

2019

Skilling Up: Providing Educational Opportunities for Aboriginal Education Workers through Technology-based Pedagogy

Elizabeth M. Jackson-Barrett

Murdoch University, e.jackson-barrett@murdoch.edu.au

Graeme Gower

Edith Cowan University, g.gower@ecu.edu.au

Anne E. Price

Murdoch University, a.price@murdoch.edu.au

Jan Herrington

Murdoch University, j.Herrington@murdoch.edu.au

Follow this and additional works at: <https://ro.ecu.edu.au/ajte>



Part of the [Indigenous Education Commons](#)

Recommended Citation

Jackson-Barrett, E. M., Gower, G., Price, A. E., & Herrington, J. (2019). Skilling Up: Providing Educational Opportunities for Aboriginal Education Workers through Technology-based Pedagogy. *Australian Journal of Teacher Education*, 44(1).

<http://dx.doi.org/10.14221/ajte.2018v44n1.4>

This Journal Article is posted at Research Online.

<https://ro.ecu.edu.au/ajte/vol44/iss1/4>

Skilling Up: Providing Educational Opportunities for Aboriginal Education Workers through Technology-based Pedagogy in Western Australia

Elizabeth M. Jackson-Barrett
Murdoch University
Graeme Gower
Edith Cowan University
Anne E Price
Jan Herrington
Murdoch University

Abstract: Over the past decade Aboriginal and Torres Strait Islander studies and perspectives have been mandated across the Australian national curriculum and all teachers are now required to demonstrate strategies for teaching Aboriginal and Torres Strait Islander students and have a broad knowledge of Aboriginal histories, cultures and languages. This paper describes a project focused on enabling Aboriginal Education Workers (AEWs) to play a critical role in transforming these initiatives into real and sustainable change through authentic, technology-based pedagogy. Indigenous research methodologies and design-based research (DBR) were used to investigate the potential educational roles for AEWs enabled by e-learning and new technologies. The project, called Skilling Up: Improving educational opportunities for AEWs through technology based pedagogy was funded by the Office of Learning and Teaching. This paper reports on the findings of the study conducted in Western Australia, including pre-study survey results, together with a description of a unit of study to provide opportunities for AEWs to use technologies in their work, and to create authentic digital stories for use in teacher education. The development of design principles for the design of such environments is also discussed.

Keywords

Aboriginal education, Aboriginal Education Workers (AEWs), Indigenous research methodologies, Design-based Research (DBR), Authentic learning, ICTs, e-learning design principles

Introduction

Changes to the Australian educational context aimed at redressing inequitable educational outcomes for Indigenous students have included the introduction of a new mandated Australian Curriculum (ACARA), national standardised testing (NAPLAN), professional standards for Australian teachers, and national accreditation for Initial Teacher Education providers (AITSL). These initiatives provide the context for the

rationale of this project, principally because the Australian Professional Standards for Teachers require that all educators across Australia engage with Aboriginal Australia in significant ways—firstly by directing that all educators teach Aboriginal content and perspectives throughout the Curriculum; and secondly by implementing standards that require both pre-service and in-service teachers to demonstrate their teaching strategies, broad knowledge and respect of Aboriginal Australia so that they have the capacity and resolve for further Reconciliation between Indigenous and non-Indigenous Australia.

It is within this educational context, that we argue that the interface of Aboriginal education is on the cusp of a revolution. It is a revolution that was initiated four decades ago, by Aboriginal educators who, through their resilience, have fought long and hard to address issues of equity and opportunity within education for Aboriginal students. This has come after a long history of exclusion and poor provision of education for Aboriginal students which has resulted in ‘intergenerational education disadvantage’ which continues to the present day (Beresford, 2012, p. 85). Early policy drivers, such as the United Nation’s Declaration on Human Rights (1948), and statement on the right for everyone to education, have forced Governments to take appropriate action. However, Beresford indicates that this became evident in Australia from the 1970s (2012, p. 105).

Improving educational access, retention and outcomes for Indigenous Australians through a concerted effort across state, territory and the national governments has been enshrined in national policy agendas for almost three decades (NATSIEP, 1989). Yet today Indigenous Australians still lag behind the rest of the country on all educational indicators, except for Year 12 attainment which has continued to improve over the past decade (Close the Gap, 2018).

The government’s current ‘Close the Gap’ agenda follows continued demands by Aboriginal educators to improve outcomes for Indigenous Australians. Initially, Tom Calma, the Aboriginal and Torres Strait Islander Social Justice Commissioner, focused the ‘closing the gap’ campaign on health initiatives, referring principally to the life expectancy gap between Indigenous and non-Indigenous Australians. The campaign was soon extended to education (Social Justice Report, 2005). The Council of Australian Government (COAG) was the vehicle in which ‘close the gap’ changes in education for Aboriginal students were to be driven. Through the campaign, many school initiatives were introduced, such as early childhood access and participation; school readiness; school attendance and retention; school completion; early learning programs; parenting in the early years; and strategies to improve employment (*Closing the Gap Clearing House*, 2013). Significantly, among these initiatives, the *Teacher and school leader quality and sustainability* initiative highlights that: ‘Schools that employ and value Indigenous staff provide ‘ready’ links between school, families and communities which can enhance the transition to school for Indigenous children’ (Mulford, 2011, p. 2). Aboriginal Education Workers¹ (AEWs) are key cultural brokers in closing the gap in education for Aboriginal students and bringing forward such reconciliation.

¹ The term Aboriginal Education Workers is used here to refer to Indigenous support workers/officers in schools, except when a specific term is used within the source. We acknowledge that there are a variety of terms used across Australia including Australian Indigenous Education Officers (AIEOs), Aboriginal Teacher Assistants (ATAs) and Aboriginal Education Workers (AEWs). AIEWs – Aboriginal and Islander Education Workers; ATSIEWs – Aboriginal and Torres Strait Islander Education Workers). The term AIEO is used as generic and includes ATSIEWs.

Aboriginal Education Workers in Schools

In the 1970s the first AEWs or Aboriginal teacher aides as they were known at the time, were employed in public schools to assist teachers in communicating with students, parents and the Aboriginal community who spoke in the local vernacular (Education Department of WA, Annual Report, 1974). The numbers of AEWs increased significantly following the provision of prioritised funding programs for Aboriginal Education that were introduced by the Whitlam Government between 1972 and 1975. For example, the newly formed Aboriginal Affairs Department provided funding for salaries to boost the number of AEWs employed in schools throughout the country (Sherwood, 1982).

The need for training for AEWs was identified by the Commonwealth Schools Commission in a report published in 1979. The report found that many AEWs who were appointed in schools were unqualified and inexperienced for the role and as a result, recommended funding for AEWs to assist them in performing their duties as liaison officers between the school, parents and the community (Commonwealth Schools Commission, 1979). Furthermore, in 1979 the National Aboriginal Education Committee identified both strengths and weaknesses of the current AEW program. Strengths of the program included: home-school liaison, role models, team teaching, individual instruction and cultural advisor. Weaknesses included: clarity of role definition, teacher attitudes, security of tenure and the selection and appointment of AEWs (National Aboriginal Education Committee, 1979, p.49). The weaknesses in particular, further highlighted the need for training for AEWs as well as teachers, the clarification of their roles, and improving the process of selection.

In Australia, educational leaders have had access to a plethora of reports that review and recommend changes in education for Aboriginal students (e.g., MCEECDYA, 2010-2014; COAG, 2008; Department of Education and Training Western Australia, Aboriginal Education Plan for WA public schools 2011-2014; Western Australian Strategic Plan for Aboriginal Education and Training 2011-2015). Many of these reports indicate that AEWs in schools are of vital importance but that these workers have too often, and for far too long, been relegated to the margins of schools and not utilised in ways that are conducive to Aboriginal student success (Gower, Partington, Byrne, Galloway, Weisssofner, Ferguson & Kirov, 2011; COAG, 2008; Cunningham, 1998; MCEECDYA, 2010-2014). Sarra (2003) also maintains that a key strategy for improving Indigenous student achievement and engagement in schools and higher education institutions is the employment and meaningful engagement of Indigenous staff. Students have been found to have a more positive sense of self when either Indigenous teachers or Indigenous adults are present at school.

