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Digital Empowerment for Indigenous Communities Using Generative Artificial Intelligence

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ABSTRACT

Objective - Indigenous communities face various challenges, including marginalization, loss of cultural heritage, language endangerment, health disparities, and economic inequities. Digitalization, empowered by Artificial Intelligence (AI), offers transformative solutions for preserving and revitalizing indigenous knowledge systems and improving the quality of life for these communities.

Methodology/Technique – This review critically examines the impact of digitalization and AI on indigenous populations, focusing on culture, language, health, and economic status. It evaluates both the positive outcomes and the potential biases introduced by AI technologies.

Finding – By exploring the application of Generative AI, this review extends existing studies and demonstrates its capability to mitigate biases and enrich our understanding of Indigenous cultures. The review identifies the dual narrative present in existing research, the beneficial effects of digitalization and AI, and the potential for bias.

Novelty – This study uniquely focuses on the dual narrative of AI impacts, particularly the potential for Generative AI to mitigate biases, offering new insights into the intersection of digitalization and Indigenous knowledge systems.

Type of Paper: Review
JEL Classification: O33, I15, Z13, L86
Keywords: indigenous communities, artificial intelligence, deep learning, large language, models, digitalization, decolonial AI, ethical artificial intelligence.

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1. Introduction

Historically, we have witnessed the social exclusion of indigenous populations due to socioeconomic status (Williamson A., 2021), supported by the high representation of these communities in the most negative socio-economic statistics. Earlier technologies, such as machine translation systems, also had higher levels of errors in translating written texts (Ishida, 2006). Unique learnings, like traditional ecological knowledge for forest management, could not be digitalized as there were no effective methods for representing traditional knowledge in the computer (Thomson & Schmoldt, 2001). Emerging digital technologies offer unique opportunities for Indigenous peoples to represent their knowledge, reclaim cultural heritage, and connect with their communities (Hao, 2022).

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A great example is how New Zealand has focused on the preservation of Maori Indigenous communities by integrating them with the mainstream (Paterson, 1999). Within Indigenous communities, new digital versions of historic artifacts are being utilized for a variety of purposes (Newell, 2012). For instance, GIS mapping can be used to support Maori land management in New Zealand, and 3D scanning enables the digital repatriation of Indigenous cultural heritage held by overseas institutions (Lischer-Katz, 2022).

Generative AI, characterized by technologies like deep learning and neural networks, represents a significant leap in artificial intelligence (Fui-Hoon Nah et al., 2023). While traditional AI systems primarily analyze and learn from input data, generative AI goes a step further by creating new data that is similar yet distinct (Forbes, 2023). With its capacity to produce new content, insights, and solutions independently, generative AI holds great potential to reduce prejudice, promote inclusivity, and elevate the voices of Indigenous people in the digital sphere (Ishida, 2006).

1.1 Contributions to the study

The authors explored the transformative potential of generative AI in enhancing media regeneration, language revitalization, bias mitigation, and the promotion of indigenous businesses and cultural communication. The study emphasizes how crucial it is to create moral AI frameworks that uphold cultural integrity, data sovereignty, and collaborative development methods. Guidance for Future Technological Developments: The importance of this research resides in its ability to direct future technological advancements towards more moral, inclusive, and culturally aware uses of AI. Through emphasizing the critical function that generative AI plays in aiding Indigenous communities, we hope to initiate a more extensive conversation about the significance of decolonizing technology and redefining it as an instrument for social justice and cultural conservation.

2. Literature Review

Our extensive review of the literature explored the transformative potential of generative AI for Indigenous communities, emphasizing the ways in which these technologies can support the growth of Indigenous businesses and cultural communication, as well as media regeneration, language revitalization, and bias mitigation. We found that there are a number of important gaps in the current research, especially with regard to the ethical application and the cultural heritage impact. The review emphasised the significance of decolonizing digital technologies to ensure the respectful and consultative application of AI and stop colonial biases from recurring. Generative AI has the potential to be a potent tool for empowerment by emphasizing Indigenous sovereignty and self-determination. This will allow Indigenous communities to recover their stories and cultural legacies in the digital era.

Research Questions

1. RQ1: *How does the adoption of generative AI serve to empower Indigenous communities, both economically and socially?*
2. RQ2: *What ethical considerations need to be addressed when implementing generative AI within Indigenous communities?*

2.1 Review Scope, boundaries, and protocol

For this review, we have considered indigenous reports and publications, academic databases, which include SCOPUS and Web of Science, online databases, and government websites. A tabular list of the sources is provided below.

