

Perspectives From Emerging Researchers: What Next in EE/SE Research?

#aaeeer: Claudio Aguayo,¹ Blanche Higgins,² Ellen Field,³ Jennifer Nicholls,³ Susan Pudin,⁴ Sangion Appiee Tiu,⁵ Maia Osborn,⁶ Farshad Hashemzadeh,⁵ Kevin Kezabu Lubuulwa,⁷ Mark Boulet,⁷⁸ Belinda A. Christie⁹ & Jeremy Mah¹⁰

¹*Centre for Learning and Teaching, Auckland University of Technology, New Zealand*

²*Faculty of Education, Monash University, Melbourne, Victoria, Australia*

³*James Cook University, Cairns, Queensland, Australia*

⁴*Studies and Information Management Division, Environment Protection Department, Sabah, Malaysia*

⁵*University of Waikato, Hamilton, New Zealand*

⁶*Southern Cross University, Gold Coast, Queensland, Australia*

⁷*Faculty of Education, University of Tasmania, Launceston, Tasmania, Australia*

⁸*BehaviourWorks Australia, Monash Sustainability Institute, Melbourne, Victoria, Australia*

⁹*School of Arts, Social Sciences and Humanities, Swinburne Institute for Social Research, Swinburne University of Technology, Melbourne, Victoria, Australia*

¹⁰*Centre for Sustainability Leadership, Sydney, New South Wales, Australia*

Abstract

Following the inaugural Australian Association for Environmental Education (AAEE) research symposium in November 2014, we — a group of emerging researchers in Environmental Education/Sustainability Education (EE/SE) — commenced an online collaboration to identify and articulate our responses to the main themes of the symposium. Identifying as #aaeeer, our discussions coalesced into four main areas that we felt captured not only some of our current research interests, but also ‘under-explored’ areas that need further attention and that also held the potential for meaningful and ‘dangerous’ contributions to EE/SE research and practice. These themes were: (1) uncertain futures, (2) traditional knowledges for the future, (3) community EE/SE, and (4) the rise of the digital, explorations of which we present in this article. By no means intended to capture all that is worth researching in this field, these themes, and this article, are deliberately presented by #aaeeer to spark discussions, as well as showcase an example of online collaboration between researchers in a number of countries.

This article has been collaboratively developed and written by a number of the emerging researchers who attended the Australian Association for Environmental Education [AAEE] research symposium in November, 2014. The article is an articulation of what

Address for correspondence: Claudio Aguayo, Centre for Learning and Teaching, Auckland University of Technology, 56 Wellesley Street East, Auckland Central, New Zealand. Email: caguayo@aut.ac.nz

we as emerging researchers deem as important research areas and processes for the field of Environmental Education/Sustainability Education (EE/SE). This work is also an experiment in online collaborative research and writing. The culmination of these words could not have resulted as an individual response but have been assembled and reworked by this evolving collective, #aaeeer (Australian Association of Environmental Education emerging researchers).

At the AAEE research symposium, the *Australian Journal of Environmental Education* celebrated 30 years of publishing research. The symposium theme, 'It's about dialogue and it's about time' provided an invitation to reflect on the history of environmental education research, and in this reflective pause, consider future research directions for environmental education. Provocative questions and statements that resonated with us included Jo Ferreira's observation that much research is 'old research that looks new'; Bob Stevenson's reflection on environmental education being marginalised in schools — 'if we think of it as a reform then it is a failed reform'; and Alan Reid's direct and challenging question: 'What is worth researching?'. David Orr incited us to make research more 'dangerous', and the idea of 'flourishing' systems and futures as a complement to sustainability emerged in many of our conversations at the symposium. These two words in particular — 'flourishing' and 'dangerous' — provided much for us to reflect on and consider about our research goals and directions.

'Dangerous' research was a provocative concept for us to think with. Our network and paper emerged through conversations about our dissatisfaction with many of the perspectives represented and promoted within EE/SE research. We felt that often, EE/SE research — and practice — can promote conformity towards mainstream paradigms if it is not deeply self-reflexive, and addressing this is an ongoing challenge. We also felt that good intentions are not sufficient — implicit biases in well-meaning research agendas can support systems that are genuinely dangerous for certain groups of people. It can also be dangerous to challenge such biases and systems. Dangerous, then, was an idea to stimulate our thinking about how to diversify the perspectives within EE research to make it more inclusive. While pushing an indigenous/feminist/queer agenda might seem 'old', as such arguments have been made in the past, it is genuinely still a career threat to those of us occupying marginalised positions and our allies who choose to speak out. At a broader level, being an 'emerging' researcher inherently requires some conformance to discipline norms and discourses, and challenging these requires taking certain risks. So, the idea of doing 'dangerous' research in EE/SE challenged us to continue to reflect on our own assumptions and biases, while simultaneously respecting our ideas when they don't necessarily 'fit in'.