Currently, there are over 600 AEWs employed in the three educational sectors in Western Australia. They comprise a committed presence in schools as long-term participants in education and provide a stable and continuous part of the school community, with Buckskin and Hignett (1994, p. 4) highlighting that 'AIEWs are the largest body of education staff who work consistently with Aboriginal students for long periods and [they are] the most stable staff', as teachers come and go. But few go on to become fully qualified teachers, as they have a flat career trajectory with limited prospects. Gower et al, (2011) noted that additional promotional opportunities could lead to incentives to become fully qualified teachers, however, it was also reported that many AIEOs who were surveyed indicated that they had no desire to become teachers.

In efforts to increase the number of Aboriginal and Torres Strait Islander teachers, the Commonwealth Government provided funding between 2011 and 2015 for the 'More Aboriginal and Torres Strait Islander Teachers Initiative (MATSI). This

initiative provided a number of research projects to be undertaken, including strategies to transition AEWs into careers as teachers (MATSITI, 2016). In a report submitted to MATSITI in 2012, the Department of Education in Western Australia outlined its commitment in providing opportunities and support for AIEOs to train as teachers. It reported that between 2008 and 2010, 40 AIEOs had graduated as teachers under a Department supported initiative (Nexus, 2012). The Department of Education (WA) has continued to provide support to increase rates for pre-service AIEOs through MATSITI in 2014 and 2015 and continues this initiative presently.

For those AEWs who do not wish to become teachers, the opportunity to access professional learning programs to upskill and support their roles is currently inadequate. For example, Gower, et al., (2011) highlighted that while it was widely recognized that the role is vital for improving educational outcomes for Indigenous students, a need for greater provision of professional learning opportunities and improved recruitment and retention processes exists. Teachers surveyed identified lack of skills and formal education among some AEWs as one of the barriers to effective working relationships. AIEOs commented that their particular skills and roles were often not understood by some teachers, and there was a need for greater awareness of the nature of their work in communities and schools. Gower et al., (2011) also noted the lack of career pathways for AIEOs, and that the current job description was inappropriate for the range of work performed by them.

In this paper, we describe a study, funded by the Australian Government Office of Learning and Teaching, which focused specifically on upskilling the role of Aboriginal Education Workers as a sustainable way to improve educational outcomes for Aboriginal students through technology-based pedagogy. Specifically, the research investigated pedagogically and culturally appropriate ways to provide educational and career opportunities for AEWs in their own communities in Western Australia, and to open up pathways and opportunities to higher education. The study tapped into the potential of AEWs to provide a key supporting role for teachers through enhanced technological capability. This was done through a collaborative program in mobile learning where AEWs developed their competence in new educational technologies (using iPads) to provide a highly valuable role in modern classrooms, and potentially to enable pathways into teaching degrees. In particular, this paper reports on the research design that used Indigenous methodologies—within a design-based research approach—to consult with practitioners (principals, teachers and AEWs) about issues and challenges facing AEWs in schools in Western Australia.

Key Issues of Skills, Career Pathways and Professional Understanding

In researching the role of Aboriginal Education Workers, the project focused on using technologies for research and development in three key areas encapsulated by the themes of *Enabling skills*, *Pathways in higher education* and *Understanding of AEW roles* (particularly for pre-service teachers):

Enabling Skills

This element comprised the collaborative creation of a professional learning program for AEWs based on new technologies and their use in creating genuine and culturally appropriate artefacts (stories). The rationale for this approach was to help to develop the

skills of AEWs so that they would be able to provide valuable knowledge and support in classrooms in a critical area that is often not mastered by teachers themselves (Jorgensen, 2012). Further, they would learn valuable professional skills in relation to educational and communications technology, by engaging with mobile devices (iPads) to not create stories in audio and visual formats, but also to edit and upload the stories to a dedicated website. These digital stories could themselves be part of induction programs for teachers providing them with an opportunity to develop an understanding of the roles of AEWs and the communities they work with from the AEWs' perspective.

Pathways in Higher Education

Creation of a sustainable pathway for AEWs to access Bachelor of Education degrees was the second element of the research. The contextualised skills required to: learn appropriate mobile technologies (such as iPads), plan for collection of material, input audio and visual images, edit material to create sharable stories—to name just a few such skills—comprise significant achievement parallel to completion of an educational technology unit in a first year initial teaching degree. Providing such a program and pathway guidelines (including for Advanced Standing) would assist interested AEWs transition into B.Ed. degrees. A key benefit of this approach is that AEWs could create e-portfolios of the stories and products they create as they learn skills in educational technology and pedagogy.

Understanding of AEW Roles

The third element was on the creation of a module for use in in-service professional development and pre-service teacher education. Using the stories of AEWs and other resources, a module has been developed to promote understanding of how to work alongside AEWs—their roles in classrooms and schools, and how to work in collaboration with them to enhance Indigenous students' learning and outcomes.

The development of these three areas of interest in the study was then researched using Indigenous methodologies and a design-based research approach, as described in detail below.

Incorporating Indigenous Ways of Knowing, Being and Doing in Research

Indigenous ways of knowing, being and doing are practices that are as varied as Aboriginal peoples, their community contexts and the '*Country*' that ground them. The term 'On Country' in this context refers to the land that is associated with a particular Aboriginal language group and distinguishing them from over 250 other language groups that existed prior to European occupation in 1788 (AIATSIS, 2017).

The above mentioned practices enacted in this project were done so with purpose — to engage the issue of Indigenous knowledges and voices within the institution of education for they have been silent for too long. For example, the work by Rigney (2006) on 'Indigenist Research', and Nakata (2007) on the 'Cultural interface' and Indigenous standpoint theory, provide key understandings of Indigenous research methodologies for researchers who engage in this space. Rigney's 'Indigenist research'

methodology refers to the ‘de-colonising’ of practices in research and Indigenous control and ownership over research. Two of the four researchers in this project were Indigenous. Indigenous participants were provided opportunities to express their views in a culturally safe environment and through yarning. The project’s methodology is characterised by the Aboriginal protocol of ‘to sit and listen’ (Jackson-Barrett, Price, Stomski & Walker, 2015) that is, to listen to the voices of the AEWs in order to establish the direction of the research. Rigney asserts that ‘what is central to Indigenist research is that Indigenous Australian ideals, values and philosophies are the core research agenda, even if there is a difference about what constitutes such values and ideals’ (Rigney, 2006, p.41). In this research we have given voice to the AEWs through presenting their words in full quotes in the latter part of the paper.

Nakata uses the term, ‘cultural interface’ to describe the contested space where Western and Indigenous knowledges and discourses come together. ‘It is a space of many shifting and complex intersections between different people with different histories, experiences, languages, agendas, aspirations and responses (Nakata, 2007, p. 290). In working in these contested spaces and when dealing with complex issues, Nakata (2013, p. 290), pointed out that there will be ‘tension’ on how these issues are thought through and how they are analysed by Indigenous communities and individuals. A number of incidences occurred during the research project to highlight issues that related to contested spaces involving the participants, the research team and school administrators. For example, the principal at one school insisted that only school owned iPads be used by the participants for the research project rather than allowing them to receive a personal issued iPad that was made available by the Skilling Up Project. By adopting this stance, the principal orchestrated a deficit position by controlling when these devices could be used, and what apps or content could be loaded and accessed by users. The use of individual passwords was not permitted which resulted in participants having to share the same password when accessing the two apps that were designated for the project. As a consequence, this incident caused tensions among the participants, the research team and the principal as it raised issues relating to the lack of trust, respect, privacy and opportunities to spend time on Project tasks. The ‘contested space’ in this example displays an unequal power relationship and relates to a conflict of interest whereby the school was prepared to support the skilling up of AEWs, but placed restrictions on how this could happen, despite the process being presented by the research team as an educative tool that would engage AEWs in the learning program at the school.

