Rethinking online learning design to enhance the experiences of Indigenous higher education students

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The educational inequity that Aboriginal and Torres Strait Islander people have experienced in higher education in Australia is replicated in virtual learning spaces, with generic models of online learning design taking little account of cultural factors that impact on learning. To counter this, new approaches to online learning design are needed that consider the experiences of Indigenous people. This article explores culture as a critical element of online learning design that enhances the learning experiences and outcomes of Indigenous people. The study reported in this article was conducted at a regional Australian university and was methodologically situated within an educational design research framework. Data were collected through the narrative method of yarning with 19 Indigenous students enrolled in a range of disciplines. From the data, 10 themes were developed, which guided the design of a learning design model and six preliminary design principles. The study contributes to the gap in the literature on learning design for Indigenous online higher education students. As the model and preliminary design principles are culturally situated at the site of the study, they need testing by educational designers and academics to ascertain their usefulness in other contexts.

Implications for policy or practice:

- Education developers, academics, and others involved in online learning design should consider the impact of culture when making learning design decisions.
- Educational equity for Indigenous learners may be enhanced through the use of the learning design model and preliminary design principles proposed in this article.
- Non-Indigenous researchers may consider yarning as an ethical and culturally appropriate method for engaging in research with Indigenous people.

Keywords: Indigenous, relational epistemology, yarning, education design research

Introduction

Online learning and the use of learning management systems (LMSs) are ubiquitous in higher education in Australia (Baik, Naylor, & Arkoudis, 2015). However, for Aboriginal and Torres Strait Islander people, access to technology continues to be an issue that impacts on educational access and participation (Anthony & Keating, 2013; Rennie et al., 2016; Wilks, Wilson, & Kinnane, 2017). As learning in higher education is increasingly online, there has rightly been a focus on access to technology and connectivity as major factors necessary to the achievement of digital equity in educational contexts (Gibb, 2006; Radoll, 2010; Rennie et al., 2016). Despite the issues associated with access to technology, particularly in remote locations (Rennie et al., 2016), Aboriginal and Torres Strait Islander people have embraced the use of digital technologies in a range of educational contexts (Christie, 2009; Eady, 2010; Kral & Schwab, 2012).

Along with increasing participation of Indigenous students in higher education (Department of Education, 2019; Department of the Prime Minister and Cabinet, 2019; Universities Australia, 2017), Indigenous Australians are enrolling in online learning at a higher rate than non-Indigenous people (Behrendt, Larkin, Griew, & Kelly, 2012; Stone 2019). As enrolment in online courses in Australia is growing at a faster rate than for enrolment in campus-based programs (Stone 2019), online learning is "contributing significantly to the Australian Government's student equity agenda" (Stone, 2019, p. 2). However, Indigenous students continue to be underrepresented in higher education, with increasing enrolment offset by high levels of attrition (Department of the Prime Minister and Cabinet, 2017, 2019). As rates of attrition are higher for students engaged in online learning as compared to that for on-campus students, this suggests that a problematic relationship exists between online learning and equity outcomes (Stone, 2016, 2019).

This article contributes to the small body of literature focused on learning design for Indigenous people in online higher education. Although there is an increasing body of work related to culture and online learning design (e.g., see Eady, 2010; Hall, 2009; Hando, 2014; Henderson, 1996), there is a dearth of research that provides insight into online learning design specifically for Indigenous people in the Australian higher education context (see Dreamson, Thomas, Lee Hong, & Kim, 2017; McLoughlin & Oliver, 1999). This study embraces the concept of cultural localisation (McLoughlin & Oliver, 1999) to counter the prevelant generic one-size-fits-all model of learning design such as proposed by Phillips, McNaught, and Kennedy (2010) and puts forward a learning design model and six preliminary learning design principles that aim to support the learning of Indigenous students in online higher education.

Background

This study took place at Charles Darwin University (CDU), a regional university in the Northern Territory, Australia. The Northern Territory has an Indigenous population base of over 30%, as compared to 3% nationally (Taylor & Bell, 2013), and the university has a strategic commitment to enhancing educational opportunities for Indigenous people (CDU, 2016; Webb, 2014). Despite this, there is strong inequity in student outcomes. Only 58% of Indigenous higher education students successfully complete their courses as compared to 76% for all students at the university (CDU, 2016).

CDU is predominantly an online university. Over 90% of its higher education courses are offered online through the Blackboard LMS (CDU, 2015), and over 70% of CDU's higher education students study externally online (Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education, 2013), with the majority of students involved in online learning regardless of their enrolment mode. This reflects the increasing complexity of defining learning modality, where 99% of first-year higher education students in Australia utilise an LMS to access their learning materials and submit assignments, regardless of whether they are enrolled as internal or external students or studying in blended learning modes (Baik et al., 2015).

The widespread implementation of the LMS at CDU has had the effect of bringing traditionally separate cohorts of internal, external, and block mode students into contact with one another through synchronous and asynchronous online activities. Although there remain clear distinctions between enrolment modes, the LMS contributes to an increasingly fuzzy line between what it means to teach or to be an internal or external student (Forsyth, Pizzica, Laxton, & Mahony, 2010; Norton, 2014). In this study, online learning is used as an umbrella term that reflects the institutional LMS as an integral part of the learning environment. At CDU, students can enrol in internal, external, or block mode, where block mode involves online study combined with week-long intensive on-campus blocks in an Indigenous-only cohort. In all these enrolment modes, students are engaged in online learning.

Research design

The study was guided by a supervisory panel comprised of Indigenous and non-Indigenous academics, all with vast experience in research with Indigenous people. A reference group was also established to give power and authority to Indigenous voices in the design, enactment and analysis of the research. The reference group comprised mainly Indigenous representation, with one non-Indigenous member with an extensive cross-cultural research background. The study was approved by the CDU Human Research Ethics Committee.