Table 1. Secondary Data Sources for Data Collection.

Secondary Data Sources	Source Type
Report and Publications	ILO, UNESCO, WWF, Niti Ayog, Corporate Reports, GSMA etc.
Academic Journals	SCOPUS and Web of Science
Online Databases	World Bank's World Development Indicators
Government Websites	Government websites dedicated to indigenous affairs

To ensure our systematic review was both methodical and replicable, we reviewed not only academic journals but also indigenous databases, government websites, and other online sources. This comprehensive approach allowed us to cover local reports on indigenous communities, providing a well-rounded perspective. We conducted our search using structured keywords as mentioned in the abstract, employing both backward and forward source searches. This involved examining references cited in relevant studies and exploring more recent publications that have cited these key studies. By incorporating these approaches, we ensured a thorough examination of the existing literature.

Given that Generative AI is a relatively novel concept, our research was conducted in two phases. Initially, we focused on literature concerning indigenous people and digitalization/artificial intelligence, which is a well-researched area. Subsequently, we extended our study to include Generative AI, identifying gaps that could be addressed by its application. This included reviewing industry reports and publication from institutions like UNESCO, ILO etc. as well which highlight the need for informed consent and cultural sensitivity to avoid misuse and misappropriation of indigenous data. These reports provide a robust framework to support the ethical use of AI.

Our research was structured around clearly formulated questions, developed at the outset of the review process. This protocol ensured that our examination of digital empowerment for indigenous people using generative AI was comprehensive and focused. Our review on digital empowerment of indigenous people utilizing generative AI has been developed around our research questions. The review process has been shown in Figure 1 below.

