

ADVANCES IN GLOBAL EDUCATION AND RESEARCH

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Indigenous Women in Science: A Proposed Framework for Leadership, Knowledge, Innovation, and Complexity

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Abstract

Indigenous engagement in tertiary education has been contentious in Australia for many years. This was brought sharply into focus with the 2012 review into higher education, which highlighted a lack of parity for Indigenous Australians. One of the solutions to a lack of parity in participation could be the concept of a dual academy. A dual academy approach to higher education would incorporate both Indigenous and Western knowledge systems equally. Conversations and thinking about Indigenous participation and engagement in higher education led to an opportunity to coordinate a series of workshops. These workshops, conducted in Darwin, Alice Springs, and Galiwin'ku in the Northern Territory of Australia, were attended by Indigenous women with definite views about links between their own cultural knowledge and education. The combined knowledge addressed diverse areas of science, including midwifery, educational design, linguistics, and drone piloting. After listening to the participants, a list of themes emerged together with a proposed implementation framework requiring testing and possibly paving the way for a future research project.

Keywords: Indigenous engagement, higher education, dual academy, knowledge systems, Indigenous women, science

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Introduction

Indigenous people led scientific theory and practice for tens of thousands of years. Scientific knowledge is core in the areas of high-value knowledge work that provide opportunities for thought, leadership, innovation, and viable careers for many Indigenous people nationally and internationally. This knowledge work and the management of scientific knowledge and processes has been undertaken through culturally informed, Indigenous-led systems, integrated and holistic discipline structures and individually tailored, place or team-based learning approaches.

Universities that developed through Western traditions since medieval times, are authorised to teach, research, and confer degrees in discipline-based studies in scalable systems, have specialist research and teaching areas and provide standardised programs at undergraduate and postgraduate levels and individual qualifications.

Australian universities have attempted to connect to Indigenous people and knowledge through the development of Indigenous studies and advocacy units, employment of Aboriginal people and targeted funding. Universities Australia, for example, has established a framework to improve Indigenous students' outcomes through education (Universities Australia, 2019). While educational outcomes and employment rates have improved, these outcomes are related to achieving recognition for competence in disciplines and attributes defined by Western university models. Indigenous knowledge and people have been connected through approaches that range from specific units, topics, and examples within the Western knowledge authorising framework and measures designed to address deficits related to the standardised education model. Indigenous-led models such as 'Bush Universities' have struggled to move beyond these issues and have discovered new challenges when establishing bases in the country.

Further investigation into the overarching concept of a dual academy approach to higher education is required. Initial investigations took the form of a series of workshops to begin the conversation and to better understand Indigenous views about Indigenous knowledge and engagement with higher education as a baseline for future research.

The goal was to explore and articulate dual academy approaches that establish ways universities, university staff, Indigenous clans and Indigenous people are recognised for their scientific leadership and authority framed within the relevant place-based cultural and social systems. It was thought that a dual academy approach would establish models to negotiate Indigenous-led learning and authorisation processes and the points of intersection with university degree processes. The dual academy process would be adaptive to different places, priorities, and partnerships nationally and internationally. A dual academy process could provide not only a method to establish sustainable, respectful, and reciprocal systems but could also provide an approach to build links across different regions and clan groups that ensures local leadership and knowledge is recognised and recompensed appropriately.

A dual academy approach would need to recognise the scientific leadership of Indigenous people and establish partnerships where Indigenous knowledge leaders are respected and responded to seriously, where trust is established in partners' motivations and actions and where the university leadership values Indigenous perspectives. The university would need to demonstrate trust in Indigenous people's motivations and support Indigenous staff. The dual academy approach could establish models of dual study, authorisation and graduation while ensuring each knowledge system communicates, provides points of verification, and recognises the integrity of both knowledge systems.

Interesting Beginnings

Funding was secured for a scoping exercise to investigate a dual academy approach in more detail, bringing together Indigenous women and non-Indigenous colleagues to discuss the concept of a dual academy within higher education, where both Indigenous and Western knowledge systems

could be acknowledged as equal. This activity took the format of a series of workshops to initiate a conversation about Indigenous participation in higher education, including considerations for local context in the Northern Territory, Australia. Historically, Indigenous voices and the voices from the different regions in the Northern Territory have been largely missing with regards to culturally inclusive approaches to education (Woodroffe, 2020), and specifically about a dual academy approach to higher education.

