact receive 80% higher funding through the bulk of Commonwealth provision, the lower private enrolment figure springs from the reluctance of private schools to accept these students so that resources are diverted to other fee-paying students without support needs (Cook, 2016; NSW Legislative Council, 2010). While a severe lack of funding for more than 2500 students with disabilities is a key issue highlighted in the Public Schools Principals Forum (2009), the NSW government claims that the huge investment for its specialist disability service system made through the Stronger Together 2006-2016 initiative has outshone financial input made by any other Australian State Government. The federal decision to financially support and politically promote the establishment of school markets has brought about segregative effect of education commercialism when higher SES students are able to pay for private education while children from poor families and with a disability make a default decision to attend the local public schools. The overrepresentation of low SES students and Aboriginal students in disadvantaged schools shows how school marketization can aggravate exclusion. N3 remarked that non-government schools by and large did not recognise the additional learning needs of children. Parents who had their children enrolled in non-government schools made use of the Centre for Effective Reading in Dalwood as a special education program because it serviced public and private schools. The complex political environment heavily influenced by the dominant neo-liberal approach
to public administration at the national level has to a large extent restricted the ‘manoeuvring space’ (Broomhill, 2011, p. 137) available to the NSW Government as bound by strong federal obligation and financial relations.

Under the constant change of federal leadership accompanied by their differing commitments to disability provisions in education, the state of affairs remains laden with uncertainty but some directions are persistent: (1) Commonwealth funding in support of Australian non-government education providers persists while public schools remain as the main education provider for students who are socio-economically less privileged and/or with a disability (2) full inclusion is not envisioned in the NSW Education Department; a continuum of options remains the best policy to meet parents’ or students’ myriad needs (3) students with the highest level of need are prioritised to receive individualised funding while others are aimed to be supported either through school-wide allocation or by using the functional assessment tool.

Conclusion

The evolution of ‘special’ education policies in NSW reveals the problem-solution chain: Every Student, Every School was launched to cope with the failings of the Learning Assistance Program (NSW DET, 2006) and to deter over-diagnosis within schools to secure funding support; intra-departmental compartmentalised educational planning drives the need to implement the Working Together strategy for greater organizational efficiency; the functional assessment tool attempts to remedy disconnected understanding and disjointed provision to support the many needs of a student. Policymaking is shown to be a corollary of public demands and departmental positions which aims to generate suitable responses or solutions to existing problems within a set of financial and political constraints defined by the immediate context. As opposed to full inclusion, the NSW Government has maintained a strong policy position endorsing a continuum of support services and a parallel school system to achieve middle ground among differential parental demands. The multiple dilemmas circle around dissimilar views and preferences of various stakeholders, consequentially giving rise to a rich hybrid of ‘special’ education discourses in NSW including integration, inclusion and responses to diversity.

While the Salamanca Statement has gained the endorsement of Australian government, the actual deployment of inclusion into individual states and school settings has progressed to a lesser extent. Unintended exclusion can happen on many grounds, one such example is the incompatibility between national standards and the learning goals of students with a disability which as a result contributes to their exemption from tests like NAPLAN. Within the wider political environment, neo-liberal demands inadvertently work against educational equity through the publication of NAPLAN results, school choice, accountability measures and performative monitoring that substantially raise the stakes of academic competition. In this context, inclusion seems to mainly concern students with additional needs fitting into the wider educational agendas which are of competition and standards. The Australian government has persistently supported school marketization and a strategic performance-based reward system that has widened the social divide instead of mitigating the influence of student background on educational outcomes. The cascade of accountability induced by the federal competitive agenda has aligned NSW Government and its schools to bid for greater academic excellence while inclusion and equity are inadvertently sidelined in policy agenda.