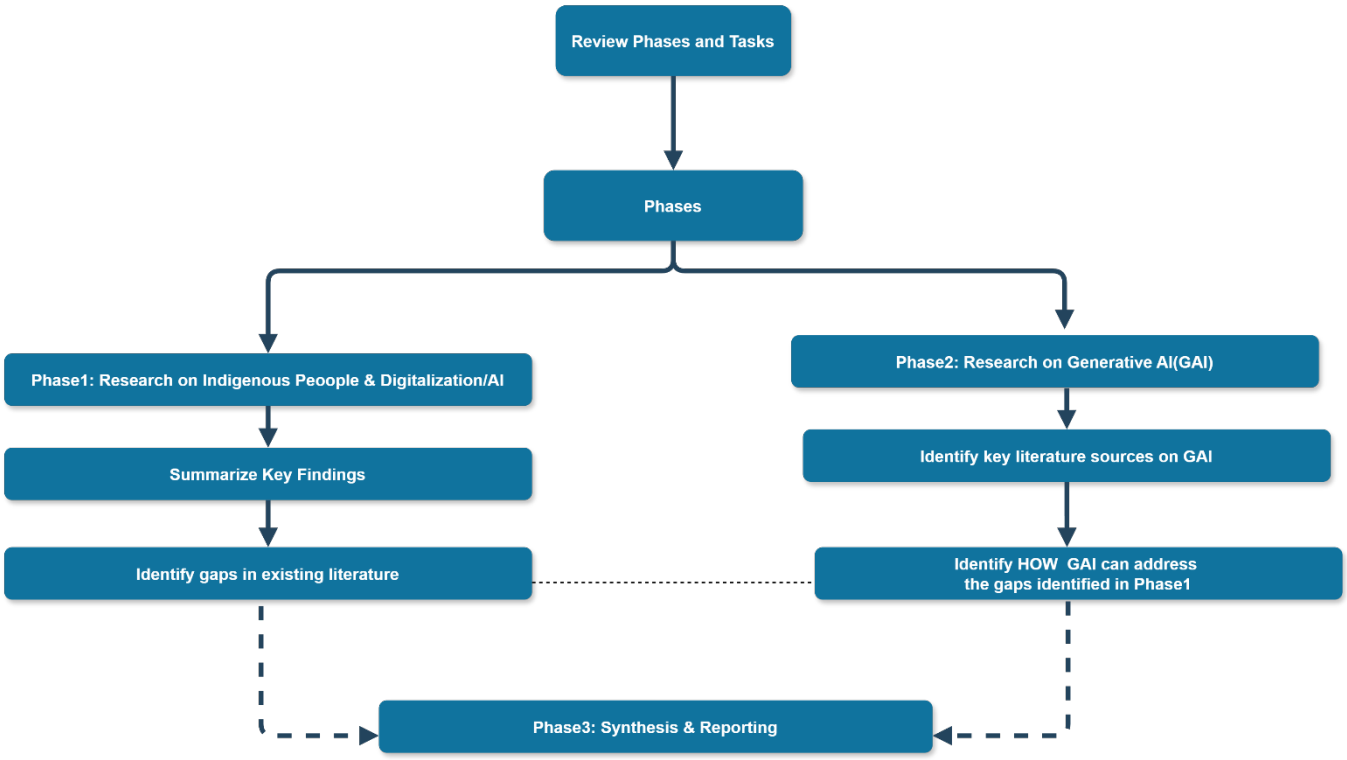


Figure 1. Review Phases & Tasks

3. Research Methodology

For our review, we focused on key terminologies like indigenous, digitalization, and artificial intelligence, ensuring articles were relevant to the impact of these technologies on indigenous lives. Papers were coded based on themes such as education, health, and knowledge, leading to the categorization into eight main themes.

The integration and preservation of indigenous knowledge systems are critical for maintaining indigenous languages and cultural resources, which face numerous challenges for long-term survival (Mamtora & Bow, 2017). Digitalization aids this effort by preserving elements like folk tales and music through digital media (Chan, 2018). Effective knowledge preservation requires user-friendly and integrated processes to ensure local appropriation and co-design of tools (Winschiers-Theophilus H. et al., 2013).

Digital transformation in education, especially in higher education, has been critically examined for perpetuating colonial legacies and inequities (Gumbo M.T., 2023). It is crucial to reassess digital practices to enhance educational equity and access, as reflected in the eSDG framework (Rahmadi et al., 2023). Machine learning algorithms can analyze vast data to recognize patterns in Indigenous languages, aiding their preservation and revitalization (Fiorucci et al., 2020). AI can also predict languages at risk of extinction and develop preservation strategies (Arista, 2023).

Decolonizing health data is essential for addressing disparities in health equity. Modern practices must support equitable healthcare outcomes. Initiatives such as AI-powered wearable electrocardiogram sensors and AI-assisted diabetic retinopathy detection demonstrate technological advancements aiding indigenous health (Zobair K.M. et al., 2023; Scheetz J et al., 2021). Studies have also examined AI and

Machine Learning in detecting disease onset in primary health care for indigenous populations (Jeong et al., 2023).

Ethical considerations are crucial when designing software systems, focusing on property, accessibility, accuracy, and privacy (Thomson & Schmoldt, 2001). While machine learning can enhance decision-making, it may introduce biases from datasets. Ensuring datasets include relevant data for identifying historically marginalized populations is vital (Fong N. et al., 2023).