We were inspired by the Latin botanical roots of 'flourishing', pushing us to consider the complexity, energy, vitality, fertility, ephemerality, beauty, and promise of flowers, inflorescences, and blooms. Flourishing compels us to consider the possibility of working for futures where all beings can thrive, not just survive, given the right conditions. Such an ethics requires considered and challenging decision-making that is tailored to the uniqueness of each particular and specific socio-cultural context. This is in contrast to ethical frameworks such as rights or utilitarianism, which set up generalised rules in advance of an ethical challenge. Working for flourishing worlds always requires holistic consideration of the unique situation. The absence of rules that may justify certain decisions, as 'right' requires that we acknowledge our embeddedness in complex systems, where we are always complicit in some forms of harm. We cannot escape this but must face the ongoing challenges and continue to reflect on our actions.

Through engaging with these provocative questions and ideas, we sought to explore what we as emerging researchers think is worth researching in EE/SE. We suggest

that the resulting ideas in this article indicate some likely future directions for EE/SE. To answer our research question we engaged in an online collaborative co-research process using social media (specifically a Google+ community) to store all individual, small group and collective documents, facilitate video conference calls, and to document our process so that others could engage in sharing ideas, editing, or commenting at various stages of idea and writing development. This process was structured by brainstorming emerging areas of research, small group paragraph writing and voluntary editing, with specific task deadlines and group feedback. Leadership and task assignment was decided through self-selection, time availability, and capacity. This culminated in this research paper, which is thus part reflective essay, and part collaborative self-research. We think this is innovative in the high level of collaboration and the removal of the researcher/researched distinction that has led to this article.

The first author of the paper is the name of our evolving collective: #aaeeer, originally comprised of 12 emerging researchers who are studying or working within Australia and New Zealand, who are from seven different countries (Chile, Uganda, Canada, Iran, Malaysia, Australia and Papua New Guinea), and who are of various ages. The original 12 came together to write this article and are listed as authors; a further 11 have joined our online community since then. Moreover, #aaeeer is also the name of the online space where we have collaboratively thought and written from, and so we feel it is appropriate to acknowledge our shared online space.

While we hope to contribute our perspective(s) on what we see as future directions of EE/SE research, we recognise and acknowledge 'where the field [has come] from and how it has evolved' (Stevenson, Dillon, Wals, & Brody, 2013, p. 516). Further, we want to clarify that this article is not representative of all areas of flourishing EE/SE research but does represent salient themes to #aaeeer, as well as highlight some of our current research interests, at this particular moment in time. Through the collaborative writing process, the concept of the Anthropocene struck a chord as a theme connecting our diverse ideas and their relevance for a drastically changing and uncertain future. In the subsequent sections, we present our thoughts on key issues and themes deserving attention from the EE/SE research community, which we have organised as the following: uncertain futures, traditional knowledges for the future, community EE/SE, and the rise of the digital age.

Uncertain Futures

'The Anthropocene' is the proposed name for the contemporary geological epoch that is characterised by large-scale biophysical changes of anthropogenic origin (Baskin, 2015). The Anthropocene, as a construct, requires EE/SE researchers and contributors to consider the unprecedented impact of humans on the planet. Despite our collective efforts as a research community over the past 40 years, all indicators point to the future being a more confronting challenge than we could have imagined.

An uncertain future requires embracing diverse ways of knowing that are context and needs specific, and as such, do not have one right answer or a linear, textbook-driven learning process (Selby, 2008). Some initial questions for consideration as we settle into thinking with an uncertain future are: How do we influence educational institutions that 'remain the bastions of a mechanistic mindset' (Selby, 2008, p. 252)? How do researchers and educators facilitate whole systems or ecological thinking (Sterling, 2001) in the current formal education era of high stakes, national and international standardised testing, which leads to a narrowing of curriculum and pedagogical practices (Polesel, Dulfer, & Turnbull, 2012; Polesel, Rice, & Dulfer, 2013)? How do we as researchers and educators facilitate educational practices that involve an emancipatory

or transformative approach to learning, that support learners to be action-competent, ‘who actively and critically participate in problem solving and decision making, and value and respect alternative ways of thinking, valuing and doing’ (Wals & Jickling, 2009, p. 79)?

We recognise uncertain futures require collaborative approaches to research and action. It is also important to challenge an individual frame of reference and focus on a dynamic conception of community, that encompasses diffuse to cohesive characteristics. However, we also recognise that in reality there is no one universally agreed upon vision of what the future will be like and there is no single ‘right vision’ of the future (Wals & Jickling, 2002, p. 224). Therefore, a future shaped by the Anthropocene requires learning that is creative, reflexive and participatory, and that supports individuals and communities to develop capacities that are transferable to new, uncertain, and as yet unknown, or poorly defined, situations (Wals, 2011).