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References


Discursive mélange and multiple dilemmas: navigating New South Wales ‘special’ education policymaking  | Jessica Chong


Midwife observations on the impact of hot weather on poor perinatal outcomes in central Australia: a qualitative study

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Abstract
Remote arid Australian towns already experience high summer temperature and are projected to have warmer future temperatures due to climatic changes. It is also home to many Indigenous women who prefer an outdoor lifestyle and have poor perinatal outcomes. Quantitative analysis of preterm birth and temperature data indicated higher risks to preterm births among Indigenous women in central Australia. This paper aims to report midwives’ observations on the effects of hot weather on poor perinatal outcomes in a central Australian town. Semi-structured interviews were conducted with 12 registered midwives providing perinatal services to families in central Australia. The interview responses were coded and classified against the major themes. None of the midwives perceived any direct relationship between heat exposure and preterm birth, but reported increased incidences of dehydration, exhaustion, discomfort and requests for induction among pregnant women which were often treated before further complications. A quarter of the respondents also mentioned that Indigenous pregnant women do not complain, even when symptoms of heat stress are evident. Quantitative analysis of perinatal and temperature data indicated increased risks to preterm births, but did not provide information on discomfort, dehydration, exhaustion or more requests to be induced. The study also shows that it is important for midwives and health practitioners to be culturally-sensitive to the fact that certain population groups tend not to complain, even if they are experiencing symptoms of heat stress. This research highlights the importance of cultural training for midwives and their role in alerting pregnant women to take precautionary measures during summer periods.

Introduction
Poor perinatal outcomes such as stillbirths (baby born with no signs of life at or after 28 weeks’ gestation) and preterm births (births before completing 37 weeks of gestation) often lead to economic costs and stress on families (Trasande et al., 2016; Ten Hoope-Bender et al., 2016; Petrou et al., 2001). Pre-term
births were one of the leading causes of death among children under the age of 5 years (WHO, 2016a). Globally, for every 1000 births, around 18 babies were still born in 2015 (WHO, 2016b). Preterm infants are likely to experience short and long term health problems and even permanent disability (Petrou et al., 2001; Wen et al., 2004; Soilly et al., 2014). Despite improved antenatal programs and access to technology to monitor pregnancy, the incidence of poor pregnancy outcomes such as preterm births have risen globally in the past two decades (Blencowe et al., 2012). While preterm births are highest in low income countries (Beck et al., 2010), such risks are also quite high among Indigenous populations in high income countries such as Australia, Canada and the United States (Shah et al., 2011; Heaman et al., 2005). In Australia, the rate of Indigenous preterm birth and perinatal mortality is nearly double that of the non-Indigenous population making it important to understand factors that may influence such poor perinatal outcomes (AIHW, 2016b; AIHW, 2017).

Several risk factors have been linked to preterm births, low birth weights and stillbirths. Maternal characteristics (e.g. age), maternal medical conditions (e.g. overweight, diabetes, high blood pressure), maternal reproductive history (personal or family history of preterm birth, previous preterm births or miscarriages) and general maternal health (nutritional status, infection and chronic disease, e.g. diabetes and hypertension) include some of the risk factors (AIHW, 2016a; AIHW, 2017; AIHW, 2016b; Goldenberg et al., 2008; Flenady et al., 2011). Certain fetal characteristics such as multiple pregnancies, small for gestation age and growth restriction also contribute towards poor perinatal outcomes (AIHW, 2016a; AIHW, 2017; AIHW, 2016b).

Other risk factors include social factors such as low education, domestic violence, poor socio-economic conditions (Negger et al., 2004; Chiavarini et al., 2012), Indigeneity (e.g. 16% preterm births compared to 6% preterm births for non-Indigenous Australian mothers) and access to antenatal care (e.g. living in very remote locations or locations with low access to antenatal care) (AIHW, 2016a; AIHW, 2017; AIHW, 2016b, Goldenberg et al., 2008). Exposure to environmental variables such as extreme temperature, humidity, ozone, carbon monoxide, nitrous oxide and particulate matter (Trasande et al., 2016; Strand et al., 2011a; Basu et al., 2010; Dadvand et al., 2011; Flouris et al., 2009; Zhang et al., 2017; Wang et al., 2013) and certain lifestyle choices such as use of alcohol and other drugs (Flenady et al., 2011; Varner et al., 2014) also contribute to poor perinatal outcomes.

