Indigenous Digital Inclusion: Interconnections and Comparisons

Jennifer Campbell-Meier, Allan Sylvester, and Anne Goulding

Victoria University of Wellington, New Zealand

jennifer.campbell-meier@vuw.ac.nz, allan.sylvester@vuw.ac.nz, anne.goulding@vuw.ac.nz

ABSTRACT

This paper explores published research on Indigenous digital inclusion, starting from the premise that Indigenous peoples adopt and use digital technologies in ways that fit their specific social contexts. Analysis of search results from Scopus and Web of Science aimed to identify common themes and approaches, and to explore differences and interconnections between research from disparate academic disciplines. The findings indicate that research from Australasia features prominently and that the Social and Computer Sciences produce the bulk of the work in this area. Conclusions comment on the importance of a strengths-based, as opposed to a deficit, approach to research and instruction in Indigenous digital inclusion.

ALISE RESEARCH TAXONOMY TOPICS

critical librarianship; information rights; information system design; specific populations; social computing

AUTHOR KEYWORDS

digital inclusion; Indigenous inclusion; literature review; Indigenous peoples

BACKGROUND AND CONTEXT

As the world comes to terms with the scale and impact of the COVID-19 pandemic, it is more evident than ever that contemporary society depends on reliable access to information and communication technology (ICT) infrastructure to participate fully in a digitally connected world (Townsend, Sathiaseelan, Fairhurst, & Wallace, 2013; Pavez, Correa, & Contreras, 2017). Internet access and the ability to fully use digital technologies is still far from universal, however, and many people remain excluded from online participation. Digital exclusion has emerged as a driving force of inequality and is directly linked to other areas of deprivation (Atkinson, Salmond, & Crampton, 2013; Park, Choi, & Hong, 2015). Access to the internet is *"…considered to be a fundamental aspect of our structures of opportunity, both socially and in the market; our structures of communication; and our structures for enabling choices"* (Atkinson, Salmond, & Crampton, 2013, p. 21). Access to and the ability to use digital platforms

and technologies has clear economic and social benefits for those individuals who can connect and have the skills to leverage that access through internet-enabled opportunities for active citizenship, social inclusion and employment (Bartikowski, Laroche, Jamal, & Yan, 2018; Clayton & Macdonald, 2013; Hartnett, 2016: Townsend et al., 2013). In other words, digital access provides a level of richness and reach similar to that ascribed to the call for literacy and general access to education in the 19th and 20th centuries (Lloyd, 2007).

The impact of a widespread emergency, like the COVID-19 crisis, means that digital skills are increasingly important as a large part of global society is shocked into moving online (Townsend et al., 2013). Alongside the steady adoption of digital services over the last decade or more, defining moments such as COVID-19 created a situation where people are left with little choice but to engage online with commercial goods and services via platforms such as eCommerce, public services and eGovernment as well as, interacting socially with friends and family online. The pandemic has, for many, forced an involuntary shift to working and learning from home whether or not they have the skills for teleworking or eLearning (Ebbers, Jansen, & Van Deursen, 2016). People do not spontaneously acquire the necessary skills to participate meaningfully in a complex digital world (Ball, Francis, Huang, Kadylak, Cotton & Rikard, 2019; Friemel, 2016; Hilbert, 2011; Van Deursen, & Van Dijk, 2014; Schradie, 2011; Starkey, Sylvester, & Johnstone, 2017). Moreover, intertwined social factors are in-play as the world has had to adjust rapidly to a new reality of online, technologically-mediated work, life and education. As well as having to adjust to working from home themselves during the pandemic lock-downs, parents have also needed to manage their children's education and this is more difficult for some than others. People in digitally marginalised settings, for example, frequently have overlapping and complex needs such as over-crowded housing arrangements, poverty, or health and wellbeing barriers (Buré, 2006).

It is imperative to explore the nuances of digital exclusion so that we have a more informed understanding of how people may derive benefits from the use of technology to participate in society on terms that makes sense to them (Ball, et al., 2017; Starkey, Sylvester, & Johnstone, 2017; The global information technology report, 2012). However, it is easy to adopt the position that those who have and use digital technologies will automatically be better off than those who do not, and that those without are somehow beyond hope (or help). It is tempting for scholars to adopt a deficit position; however we posit that in doing so there is a risk of masking the social context where technology does not fix-that-which-is-broken, but instead, enables those who are doing their own thing with technology to do it on their own terms, in the ways that they want to, rather than imposing a normative, dare we say, colonial perspective on use and/or non-use of technology. This is particularly relevant for members of Indigenous communities who routinely have a different perspective on and attitude towards hegemonic cultural and societal norms and approaches. In other words, digital technologies can be an enabler of post-colonial expression and establishment of identity rather than a tool for social homogeneity.