Indigenous methodological approaches lend themselves to ‘situational responsiveness’ (Patton, 2002) and given the depth of the cultural diversity amongst Aboriginal peoples, their communities and their working contexts, it is necessary and culturally appropriate to draw on a number of inquiry methods. In this study, Aboriginal communities from three different locations in Western Australia were involved, and it was therefore necessary to keep in mind the Aboriginal protocols and school regulations that needed to be negotiated throughout this whole project. Further, while working in ‘localised’ spaces, it is important to acknowledge that these spaces are grounded in ‘the politics, circumstances and economies of a particular moment, a particular time and place, a particular set of problems, struggles and desires and possibilities’ (Denzin, Lincoln & Smith, 2008, p. 9). By understanding and acknowledging the locality of space across three educational sectors it allowed the research team to empower the project participants—all of whom were key cultural brokers in their respective schools—to discuss the reality of their roles as AEWs on their own terms, in their own contexts, and to develop their digital skills based on their

existing skill levels and context needs. A major element or central tenet of the project's methodology was the Aboriginal protocol of 'to sit and listen'—listen to the voices of the AEWs all of whom have something worthwhile and important to say about the space they occupy within Aboriginal education. This is a space that over the last four decades has been continually acknowledged as having a key role for Aboriginal students and their families.

As with any research, it is essential to develop an understanding of the context and in this case the need to understand AEWs' roles on a daily basis, as well as the context in which each was employed. By utilising Indigenous methodologies alongside design-based research we were able to collaborate with the participants through interconnected phases of survey, data collection through 'yarning' sessions that in turn developed the Professional Development sessions and respective field trips (Department of Education, Training & Employment, n.d.). It was also known from the research team's extensive research experiences that 'unknowns' often appear, and thus the research needed to remain open and flexible, for it may be that the 'unknowns' could revolutionise the direction and the methods of the research. Combining Indigenous methodologies and design-based research readily allowed the space to accommodate 'unknowns' if and when they appeared. Moreover, an interpretative approach allowed the flexibility for the methodology to strategically match skills with the digital technology needs for each of the AEWs' contexts—all of which lent an authenticity (Herrington, Oliver & Reeves, 2010) to the research itself because it was based on the breadth and depth of AEWs' experiences. The research adopted a methodology of emancipation and empowerment (Rigney, 1999) that encourages a 'shared approach' as participants were considered co-researchers. Such 'sharing' required constant negotiation in order to ensure the research was equitable and responsive to the needs and contexts of the AEWs.

Indigenous epistemological and axiological ways of conducting research is through established relationships, for it cuts through the 'humbug' of unfamiliarity, and given that this was an educational research project, it allows the researchers to [re]connect at the cultural interface (Nakata, 2007), that is, the schools and classrooms where AEWs were situated. It was these established relationships from previous research that fostered the goodwill that began work on the research project, and it was the hours of 'yarning' from these relationships that morphed the ideas for the *Skilling Up* project. It is here that Indigenous research methods through 'local' epistemological ways of knowing and doing were used to empower the participants in their roles as AEWs. Additionally, the methods used add another branch to the *Grounded In Country* methodological framework currently in development to assist researchers when working on 'Country', and in 'Country' alongside and with Aboriginal peoples and their respective communities (Jackson-Barrett, et.al., 2015). This framework offers a starting point and insights into specific approaches that work across borders, and that engage and privilege Indigenous voices, knowledges and experiences within an academy that was previously prescribed by Western institutions and the disciplines contained within them.

Design-based Research

Design-based research (DBR), incorporating Indigenous research methodologies described above, was also used as a framework for the conduct of the study. DBR is a relatively new approach that the authors considered to be particularly

appropriate for research in Indigenous settings because of its strongly consultative focus, and because it addresses complex problems in real contexts in collaboration with practitioners. It is also appropriate for development research, where an innovative approach is implemented, and there is an emphasis on *making* a project work, rather than simply researching *whether* it works or not.

The research involved four phases that aligned with Reeves' (2006) model of DBR, depicted in Figure 1 below.

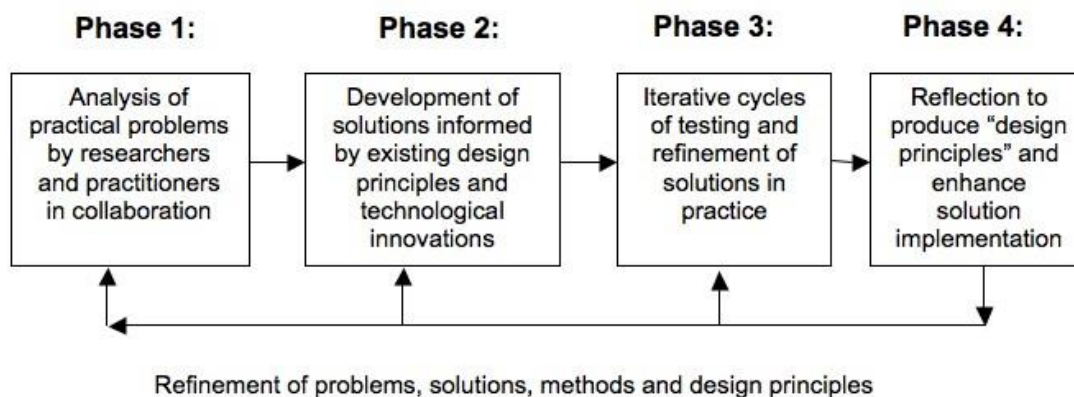


Figure 1: Phases of design-based research (Reeves, 2006, p. 59)

Each phase, together with the three interwoven project elements, is described in brief below.

Phase 1 was guided by the question: *What are the potential educational roles for AEWs that are enabled by e-learning and mobile technologies?* An investigation and analysis of technology use in Indigenous educational settings was conducted through an in-depth literature review and an online survey, with an invitation sent to all AEWs working in West Australian schools and their school principals. The views of Indigenous experts, and sector advisors were also sought through meetings and discussions. Investigation and analysis was also conducted to explore higher education pathways for non-typical entry, together with means and methods universities have adopted to provide advanced standing credit for university study (Price, 2005). In promoting understanding of the role of AEWs, investigation and analysis of the current role of AEWs across different school sectors was conducted through access to recent reports (Gower et al., 2011, MATSITI, 2016; Nexus Network, 2012).

Phase 2 focused on providing solutions or further opportunities, based on the findings from Phase 1. This phase addressed the question: *What are appropriate strategies for professional learning for AEWs, pre-service and in-service teachers?* A professional learning course for AEWs was designed and created, based on design principles derived from the literature review, the surveys and other consultations. A course of activities comprising the equivalent of a semester unit of study was designed and developed for up to 30 AEWs self-nominated through the survey, and from across all school sectors (WA Department of Education, Catholic, and independent schools), and remote and urban schools. The course focused on technology skills and pedagogical strategies appropriate for use in primary and secondary classrooms, based on mobile technologies (iPads) to facilitate the enabling skills of AEWs in their classroom roles. These activities create pathways to higher education, as they can be used in the development of an e-portfolio, and serve a dual role, also as assessable tasks for a unit of study to be taken by AEWs over twelve months, comprising the equivalent of advanced standing or RPL (Recognition of Prior Learning) for one base unit in a

Bachelor of Education. Unit curriculum, workshop activities, e-learning and communication strategies were planned and developed during this phase, ready for implementation in Phase 3.