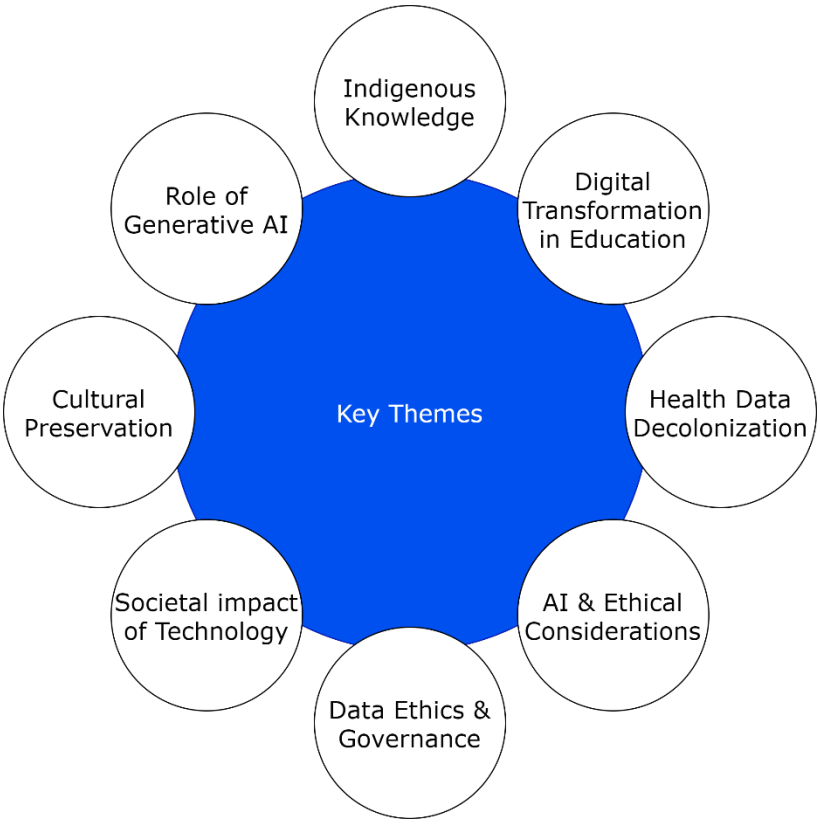


Figure 2: Key themes from our Research Methodology

Data governance, especially in research and health sectors, emphasizes consent, privacy, and fair use of data. Robust governance frameworks are necessary for responsible and ethical data use, enhancing adherence to legal obligations regarding data acquisition, preservation, and access (Kandiuk, 2016).

Digitalization has significantly impacted indigenous lives. Initiatives like the Traditional Knowledge Digital Library address traditional knowledge and intellectual property concerns (Ahir et al., 2020). Hubs established by Dell, Intel, Microsoft, and Computer Aid International since 2011 have facilitated the digitization and inclusion of remote and low-income communities in the global digital economy (Balán L., 2023).

Technology plays a crucial role in preserving cultural heritage and supporting access to cultural and historical resources (Brown D. et al., 2012). Studies support policies respecting ethnic identity by identifying aspects of cultural identity susceptible to change (Espín-León et al., 2020).Generative AI can identify and remove historical biases in datasets, ethically include indigenous perspectives, and aid in digitalizing endangered cultures and languages. This potential is explored further in the next section.

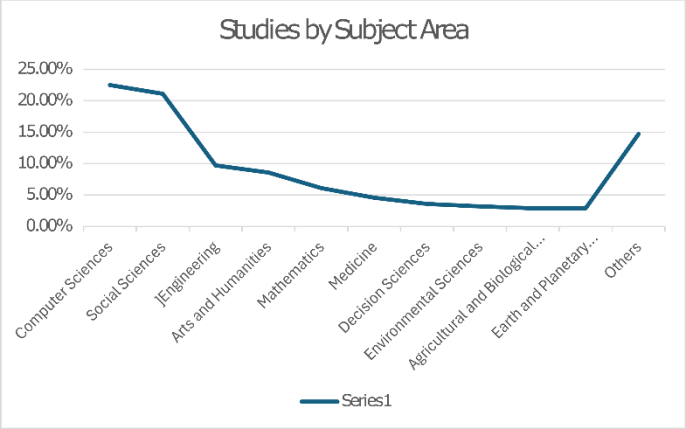


Figure 3: Studies by Subject Area

4. Results

Although the indigenous population may benefit greatly from digitalization, it is crucial to acknowledge that decolonization is still necessary in this digital age (Specht, 2018). Artificial intelligence and digital technology colonisation are serious issues that require attention. In the same way that colonisation has affected indigenous communities in real-world settings, it can also have an effect online. Indigenous communities may become even more marginalised and power disparities may be sustained by non-indigenous groups' extraction and appropriation of indigenous knowledge and cultural practices.

Prioritising the involvement and participation of indigenous communities in the creation and execution of digital technologies and artificial intelligence projects is essential for decolonizing these fields. This entails forming partnerships with indigenous communities that are based on respect and consultation in order to guarantee that their opinions and voices are heard throughout the decision-making process. Digital technologies can be used as tools for empowerment and cultural revitalization by placing a priority on indigenous sovereignty and self-determination (Mohamed et al., 2020). Our review concentrated on areas where generative AI can support indigenous emancipation because it was centred on digital empowerment through the use of AI while adhering to the above guidelines, which have been identified by numerous studies.

Our comprehensive literature review revealed several key areas where generative AI can have a transformative impact on indigenous communities:

- Regenerating Indigenous Media: Digital media can help preserve and share indigenous stories, music, and cultural heritage.
- Revitalization of Indigenous Languages: AI can analyze and recognize patterns in indigenous languages, aiding in their preservation and revitalization (Fiorucci et al., 2020).
- Removing biases and including indigenous perspectives: Ethical AI frameworks can ensure that datasets include indigenous perspectives and do not perpetuate colonial biases (UNESCO).
- Communicating Culture: Digital platforms can help communicate and sustain cultural practices and knowledge.