A focus on cultural and social aspects to explain why people are reluctant to participate digitally can include consideration of people's place of access, the quality of the experience, digital skills and expectations of use (Pavez, Correa, & Contreras, 2017). When studying digital inclusion, it is essential to look beyond access-opportunities, education, and income to the social and cultural interpretation and use of digital artefacts among and within different groups to properly understand why, in some cases, use of technology can be regarded with suspicion or

indifference rather than opportunity (Pavez, Correa, & Contreras, 2017). This is clearly evident within Indigenous communities who are often nursing the persistent injury of colonialism. Interventions that address Indigenous digital inclusion have to happen within a frame of negotiated terms of use and with careful respect to context, Indigenous ways of knowing and the safeguarding of Indigenous knowledge.

In this context, an exploration of the research on Indigenous digital inclusion can assist those working in the area to identify culturally safe approaches to investigating the issues around Indigenous peoples' engagement with digital technologies. Collaboration across academic disciplines and/or with community stakeholders is increasingly considered vital to ensure that the knowledge and expertise of a range of specialists are brought to bear on important societal problems. Analysis of the interconnected and socially situated characteristics of the research enables a mapping of different approaches to the same topic across disciplines, bringing together different theoretical perspectives to shed light on it, and highlighting the use of different research approaches to answer similar research questions. The aim of the research reported in this paper is to provide an overview of the research on Indigenous digital inclusion by identifying which academic disciplines are active in this field and by analysing differences and similarities in their focus and approach to the topic. The research questions guiding the analysis are:

1. Which subject disciplines are undertaking research into Indigenous digital inclusion?
2. What evidence is there of interconnections in themes, approaches and perspectives between scholars from different academic perspectives researching Indigenous digital inclusion?

METHODOLOGY

We chose to search Scopus and Web of Science for this project because of the broad scope of the databases as well as the quality of the content. The searches on Indigenous digital inclusion were conducted in January 2020. The searches were developed to identify the most consistent search strategy across the two databases. Although it is preferred to identify specific Indigenous peoples, "Indigenous", "Native American", "First Nations" and "Aborigin*" were used to capture a wider discussion on digital inclusion. While the searches did not include the names of specific Indigenous people outside of the Māori, other Indigenous identifiers were tested, but did not change the search results. Both Native American and American Indian were used because there was a noticeable difference between the search results. The results are shown in Table 1.

Database	Search Strategy	Initial Results	Relevant Abstracts	Relevant Articles
Scopus	TS=("digital divide" OR "digital inclusion") AND TS=(indigenous OR maori OR aborigin* OR "first nations" OR "native american" OR "american indian")	123	89	45
Web of Science	TITLE-ABS-KEY (("maori" OR "native american" OR "american indian" OR "aborigin*" OR "first nations" OR "indigenous") AND ("digital inclusion" OR "digital divide"))	74	18	13

Table 1. Search Strategy and Results

After removing duplicates between the two sets, the authors reviewed 146 unique abstracts identified in the searches. From that group, we removed posters, articles that discussed specific projects, policy, or did not directly involve Indigenous groups in the abstract. This resulted in a set of 107 abstracts. Articles and chapters were reviewed for relevance and those not focused on Indigenous communities, digital inclusion/divide, or not in English were also removed. While there are limitations to our approach (e.g. both databases include only published materials and do not cover grey literature or report literature), the results give a clear indication of the focus of published scholarly research in this area. The final set of articles analyzed contained 58 articles and chapters. Please see the list of references for all those coded in the Appendix**.**

.

In order to analyze the articles included in our search, a protocol for comparison was developed which covered:

- Digital Inclusion focus: identifying access, skills, motivation, trust
- Country (of study)
- Indigenous communities discussed
- Discipline.

FINDINGS

We applied the four elements of digital inclusion adopted by New Zealand government digital inclusion policymakers (Access, Skills, Motivation and Trust) and identified in *The Digital Inclusion Blueprint* to the set of papers (Department of Internal Affairs, 2019). The elements were chosen because of *The Blueprint*'s discussion of a Māori lens for inclusion (p.8). Papers were coded for each of the elements discussed. The total number of codes adds up to more than 58 because some of the articles and chapters covered more than one element (see Figure 1).