In addition to the course materials for AEWs, a 2-week PD module was also planned and developed during Phase 2 for pre-service and in-service teachers, with the goal of creating a means to promote understanding of the cultural significance of AEWs and their role in the classroom. The module, entitled *Building relationships with AEWs*, has been developed as a web-enabled learning environment, together with guidelines for its use as an embedded topic within a foundation unit for a B.Ed. or as a stand-alone in-service teacher PD module. The PD module is one that any university or institution could use or adapt, either as an embedded task in an introductory teaching unit or as a shorter stand-alone PD session.

Phase 3 comprised the implementation of the AEW program guided by the question: *What pedagogical strategies facilitate the use of e-learning and mobile learning devices in Indigenous primary education settings?* The authentic activities using mobile technologies were implemented with 32 AEWs nominated from the surveys and consultations. A set of iPads was purchased for use by AEWs to act as a communication device, cognitive learning tool, and production and delivery instrument for products (such as digital stories). A series of workshops were conducted in Perth and regional hubs to commence the unit and associated activities. The workshop introduced AEWs to activities with iPads, brainstormed the educational uses of iPads in classrooms and communities, provided instruction and practice on the creation of digital stories, and demonstrated how the iPads could be used for communication and learning in the completion of the educational technology unit through subscription to a Moodle-based Learning Management System (LMS). The participating AEWs completed embedded authentic tasks with online and in-school support.

Phase 4 consisted of a process of documenting and reflecting on all findings to produce design principles, with the focus question: *What pedagogical principles can guide the use of mobile technology to empower AEWs?* In order to reflect upon those understandings, and to disseminate them in a freely accessible manner to educators. Ten design principles were derived from the findings of the research.

The design principles, together with the analysis of an initial consultative survey are described below, followed by discussion of the development of the unit of activities for AEWs, the professional development modules research design, and the findings of the study.

The Selection of Participants

Participant hubs were suggested based on principals' and AEWs' responses to the request for Expressions of Interest (EOI) for the project. Three hubs were created for more contextualised workshops and onsite visits: the metropolitan area of Perth, the Gascoyne area, and the Kimberley. Schools with large numbers of AEWs were chosen.

Survey of AEW Roles and Responsibilities

In order to investigate the potential educational roles for AEWs that could be enabled by e-learning and mobile technologies, a survey was developed to explore the views of AEWs themselves and principals throughout Western Australia. The survey comprised a mix of questions requiring answers in the form of multiple choice and

descriptive text. Questions varied slightly in content and form, but broadly focused on the following areas for each group:

Principals: Demographic information (gender, age, sector, years teaching, number of teaching staff and AEWs in school, etc), policy governing AEW role in school, the extent of ICT use in the school, professional development opportunities for teachers and AEWs in the school in relation to ICT, the educational role of AEWs in relation to ICT use with students in the classroom, and issues or problems identified in relation to ICT use by AEWs or the school generally.

AEWs: Demographic information (gender, age, sector, working on or off country, etc), roles performed as an AEW, induction and professional development opportunities, professional development opportunities for ICT, the access AEWs have to mobile technologies or other ICT in the school, the educational role of AEWs in relation to ICT use in the classroom with students, and issues or problems identified in their learning to use ICT or implementation of ICT in the classroom.

The surveys were created in an online form (using Survey Monkey) and all school principals in Western Australia were emailed and invited to participate. Principals were also asked to advise AEWs in their schools of the survey, and encourage them to participate. A reminder email was sent approximately three weeks after the original request.

A total of 82 responses were received from the survey (51 principals and 31 AEWs). Of the 31 AEWs, 23 were female (79%) and 6 were male (21%). There were a range of ages: 6 were 18-25, 8 were 41-45 years old, and 6 were 51 or over. 71% worked in primary schools, and 87% were in the government sector. 73% had permanent employment, and 81% were working on country. There was a close split between full-time employment (52%) and part-time employment (41%); only 2 were casual.

Of the 51 principals, 29 were female (57%) and 22 were male (43%). Most of the responses were from principals of primary schools (75%) and 45 (90%) were in government schools. More than half of the respondents had only 1 AEW working in the school (52%) but 11 had 2 AEWs, 5 had 3 AEWs and 4 respondents each reported having 4 AEWs or 5 or more AEWs working in their school. Approximately 88% of principals had 6 or more years of experience working with AEWs (43 responses).

Of interest for the consultative phase of this research was an exploration of: current roles performed in schools by AEWs, and how they use ICTs in their roles, together with emerging issues and problems.

Positive Affordances and Benefits of Mobile Technologies for AEWs

All responses from AEWs and principals reflected their views that the use of mobile devices in learning is a positive thing. Principals generally reported views that the use of ICTs in learning was fundamental for 21st century learning and, as one described it, that it was ‘part of our staff charter’. Some pointed out that their encouragement for the use of ICT was in response to Government curriculum requirement, and that consequently there was: (all quotes are anonymous responses from the survey) “Full integration into all learning areas. This is a whole school approach to learning that supports objectives of the Australian Curriculum.”

One principal acknowledged that encouragement of staff to use technology was

not necessary, as they already know the benefits. Another made this point more forcefully by indicating that they are becoming ‘a right’ in education:

“We have an appointed ICT coordinator that works with teachers and students to implement good programs that support learning. Laptops and iPads are not used as ‘rewards’ - they are integrated into our everyday classroom learning. They are a right not a privilege”.

Overall, there was acknowledgement that that use of technologies in learning was inevitable and the way of the future:

“ICT is an important aspect of our society. Students need these technical skills to function in this digital world. By up skilling AEWs, they become a resource and a source of knowledge that will close the ‘digital divide’.”

The positive reaction to the use of mobile devices was common across all responses in the survey. However, it was also recognised by both AEWs and principals that there were problems and impediments towards their successful implementation in AEW work practices. These are discussed under the section Issues identified in the use of ICTs below.

Roles of AEWs

When asked similar questions on the roles that AEWs performed, and given 12 options from which to choose (plus ‘Other’), both groups agreed that most important roles are education support (small group and individual work) (100% AEW/98% principals) and cultural celebrations (97%/94%) such as NAIDOC week. Similar results were also found for parent and community liaison (87%/96%), and teacher-student communications (87%/78%). Notable differences relate to administrative tasks (63%/35%), behaviour management (70%/55%) and professional development (27%/53%). Nevertheless, it is evident that there is generally close alignment between the AEWs’ and principals’ views of AEW roles in schools (see Figures 2 and 3).