Education design research

The study was designed with educational design research (EDR) as the guiding methodological framework. EDR is a practical approach to addressing real-world problems in educational contexts which "bridges the demand for rigorous research with the development of relevant solutions to educational problems" (Kopcha, Schmidt, & McKenney, 2015, p. i). An essential characteristic of EDR is the combined focus on both theory and praxis in the research process and in its outcomes (Barab & Squire, 2004; McKenney & Reeves, 2012) with the theoretical outcomes presented as design principles that, when mature, can be adopted and applied to new contexts. The EDR process is robust and adaptable to many contexts through the enactment of three core processes: analysis and exploration, design and construction, and evaluation

and reflection (McKenney & Reeves, 2012). Although mature EDR studies, such as that of Wozniak (2015), have established "a set of design principles from data collected over multiple iterations and across multiple contexts" (Kopcha et al., 2015, p. v), the flexibility of EDR enables it to be conducted as phase-specific projects, such as that of Kopcha et al., which produced "three well-grounded design principles that will inform future design iterations" (p. iv).

The choice of EDR for this research was based on evidence of its successful use in addressing practical problems in technology-rich higher education contexts (Bollen, van der Meij, & Leekmuil, 2015; Reeves, 2015), in exploring cultural influences on learning design (Hall, 2009), and in learning contexts with Indigenous people (Eady, 2010). The study was conducted over three iterative micro-cycles of the analysis and exploration phase of the EDR process (see Table 1). Situating the study within a single phase of EDR was a strategic decision intended to deepen understanding of the Indigenous participants' experiences in online learning in order to inform and culturally locate subsequent work on the design and construction of online learning environments. However, design principles developed from one-phase studies such as this need testing and iterative development in order for them to be considered mature and applicable to other contexts.

Table 1
Design of the one-phase EDR study

Phase 1 of EDR: Analysis and exploration		
Micro-cycle 1	Micro-cycle 2	Micro-cycle 3
Review of context and literature to identify emergent themes	Yarning with participants; analysis of data; development of themes and case summaries; review literature in relation to identified themes	Development of learning model and design principles

Yarning as method

Yarning is a term used colloquially in Aboriginal contexts to mean to chat, to talk, or to tell a series of interwoven stories. It is an accepted means of communicating in Australian Indigenous contexts (Bessarab & Ng'andu, 2010) and is a culturally appropriate and legitimate method of data collection with Indigenous participants (Bessarab & Ng'andu, 2010; Geia, Hayes, & Usher, 2013; Kickett, 2011). In response to the historical use of research to disempower and colonise Indigenous peoples (Smith, 1999), yarning was used in this study as a research method that privileged Indigenous ways of knowledge-gathering and shifted the balance of power in the data collection process to the participants by giving them control of what was spoken and what was left unspoken in relation to the research topic. As an open-structured research method, yarning allowed participants space to focus on aspects of the research that were important to them.

In combination with Indigenous research protocols (Martin, 2005), yarning provided me with an ethical conceptual and practical framework for engagement and interaction with Indigenous participants. The literature around yarning as a research practice is overwhelmingly by Indigenous researchers (Bessarab & Ng'andu, 2010; Fredericks et al., 2011; Geia et al., 2013), whereas this study demonstrates its use by a non-Indigenous researcher.

In the study, yarning sessions were conducted with the participants by phone or in person and lasted between 45 minutes and 2 hours. Sessions were conducted individually with the exception of one group session with four participants. Two participants who were part of the group yarning session subsequently had individual yarning sessions with me. Three other participants had more than one yarning session. The sessions were audio-recorded and the transcripts resulted in "messy texts" (Martin, 2008, cited in Bessarab & Ng'andu, 2010, p. 39) featuring Indigenous linguistic features and rich descriptive language that was "many-layered, intricate, detailed [and] nuanced" (Fusch & Ness, 2015, p. 1409). The transcripts were provided to the participants for verification.

Data analysis

The data collected through the yarning process were analysed thematically, guided by the approaches of Braun and Clarke (2006) and Bazeley (2009). Based on Braun and Clarke's six-phase process, the data

analysis involved familiarisation with the data through the transcription process, inductive coding of the data in NVivo, searching for themes, reviewing themes, defining and naming themes, and writing up the analysis. The analysis also incorporated Bazeley's describe-compare-relate formula to extend thematic analysis from the identification and description of themes to the development of models and/or theories.

I conducted the analysis independently and then engaged with the reference group through the process of "collaborative yarning" (Bessarab & Ng'andu, 2010, p. 40). Collaborative yarning involves "actively sharing information about [the] research project" (p. 40). The collaborative interrogation of the themes with the reference group led to "new discoveries and understandings" (p. 41) of the data that enabled the themes to be reconsidered, reworked, distilled, and transformed.

Participants

The participants were 19 Indigenous people who were or had been enrolled in undergraduate or postgraduate course work programs at CDU. Initial contact was through an email sent by CDU's Office of Indigenous Academic Support to approximately 500 students. A low response rate ($n = 11$) led to purposive sampling to identify additional participants across a spread of age ranges, gender, discipline areas, and geographic locations. A modified snowball effect occurred as participants discussed the research with others, who then asked to join the study. Given that most qualitative researchers find that data saturation is often reached with about 20 participants when conducting in-depth interview-based studies (Green & Thorogood, 2004, as cited in Vasileiou, Barnett, Thorpe, & Young, 2018), the sample size of 19 is considered the optimum number for this study.