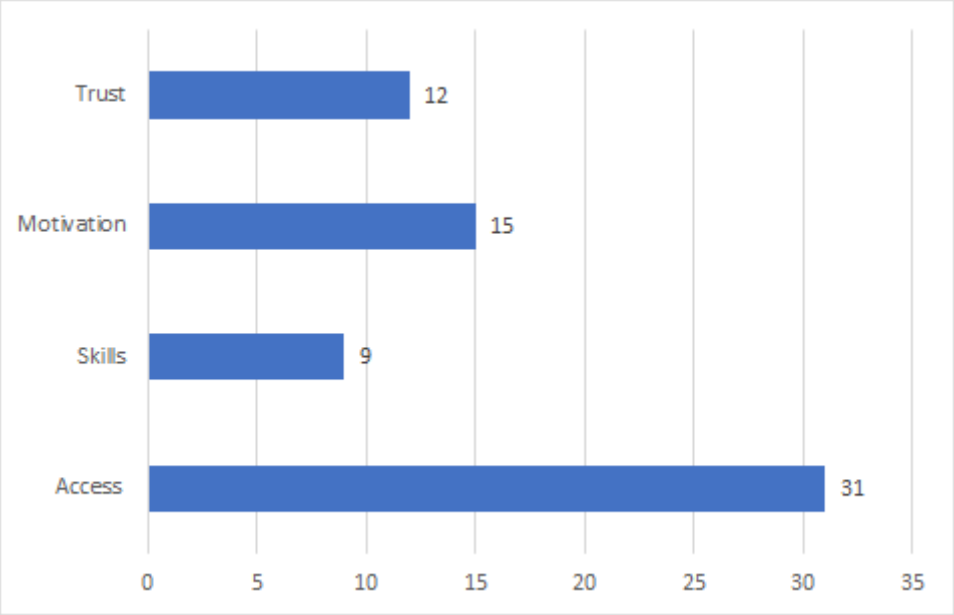

Figure 1. Frequency of Codes for Indigenous Digital Inclusion Articles 2000-2019

Access is the most common and easiest of the elements for governments to accomplish and researchers to quantify. The papers in this category spanned the whole twenty year period covered by the search, suggesting that although there is now widespread recognition that digital inclusion is not just reliant on people having the necessary hardware and software, studies often continue to take this binary perspective. Nevertheless, much of the research in the access category does go beyond the mere presentation of statistics of ownership and use, advocating a more nuanced approach that considers cultural context (Stenberg, 2018). Papers with a focus on *skills* represented the smallest proportion of the corpus; just nine were identified. Moreover, the development of digital literacy skills was often not the main focus of the research coded under this category but rather skills development was highlighted as just one consideration for those seeking to improve the digital inclusion of Indigenous communities. Papers discussing *motivation* often focused on the lack of relevant or appropriate content as well as content in Indigenous languages. Some of the narratives in the category of *trust* pick up on those raised in the motivation category with a degree of wariness noted from Indigenous people about the impact of digital technologies on their traditions and culture. Figure 2 suggests that research interest in the different areas has been reasonably consistent over the two decades of publications analyzed with the domination of research focusing on access over much of the period.

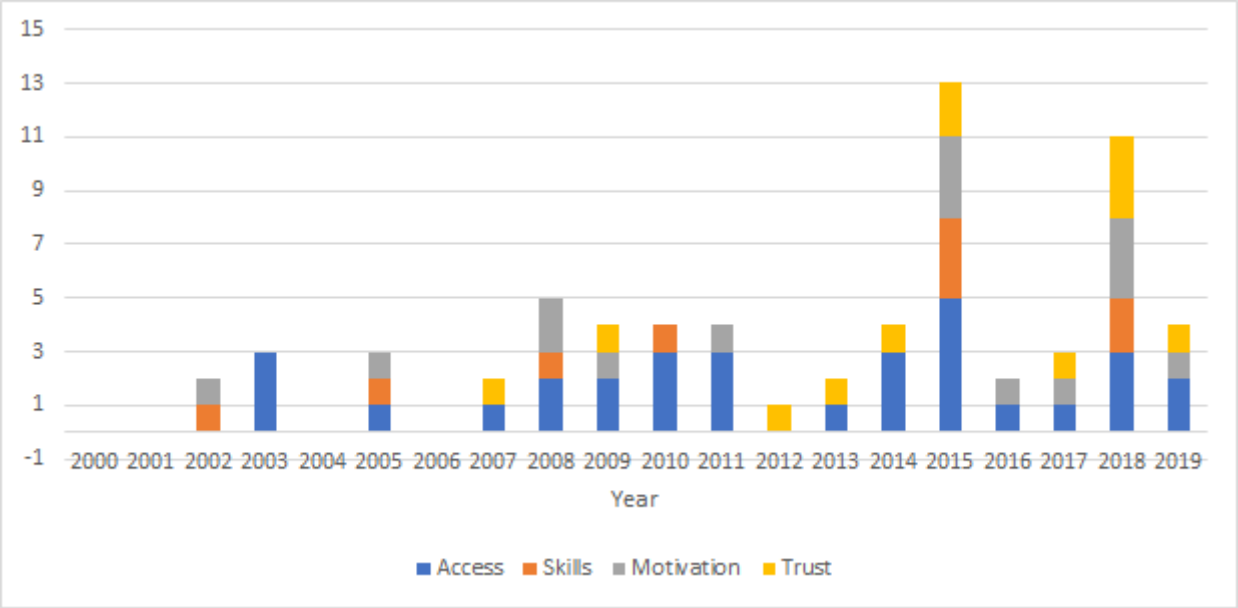

Figure 2. Indigenous Digital Inclusion Coding Articles by Year 2000-2019

Many of the papers focused on a single element, there were eight papers that were coded to at least two of the elements. Four of the papers discussed both access and motivation within the context of specific projects (Samaras, 2008; Salazar, 2008; Pohapatchoko, Codwell, Powell and Lassos, 2017; Carew, Green, Kral, Nordlinger, and Singer, 2015).