- Promoting Indigenous Businesses: AI can support the promotion and growth of Indigenous businesses by providing new opportunities and resources.

These contributions are guided by three key theories that impact the adoption of new technologies like generative AI: Rational Choice Theory (RCT), Ability-Motivation-Opportunity (AMO) Theory, and the Unified Theory of Acceptance and Use of Technology (UTAUT). These theories collectively inform our "Indigenous Emancipation through Generative AI Adoption Framework" (IEGAA Framework), which emphasizes the critical role of generative AI in supporting the empowerment and cultural revitalization of Indigenous communities.

5. Discussion

In our review of the literature, we identified several limitations in existing research studies. Primarily, these studies tend to focus either on the positive or negative aspects of digitalization and artificial intelligence, rarely providing a balanced perspective. Our research aims to fill this gap by examining how generative AI, as an extension of AI, can impact the lives of indigenous people in a balanced manner. This comprehensive approach led to the development of the "Indigenous Emancipation through Generative AI Adoption Framework" (IEGAA Framework), which extends current studies and theoretical frameworks to explain how generative AI can be leveraged to support Indigenous communities.

To bolster our argument, it is instructive to look at comparable initiatives focused on empowering indigenous communities through technology in countries like New Zealand, Australia, and Canada. For example, in New Zealand, the integration of digital technologies has played a significant role in the preservation of Maori culture. Projects like Te Hiku Media have used AI to create speech recognition tools that help in the revitalization of the Maori language. Similarly, in Australia, the National Indigenous Australians Agency has implemented several digital initiatives to enhance educational outcomes and economic opportunities for Aboriginal and Torres Strait Islander peoples. In Canada, the First Nations Technology Council has been pivotal in advancing digital skills and capacities within First Nations communities. These case studies, both successful and otherwise, provide valuable insights and highlight the potential of generative AI to support similar outcomes in other Indigenous contexts.

Extending our discussion above, we propose Indigenous Emancipation through the Generative AI Adoption Framework (IEGAA Framework). This framework extends the current studies and theoretical frameworks and explains how Generative AI can be leveraged to support indigenous communities. Each avenue can be explained through the lens of the Rational Choice Theory, the Ability-Motivation-Opportunity (AMO) Theory, and the Unified Theory of Acceptance and Use of Technology (UTAUT).

Rational Choice Theory (RCT) posits that individuals make decisions based on a rational evaluation of available information and potential outcomes. In the context of generative AI, Indigenous communities can utilize AI tools to make informed decisions about preserving their cultural heritage and enhancing socio-economic opportunities. For example, AI-driven data analysis can help identify the most effective strategies for language preservation or economic development.

Ability-Motivation-Opportunity (AMO) Theory highlights the importance of providing individuals with the ability, motivation, and opportunity to perform certain tasks. The "Opportunity" aspect is particularly relevant to generative AI adoption in indigenous communities. For instance, providing access to AI technologies and training can empower community members to create and manage digital content that reflects their cultural narratives and values. This can lead to greater engagement and the revitalization of cultural practices.

Unified Theory of Acceptance and Use of Technology (UTAUT) focuses on how user acceptance and use of technology is influenced by performance expectancy, effort expectancy, social influence, and facilitating conditions. Applying UTAUT to our framework, it is crucial to ensure that indigenous communities perceive generative AI technologies as useful and easy to use. Additionally, social influence from community leaders and adequate support structures can facilitate the adoption and sustained use of these technologies.

By grounding our framework in these theories, we can better understand the multifaceted impacts of generative AI on Indigenous communities. Furthermore, real-world examples from countries like New Zealand, Australia, and Canada provide concrete evidence of how similar technological integrations have been approached and highlight both the challenges and successes experienced in these contexts.