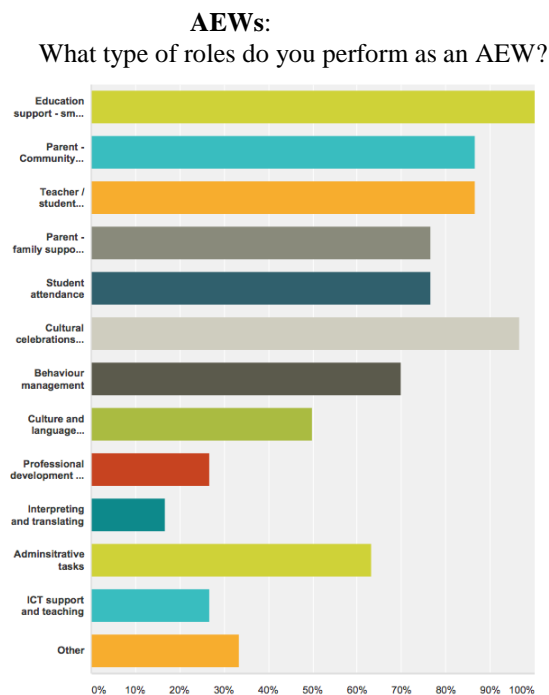


Figure 2: AEW self-reported roles

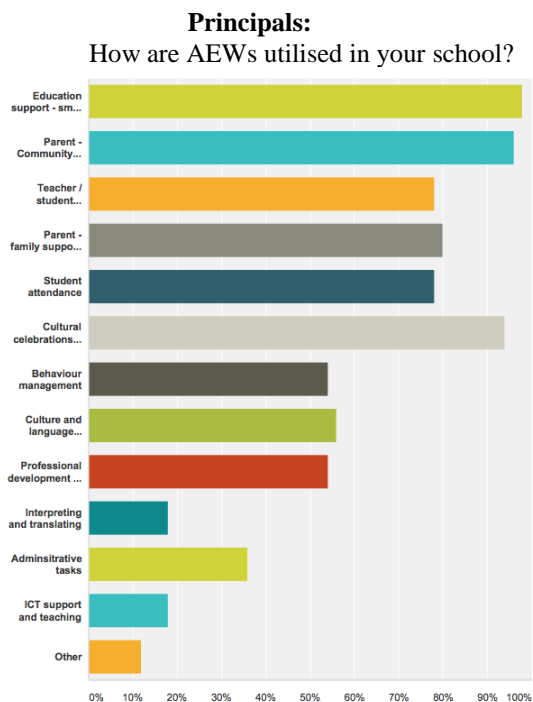


Figure 3: Principals' reports of AEW roles

Most of the AEWs received an induction (73%) and training to assist them in their role (69%). Interestingly, the top two types of training given were in education support (62%) and behaviour management (57%). However, only four respondents (19%) indicated that they had received training in the use of ICT support for teaching. The use of ICTs, in particular, computers and mobile devices, is discussed in the next section.

Use of ICTs in AEW Roles

Mobile devices, such as tablets and iPads, have a great deal of potential to be useful to AEWs in their educational support roles, particularly for individual one-on-one and small group work. Of the 31 AEW responses received, 28 stated they used mobile devices in their role (93%). The three top tasks using ICTs were in education support (small group and individual work) (81%), cultural celebrations (59%) and equal third were teacher-student liaison, attendance, and administrative tasks (48% each) (see Figure 4).

Most principals (88%) indicated that their AEWs used mobile technologies in their role, with only 6 (12%) answering that these devices were not used at all by AEWs. Most use of the devices was reported in the education support role (small group and individual work) (86%) which again reflects the key importance placed on this role by principals. (See Figure 5)



Figure 4: AEWs' ICT use in roles

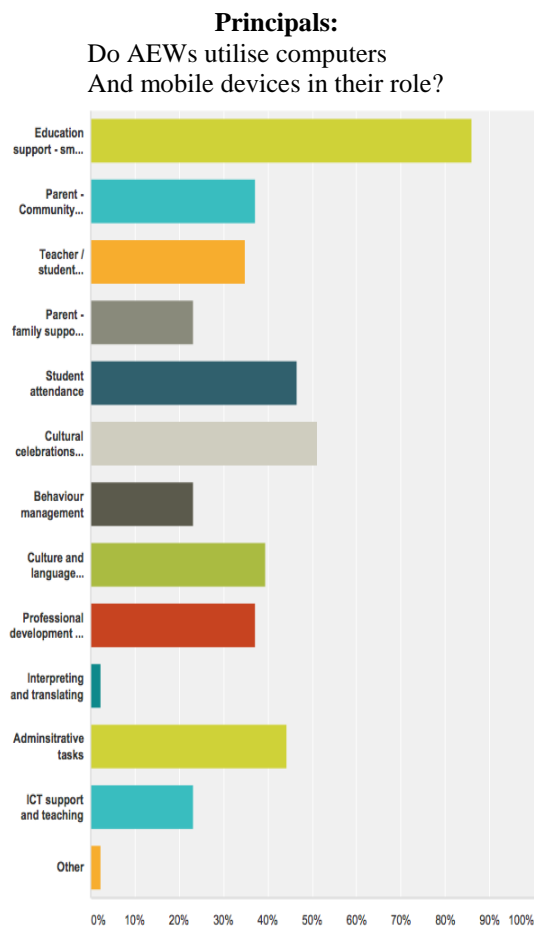


Figure 5: Principals' reports of AEW ICT use in their roles

The high use of mobile devices by AEWs in their roles revealed in the survey is a positive finding, particularly when the devices are used for educational and cultural purposes. However, a few issues and problems were also revealed in the survey and these are discussed in the next section.

Issues Identified in the Use of ICTs

Identifying opportunities for the use of mobile technologies was an essential aspect of the study, but it was also important to explore problematic issues and impediments to the educational use of the devices. Two major themes emerged in this regard: access and training.

Access to Mobile Devices

Not all AEWs were given access to the technologies that might be available to teachers. Two of the AEWs responding to the survey, and six principals indicated that the AEWs had no access to mobile devices. One respondent mentioned that AEWs are not allowed to use iPads:

“As [AEWs] we are not allowed iPads, as teachers have one each it makes it hard.”

This is not necessarily always a school decision on resource allocation. As one principal pointed out, in remote and regional areas, problems can arise from poor internet connectivity:

“Computer connectivity has been absent for most of the year”.

Another principal noted that even when the devices are allocated throughout the school, other factors affecting wifi connectivity can intervene to prevent their efficient use:

“Our location alone prevents use of internet and computers generally from time to time (weather conditions, lack of constant links to servers, electrical power outages, geography)...less mobile devices are able to be used because of weakened signals from time to time. More would happen with regular and fast internet speed and wifi consistency.”

None of the respondents commented on whether they had access to shared school-owned devices, such as from a class set of iPads, but the personal nature of tablets means that they are normally designed for use by a single user (e.g., no multiple log ins). It is likely then that shared use would not be a satisfactory option for AEWs in any case, because of the inability to download specific personalised apps or save progress.

Need For Training and Professional Development

The second area of concern was the need for training in technology. One AEW respondent commented on the pace of change in educational technology-related fields, and how this would impact on their ability to support students with fast changing tools:

“I think IT is moving too fast in schools ... Technology is changing before us mere humans have caught up on how to use them to their best ability.”

It is apparent that AEWs were generally concerned about the need to be competent users of mobile technologies in their roles assisting students. For example, one AEW recognised the importance of the tool itself and the value in learning how to use it in assisting students:

“I think that they are a valuable tool that we should all learn to use, especially when it comes to helping the students.”

In a similar way, one AEW expressed a desire to be able to assist when asked by a student, and the feeling of helplessness if they were not able to provide this help:

“I am finding that the use of computers, iPads & iPhones are becoming more popular in the classroom & they’re being used to do assignments or projects . I would like to be able to help students in this area if they should ask for my help. At the moment my knowledge of these tools are limited therefor I cannot give too much help....it’s a learn as you go situation....so I feel helpless.”

The need for targeted professional development in ICTs was expressed by a number of AEWs. For example one pointed out that teachers are given many more opportunities to access such PD:

“I would value any support and training in these areas that would further my skills. It is always the classroom teachers who get the training. We are busy doing other roles that IT is sometimes forgotten about.”

A few principals commented on such PD being on a needs basis—‘as deemed necessary’—and one pointed out that when the AEW is already competent, such PD is not highly prioritised:

“I don’t as a rule provide my AEW with PD in ICT because she is self motivated and is well abreast of ICT developments. But if a worthwhile PD came up would support her in going, and have done so in the past.”

It is clear from this review of survey comments that professional learning is considered one of the most important elements in preparation of AEWs for the use of iPads and other mobile devices in education, particularly for their learning support roles and their engagement in cultural events and celebrations. Access to a dedicated and personal device is also a key imperative. These findings led into a set of draft design principles to inform the design of the technology-based innovation, which were used to design the professional learning activities for

the AEWs.

Each element of the design of the professional development (PD) and its implementation is described below in more detail.

AEW Professional Development (PD) Program

The participating AEWs were required to undertake a task-based study that was designed equivalent to a first year Bachelor of Education unit of study. A unit guide was developed including three essential authentic tasks (Herrington, et al., 2010) that constituted a core semester unit in an educational technology, requiring the design and creation of:

- a. A website to be used as an ePortfolio
- b. A digital story incorporating images and sound
- c. A pedagogical strategy for individual students or small groups using iPads and educational applications (apps).