Traditional Knowledges for the Future

The Anthropocene is a powerful construct that in one word communicates complex messages regarding humanity’s relationship and interconnection with non-human nature. We see a key challenge for EE/SE to be ensuring that in such discussions this complexity is not reduced. Looking to decades of work in multicultural, postcolonial, feminist and ecological philosophy, we know that the scientific assumptions of ‘the human’ embedded in the notion of ‘the Anthropocene’ can function to over-emphasise human agency and deny human diversity (e.g., Barad, 2007; Baskin, 2015; Malm & Hornborg, 2014; Plumwood, 1993). Such a universalist discourse can eliminate hope that we could do ‘humanity’ differently. As EE/SE practitioners and researchers, we find the challenge of acknowledging aggregate human impacts on the planet while rejecting essentialist models of humanity to be a crucial task. We believe that we can address this in part by engaging with and promoting diverse worldviews, and we hope that through this we can contribute to more flourishing worlds.

For example, indigenous knowledges (IK) and cultural practices offer important ontologies and epistemologies that can be incorporated into EE/SE to address these issues and which embed quality of living with sustainability goals (Reid, Teamey, & Dillon, 2002). Maurial (1999) defines IK as people’s wise legacy as a result of their interaction with nature in a common territory. While we see that the value of incorporating IK as ‘other’ knowledge areas into EE/SE has been advocated for decades (Freeman, 1992; Gough & Gough, 2003), this has not been fully realised in much of the formal education curricula because many societies still find incorporating IK into formal education systems challenging.

Similarly, while some EE/SE does engage with intercultural communication (Lake, 2010; Nordström, 2008; Tilbury & Henderson, 2003), there is little evidence that this is widely or deeply implemented in practice. This shortfall may lie in both the methodologies employed and the nature of IK. Semali and Kincheloe (1999) argue that the holistic nature of IK is often challenging for non-indigenous people to engage with. It can be difficult for non-indigenous people to recognise the continuing existence and evolution of IK or to fathom its relevance for the Anthropocene. While IK is still alive and relevant in many indigenous communities today, for too long IK has been subjugated because it has been branded ‘primitive’ or ‘traditional’ by the Western ‘modern’ thinkers/researchers (Cajete, 1994). As a result of colonialism and Western education paradigms, even indigenous people themselves have been made to progressively and successfully lose trust both in their knowledge’s potency and relevance (Biermann, 2008; McCarter & Gavin, 2011). As a result, people with these kinds of knowledges

are becoming more and more wary of unfair judgment and exploitation by researchers (Smith, 1999) and can be reluctant to share their knowledge with researchers or others. Thus EE/SE researchers that seek to explore opportunities for working with IK need to have not only a conversation with, but to be intimate with, the relevant indigenous cultures and to build camaraderie with IK holders. To build relationships strong enough to overcome the fears and prejudices of the past, Bierman (2008) advocates the need to find common ground for integrating indigenous pedagogies with environmental education.

The challenge for us as EE/SE researchers is to begin to conceptualise what role 'traditional' ecological and IK have to offer an EE/SE that is facing the Anthropocene, and to develop research methods that allow such ontologies and epistemologies to play this role. New materialist and posthuman perspectives have been challenging the tendency in scholarship to focus solely on the agency of culture while backgrounding the agency of nature (Barad, 2007; Whatmore, 2002), and we see these critiques as very productive for EE/SE. Abrupt climatic changes are just one example that demonstrate that the Anthropocene will be shaped not just by human cultures, but by planetary and non-human forces far beyond our control. Thus, one way in which we see IK as being relevant and useful for EE/SE in the Anthropocene is that they have often accounted more fully for the agency of nature.

With this in mind, we believe the kind of research that is worth pursuing is that which not only values, recognises, promotes and learns from non-Western cultures, but which also acknowledges more-than-human agency and also the diversity of 'natures'. It is, of course, difficult to challenge and break down dominant assumptions of what it means to be human, while balancing this with a strong commitment and clear articulation of why and how to reduce destructive human impacts on nature, as this requires implementing and acting upon those very boundaries and assumptions we simultaneously seek to challenge and reconfigure. Attempts at addressing this are beginning to emerge in EE/SE (e.g., Pacini-Ketchabaw & Clark, 2014; Stewart, 2011; Taylor & Pacini-Ketchabaw, 2015). These articles explore what the implications of considering 'non-humans', including matter, as pedagogical subjects that exert agency and demand ethical responses in educational contexts might be. Such efforts aim to go beyond the humanist assumptions of education that take 'the human' as a fixed, pre-existing, self-evident and independent entity (Snaza, 2015), demonstrating instead that 'the human' (and, therefore, its others, e.g., 'nature', 'the environment') are emergent properties of relational worlds.