A few Brisbane based studies have explored the impact of ambient temperature (Strand et al., 2011b; Li et al., 2018) and heat waves (Wang et al., 2013) and identified increased preterm birth risks. Another study in arid Australia indicated statistically significant increase in risks of preterm births due to exposure to extreme maximum temperature (>41°C) during the last 3 weeks of pregnancy (Mathew et al., 2017). Environmental risk factors such as exposure to extreme heat and its impact on perinatal outcomes have been under-researched in Australia. All the existing Australian studies exploring the association between heat exposure and perinatal outcomes used hospital level health record data. The studies did not collect place-based data or explore the impact of temperature exposure on less severe heat related health symptoms such as dehydration or tiredness. This paper focuses on the same geographical area as Mathew et al. (2017) and aims to explore further the issue using midwives’ observations on the effects of hot weather on poor perinatal outcomes. Specifically, the paper explores the following research questions: What impacts of heat are observed among pregnant women in a central Australian town? What are the factors that might be contributing towards the impact? Do the observed impacts differ for specific groups of the population?

Data and methods

Study design and data collection

Quantitative data was analysed in the initial stage of the research (Mathew et al., 2017). The quantitative study was conducted using birth and perinatal outcome data for the central Australian hospital which was accessed from the Northern Territory (NT) Midwives Data Collection (available from the Northern Territory Department of Health, Health Gains Planning branch) and temperature data sourced through the Bureau of Meteorology (BoM). This qualitative study was sequentially planned to examine...
if midwives practising in the central Australian hospital observed increased preterm births or other poor perinatal outcomes such as stillbirth and or any other heat related stress due to temperature exposure and whether it was higher among any specific groups of the population. Heat related stress could be observed in the form of more antenatal visits, discomfort, dehydration, requests for induction (artificial start of the birth process through medical interventions or other methods), elective caesarean or miscarriages (Rylander et al., 2013), none of which have been explored in the quantitative study using the NT midwives’ data collection.

The interview questions in this study were targeted to understand three main objectives: Objective 1: What impacts of heat are observed among pregnant women in the central Australian town? Objective 2: What are the factors that might be contributing towards the impact? Objective 3: Do the observed impacts differ for specific groups of the population? The interview questionnaire was pilot tested with two central Australian health researchers with nursing and midwifery background.

**Ethics**

Ethics approval (reference number HREC-15-326) to access the NT Midwives Data Collection and to conduct the interviews was obtained from the Central Australian Human Research Ethics Committee (CAHREC).

**Study site**

The Central Australian service town was chosen as it has (i) an arid climate with high summer temperatures (average of monthly summer maximum temperatures >35°C) (see Figure 1), (ii) high proportion of Indigenous population (18%) (ABS, 2016) who are more exposed to the outdoor environment due to their preferred way of living, (iii) future warmer atmospheric projections (e.g. days with temperature >40°C will nearly double by 2030 for a mid-range greenhouse gas emission scenario; Webb et al., 2015). The town also has the major secondary referral hospital for central Australia, with 186 beds and serving up to 60,000 people including visitors to the region. The hospital covers a catchment area of approximately 1.6 million square kilometres and supports people residing in the Northern Territory and also in remote communities in northern South Australia and in the south west of Western Australia. In 2013 (which is the latest data available through the NT midwives data collection) there were 713 births in the hospital, 50% of the births were Indigenous of which more than 60% were non-residents of the town.
Participants & recruitment

Registered midwives providing perinatal services to families in the central Australian town were interviewed using a semi-structured questionnaire (interview questions in table 1 Appendix). A list including the names and contacts of 23 midwives were provided by the hospital and they were invited to participate in the interview. Twelve midwives provided informed written consent and attended appointments to be interviewed (N=12); another four replied to the request for interview but declined to participate; three others responded but as they had only recently moved to the central Australian town they were not interviewed; and no response was received from four midwives despite more than one request made for interview consent and suitable time. The response rate was 60% (12/20) after excluding the three midwives who had recently moved to town from the total number of midwives. A higher response rate was not attained primarily because shift work and rostering issues made it difficult for midwives to identify a suitable time to be interviewed, and not all midwives checked their work email on a regular basis, which made communicating with them difficult.