Of the participants, five (26%) were male and 14 (74%) were female. Participants ranged in age from 22 to 66 years old and were drawn from across a range of disciplines including education, nursing, Indigenous languages and linguistics, law, commerce, business, pharmacy, creative and Indigenous writing, and Indigenous policy development. The participants resided in five of Australia's seven states and territories. Three participants lived in major cities, one in inner regional Australia, eight in outer regional Australia and seven (more than a third) lived in areas classified as remote or very remote. Although the participants were all involved in online learning through the institutional LMS, the modes in which they were enrolled in their units was varied, comprising external ($n = 7$), block mode ($n = 6$), and a combination of modes ($n = 6$) including internal mode.

Findings and discussion

Through the yarning sessions, the participants shared a range of diverse experiences of online higher education. These experiences were distilled into 10 themes, which are presented in this section along with discussion of these themes in order to situate them within theory and literature. The findings are supported by quotes, making visible the participants' voices. Quotes have been deidentified and are shown by the participants' gender and age. For example, F29 represent a female participant aged 29.

Theme 1: Making connections

Participants commented on the difficulty of making connections with others in online learning environments.

Participants stated that the shared nature of learning was central to a positive educational experience and that collaborative and collegial educational processes were an important part of this: "For Aboriginal people learning is a journey and it's not so much about the self, it's about the journey you take when you're sharing those experiences" (F37).

Yet many participants expressed that the online learning environment was an isolating and lonely place, one where they were left to navigate their educational journeys alone: "I feel very isolated. I feel very sectioned off from everybody" (F29). Participants indicated that this reflected the lack of communicative opportunities in the LMS, as well as the design of the activities that were included, which made it difficult for participants to develop a sense of connection with others online: "I just couldn't make the connections to anybody. I couldn't make it to the lecturer. I couldn't make the connection to the other students. I couldn't even connect with the Indigenous unit" (F30).

A comparison of participants' enrolment mode with the nature of their comments about the importance of being able to make contact with other students online showed interesting differences. Participants enrolled fully online indicated that building connections online with other students was critically important, although it rarely happened and when it did it was rarely positive. "That wasn't a positive connection I made with someone. It felt really competitive and uncomfortable" (F26). In comparison, participants enrolled in the intensive environment of block mode indicated that although the development of relationships was extremely important to them, making online connections was not as they had the opportunity to develop relationships through physical contact. The participants indicated that regardless of their enrolment mode, making real-world contact with other students increased the likelihood of contact continuing virtually. The participants stated that this contact occurred mainly though social media platforms, such as Facebook groups, rather than in the LMS.

The formation of socio-emotional connections in online environments is an area that is under-researched (Delahunty, Verenikina, & Jones, 2014) but clearly of critical importance to Indigenous students' experiences in online learning. Indeed, the lack of communicative opportunities in the LMS, as well as the design of activities that were included, made it difficult for participants to develop a sense of connection with others online. This had more serious consequences on participants' sense of inclusion and belonging if they were enrolled fully online than on those who were enrolled in the block mode or in a combination of modes that included some face-to-face contact with other students.

Participants' desire to make contact with their fellow students reflects the importance of the social dimension of learning in Indigenous pedagogies (Ford, 2010; Martin & Mirraboopa, 2003) as well as in Western theories of learning (Bourdieu, 1986; Vygotsky, 1978). Recent studies have also shown the central place of "human-to-human interactions" (Dreamson et al., 2017, p. 431) in online learning environments that support the cultural needs of Indigenous learners. However, in practice, there is clear evidence of gaps between theory and the "mythical perceptions" (Dreamson et al., 2017, p. 431) of interaction taking place in the LMS. Although learning design models and frameworks exist that highlight the need for interaction (Czerkawski & Lyman, 2016), this study indicates that the need for interaction is not always present in the design and delivery of online learning environments. Hence, online learning design that is inclusive of Indigenous students must place particular emphasis on communication and interaction between students.

Theme 2: Establishing relatedness

Participants expressed that establishing relatedness with other Indigenous students was important to them but had difficulty in identifying who was Indigenous in online learning environments.

The majority of participants in the study expressed that establishing relatedness with other Indigenous students was an important part of the process of establishing their identity and sense of belonging within the academy. Martin (2005) indicated that relatedness "is the ultimate premise of an Aboriginal worldview because this is the formation of identity. This is acquired through being immersed in situations, contexts of people and other elements which lead us to come to see and to come to know" (p. 28). The process of establishing relatedness with other Indigenous people in the higher education context was described by one participant as about locating the bonds that come from a shared cultural background:

> [With Aboriginal students] there is a connection. There's this unwritten rule of 'Yeah! You're from there! I'm from here! Yeah, yeah! What's going on over there?' You know, there's instantly, you've got something to talk about. There's always food, relations. In some way you're always bloody connected. You always find that you know, you're one person removed from who you're talking to. (F37)

The participants who were studying fully online stated that they were unable to identify if there were other Indigenous students in their online units as there were no mechanisms that enabled them to safely do so. This led to a sense of frustration and desperation: "So … what am I supposed to do? Stand up in my online lecture and say, 'Hey, I'm a blackfella. Is there anyone else out there?' You know?" (F29). When these participants were not able to establish relatedness with other Indigenous students, many indicated feelings of disconnection. This directly impacted on their interaction and participation online: "I've mainly gone in; I've had a look at a couple of the discussion boards. I haven't commented as such on there, because I've thought, maybe if I put something up it'll sound silly" (F45). This contrasted to the feelings of inclusion and safety that were expressed by the participants who were enrolled in the Indigenous-only block mode.