Community EE/SE

A key insight of posthuman analysis of the Anthropocene is that knowledge is produced and enacted in relationships with others, that is, through communities. Analysis of key international and national policy documents and research spanning decades highlights that the importance and benefits of utilising community engagement to advance the goals and aims of environmental education have long been advocated (Department of Education Employment and Workplace Relations, 2009; UNESCO, 1997, 2005, 2008, 2009; UNESCO-UNEP, 1987). Hacking, Scott, and Barratt (2007, p. 225) argue that environmental education has, since its origin, actively sought to 'bridge the gap between school and community'. Eilam and Trop (2013) assert that national and international statements are increasingly appealing for partnerships between schools and communities to collaborate on local sustainable development issues.

Despite the above, community sustainability learning appears to be a 'high hanging fruit' (i.e., 'harder to reach') research domain (Reid & Scott, 2013). We call for

additional research with a community focus to encourage more widespread community engagement within environmental education. Recently, a core thematic finding of a mixed methods study attempting to describe future trends in environmental education research identified the need for shared community learning and responses as one of four core potential future areas of research (Ardoin, Clark, & Kelsey, 2013). We are interested in research that explores responsive, community-based transformative learning processes and the various ways that cultural communication and interaction today is complemented between online and offline spaces across dimensions. Here we recognise the usefulness of embracing systems thinking approaches as a way to address the complexities of community learning for sustainability in such multidimensional and unpredictable spaces. We recognise the importance and the difficulties of longitudinal studies assessing the dynamics and tipping points of community learning and action over time. We are also advocating an approach to research that values and celebrates diverse key stakeholders' knowledge and experience as a means of bridging the gap between theory and practice in relation to community-based EE/SE.

Further, we believe that ongoing focus and research committed to the creation and nurturing of diverse partnerships would be beneficial, as these partnerships can facilitate small shifts which influence larger societal practices (Meadows, 2008). Place-based approaches to partnerships can encourage the development of strong connections between the different elements of a community (Brown, Jeanes, & Cutter-Mackenzie, 2014). Facilitating community connections supports 'collaborative knowledge development and experiential learning processes that allow the seamless convergence of intellect and experience' (Manteaw, 2012, p. 382).

A relevant example, already implemented by a small number of Australian universities, involves fostering school-university-community partnerships (Tilbury, 2011). In these partnerships, preservice teachers develop their knowledge and understanding of EE/SE pedagogy and practice through teaching and learning in local schools or with in-service learning placements with non-governmental organisations. Although evident in some universities, these partnerships are not widely offered. We believe such collaborations present opportunities for researchers to deliberately conduct practice-based research addressing questions that are locally relevant and meaningful (Reid & Scott, 2013) and which can be mutually beneficial. We see these types of partnerships as important collaborations that can tap into the diverse and extensive knowledge, and experience of these communities, to address local issues and work towards a more sustainable future (Sobel, 2004).

The Rise of the Digital Age

As emerging researchers, we also see 'the rise of the digital age' as an exciting area for research and practice for EE/SE. Ardoin et al.'s (2013) exploration of future trends in environmental education research highlighted 'the rise of the digital age' as a research area of medium to high impact; however, few of the researcher-respondents interviewed in the study referred to the rise of the digital age as an area that they would like to conduct research within. The internet, Web 2.0 and mobile technology affordances have shifted organisational systems of human engagement and practice (e.g., personal relationships, finance, health, education, conservation) (Castells, 2009; Cochrane, 2014). Specifically, within education, information abundance and online learning systems are fostering a shift from education (bound by institutions) to learning — which can happen anywhere, for anyone and in any region (MacArthur Foundation, 2011; Pachler, Bachmair, & Cook, 2010). These socio-technical possibilities are occurring while as humans

we are facing a ‘crucial decision-making window’ that requires careful navigation of increasingly unstable social, economic, and ecological systems (Laszlo, 2001, p. 41). As we are living at a time of great innovation and great degradation, we are troubled that only a few EE/SE researchers are focusing their research in this evolving and interdisciplinary field of where the techno-social and ecological meet. This is because we see the use of technology to be of great potential for the achievement of EE/SE goals.

More specifically, we are interested in further researching how EE/SE can be scaffolded and facilitated within online learning systems that can (re)connect local people with local issues through meaningful and relevant education and communication about local socio-ecological challenges (Aguayo, 2014; Aguayo & Eames, 2015). In these systems, public misconceptions can be actively addressed through interactive feedback regarding local environmental and social issues, and in this way the system can act as a corollary for responsive place-based community education (Aguayo, 2016). Furthermore, if and how these online learning systems are, or can be, used or valued by teachers to engage with EE/SE pedagogy (both informally through community engagement and formally through classrooms) also needs further investigation (Christie, Miller, Cooke, & White, 2013, 2015; Christie & Miller, 2015).