Midwives were considered as the main respondents for the interviews, as they could be considered as ‘experts’ based on their experience in antenatal care. Midwives working at both the public hospital and the local community-based Midwifery Group Practice (MGP), which is also part of the hospital were invited for interviews. Participation in the interviews were restricted to midwives who had at least a year of experience working in central Australia. This selection criterion was important as there is usually a large staff turnover in remote communities (Russel et al., 2017) and many new midwives may not have sufficient contextual experience working with pregnant women in central Australia. At least 60% participation by the eligible midwives was targeted. A 60% response rate is considered sufficient to reach data saturation, after which no new information arises despite continuing data collection (Morse et al., 2002). The interviews were conducted by a local female researcher experienced in conducting qualitative research. All the midwives who participated were female. The interviews took a maximum of 15 minutes and were conducted during breaks of work time and after work shifts. Interview responses were audio recorded and transcribed. Interview notes were also taken by the interviewer and summarised to the respondent at the end of the interview. While the interviewer was aware of the results of the quantitative analysis, care was taken not to mention the results to the respondents and create any bias. A quick summary of the response was provided to validate the data and encourage the respondents to
add any further information. It also helped the researcher to understand if additional interviews were to be conducted to test whether the themes and categories were sufficient. Data saturation was observed by the researcher conducting the interview after nearly 8 interviews. To maintain the anonymity of the respondents, the interview responses were numbered and only the numbers are quoted in this paper.

Data analysis

Actual interviews were conducted between 2016 December and 2017 March. The collected responses were coded by both the first and second author. After coding, the authors checked for commonalities between the codes, relationships and differences across the data set, and identified the major themes (Gibsen and Brown, 2009).

Results

There were 7973 births including both live and still births during the period 2003 to 2013. The data included 87 stillbirths and almost 67% of the stillbirths were Indigenous. There were 7942 singular livebirths (number of Indigenous births=4194; number of non-Indigenous births=3748; preterm births=809; number of Indigenous preterm births=547 and number of non-Indigenous preterm births=262; total number of inductions=2035; number of inductions for Indigenous women=1123; number of inductions for non-Indigenous women=912; total number of elective caesarean=816, number of elective caesarean for Indigenous women=380; number of elective caesarean for non-Indigenous women=436; number of elective caesarean before full term (i.e. <40 weeks=713)) during the period 2003-2013.

The number of preterm births per total births peaked during the summer months of November, December and January and was lowest during the months of September and October (see Figure 2a). The preterm birth to total birth ratio was higher for the Indigenous births compared to the non-Indigenous births (see Figure 2b-ca) The preterm birth ratio for Indigenous births was highest in January and lowest in September and October (see Figure 2b). The ratio for non-Indigenous births was highest in December and lowest in September and October (see Figure 2c). There was a total of 2035 inductions during the period 2003-2013. The peak number of inductions per total live births did not coincide with the hotter months (See Figure 3a). It was highest in May and lowest during March and June. The induction ratios for Indigenous births were highest in February and November and lowest in June and July (see Figure 3b). The induction ratios for non-Indigenous births peaked in May and June, but was lowest in March and September (see Figure 3c).

Figures 2a-c: Variation in the a) number of preterm births (PTBs) per total singular live births; b) number of Indigenous preterm births per total singular live Indigenous births; c) number of non-Indigenous preterm births per total singular live non-Indigenous births across months using the NT midwives data collection for the period 2003-2013; Error bars show standard error.
Figures 3a-c: Variation in the number of a) induced births per total births; b) induced Indigenous births per total Indigenous births; c) induced non-Indigenous births per total non-Indigenous births across months using NT midwives data collection for the period 2003-2013.
The results of the semi-structured interviews are discussed mainly using two major themes: i) impacts of hot weather and ii) vulnerability of Indigenous pregnant women to hot weather.