After an initial review of articles by country as identified by Scopus and Web of Science, the articles were reviewed to identify the place of study, not just the location of the first author. The aim was to identify where the work was being undertaken and establish whether any specific geographic area dominates and/or whether researchers from particular countries specialise in the field. A review of the corpus combining analysis from Web of Science and Scopus indicates that a large percentage of the research in this area is by researchers in Australia; thirty-four percent of the articles focused on Australia (n=20), while thirty-eight percent were written by academics in Australia (Table 2). Seventy percent of articles focus on digital inclusion in Australia, Canada, and the United States while seventy-nine percent of authors are located in the three countries suggesting that researchers from the three countries are undertaking research into Indigenous digital inclusion outside their country of work. While this may indicate that some researchers are researching places and people with which they may not be completely familiar, it is entirely possible that they are native to the locations/Indigenous peoples being studied but have relocated.

Geographic Location	Place of Study*	Location of first author**
Australia	20	22
United States	12	15
Canada	8	9
India	2	2
New Zealand	2	2
Malaysia	2	2
Cameroon	1	1
China	1	1
Egypt		1
Israel	1	1
South Africa	1	1
United Kingdom		1
Africa	1	
Latin America	1	
Multiple Countries	4	
Not defined	2***	

*Document content
**As Identified by Scopus or Web of Science
***Waiting for Interlibrary Loan papers with additional detail.

Table 2. Number of papers by place of study and location of first author

In addition to the location of the study, we were also interested in the Indigenous peoples discussed. Many of the articles explored Indigeneity broadly with specific examples at national and international levels (Samaras, 2005; Kizza, 2013). Other authors were quite specific in their discussion of Indigenous populations, providing locations and identifying specific peoples, aligning with Indigenous research practices (Prahdan Beetson, and Kutay, 2018; Williams et al, 2003; Smith, 2013). Appropriate conventions were not always observed in the discussions of Indigenous groups. For example, while it may not be the author's fault that typographic macrons

are not provided in text, publishers should ensure that appropriate diacritical marks, like the ā in Māori are applied (Parker, 2003). The omission of which can change cultural meaning and context and render the work disrespectful in the eyes of those whom it seeks to represent.

To identify subject disciplines, we chose to examine major subject categories identified by Web of Science and Scopus as broad indicators of field (Table 3). The papers were analyzed to identify area active in Indigenous digital engagement to answer the first research question and understand the intellectual structure of the research area. As digital inclusion is a relatively new field of both scholarly inquiry and governmental policy focus, it is important to define the boundaries of the field and map its domain to guide future research in the area. The productivity of different disciplines in the field can help us document and explain its growth and development and the various disciplinary perspectives being applied to its study.

Scopus	*Maps to Web of Science*	*Total*
Social Sciences	Social Sciences: Communication, Information Science Library Science, Psychology, Family Studies	33
Computer Science	Computer Science Technology Public Administration (content)	27
Engineering	Telecommunications	7
Arts and Humanities	Arts Humanities: History, Anthropology, linguistics	7
Business management and accounting	Business economics	6
Medicine		5
Decision Sciences		1
Earth and Planetary Sciences	Geography	1
Economics, Econometrics and Finance		1
Health Professions	Public environmental occupational health	2
Mathematics		1

Table 3. Subject disciplines of Indigenous digital inclusion research

We chose to map Web of Science subjects to Scopus subjects as a matter of convenience. The majority of the papers reviewed were indexed in Scopus. Articles indexed in both Web of Science and Scopus were used to verify mapping between the two sets of categories for Social Sciences (Rennie, Thomas, and Wilson, 2019), Arts and Humanities (Pohawpatchoko et al, 2017; Intahchomphoo, 2018), and Earth and Planetary Sciences (Greenbrook-Held and Morrison, 2011). Papers in both Web of Science and Scopus could have multiple subjects, though most had (29, 50%). Twenty-five papers (43%) had 2 subjects, and four papers (7%) had 3 subjects.

The majority of papers were identified with the subjects Social Sciences (33, 57%) and Computer Sciences (27, 47%). Nine of those papers (15%) were coded with both Social Sciences and Computer Sciences. Computer Science, as a subject, was used broadly within Scopus and Web of Science for information systems and information technologies, as well as the Internet. While the major subjects may not provide comprehensive detail, they do provide a general overview of the topic giving us a clearer understanding of the disciplinary context of the research and some indication of the likely approaches taken to the topic, although this is an area for further investigation. Additional analysis would also be helpful to explore if any of the four digital inclusion structural elements (Access, Skills, Motivation, Trust) are most prominent in the research within the different disciplinary areas and, if so, which. Similarly, an in-depth, qualitative exploration of how Indigenous digital inclusion is defined and conceptualized across the different academic disciplines would be instructive. We began the literature review process with the expectation that there would be clear disciplinary patterns between digital inclusion element and major subject. That was not the case.