All participants in this project were issued with iPads at their initial workshops. The exception to this was the remote Kimberley regional hub, as the school principal requested that iPads be provided by the school with apps pre-loaded by the school's IT provider. Whilst this was a generous offer, an unexpected outcome was that participants were limited to iPad use and access only within the school hours and premises, and they were unable to take the devices home for further exploration and incidental learning. A description and discussion of this cohort is provided below, followed by the description of the Gascoyne and Metropolitan cohorts.

The Kimberley Remote School hub is located 280km south east of Broome in Western Australia. The best option for travelling to the remote community is a 1-hour flight by light aircraft from Broome as the road journey can take more than 10 hours. The current population is approximately 360 people and is home to the Yungngora people. The School is an Aboriginal Independent Community School employing 16 AEWs. The selection of this school provided the opportunity for a large number of AEWs to participate in the project.

Under the provisions of the project, each participant was to have received a Murdoch University-provided iPad; however, the Principal of the school preferred that the AEWs use the school's iPads (40 for staff and student use). The principal did approve the free Weebly and EduCreations apps that were recommended for the development of the website and the digital story (Tasks 1 and 2). Three visits by the research team were arranged for the group, and each workshop ran for more than 2.5 hours.



Figure 10: Workshop for the Kimberley remote school hub

Despite technical issues, restricted access to iPads and varying attendance numbers in each of the three sessions, the outcomes at the Kimberley remote school proved to be very successful.

The initial workshops for both the Gascoyne and Metropolitan hubs were conducted at Murdoch University in Perth, and it was quickly established that all AEWs had very different working contexts. The team felt that in order for the project to meet the needs of the participants at future workshops, it was imperative to see the authentic contexts in which each participant was working. Subsequently, two team members arranged two visits to all AEWs individually at their respective schools, with further workshops in Geraldton (1) and Perth (2) held over the duration of the project.

While not all site visits went entirely to plan, some proved to be worthwhile for both participants and project team members. Project team members were able to yarn with the AEWs about their roles and their future aspirations in the role. It was possible to problem-solve with AEWs on issues they brought up in relation to education strategies that might assist their particular needs. As an additional benefit to the on-site workshops, some sites (such as Geraldton) were more than four hours' drive from the project base, and this time allowed the team to debrief the sessions while travelling, and work through issues and problems where necessary.

The ability and willingness to adapt the format of the initial intentions of holding all PDs in Perth was an integral part of the design-based research (DBR) approach, and in keeping with respect for Indigenous methodologies and protocols. The ability to be so flexible is a strong feature and clear strength of the DBR method employed (which seeks to adapt to circumstances to *make* an innovation work rather than assess whether it *does* work). This gave the team the ability to improvise to overcome obstacles, and to flexibly adapt to the needs of the participants.



Figure 11: Initial workshop for the Perth urban and eastern regional hub



Figure 12: Workshop for the Gascoyne hub

Workshop Feedback and Evaluation by Participants

At each of the Professional Development workshops participants were given feedback and evaluation sheets and discussion time to ‘troubleshoot’ any issues that they (or project team members) were experiencing and also to have space to discuss issues around their roles with other participants.

All participants (Perth regional and Gascoyne hubs) indicated that the off-campus workshops were useful and relevant to their roles, and that the networking with other AEWs was excellent. Further feedback from participants included positive statements such as: ‘There was plenty of support and guidance’, ‘Liked learning new skills and the relevance of information for our roles’, ‘Ability to take the iPads back to school’, ‘Learning for the first time with an iPad and everyone helping each other’.

When asked to suggest needs for upcoming workshops, participant responses included: ‘Extras, like how to take pictures’, ‘Find other apps and ways to use the iPad to help students’, ‘Maths and reading apps that are in Aboriginal language’, ‘Indigenous resources apps and NAIDOC resources’. Importantly, in order to improve or adapt future workshops, AEWs were asked to suggest changes to improve the workshops, and to indicate if they found any part of the workshop irrelevant. Neither of these questions received a single reply. The feedback overall was vital to the project for it guided project team members in their planning for the 1:1 visits to participants in their respective schools and the ability to change the structure for future workshops if this was indicated by the participants.

Constant revisions and adjustments to the professional learning program were conducted throughout the year-long project, in keeping with both the Indigenous methodologies employed and the design-based research approach that guided the conduct of the study. Revisions were also made throughout to the design principles that were a major outcome of the research. The final amended list of design principles are presented below.

Development of Design Principles

One of the most valuable aspects of a design-based research approach is the development of design principles as an outcome of the research. They are first developed in draft form from the literature review and consultations with practitioners, and in this research, the survey results. Such principles are tested and revised in practice and form an important outcome as they can be used by other practitioners in similar or parallel situations in the form of theoretically-based and practically implementable guidelines. The core of this project was the professional development program designed for the AEW participants, and the design of the learning environment was based initially on the draft design principles, which were revised and refined throughout the study as below:

Ten Design Principles for Professional Development in Indigenous Contexts

1. Enable work in partnerships with Indigenous community members (Wallace, 2008)
2. Adopt an epistemology that is consistent with, and supportive of constructivist learning and multiple Indigenous perspectives (McLoughlin & Oliver, 2000)
3. Design authentic contexts, tasks and assessments (Herrington, Reeves & Oliver, 2010)
4. Provide ready access to technology, and professional learning and training (Project survey consultation)
5. Require problem solving in learners' own places, allowing time and space for the unexpected (Wallace, 2008)
6. Allow a culturally safe space for participants to network and yarn about their work, their successes, challenges and other issues in their roles in schools and communities (Power, 2004)
7. Place the learner in full proximal and temporal control of the [mobile] device (Kim, 2009)
8. Scaffold digital literacy (Wallace, 2008)
9. Ensure flexible tutoring and mentoring roles that are responsive to learner needs (McLoughlin & Oliver, 2000)
10. Require the creation of meaningful and worthwhile products (Herrington, Reeves & Oliver, 2010).

These principles were instantiated within the professional development program created for the AEW participants, as shown in Table 1 below, where each principle is listed together with a description of its implementation in the learning environment.

Design principle	Implementation in the professional learning context
Enable work in partnerships with Indigenous community members	Consultation with Indigenous educators and Elders, and school and community members was integral to the project
Adopt an epistemology that is consistent with, and supportive of constructivist learning and multiple Indigenous perspectives	Indigenous perspectives were prioritised in the research and implementation of the PD. Constructivist philosophies guided the design of the flexible and contextualised professional learning activities and tasks
Design authentic contexts, tasks and assessments	A course of task-based study was designed equivalent to a first year Bachelor of Education unit of study. A unit guide was developed including three essential authentic tasks that constituted a core semester unit in an educational technology subject. The three tasks required the design and creation of: <ul style="list-style-type: none"> • A website to be used as an ePortfolio • A digital story incorporating images and sound • A pedagogical strategy for individual students or small groups using iPads and educational applications (app).
Provide ready access to technology, and professional	Participants were provided with iPads, and offered professional learning workshops and support.

Design principle	Implementation in the professional learning context
learning and training	
Require problem solving in learners' own places, allowing space and time for the unexpected	AEWs used the iPads to create a website, digital story and pedagogical strategies in their own schools and communities, and the flexibility of the requirements allowed changes as required
Allow a culturally safe space for participants to network and yarn about their work, their successes, challenges and other issues in their roles in schools and communities	The workshops and in-school activities allowed participants to yarn and share stories about their roles and responsibilities, together with strategies for dealing with work-related issues and problems, in a safe and supportive environment
Place the learner in full proximal and temporal control of the [mobile] device	In most sites, iPads were given to participants to be personalised and used both in school and in private time as they wished. In one site, at the Principal's request, school iPads were used by AEWs only onsite.
Scaffold digital literacy	As AEWs completed the authentic tasks on the iPads, scaffolding was provided as and when required: in workshops on campus, in support sessions in regional hubs, and at AEWs' own schools by team members who travelled there. The project website also provided support, together with other means (phone, email, etc).
Ensure flexible tutoring and mentoring roles that are responsive to learner needs	Because each AEW approached the tasks differently, tutoring and support were responsive to each learner's needs in the creation of their unique products, rather than through didactic instructional methods
Require the creation of meaningful and worthwhile products	The products created by AEWs included worthwhile and meaningful products such as their own personal ePortfolio (website) that could be used for personal and professional purposes, and digital stories that enabled them to express their creativity by writing, illustrating and speaking about their own people and places.