Themes 1 and 2 represent different types of relationships that the participants were looking for in the online learning environment, with students in general and with other Indigenous students. Although the learning design literature is silent on the need to explicitly address different types of relationship formation, this study found that communication and relationship-building between different groups of students were important for reasons that can be conceptualised in terms of social capital theory (Bourdieu, 1986). That is, when participants expressed the importance of interaction between students from all backgrounds, as identified in Theme 1, this relates to the concept of bridging social capital. Further, the desire for interaction with other Indigenous students aligns with the concept of bonding social capital. Rather than student interaction being a generic requirement of learning design, this study indicates that different types of interaction in the online environment are important to Indigenous students in order that they have the opportunity to develop different types of relationships for different purposes, with the opportunity to build both bonding and bridging social capital.

The participants' desire for interaction and to be part of a shared journey points to a *relational epistemology* (Thayer-Bacon, 1997) being at the heart of the learning experience. A relational epistemology opens "possibilities for valuing contributions from all people [as well as recognising our need for] each other to nurture the constructing/deconstructing of knowledge and help us in our searches for knowledge that is sound, comprehensive, coherent, and cohesive, as well as beneficial and beautiful" (Thayer-Bacon, 1997, p. 240). The concept of bridging social capital within a relational epistemology implies an uncomfortable process of mutual dependence "in our efforts to problematize and unsettle such knowledge, therefore allowing for multiplicity, dissonance, and discord" (Thayer-Bacon, 1997, p. 240). Nakata (2007) described this process of unsettling as taking place at the *cultural interface,* while Verran (2015) framed the term *dissensus* to reflect the process of constructing new shared knowledge through "an ethic of doing difference together" (p. 53). The knowledge work that occurs within a relational epistemology may result in deep learning (Marton & Säljö, 1976), which benefits all learners, not just Indigenous learners. With that in mind, learning design that is underpinned by a relational epistemology may enhance cognitive as well as affective outcomes for students.

Theme 3: Choice of learning mode

Participants expressed that online learning is not a choice if there are no other options.
Online learning may appear to provide greater choice and flexibility for Indigenous people wanting to access higher education; however, the participants spoke of barriers inherent in online learning that act to discourage participation. In particular, participants indicated that the extent to which they were able to choose their study mode was critically important to their experiences of higher education, with mode-based preferences impacting on decisions about whether to attend university, which university to attend, and even which course and units to enrol in. The ubiquitous nature of online learning across enrolment modes was for many participants an unwelcome imposition: "You're forced into an IT [information technology] technology mode" (F58). Many participants indicated discontent when they felt forced into a mode that was not their preferred one: "Last year I applied to do this [course] and the information [that it was online reliant] was like a silver bullet through the heart" (M54). This – and similar responses from participants enrolled in block mode – indicates a discontent with online learning that could reflect traditional views about how learning should take place "based on their past experiences and assumptions" (Ladyshewsky & Taplin, 2013, pp. 37–38).

Participants who chose to study externally exhibited certain characteristics. They had experienced prior academic success and had the confidence, resilience, and autonomy to enrol externally. Their circumstances, such as working full time or having carer responsibilities, also influenced their decisions regarding enrolment mode, with online external study making higher education possible: "I really appreciate the ability to study externally. My law degree would probably be on a shelf indefinitely if I wasn't given that opportunity through CDU. So, I am very thankful for it and it's a great incentive" (F29). Despite this, many participants indicated that online external study was a pragmatic choice rather than a preference as it lacked the opportunities for connectedness that most participants wanted: "There's none of that personal contact thing" (M22). To this end, one participant travelled for 2 days to attend an optional workshop in order to make physical contact with her lecturer and with other students.

Participants who enrolled in block mode indicated that one of the primary reasons for doing so was for the benefit of studying within an Indigenous cohort that included face-to-face interaction. Some of the participants enrolled in this mode indicated a sense of resentment that they had to engage in the online component of the course as they did not feel equipped with the skills, the confidence, the computer equipment, or a reliable Internet connection to make this a viable option for them.

This study confirms the evidence found in other studies that the mode in which a student is enrolled has a significant impact on their experience in higher education (Baik et al., 2015; Bailey, Ifenthaler, Gosper, & Kretzschmar, 2014; Rose, Rose, Farrington, & Page, 2008). In addition, it suggests that for the participants in this study characteristics, such as past educational experiences, informed the choices they made about their enrolment mode. Even as the use of computer and Internet technologies have made online learning the norm regardless of learning mode and made fuzzy the boundaries between modes of study (Forsyth et al., 2010; Norton, 2014), there is increasing awareness of the importance of communication and interaction for students studying online. As the sense of social isolation increases with online learning, particularly in external mode, this heightens students' regard for human contact and face-to-face interaction (Baik et al., 2015; Ladyshewsky & Taplin, 2013). This is evident in findings of the First Year Experience survey (Baik et al., 2015), which provides 5-yearly snapshots of student experiences in the first year of university, including how those experiences are influenced by learning mode. The 2014 survey results indicated that even as the percentage of external students studying fully online had grown, paradoxically "students' appreciation of the campus-based experience has increased, with two thirds of students reporting that they really like being on campus, a significant rise in the past ten years" (Baik et al., 2015, p. 3).

The findings of this study reinforce the importance of face-to-face interaction with other students to enhance the student experience. Additionally, the findings also support a stronger focus on the design, creation, and facilitation of online spaces that prioritise the relational nature of learning. A focus on enhancing opportunities for online and face-to-face communication between students is likely to enhance the satisfaction of students who have chosen to enrol fully online. Although there is little opportunity for students to opt out of online learning altogether, and to do so would likely be detrimental to their learning in this technological age, this study indicates the importance of providing support for Indigenous students who are not prepared for or comfortable with the nature and demands of online learning. Block mode can be seen as a safe entry point into higher education as well as a stepping stone into online learning. However, the intensity of the on-campus component combined with some students' possible lack of preparedness for online communication, and the need to be autonomous during the off-campus study component while simultaneously dealing with competing demands, may impact on student success in this mode (Rose et al., 2008).