The project was Indigenous-led, with the team consisting of experts in Initial Teacher Education (ITE), intercultural communication, particularly related to Indigenous health and early childhood, as well as culturally responsive policy and practice, Indigenous epistemologies, ontologies and axiologies, Indigenous research methodologies and ethics, Indigenous-Australian contact archaeology, Indigenous archaeology, historical archaeology, and emancipation research methods.

Correspondence was sent out to potential workshop participants with an invitation to engage. Discussion questions provided a stimulus focus and some scope to a potentially broad topic of Indigenous engagement in higher education STEM, and the use of Indigenous knowledge. Participants were asked to explore the articulation of Indigenous science in the academic (university) space and expand on the concept of a dual academy. To do this they were asked to consider the following questions:

- What is meant by Indigenous science?
- How is this currently articulated in higher education?
- Is there articulation in Vocational Education and Training (VET)?
- What is a dual academy?
- How would a dual academy improve on current practice?

Workshop participants were told that the aim of the workshops was to discuss how to create an environment where Indigenous leadership is recognised and to establish partnerships where Indigenous knowledge leaders are respected and responded to seriously. The environment should cultivate trust in the partner's motivation and actions and the university leadership should embrace the value of Indigenous perspectives, trust Indigenous people's motivation and support Indigenous staff. The dual academy approach could present models of dual study, authorisation and graduation while ensuring each knowledge system communicates, provides points of verification, and recognises the integrity of both systems. These concepts were targeted with the following discussion questions:

- How could this be achieved?
- Are there existing examples?
- How could theory inform practice?
- How is this different from current practice?

The workshops were a way to start the thinking process and to decide on further action to progress to a research project later. The conversations were around Indigenous knowledge, western scientific method, Indigenous scientific methods, and educational pedagogy in the higher education space. The contention was that workshops needed to be organized in quite a short timeframe. Discussion questions for planning were:

- What will this look like?
- How will it fit with higher education systems and processes?

Cultural Connections and Contexts Sample, Data Collection, Data Source, and Empirical Model

The workshops were opportunities for interaction and sharing at deeper levels facilitated by common cultural connections and contexts. These are listed as:

1. Discussion of Indigenous knowledge, Western scientific methods, possible Indigenous scientific methods, and educational pedagogy in the higher education space.
2. The consideration of focus questions about the dual academy concept.
3. Acknowledgement of the importance of Indigenous knowledge and contributions from participants invited to create a shared knowledge and experience of what a dual academy could look like, such as a place where Indigenous knowledge and western knowledge are equally valued.
4. Sharing in the wealth of knowledge represented. Participants were not empty buckets to be filled with western academic knowledge, but all came with knowledge and expertise to share.
5. Enactment of an Indigenous learning pedagogy using storytelling central to the experience of learning. Mutual respect was demonstrated through active listening and engagement with topics presented through the resulting questions and discussion.
6. Clarifying and presenting participant work and expertise connecting where possible to science and/or to the science of teaching pedagogy. Indigenous knowledge as a central theme and the overlap with western academic expectations was explored.

Indigenous Diversity

The workshops were held in different locations in the Northern Territory, urban (Darwin), regional (Alice Springs) and remote (Galiwin'ku). The importance of this is the diversity of Indigenous Australians and the impact of geographical location on access to services, educational outcomes, and aspirations. The generalized information collected at each of these locations highlighted the complexity of the innovation required to realize equity in higher education in the Northern Territory of Australia. The conversations were about recognising Indigenous knowledge as comparable, compatible and of equal value to what is learnt in Western education, with the focus on higher education. Most participants were Indigenous women. This was the strategy taken to hear Indigenous voices and perspectives.

Darwin

The women who attended were directly connected to the university, either employed at Charles Darwin University (CDU) or associated with the university. Many of the women involved held doctorates and were involved in research with Indigenous people, lecturing about Indigenous content or research, and connected to the Indigenous community. The women presented their own expertise in their chosen fields and discussed the part that their indigeneity played in the recognition, acquisition, and transmission of content knowledge. Science was discussed as a central theme and was easily associated with health, piloting drones, archaeology, and linguistics.

Scientific methods and Indigenous methodologies were discussed in relation to research. Education design and (Indigenous) pedagogy was also discussed as a science.