Indigenous Emancipation through Generative AI Adoption Framework (IEGAA Framework) can provide a detailed and comprehensive view of how Generative AI can be leveraged to support indigenous communities. Each avenue can be explained through the lens of the Rational Choice Theory, Ability-Motivation-Opportunity (AMO) Theory, and the Unified Theory of Acceptance and Use of Technology (UTAUT)

6. Conclusion

The use of generative AI to assist indigenous communities has a bright future and the potential to bring about a number of advantages. Researchers, technologists, and indigenous stakeholders must work together to make sure that these cutting-edge tools are created and used in ways that are honorable, helpful, and empowering. Future generative AI research and applications can result in sustainable, culturally sensitive solutions that greatly improve people's quality of life and preserve the rich legacy of Indigenous peoples worldwide by placing a high priority on ethical frameworks and community collaboration. This cooperative strategy optimizes the benefits of AI technologies and establishes a standard for ethical AI innovation that honors and advances the various human cultures and societies.

7. Author Contribution

- Sankalp Srivastava: Conceptualization, Methodology, Writing – Original Draft.
- Dr. Parijat Upadhyay: Supervision, Project Administration, Writing – Review.

References

Ahir, S., Telavane, D., & Thomas, R. (2020). The impact of artificial intelligence, blockchain, big data, and evolving technologies in coronavirus disease-2019 (COVID-19) curtailment. *2020 International Conference on Smart Electronics and Communication (ICOSEC)*, 113–120.

Abdelnour-Nocera, J., Kurosu, M., Clemmensen, T., Bidwell, N., Vatrapu, R., Winschiers-Theophilus, H., Evers, V., Heimgärtner, R., & Yeo, A. (2011). *Re-framing HCI through local and indigenous perspectives*. In P. Campos, N. Graham, J. Jorge, N. Nunes, P. Palanque, & M. Winckler (Eds.), Human-Computer Interaction – INTERACT 2011 (Vol. 6949, pp. 738-739). Springer Berlin Heidelberg.

Chan, C. S. C. (2018). Sustainability of indigenous folk tales, music, and cultural heritage through innovation. *Journal of Cultural Heritage Management and Sustainable Development*, *8*(3), 342–361.

Fiorucci, M., Khoroshiltseva, M., Pontil, M., Traviglia, A., Del Bue, A., & James, S. (2020). Machine learning for cultural heritage: A survey. *Pattern Recognition Letters*, *133*, 102–108.

Hao, K. (2022). A new vision of artificial intelligence for the people. *MIT Technology Review*.

Ishida, T. (2006). Communicating culture. *IEEE Intelligent Systems*, *21*(3), 62–63.

Jeong, K., Mallard, A. R., Coombe, L., & Ward, J. (2023). Artificial intelligence and prediction of cardiometabolic disease: systematic review of model performance and potential benefits in indigenous populations. *Artificial Intelligence in Medicine*, *139*, 102534.

Kandiuk, M. (2016). The rhetoric of digitization and the politicization of Canadian Heritage. *Library Trends*, *65*(2), 165–179.

Lischer-Katz, Z. (2022). The emergence of digital reformatting in the history of preservation knowledge: 1823–2015. *Journal of Documentation*, *78*(6), 1249–1277.

Mamtora, J., & Bow, C. (2017). Towards a unique archive of Aboriginal languages: A collaborative project. *Journal of the Australian Library and Information Association*, *66*(1), 28–41.

Paterson, R. K. (1999). Protecting Taonga: the cultural heritage of the New Zealand Maori. *International Journal of Cultural Property*, *8*(1), 108–132.

Rahmadi, A., Rohmah, M., Sari, K., Amaliah, N., Widiastuti, M., Sagena, U. W., Setyowati, D. L., Paramita, S., Arifin, Z., & Doa, M. N. (2023). Implementation of eSDG Framework Involving Multi Stakeholders Matching Program Engagement: Digitalization of Traditional Community Market. In *Digitalization, New Media, and Education for Sustainable Development* (pp. 108–130). IGI Global.

Ruster, L. P., & Brown, G. (2020). Termination for cultural misalignment: Setting up contract terms to ensure community well-being in the development of AI. *International Journal of Community Well-Being*, 3(4), 523-537. https://doi.org/10.1007/s42413-020-00081-8

Siddaway, A. P., Wood, A. M., & Hedges, L. V. (2019). *How to do a systematic review: A best practice guide for conducting and reporting narrative reviews, meta-analyses, and meta-syntheses*. Annual Review of Psychology, 70(1), 747-770. https://doi.org/10.1146/annurev-psych-010418-102803

Thomson, A. J., & Schmoldt, D. L. (2001). Ethics in computer software design and development. *Computers and Electronics in Agriculture*, *30*(1–3), 85–102.