Looking at the abstracts and keywords of the publications, it is apparent that the language of digital inclusion still incorporates much of the deficit thinking of the digital divide; the keywords most associated with the papers analyzed are *Digital Divide* and *Internet*. We contend that this is a dated approach and perspective that problematizes digital inclusion unhelpfully and suggests that Indigenous peoples are somehow "failing" at digital engagement, unable or unwilling to adopt digital technologies because of their own internal cognitive or motivational deficits. In so doing, some of the research reviewed ignores structures, policies, and practices that reinforce this hegemonic thinking. We support efforts to adopt instead a strengths-based approach in the design of Indigenous inclusion research aimed at shifting the current dominant deficit narratives.

LIMITATIONS

The lack of content from Arts and Humanities may be the result of biases inherent in the databases we selected for the review (Martín-Martín, Orduna-Malea, and López-Cózar, 2018). The searches run for this project are part of a larger literature review on digital inclusion.

CONCLUSION

We are researchers of European descent focusing on digital inclusion in Aotearoa New Zealand. We have identified a need within our university and Aotearoa for research from Māori and Pasifika worldviews. We have been undertaking research projects in the area to develop

frameworks and paths for students in Aotearoa and internationally and explore alternative, more culturally safe approaches to the issues raised.

Our initial analysis of the papers suggested that there are some disciplinary differences in the focus and approach taken but also many connections between the type of work being undertaken by researchers from disparate academic areas. On closer examination, however, we realized that was not the case. What we did find was the Indigenous peoples were often generalized and that their experiences are assumed to be the same at a national, continental, or regional level. There is still a strong focus on providing access to the Internet, and less focus on the development of skills, trust or motivation. While we did not find evidence of interconnections in themes, approaches and perspectives between scholars from different academic perspectives researching Indigenous digital inclusion, we did find deficit language is prevalent in the discussion of the Indigenous experience with digital technologies. In terms of LIS education, there is substantial work to be done to move away from considering Indigenous digital inclusion as a problem to be solved and thus perpetuating narratives of negativity, deficiency, and failure. Instead, we propose that the knowledge, skills, values, and cultural identity that Indigenous peoples bring should be prioritized in explorations of their engagement with digital technologies.

REFERENCES

Ball, C., Francis, J., Huang, K. T., Kadylak, T., Cotten, S. R., & Rikard, R. V. (2019). The physical–digital divide: Exploring the social gap between digital natives and physical natives. *Journal of Applied Gerontology*, 38(8), 1167-1184.

Bartikowski, B., Laroche, M., Jamal, A., & Yang, Z. (2018). The type-of-internet-access digital divide and the well-being of ethnic minority and majority consumers: A multi-country investigation. *Journal of Business Research*, 82, 373-380.

Buré, C. (2006). Digital Inclusion without Social Inclusion: The Consumption of Information and Communication Technologies (ICTs) in Homeless Subculture in Central Scotland. *The Journal of Community Informatics*, 2(2). Retrieved from http://ci-journal.net/index.php/ciej/article/view/251

Burrows, R.; Mendoza, A.; Sterling, S.; Miller, T.; Pedell, S. (2019): Evaluating Ask Izzy: A Mobile Web App for People Experiencing Homelessness. In *Proceedings of the 17th European Conference on Computer-Supported Cooperative Work: The International Venue on Practice-centred Computing and the Design of Cooperation Technologies - Exploratory Papers, Reports of the European Society for Socially Embedded Technologies*.

Carew M, Green J, Kral I, Nordlinger R, Singer R. (2015). Getting in touch: Language and digital inclusion in Australian Indigenous communities. *Language Documentation & Conservation,* 9:307-323.

Clayton, J., & Macdonald, S. J. (2013). The limits of technology: Social class, occupation and digital inclusion in the city of Sunderland, England. *Information, Communication & Society*, 16(6), 945-966.

Correa, T., Pavez, I., & Contreras, J. (2017). Beyond access: A relational and resource-based model of household Internet adoption in isolated communities. *Telecommunications Policy*, 41(9), 757-768.

Department of Internal Affairs. (2019). The Digital Inclusion Blueprint, Te Mahere mō te Whakaurunga Matihiko. Retrieved from https://www.digital.govt.nz/assets/Documents/113Digital-Inclusion-BlueprintTe-Mahere-mo-te-Whakaurunga-Matihiko.pdf

Ebbers, W. E., Jansen, M. G., & van Deursen, A. J. (2016). Impact of the digital divide on e-government: Expanding from channel choice to channel usage. *Government information quarterly*, 33(4), 685-692.

Friemel, T. N. (2016). The digital divide has grown old: Determinants of a digital divide among seniors. *New media & society*, 18(2), 313-331.

Greenbrook-Held J, Morrison PS. (2011). The domestic divide: Access to the internet in New Zealand. *New Zealand Geographer,* 67(1):25-38.

Goode, L. (2010). Cultural citizenship online: The Internet and digital culture. *Citizenship Studies*, 14(5), 527-542.

Hartnett, M. (2017). Differences in the digital home lives of young people in New Zealand. *British Journal of Educational Technology*, 48(2), 642-652.

Hespanhol, L., Davis, H., Fredericks, J., Caldwell, G. A., & Hoggenmueller, M. (2017). Digital outreach: designing technologies for diversity, participation and social inclusion. *Proceedings of the 29th Australian Conference on Computer-Human Interaction,* 648-650.