Alice Springs

The women who attended were either directly connected to the university or associated with the university. At the time of the workshop, the town was going through a period of unrest, and this was reflected in the low numbers of workshop participants. However, some interested women were also in contact through email. The conversations were mostly about underrepresentation and feelings of not being heard about important issues such as education. The need for the employment of more Indigenous educators was emphasised through comments about Indigenous knowledge and the expertise that Indigenous women bring with them into education, specifically higher education.

Galiwin'ku

The women who attended included both senior and younger Yolŋu working in a variety of areas with a range of experience in education and research. Due to the high level of other commitments, including funeral ceremonies and end-of-year work activities, the workshop was delayed and many who wanted to participate were not available. Both those who attended and those who were unable to attend were keen to have further conversations and to work towards action to address the issues raised. Key priorities raised in the workshop confirmed earlier conversations in this community and included: a strong concern with the loss of Yolŋu knowledge and the need for this to be strengthened, the importance of Yolŋu themselves sharing Yolŋu knowledge with others, being appropriately recognised for their expertise in their employment with universities and a strong emphasis on improving access to knowledge from the Balanda (non-Indigenous) domain for Yolŋu for a variety of reasons, including realizing their aspirations to participate in higher education.

Workshop participants stated an interest in having further workshops and building on networking opportunities. The community aspects of learning and the shared achievement of study were highlighted.

Themes

During the workshops, participants’ feedback provided an insight into some themes to consider for future research. These themes (see Table 1) highlighted numerous considerations, but also the need for research into how to overcome some of the barriers that were perceived to have limited Indigenous participation to date.

Table 1. Considerations for a Dual Academy Approach to Higher Education

Indigenous Women With Indigenous Knowledge	
Western education operating system	
Focus on content and scientific method implementation	
Indigenous Knowledge	Western Knowledge
location	university
family, language, and culture	the academy
Australian Indigenous diversity	monolingual and monocultural
Indigenous languages and Indigenous academic languages that do not necessarily directly translate.	academic language and processes
continuation of culture as an end goal	academic achievement as an end goal

Using the themes as a guide, an emerging framework for the implementation of a dual academy innovation in higher education (see Table 2) could be proposed as the focus for future research.

Table 2. Proposed Emerging Dual Academy Innovation Framework

Dual Academy Innovation	Descriptor
Knowledge informing curriculum	Incorporating both Indigenous and Western knowledge systems equally, while respecting and acknowledging intellectual property.
Location mode of learning delivery	Face-to-face delivery of learning provided to Indigenous students if preferred.
Language	Both Indigenous languages and standard Australian English accepted as measures of intellect and academic achievement. Assessment designed to accommodate this.
Educators informing pedagogy	Both Indigenous and non-Indigenous educators working together to deliver learning. Indigenous educators acknowledged as experts in their own knowledge and employed at levels that reflect this expertise.
Achievement	Recognized as both achievement for an individual, and for the community and continuation of culture.

Some workshop participants provided vignettes describing their interest and interaction with the topic of Indigenous knowledge and engagement with STEM in higher education. The following are their reflections.

Vignettes

Australian Aboriginal Studies CFP: Brilliant: Indigenous Genius, then and now by Kathy Guthadjaka and Johanna Funk

Gotha and I have a unique relationship; she is my colleague, friend, PhD supervisor and I call her Ngandi (mother). Most of all she is a brilliant and inspiring leader. It has become a significant part of my professional and research responsibility to take what she has taught me and transfer that into my practice as a non-Indigenous lecturer and researcher in higher education, online learning and digital interaction with Indigenous women's knowledge and practice.

We started working together in 2014, publishing ecological knowledge about her homeland biodiversity on Djurrwirr, part of the wider Bowerbird website; a biodiversity focused social media platform that aggregates sightings from around Australia into the Atlas of Living Australia. This led to a lot of learning about how research with Indigenous knowledge can be done ethically, defined by Indigenous people and processes. Through her nuanced management, she taught me and countless others how the Western design of knowledge management technologies can be improved beyond shallow acknowledgement (Yunkaporta, 2019). Selecting specific Indigenous practices to include in academic materials intended for diverse learner groups, ignores the need to adjust underpinning colonizing ideologies baked into higher education and its technologies.