We are also interested in the ways in which networked publics (online social networking sites) offer important avenues for democratic engagement with socio-ecological issues (boyd, 2008; Jenkins, Clinton, Purushotma, Robison, & Weigel, 2009; Lessig, 2004). Networked publics give an impression of access to a public sphere that anyone with a membership over the age of 13 can participate in, sharing their happiness, fears, opinions, and beliefs. These spaces represent the possibility of collective agency, as networked publics have played roles in the election of governments, development of local civic society, as well as the spreading of misinformation, and gossip (Facer, 2011). The conversational, collaborative and community-like qualities of social media are in alignment with ‘what we know to be good models of learning’ (Maloney, 2007, p. 26). However, these heavy-traffic sites of engagement are under-researched and under-explored areas within EE/SE literature. In this regard, the conversations and types of engagement within networked publics need to be researched to better understand the ways that networked publics shape environmental, social and civic identity development for individuals, organisations, and governments.

As such, we see productive questions and topics that EE/SE researchers could investigate to include:

- theorising socio-environmental identity development within online networks;
- analysing the content of social media posts related to environmental issues and ideally, developing subsequent interventions to address knowledge gaps in collected social media communications;
- the development of frameworks to conceptualise the emergence of interest-driven learning processes and that take into consideration collective online learning and complex offline social, cultural, technological, ecological and educational dimensions and settings;
- studies that explore the self-nurturing capacity of online learning spaces over time and understand how these can be maintained while simultaneously adapting to the dynamics of the changing local complexities and maintaining meaningfulness, relevance and cultural responsiveness;
- research that clarifies the role that offline instances can have in the learning process of individuals and how to effectively balance ‘digital’ and ‘real-life’ (non-technologically mediated) instances for sustainability;
- research that helps us understand the dangers of digital colonisation, if any, for the field of EE/SE hiding behind the rise of the digital age.

Conclusion

As emerging researchers, the opportunity to reflect individually and collaboratively on what EE/SE research is worth doing, how our research can genuinely contribute rather than simply rehashing old ideas with new case studies — that is, how we could strive for our research to be ‘dangerous’ or at least contribute to ‘effective reform’ — has been immensely productive. While it remains to be seen to what extent future EE/SE research, including our own, can contribute to flourishing futures in the Anthropocene, we are excited and inspired by the challenge and have developed our research literacy through the process of writing this article. By no means do we suggest that the research issues and themes discussed are the best or only areas in which EE/SE should or will focus. Rather, in conclusion we wish to highlight that through this iterative and collaborative process, we have gained an appreciation of different approaches to EE/SE and how our peers’ approaches could productively inform our own.

Through our research process, we ‘bridged’ our physical and time zone divides with the aid of social media and began working through ways to collaboratively engage with each other. We believe this has benefited our individual research approaches and knowledge of EE/SE as a field. In light of this, we are compelled to close by highlighting the value of collaboration and openness to different theoretical approaches to EE/SE. We, #aabeeer, therefore hope that future EE/SE research can be more collaborative and overcome disciplinary boundaries. We encourage other researchers to join with us to further elucidate what flourishing environmental education in the face of the Anthropocene could look like. As such, we are now opening new similar spaces so others can join this dialogical space. If you would like to join an online community for emerging EE researchers, then search for either the #aabeeer (which is intended for researchers in Australasia) or #eeer group (which is the global community for emerging EE researchers) on Google+ and request to join.

Keywords: #aabeeer, social media, collaborative, uncertain futures, multicultural, community education

References

- Aguayo, C. (2014). *The use of education for sustainability websites for community education in Chile*. Doctor of Philosophy (PhD) Thesis. University of Waikato, Hamilton, New Zealand.
- Aguayo, C. (2016). Activity theory and community education for sustainability: When systems meet reality. In D. Gedera & J. Williams (Eds.), *Activity theory in education: Research and practice* (pp. 139–151). Rotterdam: Sense Publishers.
- Aguayo, C., & Eames, C. (2015). *A systems thinking approach for the use of ICT tools for community education*. Manuscript submitted for publication.
- Ardoin, N., Clark, C., & Kelsey, E. (2013). An exploration of future trends in environmental education research. *Environmental Education Research, 19*, 499–520.
- Barad, K. (2007). *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Duke University Press.
- Baskin, J. (2015). Paradigm dressed as epoch: The ideology of the Anthropocene. *Environmental Values, 24*, 9–29.
- Biermann, S. (2008). Indigenous pedagogies and environmental education: Starting a conversation. *International Journal of Pedagogies and Learning, 4*, 27–38.
- boyd, d. (2008). *Taken out of context* (Doctoral dissertation). University of California, Berkeley, CA.