Hilbert, M. (2011, November). Digital gender divide or technologically empowered women in developing countries? A typical case of lies, damned lies, and statistics. *Women's Studies International Forum* (Vol. 34, No. 6, pp. 479-489). Pergamon.

Hill, L., & Alport, K. (2007). Reconnecting Australia's politically excluded: Electronic pathways to electoral inclusion. *International Journal of Electronic Government Research* (IJEGR), 3(4), 1-19.

Intahchomphoo C. (2018). Indigenous peoples, social media, and the digital divide: A systematic literature review. *American Indian Culture and Research Journal, 42*(4):85-111.

James, J. (2005). The global digital divide in the Internet: developed countries constructs and Third World realities. *Journal of Information Science*, *31*(2), 114-123.

Lloyd, Amy J.: "Education, Literacy and the Reading Public." *British Library Newspapers.* Detroit: Gale, 2007.

Martín-Martín, A., Orduna-Malea, E., & López-Cózar, E. D. (2018). Coverage of highly-cited documents in Google Scholar, Web of Science, and Scopus: a multidisciplinary comparison. *Scientometrics,* 116(3), 2175-2188.

Park, S. R., Choi, D. Y., & Hong, P. (2015). Club convergence and factors of digital divide across countries. *Technological Forecasting and Social Change*, 96, 92-100.

Parker, B. (2003), "Maori access to information technology", *The Electronic Library,* 21, 5, 456-460.

Pavez, I., Correa, T., & Contreras, J. (2017). Meanings of (dis) connection: Exploring non-users in isolated rural communities with internet access infrastructure. *Poetics*, 63, 11-21.

Pohawpatchoko, C., Colwell, C., Powell, J., & Lassos, J. (2017). Developing a native digital voice: Technology and inclusivity in museums. Museum Anthropology, 40(1), 52-64.

Salazar, J. F. (2008). "Indigenous peoples and the cultural constructions of information and communication technology (ICT) in Latin America". In *Information Communication Technologies: Concepts, Methodologies, Tools, and Applications*, 1966-1975.

Samaras, K. (2005). Indigenous Australians and the 'digital divide'. Libri, 55(2-3), 84-95.

Schradie, J. (2011). The digital production gap: The digital divide and Web 2.0 collide. *Poetics*, 39(2), 145-168.

Smith, L. T. (2013). Decolonizing methodologies: Research and Indigenous peoples. Zed Books Ltd..

Starkey, L., Sylvester, A., & Johnstone, D. (2017). Negotiating digital divides: Perspectives from the New Zealand schooling system. *Journal of Research on Technology in Education*, 49(1-2), 31-42.

Townsend, L., Sathiaseelan, A., Fairhurst, G., & Wallace, C. (2013). Enhanced broadband access as a solution to the social and economic problems of the rural digital divide. *Local Economy*, 28(6), 580-595.

Van Deursen, A. J., & Van Dijk, J. A. (2014). The digital divide shifts to differences in usage. *New media & society*, 16(3), 507-526.

Williams, M., Lujan, V., Solimon, R., Willis, L., Kennedy, T., Shendo, K., ... & Sando, A. (2003, November). Communities collaborating to bridge the digital divide: the tribal virtual network. In SC'03: *Proceedings of the 2003 ACM/IEEE Conference on Supercomputing*.

APPENDIX: INDIGENOUS DIGITAL INCLUSION BIBLIOGRAPHY

Arjun RK. (2014).Penetration of information technology in tribal life: A comparative study of Andhra Pradesh and Tamil Nadu. *10th International Conference on Public Administration*, 477-481. *Awaiting interloan.*

Benson, TM. (2013).Remotely connected: Is there a seamless solution to address the digital divide in remote Indigenous communities? In Hjorth, L., & Cumiskey, K. M. *Mobile Media Practices, Presence and Politics : The Challenge of Being Seamlessly Mobile*. Routledge. EBOOK

Broadbent, R. and Papadopoulos, T. (2009) Reducing the Digital Divide: an evaluation framework for the wired community@Collingwood project*. In Creating global economies through innovation and knowledge management: theory & practice*. Soliman, Khalid S, ed. International Business Information Management Association: 701-709. *Awaiting interloan.*

Carew M, Green J, Kral I, Nordlinger R, Singer R. (2015). Getting in touch: Language and digital inclusion in Australian Indigenous communities. *Language Documentation & Conservation,*9:307-323.

Cattoni J, Gamble L, Gibson J, et al. (2009). Out of a digital chrysalis: NIHNMF (pronounced nymphthe national Indigenous health and new media forum). *Australasian Psychiatry*,17(SUPPL. 1):S159-S162.

Clarkson G, Jacobsen TE, Batcheller AL. (2007). Information asymmetry and information sharing. *Government Information Quarterly*, 24(4):827-839.

Currie LM, Ronquillo C, Dick T. (2014). Access to internet in rural and remote Canada. *Studies in Health Technology and Informatics*, 201:407-412.