Theme 4: Use of the institutional LMS

Participants indicated that the LMS was not intuitive or easy to use.
Participants spoke of the contradictions of online learning, of how at times it made their participation in higher education possible, but how the online experience was constrained by the LMS at its core. Blackboard, known as Learnline at CDU, provided flexibility to the participants in enabling access to content and communication tools within the closed online system. However, participants viewed the LMS as neither agile nor flexible: "Learnline is clunky, it's not intuitive, so it's difficult for me to engage even now" (M45). This view of the functionality of the LMS was made in comparison to the greater ease the participants experienced using other digital tools and social media. For many students, the LMS was to be tolerated rather than embraced: "It's an annoyance, you know, because I know that things could be easier" (M45).

Participants stated that the LMS was confusing when they first started to use it: "I'm capable but it's taken me a while to learn it. I had a lot of angst in the first semester" (F58). In most instances, the LMS got easier with familiarity, and once the participants got used to it, many found it straightforward to use. The initial difficulties using the LMS would likely have been reduced if the participants had received instruction and training in using it: "An intensive Learnline week would be ideal" (M51).

These experiences of the participants in this study are not unique. We know that the tools within an LMS impact on the teaching and learning experience in different ways: they "can add to, detract from, or not affect teaching and learning" (Walker, Lindner, Murphrey, & Dooley, 2016, p. 42). Common concerns

about tools within the LMS are that they are often underutilised, cumbersome, and hard to use (Mtebe, 2015; Walker et al., 2016); however, students who use the LMS infrequently have lower satisfaction than those who use it more frequently (Horvat, Dobrota, Krsmanovic, & Cudanov, 2015, p. 524), which may indicate that increased use aligns with increased confidence. Although some regard the LMS as "outmoded and unfit to accommodate emerging trends in teaching and learning" (Pinantoan, 2014, ¶ 3), the integrated nature of LMSs into learning and teaching management, administration, and monitoring means that their use is entrenched in Australian higher education institutions and unlikely to change in the foreseeable future. Thus, providing enhanced training for students and staff in the use of the LMS, and particularly in the use of communicative tools, would likely increase staff capacity to design better experience for students and enhance students' ability to operate effectively in the LMS at a much earlier stage of their course than without such training.

In comparison to the LMS, social media platforms are well used by students and are more likely than the LMS to "have rich and friendly tools for communication" (Mtebe, 2015, p. 58). The integration of social media tools "to complement LMS features" (p. 58) is another design option that may enhance the online learning experience.

Theme 5: University services

Participants expressed that university services were not set up to support external students.
Participants expressed that university systems and support services were patchy in terms of their user friendliness, and this had an impact on their experiences of higher education. Even Indigenous-specific services did not appear to support the needs of online students:

> They just don't seem to be very developed to have an exclusively external student. They have no paperwork that is on a web format. I just found it really hard. The time difference is horrible. They ring me at six in the morning. (F29)

To compound this issue, the participants did not always access the services that were available to them either because they chose not to or were not aware of them. Although Indigenous higher education students themselves have a responsibility for proactively accessing the services they need, the university needs to do much more to communicate what services are available and to make their support services easier to use, particularly for external students: "I just found them a lot more open and proactive [when I was studying on campus] than what I'm getting now" (F29). Participants experienced difficulties with processes such as the online enrolment process, subject sequencing, arranging advanced standing or credit transfer from prior studies, and arranging a tutor under the Indigenous Tutorial Assistance Scheme. Navigation of the tutor processes was not easy, and many found it frustrating, particularly at a distance.

The significance of support services for the participants of this study was similarly noted in the final report of the "Review of Higher Education Access and Outcomes for Aboriginal and Torres Strait Island People" (Behrendt et al., 2012), which identified that "providing student support is an essential part of a university's role in ensuring that students enrol, stay and succeed at university" (Behrendt et al., 2012, p. 183). The literature also indicates a link between institution-level support services for students and student retention and academic success, even though support services differ and "student retention is a multi-causal phenomenon" (Prebble, Hargraves, Leach, Naidoo, Suddaby & Zepke, 2004, p. 94). Successful student services contain two main foci: the support of students' social and emotional needs and support for their academic needs (Prebble et al., 2004). In this study, the focus of participants' discontent was on the inadequate or inappropriate provision of both types of services to students who were not geographically located close to the university campus. Although this issue is linked to the design of online learning, it speaks specifically to the need for institutional improvement of support services for students who are not campus based.

Theme 6: Content design

Participants expressed that course content often does not reflect diverse and Indigenous perspectives.
Many participants clearly expressed that their learning experiences were diminished by the limited extent to which relevant Indigenous content and diverse perspectives were incorporated in their courses. The inclusion of Indigenous knowledges and perspectives enhanced the sense of the online environment being

an inclusive and culturally safe space: "So the content was really important for me. I didn't want to learn about Aboriginal health in a mainstream environment. I didn't trust it" (F37).

In some units, participants identified that the inclusion of inappropriate content reinforced stereotypes or presented one Indigenous perspective as if it represented the totality of Indigenous experiences: "There seems to be a general focus on alcoholism and addiction with Aboriginal people, but they don't look at more of the cross-cultural values in psychology" (F39). This spoke to the need for a diversity of Indigenous perspectives to be included in curriculum, including international perspectives: "My feedback [to improve the content] would be from an international perspective. How Australian law today not just affects Indigenous people, but like, in an international perspective, what does Canada do for its natives? How does the US embrace theirs?" (F29).