**Impacts of hot weather exposure on pregnant women in an arid central Australian remote town**

There is no universal definition for hot weather or extended period of hot days usually termed as ‘heatwaves’. Temperature thresholds for health effect studies are often dependent on a location’s climate (arid, tropical climate), health outcomes studied (e.g. cardiovascular risks, mental health illness) and the population (e.g. elderly, pregnant women) considered. The temperature threshold values midwives perceived to be ‘extreme heat’ in central Australia ranged from ‘anything over 35°C’ to over 40°C. More than a quarter of the midwives highlighted that pregnant women felt the heat more, but the perception of heat could be dependent on the individual. One midwife stated:

38°C is hot. If you are pregnant you feel the heat more. (midwife 1, hospital)

Responses related to the effects of extreme heat were mainly linked to heat stress rather than poor perinatal outcomes. Two respondents acknowledged that heat would cause a stress on the body but had not observed whether it had any direct impact on birth outcomes.

It is just another stress on the body. As soon as you get stress on the body, you can get premature labour or premature babies or stillbirths I guess. It is an added stress on the body. You can’t say to someone who is coming in with a miscarriage that you had that because of the heat. There are just too many factors, so this would be just something added to the mix. But because I have not done such a research I couldn’t say for sure. (midwife 2, hospital)

Two of the midwives indicated that they had noted more miscarriages during summer, with one of the midwives mentioning the month of January as particularly bad. None of the respondents reported that they had observed any direct link between days when the temperature was very high and preterm births. They agreed that theoretically very hot weather could lead to heat stress and the onset of labour but they had not experienced this or even thought about it. One midwife rejected the concept outright:

I don’t think I have noticed any direct correlation. I have seen a number of preterm births here- not much difference in summer and winter. (midwife 3, hospital)

Another midwife stated that pre-term births could happen if timely measures or medical interventions are not taken. Her response:
Hard to say (link between extreme heat and preterm birth), if the women and baby are tachycardic that way we might take measures and if that doesn’t settle we might have to induce her. That might cause a cascade of things. If she is really not ready then the induction might end up in an emergency caesarean. So though that’s not proven, I can see that happening. (midwife 4, hospital)

Responses by midwives to the questions concerning the effects of extreme ambient heat on the pregnancy outcomes revealed dehydration as the most pertinent effect. One midwife described a heat stress impact as follows:

Dehydration would be the big one. Many women come in with dehydration. They are probably used to that level of dehydration. The women are chronically dehydrated most of the time. When they come in and we put in a CTG trace on, often the baby is tachycardic. So that affects the interventions that we have to do for the baby sometimes or the mum. We sometimes have to rehydrate women. It increases in the summer months definitely. (midwife 2, hospital)

Another midwife described a situation of dehydration where intervention was required:

I have certainly seen that if a woman is (physically) active during the hot time, for example, I had a woman walk from the other side of town in one morning, she was tachycardic. Her heart rate was very high, she was very dry. The baby had a very high heart rate as well. There was probably not an impact on the birth. We took measures to correct this. We had to cannulate her with intravenous fluids. (midwife 4, hospital)

Two midwives mentioned that due to dehydration, pregnant women could get urinary tract infections (UTI) which could in turn lead to preterm labour. The other impact of hot weather mentioned by more than half of the respondents was that it causes discomfort to pregnant women. They highlighted that high ambient temperatures in summer, increase in body weight and the rise in body temperature that normally occurs in pregnancy could create a great deal of discomfort among pregnant women. Midwife responses indicated higher discomfort during summer months often resulted in more pregnant women requesting induction:

There is pattern of women wanting induction. Heat is so horrendous to cope and they want the baby out. (midwife 5, Midwifery Group Practice)

Definitely discomfort. Often women are so sick of the heat they ask to be induced. (midwife 6, hospital)

In addition to discomfort, exhaustion among pregnant women during summer months was also mentioned by three midwives as another direct impact of heat. Older women and mothers who had other children to look after were perceived to experience exhaustion the most.