- Brown, T., Jeanes, R., & Cutter-Mackenzie, A. (2014). Social ecology as education. In B. Wattchow, R. Jeanes, L. Alfrey, T. Brown, A. Cutter-Mackenzie, & J. O'Connor (Eds.), *The socioecological educator: A 21st century renewal of physical, health, environment and outdoor education* (pp. 23–45). Sydney, Australia: Springer.
- Cajete, G. (1994). *Look to the mountains: An Ecology of Indigenous Education*. Colorado: Kivaki Press.
- Castells, M. (2009). *The rise of the network society: The information age: Economy, society, and culture* (2nd ed.). Oxford, England: Wiley Blackwell.
- Christie, B.A., & Miller, K.K. (2015). 'Crikey! Education for sustainability?' A qualitative exploration of academics' understanding and practice of sustainability and critical thinking. Manuscript submitted for publication.
- Christie, B.A., Miller, K.K., Cooke, R., & White, J.G. (2013). Environmental sustainability in higher education: How do academics teach? *Environmental Education Research, 19*, 385–414.
- Christie, B.A., Miller, K.K., Cooke, R., & White, J.G. (2015). Environmental sustainability in higher education: What do academics think? *Environmental Education Research, 21*, 655–686.
- Cochrane, T.D. (2014). Critical success factors for transforming pedagogy with mobile Web 2.0. *British Journal of Educational Technology, 45*, 65–82.
- Department of Education Employment and Workplace Relations. (2009). *Belonging, being and becoming: The Early Years Learning Framework for Australia*. Retrieved November 13, 2014, from <https://education.gov.au/early-years-learning-framework>
- Eilam, E., & Trop, T. (2013). Evaluating school-community participation in developing a local sustainability agenda. *International Journal of Environmental & Science Education, 8*, 359–380.
- Facer, K. (2011). *Learning futures: Education, technology & social change*. New York, NY: Routledge
- Freeman, M.M.R. (1992). The nature and utility of traditional ecological knowledge. *Canadian Arctic Resources Committee, 20*, 9–12. Retrieved December 2, 2015, from <http://www.carc.org/pubs/v20no1/utility.htm>
- Gough, A., & Gough, N. (2003). *Decolonising Environmental Education Research: Stories of queer(y)ing and destabilising*. Draft paper presented at the University of Bath, 6 August 2003. Retrieved December 4, 2015, from www.bath.ac.uk/cee/resources/goughs.doc
- Hacking, E.B., Scott, W., & Barratt, R. (2007). Children's research into their local environment: Stevenson's gap, and possibilities for the curriculum. *Environmental Education Research, 13*, 225–244.
- Jenkins, H., Clinton, K., Purushotma, R., Robison, A., & Weigel, M. (2009). *Confronting the challenges of participatory culture: Media education for the 21st century*. Chicago, IL: MacArthur Foundation.
- Lake, D. (2010). Sustainability as a core issue in diversity and critical thinking education. In K.A. Bartels & K.A. Parker (Eds.), *Teaching sustainability/Teaching sustainably* (pp. 31–40). Sterling, VA: Stylus Publishing.
- Laszlo, E. (2001). *Macrosift: Navigating the transformation to a sustainable world*. San Francisco: Berrett-Koehler Publishers.
- Lessig, L. (2004). *Free culture*. Creative Commons Licensing. Retrieved December 10, 2014, from www.free-culture.cc/freeculture.pdf
- MacArthur Foundation. (2011). *Exploring digital media & learning*. Chicago, IL: MacArthur Foundation.