Daly, A. (2008). The Diffusion of New Technologies: Community Online Access Centres in Indigenous Communities in Australia. In *Global Information Technologies: Concepts, Methodologies, Tools, and Applications* ,1895-1923. IGI Global..

Fahmy, E.I. & Nermine M. Rifaat (2010) Middle East information literacy awareness and Indigenous Arabic content challenges, *International Information & Library Review*, 42:2, 111-123.

Featherstone, D. (2011). The Ngaanyatjarra Lands telecommunications project: A quest for broadband in the Western desert. *Telecommunications Journal of Australia*, *61*(1).Gauvin, S., Granger, K., & Lorthiois, M. (2015). Analog citizens. *Electronic Commerce Research*, *15*(3), 365-386.

Gauvin, S., & Lorthiois, M. (2014, June). Internet usage at the edges of mainstream: A survey of Waswanipi (Eeyou Istchee). In *Proceedings of the European Conference on e-Government, ECEG* :430-434..Geana, M. V., Daley, C. M., Nazir, N., Cully, L., Etheridge, J., Bledowski, C., & Greiner, K. A. (2012). Use of online health information resources by American Indians and Alaska Natives. *Journal of health communication*, *17*(7), 820-835.Gigler, B. S. (2006). Enacting and interpreting technology-from usage to well-being: Experiences of Indigenous Peoples with ICTs. In *Empowering marginal communities with information networking*:124-164. IGI Global.. *Awaiting interloan*

Greenbrook-Held J, Morrison PS. (2011). The domestic divide: Access to the internet in New Zealand. *New Zealand Geographer,* 67(1):25-38.

Hashim, R., Idris, K. S., Ustadi, Y. A., & Baharud-din, Z. (2011, December). Digital inclusion among the indigenous people (orang asli Semai) of Perak, Malaysia. In *2011 IEEE International Conference on Computer Applications and Industrial Electronics (ICCAIE)*: 224-228. IEEE.Hogan, E. (2016). Gender, internet and computer access in remote Central Australian Aboriginal contexts. *Australian Aboriginal Studies*, *2016*(1).Intahchomphoo C. (2018). Indigenous peoples, social media, and the digital divide: A systematic literature review. *American Indian Culture and Research Journal, 42*(4):85-111.

Jin, H., & Liang, J. (2015). How should the Chinese government provide information services for Mongol ethnic minority?. *Government Information Quarterly*, *32*(1), 82-94.Johnson, G. M. (2016). Technology use among Indigenous adolescents in remote regions of Australia. *International Journal of Adolescence and Youth*, *21*(2), 218-231.Jones, L., Jacklin, K., & O'Connell, M. E. (2017). Development and use of health-related technologies in indigenous communities: critical review. *Journal of medical Internet research*, *19*(7), e256.Kizza, J. M. (2013). Mobile money technology and the fast disappearing African digital divide. *African Journal of Science, Technology, Innovation and Development*, *5*(5), 373-378.Kutay C, (2014). HCI model for culturally useful knowledge sharing.*Lecture Notes in Computer Science* , No. 7697.

Letch N, Carroll J. (2007). Integrated e-government systems: Unintended impacts for those at the margins. *Proceedings of the European Conference on Information Systems*,:2197-2208.

Lissitsa, S. (2015). Patterns of digital uses among Israeli Arabs–between citizenship in modern society and traditional cultural roots. *Asian Journal of Communication*, *25*(5), 447-464.McCallum, K., & Papandrea, F. (2009). Community business: The internet in remote Australian indigenous communities. *New media & society*, *11*(7), 1230-1251.McMahon, R., O'Donnell, S., Smith, R., Walmark, B., Beaton, B., & Simmonds, J. (2011). Digital divides and the'first mile': Framing First Nations broadband development in Canada. *International Indigenous Policy Journal*, *2*(2).Meer, J. (2003). Getting on the net: the struggle for digital inclusion of the Navajo. *IEEE Technology and Society Magazine*, *22*(1), 53-58.Mohammad, M., & Lan, Y. C. (2010, April). The dynamic business process development framework to bridge the digital divide among the aboriginal community in Australia. In *2010 2nd IEEE International Conference on Information Management and Engineering*:76-83. IEEE.Mohammad, M. (2010). The implementation of government information systems and computer education within Aboriginal community in Australia. In *2010 International Conference on Educational and Information Technology* (Vol. 1, pp. V1-463). IEEE.Moisey S. Building inclusive libraries to bridge the digital divide. Proc Int Conf e-Lear , ICEL. 2008;2008-January. Moisey, S. D. (2008). Building Inclusive Libraries to Bridge the Digital Divide. T*he 3rd International Conference on E-Learning in Cape Town, South Africa*.:317-322.

Monroe, B. (2002). The internet in Indian country. *Computers and Composition*, *19*(3), 285-296.Nedungadi, P. P., Menon, R., Gutjahr, G., Erickson, L., & Raman, R. (2018). Towards an inclusive digital literacy framework for digital India. *Education+ Training*.O'Sullivan, S., & Walker, C. (2018). From the interpersonal to the internet:

social service digitisation and the implications for vulnerable individuals and communities. *Australian Journal of Political Science*, *53*(4), 490-507.Papandrea, F. (2010). Communication services in remote Indigenous communities. *Media International Australia*, *134*(1), 46-59.