Women with other children feel more tired during the hot periods since they are pregnant and need to look after the children too. (midwife 7, hospital)

One midwife from the Midwifery Group Practice reported that it was difficult to estimate how many pregnant women suffered from dehydration and were treated for preterm labour. Once they returned home after being treated by the midwives/doctors and had their baby on the due date, this episode might not reflect in the NT Midwives data collection (data set available from the NT department of health which is often used for research purposes). This was supported by another midwife’s response at the hospital.

Often when the women comes in on a hot day thinking she is in labour. But after cooling down and hydrating she goes back. (midwife 6, hospital)
Vulnerability of Indigenous pregnant women to hot weather and measures

Majority of the midwives mentioned that they do advise women to rest more, involve in less strenuous activities, hydrate themselves and to stay indoors during the hotter times of the day during summer months. Most midwives (i.e. 9 out 12) who responded to the question concerning extreme heat events and the effects they perceived to occur for Indigenous and non-Indigenous women, highlighted that Indigenous women, do not complain about the heat. One of the midwives mentioned:

_It is amazing what the Indigenous women put up with. When some of them come in we are amazed - how are you not thirsty, how are you not hot! They don’t complain. They are brilliant, so easy to look after._ (midwife 2, hospital)

Another midwife reiterated the same by highlighting that Indigenous woman were usually quiet about any discomfort unless specifically asked about the specific issue:

_I experienced that Indigenous girls don’t complain that much. Perhaps if they are asked they would, but they don’t volunteer that information readily._ (midwife 7, hospital)

Interestingly, some midwives commented that the number of births because of induction of labour increased due to extreme heat events. The issue of access to cooling technology was also referred by a midwife who said:

_The Indigenous women tend not to complain. You really need to look what’s going on. You can see that they are hot; you can see that they are dry. Don’t have an air conditioned house. They mostly feel the effects but they don’t tell us as well._ (midwife 4, hospital)

Discussion

While quantitative analysis of the NT midwives’ data collection indicated increased risks to preterm births due to extreme temperature exposures, in this qualitative study, midwives did not observe a direct relationship between preterm births and hot weather. In contrast, the preterm birth per total birth ratio were higher for the hotter months and the ratio was lowest for the months of September and October (see Figures 2a-c). The midwives agree that heat exposure could result in stress that could potentially result in preterm births. The quantitative study examined the impacts on preterm births only. Other potential issues such as stillbirth, discomfort, dehydration, requests for induction, miscarriages, and requests for caesareans could not be analysed due to limited data. While the midwives did not directly associate extreme heat with preterm births, their responses suggest that dehydration, discomfort and exhaustion because of extreme heat events could lead to poor perinatal outcomes. Also, several midwives thought that heat exposure triggered requests for induction, though this was not clearly evident in the NT midwives’ data collection for total births (Figures 3a). It could be that the induction requests were higher during summer months, but pregnant women were treated for their discomfort rather than induced. This would mean the actual number of induction requests would be different from the actual number of pregnant women induced per total births which is the variable available from the NT midwives data collection. Induction ratios for Indigenous births were highest for the hot months of November and February and lowest for the months with lowest mean maximum temperatures. The spike in February for total inductions and Indigenous inductions could potentially be a lagged effect of summer time temperature exposure and the spike in May could be due to exposure to sudden temperature differences (Figures 3a-3b). Further investigation of the NT midwives data as well as more information on the adaptive responses of Indigenous and non-Indigenous people are required.

Anecdotal information provided by those interviewed suggested that pregnant women frequently become dehydrated during extreme heat events. However, there are no mechanisms in place to measure how big a problem this in remote arid towns of central Australia. For example, there is no data available that links temperature to dehydration among pregnant women that could be analysed for any statistical significance. Also, from the interview data or the NT midwives data collection, we cannot ascertain with any accuracy the proportion of Indigenous as opposed to non-Indigenous pregnant women who are
presented with symptoms of dehydration. This also means that, while the quantitative study by Mathew et al. (2017), explores the impact of high temperature on preterm births in the central Australian town, the potential heat impacts could be underestimated by the fact that many cases are treated medically well before it results in preterm births.