- McCarter, J., & Gavin, M.C. (2011). Perceptions of the value of traditional ecological knowledge to formal school curricula: Opportunities and challenges from Malekula Island, Vanuatu. *Journal of Ethnobiology and Ethnomedicine*, 7, 38.
- Malm, A., & Hornborg, A. (2014). The geology of mankind? A critique of the Anthropocene narrative. *The Anthropocene Review*, 1, 62–69.
- Maloney, E. 2007. What Web 2.0 can teach us about learning. *Chronicle of Higher Education*, 53, B26.
- Manteaw, O. (2012). Education for sustainable development in Africa: The search for pedagogical logic. *International Journal of Educational Development*, 32, 376–383.
- Maurial, M. (1999). Indigenous knowledge and schooling: A continuum between conflict and dialogue. In L.M. Semali & J.L. Kincheloe (Eds.), *What is Indigenous knowledge?* New York: Falmer Press.
- Meadows, D. (2008). *Thinking in systems: A primer*. White River Junction, VT: Chelsea Green.
- Nordström, H.K. (2008). Environmental education and multicultural education too close to be separate? *International Research in Geographical and Environmental Education*, 17, 131–145.
- Pachler, N., Bachmair, B., & Cook, J. (2010). *Mobile learning: Structures, agency, practices*. Boston, MA: Springer US.
- Pacini-Ketchabaw, V., & Clark, V. (2014). Following watery relations in early childhood pedagogies. *Journal of Early Childhood Research*. Advance online publication. doi:10.1177/1476718X14529281
- Plumwood, V. (1993). *Feminism and the mastery of nature*. London: Routledge.
- Polesel, J., Dulfer, N., & Turnbull, M. (2012). *The experience of education: The impacts of high stakes testing on school students and their families* (Literature review prepared for the Whitlam Institute, Melbourne Graduate School of Education, and the Foundation for Young Australians). Retrieved September 20, 2012 from http://www.whitlam.org/_data/assets/pdf_file/0008/276191/High_Stakes_Testing_Literature_Review.pdf
- Polesel, J., Rice, S., & Dulfer, N. (2013). The impact of high stakes testing on curriculum and pedagogy: a teacher perspective from Australia. *Journal of Education Policy*, 29, 640–657.
- Reid, A., & Scott, W. (2013). Identifying needs in environmental education research. In R.B. Stevenson, M. Brody, J. Dillon, & A.E.J. Wals (Eds.), *International handbook of research on environmental education*. New York: Routledge.
- Reid, A., Teamey, K., & Dillon, J. (2002). Traditional ecological knowledge for learning with sustainability in mind. *Trumpeter*, 18, 113–136.
- Selby, D. (2008). The need for climate change in education. In J. Gray-Donald & D. Selby (Eds.), *Green frontiers: Environmental educators dancing away from mechanism*. Rotterdam, The Netherlands: Sense Publishers.
- Semali, L.M., & Kincheloe, J.L. (1999). *What is Indigenous knowledge?* New York: Falmer Press.
- Smith, L.T. (1999). *Decolonizing methodologies: Research and indigenous peoples*. London and New York: Zed Books.
- Snaza, N. (2015). Toward a genealogy of educational humanism. In N. Snaza & J. Weaver (Eds.), *Posthumanism and educational research* (pp. 17–29). New York and Milton Park: Routledge.
- Sobel, D. (2004). *Place-based education: Connecting classrooms and communities*. Great Barrington, MA: The Orion Society.
- Sterling, S. (2001). *Sustainable education: Re-visioning learning and change*. Dartington, UK: Green Books Ltd.

- Stevenson, R.B., Dillon, J., Wals, A.E., & Brody, M. (2013). Tentative directions for environmental education research in uncertain times. In R.B. Stevenson, M. Brody, J. Dillon, & A.E.J. Wals (Eds.), *International handbook of research on environmental education*. New York: Routledge.
- Stewart, A. (2011). Becoming-speckled warbler: Re/creating Australian natural history pedagogy. *Australian Journal of Environmental Education*, 27, 68–80.
- Taylor, A., & Pacini-Ketchabaw, V. (2015). Learning with children, ants, and worms in the Anthropocene: Towards a common world pedagogy of multispecies vulnerability. *Pedagogy, Culture & Society*, 23, 507–529.
- Tilbury, D. (2011). Higher education for sustainability: A global overview of commitment and progress. *Higher Education in the World*, 1–21. Retrieved December 7, 2015, from <http://insight.glos.ac.uk/siteinformation/Pages/search.aspx?k=Higher%20education%20for%20sustainability%3A%20a%20global%20overview%20of%20commitment%20and%20progress>
- Tilbury, D., & Henderson, K. (2003). Education for intercultural understanding in Australian schools: A review of its contribution to education for a sustainable future. *Australian Journal of Environmental Education*, 19, 81–95.
- UNESCO. (1997). *Declaration of Thessaloniki*. Retrieved September 17, 2014, from <http://iau-hesd.net/sites/default/files/documents/thessaloniki.pdf>
- UNESCO. (2005). *Guidelines and Recommendations for Reorienting Teacher Education to Address Sustainability*. Paris: Author.
- UNESCO. (2008). *The Gothenburg Recommendations on Education for Sustainable Development*. Retrieved November 10, 2014, from <http://www.desd.org/Gothenburg%20Recommendations.pdf>
- UNESCO. (2009). *Bonn Declaration*. Retrieved September 29, 2014, from http://www.esd-world-conference-2009.org/fileadmin/download/ESD2009_BonnDeclaration.pdf
- UNESCO-UNEP. (1987). *International Strategy for Action in the field of Environmental Education and Training for the 1990s*. Retrieved October 15, 2014, from <http://unesdoc.unesco.org/images/0008/000805/080583eo.pdf>
- Wals, A.E.J. (2011). Learning our way to sustainability. *Journal of Education for Sustainable Development*, 5, 177–186.
- Wals, A.E.J., & Jickling, B. (2002). ‘Sustainability’ in higher education: From doublethink and newspeak to critical thinking and meaningful learning. *International Journal of Sustainability in Higher Education*, 3, 221–232.
- Wals, A., & Jickling, B. (2009). A framework for young people’s participation in sustainability. In P.M. Osano & P.B. Corcoran. (Eds.). *Young people, education, and sustainable development: Exploring principles, perspectives, and praxis* (pp. 77–84): The Netherlands: Wageningen Academic Publishers.
- Whatmore, S. (2002). *Hybrid geographies: Natures, cultures, spaces*. Thousand Oaks, CA: Sage.