Table 1: Implementation of design principles

Research Findings and Recommendations

The overarching aim of this project was to investigate how iPad technology could improve the educational opportunities and the roles of Aboriginal Education Workers (AEWs) across the three educational sectors in Western Australia. The project endeavoured to take an innovative approach to working alongside and with AEWs, not only in the context of their individual roles within schools, but also in relation to developing the technological skills of each of the participants. It was in some ways an ambitious project, however, perhaps in the context of Aboriginal education one which was long overdue. The project developed a professional development program and workshops for participants in three regional project hubs – Kimberley, Gascoyne and Perth Metropolitan area.

Participants initially responded that they required more professional development in the following areas: technology, networking, resource development, literacy and numeracy to assist them in their role. In addressing this need, the research findings indicate that the Skilling Up professional development program, implemented in 2015 - 16 within the three hubs was a successful program that resulted in enhanced technological and pedagogical skills for use with Indigenous primary and secondary school students. The workshops, conducted in both a central metropolitan area and at participants' own locations, provided important networking opportunities and a space for AEWs to discuss the strengths and weaknesses of their roles. Participants in two of the hubs expressed that the iPad (because they were able to take the device home and use it for a range of activities beyond the scope of the immediate aims of the project) had impacted beyond themselves as family members and individuals.

A number of challenges presented themselves throughout the Skilling Up project, such as: the detailed and protracted problems in obtaining ethical approval to conduct the study across multiple sectors; password and email issues for many of the participants through their employer network accounts; issues of exclusion of internet access; lack of broadband access due

to remote locations; and lack of internet access at home. Most problems were accommodated by abandoning the original plan and coming up with a better solution, by persistent effort, and by and short term work-arounds on a one to one basis with individuals. Such solutions were possible through the flexibility of the Indigenous methodologies employed and the design-based research approach. A key strength of using design-based research is that the approach can be adapted and changed ‘on-the-go’ to adjust the environment and potentially to improve learning outcomes. This affordance was used to great effect in the project. Nevertheless, reflection on the processes, procedures, and the overall approach, has revealed some insights into how the project might have benefitted from more streamlined methods and more realistic timing allowances from the beginning, such as: more streamlined device set-up, ensuring that participants come prepared with account names and passwords; allowing sufficient time for obtaining ethics approvals, particularly when working in schools and across sectors; and providing access to a project website for all participants very early in the project as a central reference point throughout the whole project.

Conclusion

The value of the Skilling Up project is most evident in the potential to develop the skills of AEWs to add value to their contribution in the classroom, and to improve career progression and participation of AEWs in higher education. Information and communication technologies (ICTs) have long been regarded as motivational tools for students, but they have largely not been used in convincing ways to support learning. Nevertheless, the research that has been done indicates their potential, especially when used as part of a community of practice. Current Federal Government initiatives such as the More Aboriginal Torres Strait Islander Teachers Initiative (MATSI), Australian Institute for Teaching and School Leadership (AITSL), and the Australian Curriculum, Assessment and Reporting Authority (ACARA) are driving educational reform in Australia. Each of these projects are aligned with the COAG National Indigenous Reform Agreement and associated Closing the Gap targets to address Indigenous disadvantage.

This project has the potential to assist in these three major initiatives with important benefits that will also be evident for pre-service teachers and in-service teachers who may work in remote, regional or urban schools that employ AEWs to support teachers. Moreover, the skill development of AEWs has the potential to address some of the inequities for Aboriginal students and their communities in relation to school attendance and outcomes.

The analysis and findings of the study suggest several recommendations to improve the educational outcomes and career prospects of AEWs in Australia, specifically:

- Further research and development is needed to investigate pedagogically and culturally appropriate ways to provide educational and career opportunities for AEWs in their own communities, and to open up pathways and opportunities to higher education beyond those that currently exist. Such pathways should extend to recognising the important and possibly under-valued skills of this group. Development of enrolment processes through internship-styled teaching degrees within the schools to which AEWs are currently employed is also worthy of exploring. Such action may alleviate the need for block release, family anguish, and teaching relief needs.
- Findings of the study demonstrate that AEWs can be upskilled to use technology for classroom learning activities. However, fast-changing technology means that it can be difficult for educators, including AEWs, to remain current and feel confident in using them in their mentoring and advisory roles. More technology-based professional development (PD), and access to devices and technologies, together with reliable internet access and wifi where possible, would strengthen AEWs contribution to this important

21st century area of knowledge.

- Embed “understanding the role of AEWs” or “working with AEWs” in all pre-service teacher, in-service teacher and school leader professional development. The literature review highlighted that there was a gap in the knowledge of teachers and school leaders in the current and potential role of AEWs in schools and communities.

AEWs contribute substantially to the cultural and educational wellbeing of Aboriginal students. Yet cultural attitudes in some schools, combined with low wages and insecure employment, add to the perceived lower status of AEWs in school communities. These conditions serve to perpetuate the gap between Indigenous communities and the wider Australian community and undermine the role of AEWs as *Cultural Bridges*, *Cultural Knowledge Workers* and *Role Models*.

Undertakings such as the *Skilling Up* project help to provide deeper and more meaningful insights into educational practice, and have the potential to ameliorate considerably the gap that exists between Indigenous and non-Indigenous students in education. However, such change requires policy development and action. The basis for such action exists, such as the newly developed WA Aboriginal Cultural Framework — AEWs (where possible) should play a contributing role in the delivery to assist in achieving these standards. The widely used and respected AITSL standards could also be reviewed to ensure such cultural change is front and centre in teachers’ roles and their endeavours to make a difference in classrooms and communities.

References

- AIATSIS (2017). Indigenous Australian languages. Retrieved from: <https://aiatsis.gov.au/explore/articles/indigenous-australian-languages>
- Behrendt, L., Larkin, S., Griew, R., & Kelly, P. (2012). *Review of Higher Education Access and Outcomes for Aboriginal and Torres Strait Islander People: Final Report*. Canberra: Australian Government.
- Beresford, Q. (2012). Separate and equal: an outline of Aboriginal education 1900-1996 in Beresford, Q., Partington, G. & Gower, G (Eds.), *Reform and resistance in Aboriginal Education* (pp.85-119). Crawley, UWA Press.
- Brady, W. (1998). *The stories we tell. Storytelling – A passport across borderlines*. Paper presented at the Winds of Change Conference, Sydney: University of Technology.
- Closing the Gap (2016). Turnbull, Malcolm. Hon Prime Minister. Closing the Gap Annual Report Card <http://www.abc.net.au/news/2016-02-10/turnbull-to-deliver-closing-the-gap-report-card/7154042>
- Closing the Gap (2013). *Clearing House Publications*. Australian Government: Australian Institute of Health and Welfare, Australian Institute of Family Studies. Retrieved from <http://www.aihw.gov.au/closingthegap/publications/>
- Council of Australian Government (COAG), 2008. *Indigenous Reform: Closing the Gap*. Retrieved from <http://www.coag.gov.au/node/291#Indigenous%20Reform>
- Commonwealth of Australia, (2018). *Closing the Gap- Prime Ministers Report 2018*, Retrieved from <http://closingthegap.pmc.gov.au/sites/default/files/ctg-report-2018.pdf?a=1>
- Commonwealth of Australia, (2011). *Closing the Gap- Prime Ministers Report 2011*, Retrieved from http://www.fahcsia.gov.au/sites/default/files/documents/05_2012/2011_ctg_pm_report.pdf
- Commonwealth Schools Commission (1979). Report for the triennium 1976-1978. Schools Commission. Canberra.