Most midwives interviewed indicated that Indigenous pregnant women did not complain about heat related discomfort even when the symptoms of heat stress were evident to the midwives. The lack of communication by Indigenous pregnant women may be cultural and highlights the importance of cultural training in such areas for less experienced midwives and health professionals treating Indigenous pregnant women. The communication gap between health professionals and Indigenous Australians could be caused by cultural and linguistic differences and differences in worldviews (Amery, 2017). This study did not interview newly appointed midwives to explore if they were aware of the issue. The low level of communication by Indigenous pregnant women during regular antenatal appointments could be one of the factors contributing to the high preterm birth rates. Studies also indicate that Indigenous people often respond after a period of silence to questions (Amery, 2017). Health professionals both Indigenous and non-Indigenous need to be sensitive to the fact that Indigenous pregnant women can be less vocal or may take a period of prolonged silence to describe the consequent discomfort, dehydration and exhaustion they experience during summer periods.

Midwives also pointed out that Indigenous women living in and around the central Australian town and further away in remote communities may not have adequate access to appropriate cooling technologies. Research already indicates that energy poverty is emerging among Indigenous communities (Race et al., 2016; Race et al., 2017) and this could affect the capacity of Indigenous communities to afford energy-intensive cooling mechanisms. Often the cooling technologies installed in town camps do not suit the cultural or life style practices of Indigenous communities affecting proper use of measures used to moderate outside temperatures (Race et al., 2016). Indigenous pregnant women from remote areas are requested to move to the nearest central Australian town or the nearest public hospital closer to the birth date. Indigenous women who are in such ‘sit down’ periods are likely not to have adequate access to transport, their usual social networks and may need to walk on hot days to the hospital or to access other services.

The findings from the interviews highlight the need for further place-based research to understand the impact of exposure to extreme heat on pregnant women. It also underlines the importance of qualitative information such as midwife expert observation or midwife diaries, to complement statistical analysis of birth data. Most quantitative studies exclude induced labour and requests for caesarean while exploring the relationship between heat and perinatal outcomes, but requests for inductions or caesareans could be a direct impact of the discomfort and exhaustion caused by heat. The potential effects of extreme hot periods need to be further understood to prepare health guidelines and educate midwives and emergency care nurses/professionals who are usually the first point of contact outside regular antenatal appointments. In Australia, in addition to the study by Mathew et al. (2017), Brisbane based studies have explored the impact of ambient temperature (Strand et al., 2011b; Li et al., 2018) and heat waves (Wang et al., 2013) and identified increased preterm birth risks. These studies have also relied on preterm birth count data, but not on any observations that may have been recorded by midwives. The current qualitative study is limited by the fact that it includes only a sample of midwives practicing in the central Australian hospital and thus the results cannot be generalised for the region. The scope of the study could have been enhanced by conducting interviews with obstetricians, emergency care nurses or remote clinic nurses in central Australia.

**Conclusions**

This study points towards the need of antenatal care guidelines relevant for specific climate zones and sensitive to the cultural requirements of pregnant women especially because there are usually high staff turnover in remote hospitals and clinics. The role of Indigenous language and cultural interpreters are also important during treatment. Midwives did not observe any direct risks to preterm births in contrast to the peaks observed in the summer period using the NT midwives data collection and the higher risks reported by three other Australian studies. This highlights the need for further studies to understand
if there is a requirement to create more awareness on the potential heat related effects on pregnant women among midwives. The size of the problem of heat related discomfort, exhaustion or dehydration among pregnant women cannot be quantified, however, anecdotal information indicates the problem is not uncommon. Studies that explore the impacts of heat should thus use a combination of perinatal data usually collected for statistical purposes combined with antenatal notes or midwife observations. There needs to be a greater emphasis on educating both Indigenous and non-Indigenous pregnant women to reduce extreme heat exposure and on taking steps to minimise the effects of extreme hot weather events. These include avoiding exertion, and having easy access to good quality drinking water and availing cool places to rest.

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Appendix

Table 1: Semi-structured interview questions

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