Pariyar, A., Kulathuramaiyer, N., Bin Abdullah, J., & Man, C. K. (2019). Contextualizing learning for rural community using library-in-a-box: Experience from Penan community. *International Journal of Innovative Technology and Exploring Engineering*, 8(8), 2499-2506.

Parker, B. (2003). Maori access to information technology. *The Electronic Library*.21(5), 456-460.

Parkhurst, N. D., Morris, T., Tahy, E., & Mossberger, K. (2015). The digital reality: e-government and access to technology and internet for American Indian and Alaska Native populations. In *Proceedings of the 16th Annual International Conference on Digital Government Research*:217-229.

Pasch, T. J. (2015). Towards the enhancement of Arctic digital industries:'Translating'cultural content to new media platforms. *Jostrans, the Journal of Specialized Translations*, *24*

Pohawpatchoko, C., Colwell, C., Powell, J., & Lassos, J. (2017). Developing a native digital voice: Technology and inclusivity in museums. Museum Anthropology, 40(1), 52-64.

Prahdan, S., Beetson, S., & Kutay, C. (2018). Building Digital Entrepreneurial Platform through Local Community Activity and Digital Skills in Aboriginal Australia. *Proceedings of the Australasian Conference on Information Systems*.

Qureshi, S., & Trumbly-Lamsam, T. (2008, January). Transcending the digital divide: A framing analysis of information and communication technologies news in Native American tribal newspapers. In Proceedings of the 41st Annual Hawaii International Conference on System Sciences:124-124. IEEE.

Rennie, E. (2018). Policy experiments and the digital divide: understanding the context of internet adoption in remote Aboriginal communities. In *Digital Participation through Social Living Labs*: 299-313. Chandos Publishing.

Rennie, E., Thomas, J., & Wilson, C. (2019). Aboriginal and Torres Strait Islander people and digital inclusion: what is the evidence and where is it? *Communication Research and Practice*, *5*(2), 105-120.

Rennie, E., Yunkaporta, T., & Holcombe-James, I. (2018). Privacy at the Margins| Privacy Versus Relatedness: Managing Device Use in Australia's Remote Aboriginal Communities. *International Journal of Communication*, *12*, 19.

Robinson, R. F., Dillard, D. A., Hiratsuka, V. Y., Smith, J. J., Tierney, S., Avey, J. P., & Buchwald, D. S. (2015). Formative evaluation to assess communication technology access and health communication preferences of Alaska Native people. *International Journal of Indigenous Health*, 10(2), 88.

Salazar, J. F. (2008). Indigenous peoples and the cultural constructions of information and communication technology (ICT) in Latin America. In *Information Communication Technologies: Concepts, Methodologies, Tools, and Applications*:1966-1975. IGI Global.

Samaras, K. (2005). Indigenous Australians and the 'digital divide'. *Libri*, 55(2-3), 84-95.

Singleton, G., Rola-Rubzen, M. F., Muir, K., Muir, D., & McGregor, M. (2009). Youth empowerment and information and communication technologies: a case study of a remote Australian Aboriginal community. GeoJournal, 74(5), 403.

Soh, M., Kouesso, J. R., & Fotso, L. P. (2015). Localisation of Information and Communication Technologies in Cameroonian Languages and Cultures: Experience and Issues. *International Journal of Advanced Computer Science and Applications*, *6*(12), 295-300.

Stenberg, P. L. (2018). The purchase of Internet subscriptions in Native American households. *Telecommunications Policy*, *42*(1), 51-60.

Toth, K., Smith, D., & Giroux, D. (2018). Indigenous peoples and empowerment via technology. *First Peoples Child & Family Review*, *13*(1).

Vigil, M., Rantanen, M., & Belding, E. (2015, May). A first look at tribal web traffic. In *Proceedings of the 24th International Conference on World Wide Web*:1155-1165.

Wasserman, H. (2002). Between the local and the global: South African languages and the Internet. *African and Asian Studies*, 1(4), 303-321.

Williams, M., Lujan, V., Solimon, R., Willis, L., Kennedy, T., Shendo, K., & Sando, A. (2003). Communities collaborating to bridge the digital divide: the tribal virtual network. In *SC'03: Proceedings of the 2003 ACM/IEEE Conference on Supercomputing* : 62. IEEE.

Williams-Diehm, K. L., Miller, C. R., Sinclair, T. E., & Wronowski, M. L. (2018). Technology-based employability curriculum and culturally diverse learners with disabilities. *Journal of Special Education Technology*, 33(3), 159-170.

Winter, J., & Boudreau, J. (2018). Supporting self-determined Indigenous innovations: Rethinking the digital divide in Canada. *Technology Innovation Management Review*, 8(2).

Young, J. C. (2019). Rural digital geographies and new landscapes of social resilience. *Journal of Rural Studies,* 70, 66-74.