- Cunningham, C. (1998). *Aboriginal and Torres Strait Islander education workers (AIEWs): An important and unique occupation within indigenous education*. Unpublished Masters Thesis, Murdoch University
- Department of Education. (1974). *Annual report*. Canberra: Australian Government Publishing Service.
- Department of Education, Training and Employment (n.d.). Supporting learning resource – Yarning circles. Retrieved from: <https://harlaxtonss.eq.edu.au/Supportandresources/Formsanddocuments/Documents/yarning-circles.pdf>
- Department of Education Western Australia, (2013). Aboriginal Education. Retrieved from <http://www.det.wa.edu.au/aboriginaleducation/detcms/aboriginal-education/aboriginal-education/docs/aboriginal-education-plan-2011-2014.en?oid=com.arsdigita.cms.contenttypes.FileStorageItem-id-7148382>
- Elliott, A. (2009). Empowering Indigenous learners in remote Australian communities *CIRN 2009: Empowering communities: Learning from community informatics practice* (pp. 1-20). Melbourne: Monash University.
- Goddard, D. & Anderson, S. (1998). *Aboriginal and Torres Strait Islander Education Workers (AIEWs) research*. Mount Lawley: Simpson Norris Pty Ltd & Manguri Corporation.
- Gower, G., Partington, G., Byrne, M., Galloway, A., Weisssofner, N., Ferguson, N., & Kirov, E. (2011). *Review of the Aboriginal and Islander Education Officer program*. Perth, WA: Department of Education, WA.
- Gumala Health and Education Needs Analysis Report, 2012. Retrieved from <http://www.gumala.com.au/our-projects/health-and-education-needs-analysis/>
- Herrington, J., Reeves, T.C., & Oliver, R. (2010). *A guide to authentic e-learning*. London: Routledge.
- Jackson-Barrett, E., Price, A., Stomski, N. & Walker, B.F. (2015). Grounded in country: Perspectives on working within, alongside and for Aboriginal communities. *Issues in Educational Research*, 25(1), 36-49. <http://www.iier.org.au/iier25/jackson-barrett.html>
- Jorgensen, R. (2012). Using digital media to mediate learning in remote Aboriginal communities. In R. Jorgensen, P. Sullivan & P. Grootenboer (Eds.), *Pedagogies to enhance learning for Indigenous students: Evidence-based practice* (pp. 193-211). Singapore: Springer.
- Langton, M. (2013). The right to the good life: Improving Educational Outcomes for Aboriginal and Torres Strait Islander children. *CIS Occasional Paper 133*, The Centre for Independent Studies Limited,
- Mackay, D. (1974). These aids are a first in education. *The Aboriginal Child at School*, 2(2), 34-37. <https://doi.org/10.1017/S1326011100003562>
- MATSITI (2016). Evaluation of the More Aboriginal and Torres Strait Islander Teachers Initiative Project: Final report. Retrieved from: <http://matsiti.edu.au/wp-content/uploads/2016/05/MATSITI-2016-Project-Evaluation-Final-Report.pdf>
- Ministerial Council for Education, Early Childhood Development and Youth Affairs (MCEECDYA, 2010-2014) Indigenous Education Action Plan. Retrieved from http://www.mceecdy.edu.au/mceecdy/indigenous_ed_action_plan_2010-014_consultation,29978.html
- Mulford, B. (2011). Teacher and school leader quality and sustainability. Resource sheet no. 5. Produced for the Closing the Gap Clearinghouse. Canberra: Australian Institute of Health and Welfare & Melbourne: Australian Institute of Family Studies. Viewed 31 October 2011, <<http://www.aihw.gov.au/closingthegap/publications/index.cfm>>

- Nakata, M. (2007). The cultural interface. *The Australian Journal of Indigenous Education: (Re)contesting Indigenous Knowledges and Indigenous Studies*, 36S, 7-14
<https://doi.org/10.1017/S1326011100004646>
- Nakata, M. (2007). *Disciplining the savages: Savaging the disciplines*. Canberra, ACT. Aboriginal Studies Press.
- National Aboriginal Education Committee (1979). *Education in the 80s: The role of Aborigines and Torres Strait Islanders*. Report of the Fourth National Aboriginal Education Conference. Brisbane: University of Queensland.
- National Aboriginal and Torres Strait Islander Education Policy (NATSIEP), ((1989). Accessed from: <https://www.dss.gov.au/our-responsibilities/families-and-children/publications-articles/national-aboriginal-and-torres-strait-islander-education-policy-1989>
- Nexus Network (2012). MATSITI: Review of Aboriginal and Torres Strait Islander Teacher Education programs for the Department of Education. Accessed from: http://matsiti.edu.au/wp-content/uploads/2012/06/WA_Dept_of_Educ_Transitions_to_Teaching_final_report_NEXUS_web_ready.pdf
- Price, A. (2005). *Chelas, Ansars and Acolytes: Becoming a teacher in and for a remote culturally diverse community*. Murdoch University. WA.
- Reeves, T.C. (2006). Design research from a technology perspective. In J. van den Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational design research* (pp. 52-66). London: Routledge.
- Reeves, T.C., & Hedberg, J.G. (2003). *Interactive learning systems evaluation*. Englewood Cliffs, N.J.: Educational Technology Publications.
- Reeves, T.C., Herrington, J., & Oliver, R. (2005). Design research: A socially responsible approach to instructional technology research in higher education. *Journal of Computing in Higher Ed*, 16(2), 97-116. <https://doi.org/10.1007/BF02961476>
- Review of Higher Education Access and Outcomes for Aboriginal and Torres Strait Islander People (2012) Same Kids Same Goals Organisation, (2007). Retrieved from <http://www.samekidssamegoals.org/what/>
- Rigney, L-I. (1999). Internationalization of an Indigenous anti-colonial cultural critique of research methodologies: A guide to Indigenist research methodology and its principles. *Emergent Ideas in Native American Studies*, 14(2), 109-121.
- Sarra, C. (2003). Young and black and deadly: Strategies for improving outcomes for Indigenous students, Paper No.5 Quality Teaching Series. Canberra: ACE.
- Sarra, C. (2011). Transformational technology. *Changing the tide*, July, 1-2.
- Sarra, C. (n.d.). *Stronger smarter: Getting closer: Facilitation Guide*. Retrieved from <http://deta.qld.gov.au/indigenous/pdfs/stronger-smarter-dvd-booklet-15092010.pdf>
- Sherwood, J., (ed.), (1982). *Aboriginal Education: Issues and Innovations*, Creative Research, Perth
- Wallace, R. (2008). *Engaging remote and very remote Indigenous students with education using information and communication technologies (ICTs): Final report*. Darwin: Charles Darwin University.
- Western Australian Aboriginal Education and Training Council. *Western Australian Strategic Plan for Aboriginal Education and Training*. Retrieved from http://www.aetcwa.org.au/_Documents/Documents/WA%20Strategic%20Plan%202011-2015.pdf
- White, N., & Walter, R. (2007) Community consultation report: Education in South East Queensland for Aboriginal and Torres Strait Islander Students Queensland Indigenous Education Consultative Committee (QIECC)

Wilson, S. (2008). *Research is Ceremony – Indigenous Research Methods*. Black Point, Nova Scotia: Fernwood Publishing.

Acknowledgments

The authors would like to acknowledge that the development of the *Skilling Up: Improving educational opportunities for AEWs through technology based pedagogy* project was funded by the Australian Government Office of Learning and Teaching (OLT). We would also like to acknowledge the assistance of Dr Jenni Parker and Dr Audrey Fernandes-Satar in conducting this research.