Author Biographies

Claudio Aguayo is a Research Officer at the Centre for Learning and Teaching, AUT, Auckland, where he contributes to research and development of learning technologies. He recently completed his PhD at the University of Waikato in New Zealand with his thesis entitled ‘The use of education for sustainability websites for community education in Chile’. Claudio’s current interests relate to technology-based community

empowerment for sustainability, social media and self-nurturing online collaborative networks, and indigenous and traditional ecological knowledge.

Blanche Higgins is a PhD student in the Faculty of Education at Monash University in Melbourne, and has worked as a tutor at RMIT University in the School of Global, Urban and Social Studies for 4 years. She has been an active participant and facilitator in the Australian Association for Environmental Education Emerging Researchers (#aaeeer) network.

Ellen Field is a PhD student and lecturer at James Cook University in Cairns, Australia. Ellen's SSHRC-funded doctoral research is focused on analysing the substance, structure, and dynamics of how youth engage in self-directed environmental peer-to-peer learning within social media sites.

Jennifer Nicholls is a PhD candidate in the School of Education at James Cook University and a member of a research team on climate change education in the Centre for Research and Innovation in Sustainability Education in The Cairns Institute. She was awarded an Australian Post Graduate Award to undertake PhD research in climate change education. Her research addresses the role of teachers' personal and educational beliefs about climate change and the impact of these beliefs on their approaches to climate change mitigation and adaptation education.

Susan Pudín has recently completed her PhD in the University of Waikato, New Zealand with her thesis entitled 'Development of an environmental education programme for waste management with local communities in Sabah, Malaysia'. She worked as an environmental officer with the Environment Protection Department (EPD), Sabah, Malaysia since 2000. Her scope of work included environmental assessment, training and environmental education. She was actively involved in the establishment of the Sabah Environmental Education Network (SEEN) and the formulation of the Sabah Environmental Education Policy. She is now heading the Studies and Information Management Division of EPD.

Sangion Appie Tiu is a PhD student at the University of Waikato in New Zealand. Her doctoral research explores indigenous perceptions of traditional ecological knowledge for natural resource management and its implications for developing policy framework for sustainability education practices in Papua New Guinea.

Maia Osborn is an early career researcher at Southern Cross University on the Gold Coast. Maia worked as a primary school teacher, research assistant, and project manager for a number of years before starting her PhD last year. Maia now seeks to explore the pedagogies and philosophies of practicing environmental educators. Maia also teaches an online environmental education unit to preservice teachers at Southern Cross University. Maia draws upon her childhood experiences living on a sustainable farm to inform her values, beliefs, research, and practice.

Farshad Hashemzadeh is currently pursuing his PhD in 'Environmental awareness, attitudes and behaviour of secondary school students and teachers' at the University of Waikato, New Zealand. He finished his master's degree in environmental science at the University of Mysore, India. He was previously a biology teacher at secondary school level in Tehran, Iran.

Kevin Kezabu Lubuulwa is currently a PhD student in the Faculty of Education at the University of Tasmania in Launceston. Her Participatory Action Research project is entitled 'Intersections of indigenous knowledge and place-based education: Possibilities for new visions of sustainability education in Uganda'. She has a Master of Arts in Literature and Bachelor of Education degrees of Uganda Christian University in East Africa.

Mark Boulet is a Research Fellow with BehaviourWorks Australia at the Monash Sustainability Institute, and his research interests include sustainability education practice and evaluation, behaviour change for sustainability and organisational change. Previously, Mark managed the award-winning Green Steps program for 6 years and is still involved as a senior trainer with the program. Previous roles included work with Environment Victoria, the Office of the Victorian Commissioner for Environmental Sustainability and the Monash University environment office. Mark holds a Masters of Environmental Science.

Belinda Christie is a Postdoctoral Research Fellow in the School of Arts, Social Sciences and Humanities and the Swinburne Institute for Social Research, at Swinburne University of Technology, Melbourne. Her research and teaching interests lie in the fields of environmental sustainability, climate change mitigation and adaptation, and education for sustainability. Belinda's attendance at the 2014 Australian Association for Environmental Education conference and research symposium was supported by the HDR Publication Incentive Scheme through the School of Life and Environmental Sciences, Deakin University, Melbourne, where she received her PhD.

Jeremy Mah works as a Program Facilitator at the Centre for Sustainability Leadership in Sydney. With over 10 years' experience as a consultant, researcher, communicator, educator and facilitator in the field of sustainability, Jeremy's experience extends across the corporate, government and education sectors. He has a Bachelor of Commerce (Marketing and Japanese) and a Masters of Environmental Management. After completing the Program in 2011, he is now exploring how creative practice and the arts can be used to more effectively engage people in sustainability as a basis for his PhD at Macquarie University.