Many of the participants stated that they valued an inclusive pedagogy that promotes the respectful sharing of diverse perspectives and knowledges as more important than whether the unit contained specific content that explored Aboriginal and Torres Strait Islander knowledges, perspectives, or issues: "I think it's also important to listen, being an Aboriginal person to listen to what else is happening internationally so that we can see the context of the world that we're living in, you know?" (F37).

In terms of the nature of content, the importance of Indigenous content integration into higher education courses is captured in the national higher education agenda. Behrendt et al. (2012) recommended that Indigenous knowledges and perspectives should be integrated into curriculum through the development and implementation of institution-level Aboriginal and Torres Strait Islander teaching and learning strategies. More recently, the preamble to the "Indigenous Strategy 2017-2020" identified that recognition and celebration of "Indigenous Australian cultures and perspectives" (Universities Australia, 2017, p. 16) needs to be addressed through whole-of-university approaches "that embed Indigenous views, knowledges and voices" (p. 28). The incorporation and valuing of Indigenous knowledges and voices enacts what Smith (1999) conceptualised as the decolonising of the mind.

Despite the national focus on enhancing educational outcomes for Indigenous students and the reference to Indigenous knowledges in the Indigenous education statements and the reconciliation action plans of almost all Australian universities (Frawley, 2017), there are diverse understandings of what Indigenous knowledges are and tensions about whether it is even possible to integrate a complex knowledge system into a Western framework of higher education (Frawley, 2017; Kincheloe & Steinberg, 2008; Nakata, 2007). Indeed, the incorporation of Indigenous knowledges into a Western curriculum seems inconceivable if Indigenous knowledges are understood as situated, owned, and inseparable "from the social institutions that uphold and reinforce its efficacy" (Nakata, 2007, p. 9). However, the literature provides ample examples of locations where the integration of Indigenous content into mainstream curricula has been attempted (Behrendt et al., 2012; Cupitt, 2011). Indigenous academics are often called on to be involved in the Indigenisation of curriculum (Page & Asmar, 2008), and to teach courses that include Indigenous perspectives (CDU, n.d.). Additionally, non-Indigenous academics want the support and input of Indigenous colleagues in integrating Indigenous perspectives into their courses (Falk, 2007). This places a heavy burden on a small number of Indigenous academics (Page & Asmar, 2008) that may not be possible or sustainable with the current low levels of Indigenous academic staffing across the higher education sector (Behrendt et al., 2012). Australian universities therefore need to address individually based on context, as well as at the national level, what it means to widen course content to reflect Indigenous and diverse perspectives and who should be involved in this work. At a minimum, widening course content to reflect Indigenous and diverse perspectives requires an increase in the number of Indigenous staff members in universities (Behrendt et al., 2012) and an increase in the Indigenous cultural competence of non-Indigenous academic staff.

Theme 7: Teacher presence

Participants indicated that the quality of online teacher presence was highly variable.
Overwhelmingly, the participants expressed that they wanted to develop personal relationships with their teachers. The importance of these relationship increased for external students as it was often the only connection they made online. Participants stated that a high level of friendly and supportive teacher presence in the online environment contributed to their feelings of connection:

> I really enjoyed that unit. That was one really good unit. The external coordinator emailed us weekly and just kept us up to speed and that was really good. That was really connected, that was really involved and I really enjoyed that unit. (F29)

Participants also indicated that their connection was enhanced when teachers exhibited Indigenous cultural awareness, such as by taking flexible approaches to assessment time frames to enable students to balance their studies with their family and cultural obligations.

Participants indicated that a high level of teacher presence was achieved when lecturers engaged regularly in the LMS: "Lots of announcements and regular replying to the discussion board, and just basically that. Keeping us posted, and promptly replying to questions and keeping an eye on our own discussion board" (F30). In contrast, when teacher presence was minimal, participants studying fully online identified that they had to be more autonomous and proactive in managing their relationships with lecturers to ensure that they got the support they needed. There were instances, however, when external students were not able to make this important connection with their lecturers: "You're by yourself. I've never seen the lecturer. I've never seen his face yet, only through the email" (M22).

Participants stated that an added complication in the student-lecturer relationship in the online environment was when there were multiple lecturers teaching into a unit across modes and campuses and all were using the same online site. The online messaging was often unclear in terms of which student group it was addressing. In these instances, it was clear that the lecturers themselves had not developed the communication strategies to manage these online relationships.

This importance of online presence is reinforced in the literature – while the "physical and geographical separation of the student from their instructor and the institution" (Hull & Saxon, 2009, as cited in Delahunty et al., 2014, p. 2) diminishes the student-teacher relationship, it can be mediated by a teacher's online presence. That is, a strong teacher presence online brings a sense of belonging and community and "gives participants who are geographically dispersed the feeling of being there and being together" (Rehn, Maor, & McConney, 2016, p. 303). This results in students who "feel close to their teacher and peers as real people" (Rehn et al., 2016, p. 305). The sense of belonging created by a high teacher presence has benefits in terms of student retention (Devlin & McKay, 2017).

The participants in this study identified aspects of online learning design, including the use of a range of communication tools, which support teacher practices, which in turn develop online presence. This is reinforced by the literature, which has indicated that teacher presence is achieved through purposeful design of learning environments that have high levels of interaction and engagement (Czerkawski & Lyman, 2016).

Theme 8: Cultural identity

Participants stated that cultural identity and racism impacted on their learning.
The negative social construction of indigeneity and the participants' personal experiences of racism impacted on their experiences of higher education, in physical and virtual learning environments, with many expressing that "systemic racism is a major factor" (M51) in education. Participants' experiences of racism constrained active engagement online: "And so when I go [online] I feel like if I put something on there I'm going to be judged. And I don't feel that way when I go, when I'm with my own people" (F30). Consequently, some participants revealed that they were unwilling to reveal their racial or cultural backgrounds in the online environment because of the risk of making themselves vulnerable to prejudice or stereotyping.

A number of participants spoke of how they felt their academic success or failure reflected not just on themselves but on all Indigenous people. One participant spoke of the pressure she felt that her racial and cultural identity placed on her to achieve academically: "It's quite a cultural pressure, to be honest with you, you know, to finish my degree and make that happen. I find that actually harder to deal with than schedule juggling sometimes. It's overwhelming" (F29).

Lateral violence also impacted on participation, with one participant disclosing pressure she received from her own community not to engage in higher education as it was seen as a betrayal of her indigeneity. This

experience of lateral violence, as well as the experience that other participants felt of racism towards them arising from their racial and cultural identities, point to a range of conflicting cultural pressures that impact on participation and success.

Several early innovators at the advent of online learning recognised the need for culture to be an explicit consideration in learning design and, therefore, incorporated dimensions of culture into the learning design models that they developed (Henderson, 1996; Reeves & Reeves, 1997). However, there is little evidence that these models have been adopted to any extent in the design of online learning environments in Australian university contexts, and it is evident that "the cultural needs of Indigenous students are rarely considered" (Dreamson et al., 2017, p. 431) in the design of online learning environments. One reason for this is that "instructional design and the designer are inextricably tied to their social context" (Henderson, 1996, p. 87) with the consequence that learning design becomes an "intangible aspect of culture" (Henderson, 1996, p. 86). Given that dominant cultural perspectives pervade learning design (Hando, 2014; Henderson, 1996), it is not surprising that Indigenous ways of knowing, being, and doing are largely absent in online learning design models and frameworks. This gap reinforces the need for clear and evidence-based models and principles such as those presented in this article that make culture an important and visible consideration in learning design. The preliminary design principles that are proposed in this study put forward a much needed culturally located approach to the design of learning for Indigenous students in online higher education.

Theme 9: Knowledge and skills

Participants expressed that alternative entry pathways provided access but not necessarily the skills for engaging in online learning.

Alternative entry pathways, including through enabling programs, were a common way for participants to enter higher education. Although this highlights the critical importance of these pathways to the participation of Indigenous people in higher education, many of the participants also indicated that they were struggling with the academic demands of their courses and did not have the skills and knowledge to achieve academic success. The complexity and density of course readings pitched above the level of some participants and a high volume of readings placed online were additional stressors: "It was endless amounts of reading. Ridiculous amounts!" (F30).

Readiness for the demands of higher education was a particular concern for participants who had been out of formal education for an extended period:

> I'd been out of school for fourteen years and have never experienced an exam. I can only imagine what people who've been out of school for even longer would experience during exams. I found [my first semester] very, very nerve wracking in that department because there was nothing to prepare me for the nerves and the anxiety that I would feel in my exams. (F26)

Some participants expressed knowledge and skill gaps related to technology use. While all of the participants said that they had at least basic computer skills, there was a large disparity between their skills levels: "We grew up with computers but they were very limited. Like it was more so if you were going to do it you were playing Pac Man or solitaire on computer. You weren't really using it in that sense" (F31). As a consequence, participants called for explicit guidance and instruction to be provided in the use of technology to help improve the skills needed to study online: "I don't expect a whole week on something but a little run down would be good" (F30).

In a study by Pitman et al. (2017), a correlation was identified between enabling programs and retention, which was ascribed to their focus on building resilience. Although enabling programs built student confidence, it was unclear "whether the academic scaffolding provided in these programs is preparing students to successfully complete their undergraduate subjects and progress in their studies in a timely manner" (Pitman et al., 2017, p. 246). Yet there is an expectation by higher education institutions that Indigenous students have the requisite skills to succeed in their courses, including in their ability to use technology on their own and without external support (Henson, 2013). Given the variability of students' technology skills as a reflection of educational backgrounds, this expectation is often misplaced (Willems, 2011). This produces a fine irony: that non-traditional students access higher education to gain skills only

to find that those institutions "have preconceived expectations regarding [their] computer skills" (Henson, 2013, p. 2), which impacts on their ongoing participation and success in higher education. The experiences of the participants in this study as well as in the literature indicate the necessity of designing online learning environments that scaffold all aspects of student learning, particularly with regard to digital skills and knowledge.

Theme 10: Digital inclusion

Participants expressed that poverty as well as poor Internet reliability impacted on digital equity and inclusion.

Accessible, reliable, and affordable Internet access and computer ownership are fundamental to the delivery of online learning; yet Internet service provision remains variable, particularly across regional and remote Australia: "Internet access was shut down on a daily basis in the dry season and wet season" (F40). In addition, the financial cost of online study, including the cost of Internet access, was a significant burden for many of the participants:

> [When I started] I didn't have access to a computer. So, people assume that you have all the access. So, I didn't have the proper computer. I didn't have the proper software and so I couldn't access. And because Abstudy, you don't get very much money. So, I don't work for an organisation that pays for my Internet so I have to buy prepaid. So, it falls into an issue of poverty in one sense because we don't have enough money to start. (F58)

Many of the participants in this study indicated that they were living in poverty and that the cost of hardware and software, and the ongoing costs of Internet service and printing put them under further financial stress. Online learning impacted on participation and completion, contributing to digital exclusion. Although bursaries and scholarships were important sources of income, they were often inadequate: "The other year I applied for a bursary or something, a scholarship. It's only $500. I bought that laptop I'm using now … I bought it for $500" (F41).

The educational inequity that the participants referred to has been attributed to "the thoughtful and intentional result of many interlocking systems of oppression" (Amouzou, 2018, cited in Smith, 2018, ¶ 5) with access to technology being one contributing factor and poverty being another. While "the use of virtual networks and other technology-based solutions... provide Indigenous people with greater access to universities" (Behrendt et al., 2012, p. 21), it fails to consider that existing inequities in digital inclusion may further entrench educational disadvantage. Although there is widespread engagement with digital technologies by Indigenous people, the Internet adoption rates for Aboriginal and Torres Strait Islander people, regardless of where they live, are lower than for the Australian population as a whole (Joint Select Committee on Cyber-Safety, 2013). Digital inclusion, which is measured through the dimensions of access, affordability, and digital ability, shows that "the gaps between digitally included and excluded Australians are substantial and widening" (Thomas et al., 2017, p. 5) and that these divides are along the lines of "income, education and employment" (Thomas et al., 2017, p. 5). Digital inclusion is highest for "wealthier, younger, more educated, and urban Australians" (Thomas et al., 2017, p. 8) with Indigenous Australians being amongst the most likely group of people to be on the low end of the scale.

The digital disruption that is taking place in higher education through the ubiquitous use of the LMS provides an opportunity to rethink educational spaces and redress the historical inequity experienced by Aboriginal and Torres Strait Islander people through intentional acts such as re-envisioning the design of online learning environments as culturally inclusive and considering how the upfront and ongoing costs of participation in online learning can be defrayed.

Preliminary design principles

An outcome of this study was the development of six preliminary principles to guide the design and development of online learning environments that aim to support the learning of Indigenous students. The principles and their relationship to the themes identified in this study are shown in Table 2.

Table 2
Relationship between the preliminary design principles for online learning environments that enhance the experience of Indigenous higher education students and the themes identified in this study

Preliminary design principles	Relationship to themes
1.Design for social connection Design online environments with ample opportunities for all students to make interpersonal connections with other students.	Theme 1: Making connections Theme 3: Choice of learning mode
2.Facilitate interaction between Indigenous students Include strategies that enable Indigenous students to safely identify other Indigenous students in the online learning environment and provide appropriate digital tools and spaces to facilitate these interactions.	Theme 2: Establishing relatedness Theme 3: Choice of Learning Mode
3.Nourish interaction at the virtual cultural interface Design learning activities that promote positive cross-cultural interaction and collaboration and which contribute to the construction of shared knowledge and understandings, and provide opportunities for examination of disciplinary knowledge through different perspectives and cultural lenses.	Theme 1: Making connections Theme 3 Choice of learning mode Theme 4: Use of the institutional LMS Theme 7: Teacher presence
4.Develop strong teacher presence Ensure the design and facilitation of online learning environments promotes a strong level of teacher presence that is supportive, and culturally, and pedagogically appropriate.	Theme 4: Use of the institutional LMS Theme 7: Teacher presence
5.Integrate Indigenous and diverse perspectives in course content Include diverse and Indigenous perspectives in the learning materials.	Theme 6: Content design Theme 8: Cultural identity
6.Make learning resources accessible Ensure that content and activities are accessible to Indigenous students in flexible ways and formats in order to minimise the costs associated with online learning and the different ways in which learners access the Internet.	Theme 10: Digital inclusion

Limitations of the study

The findings of the study are culturally localised and specific to the experiences of the participants at one study site. Without testing, the preliminary design principles are not generalisable to the design of online learning environments in other contexts.

The findings of a one-phase EDR study such as this cannot be regarded as robust as those from a mature study in which the research has been conducted over one or more iterations of the three EDR cycles, or across multiple sites. Thus, a one-phase EDR can be regarded as a weakness of the study, although the depth of the analysis conducted through three micro-cycles of research in Phase 1 of the EDR process is also considered its strength.

Conclusion

In conclusion, this study demonstrates the efficacy of combining EDR, a Western methodological framework, with the Indigenous method of yarning (Bessarab & Ng'andu, 2010). This amalgamation of approaches provided me with clear guidelines for the conduct of ethical and culturally appropriate research with Indigenous people. Yarning privileged the participants' voices in the research, while EDR provided a structured and iterative research design framework. Research yarning with members of the reference group also ensured that Indigenous perspectives informed all stages of the research process. Hence, a relational epistemology, which emerged in this study as a critical component of learning design for Indigenous people, was also a feature of the research design.

In this article, digital equity in the higher education context has been framed as the achievement of equitable educational outcomes in learning environments, where LMSs are ubiquitous and where online learning is

the common experience for students regardless of their mode of enrolment. For Indigenous students, structural inequity is part of the educational experience that has been reproduced in online learning. One way to challenge ongoing educational inequity is through the mobilisation of "those who already (ostensibly) support racial justice to act on those convictions, and to live in accordance with their professed values" (al-Gharbi, 2019, p. 1208). With that in mind, this research focused on how a conscious approach to online learning design practices is a vital component to enhancing the experiences of Indigenous students in online learning. The learning design model and the six preliminary learning design principles presented in this article are intended to promote educational equity for Indigenous students in online higher education. I invite the field testing of these by academics, education developers and others involved in the design, development and facilitation of online learning environments in order to support their iterative development and maturation.

The 10 themes identified in this study paint a rich canvas of the diverse experiences of online learning of 19 Indigenous higher education students at one Australian university and the design model and preliminary design principles that draw from those themes reflect a re-envisioning of online learning design from a generic to a contextual practice, and one that positions Indigenous cultures as critical in informing learning design decisions. This study also draws attention to institutional factors that impacted on the participants experiences of online learning. Hence, the work of iterative development of the preliminary design principles needs to be done within the context of broader institutional change to enhance educational equity for Indigenous people (Behrendt et al. 2012; Stone, 2019; Universities Australia, 2017).

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