Inclusion presumes an occupied intellectual and physical territory into which people and knowledge would be included by virtue of generosity (Bali, 2016). Fredericks (2010), names inclusion gestures made by white feminist academics as casual accommodation into the mainstream which reinforces oppressive power relationships via tactics, which aim to mislead the included into feeling safe within the rigid colonial paradigm. Indigenous women's standpoint theory is distinct due to the interconnectedness of Indigenous ontology and epistemology (Moreton-Robinson, 2013). Aligning with this embodied nature of Indigenous Women's Standpoint Theory (Moreton-Robertson, 2015), Guthadjaka discusses knowledge flow in Yolŋu

teaching environments and how learning grows out of connection to a place, ‘the children will learn the land, and who s/he is, and the stories, and where the breeze is blowing from, and where it is going, because that child has breeze on his skin, he knows’ (Guthadjaka, 2010, p. 30). Ongoing western colonial narratives presume ownership and collection of knowledge, whereas earth-body embodied custodianship is more a feature of Indigenous women’s knowledge practice.

This embodiment undermines white possessive gestures and casts much-needed light on inclusion, acknowledgement, and diversity trends in higher education. As a result of learning what I can about these embodiments, my understanding of ownership and possession of my research and outcomes in the Western academy is deeply adjusted. Because Guthadjaka shared her understanding with me about this connection to learning, we have established a critique of learning in digital spaces, interdisciplinary research, and knowledge management in higher education. We have also learnt ways to negotiate narratives among social policy sectors (Funk, et al., 2015). Culturally responsible use and design of online resources is a challenge that is ongoing for me in my career.

Caring for Mum on Country Project by Elaine Lawurrpa Maypilama, Sarah Ireland and Renee Adair

The Caring for Mum on Country is a participatory-action-research project working in collaboration with Yolŋu (First Nations) women in North East Arnhem Land in the Northern Territory (NT). Women in this region are routinely transferred from their home communities to give birth in regional hospitals and face many barriers to accessing culturally competent childbirth support and care. There are no qualified Yolŋu midwives working in the community or regional health services. With ethics approval and community endorsement, our project is exploring the cultural interface and value of combining First Nations and Western midwifery knowledge to better care for Yolŋu women during pregnancy and childbirth.

The project is partnered with the Australian Doula College to pilot the delivery of doula- childbirth companion training. The role of a childbirth companion is being explored and developed through the Yolŋu cultural concept of being a caretaker, known in the locally dominant Djambarrpuyŋu language as djäkamirr. In preparation for the delivery of djäkamirr training, we hosted a workshop with NT Industry to understand the acceptability, scope, and practice of Indigenous doulas. Customized digital and film learning resources featuring Yolŋu Cultural Knowledge Authorities were co-designed and produced for use in the training. The training took place in Galiwin’ku from 30 November- 6 December 2019.

The djäkamirr training was innovative; combining Djambarrpuyŋu delivery of a Yolŋu knowledge curriculum, alongside the nationally accredited unit Promote Positive Birthing Outcomes. The training was co-delivered by Yolŋu Cultural Knowledge Authorities, a midwife, and an experienced doula educator. Together they established a best-practice pedagogy informed by decolonization, two-way learning, bilingual education and place-based learning theories and strategies.

Thirteen female students commenced the training with eleven students successfully completing the accredited unit. This was an outstanding result. Women felt empowered by their educational experience and gained a range of practical skills and knowledge that can be applied in looking

after both themselves and other women in the community. A highlight shared by students was their sense of fulfilment in learning deeper knowledge about women's reproductive anatomy and physiology.

Aboriginal English; Language, Culture, Identity and Learning by Robyn Ober

Aboriginal English is the first language for many Australian Aboriginal people (Ober & Bell, 2012), who because of horrific historical atrocities and racist policies, were denied the right to speak their own traditional languages resulting in language loss and demise. Aboriginal English is a contemporary variety of Australian English and is recognized as the lingua franca among Aboriginal students studying in tertiary education. However, Aboriginal English is not formally recognised as part of the academic discourse in higher education and so students often feel pressured to leave their social, cultural, and linguistic repertoires outside the academy gates and to take on and fit into a strictly Western academic approach to learning.

My PhD study investigated how Aboriginal students draw on their social, cultural, and linguistic repertoires to understand professional knowledge encountered in a Both-ways tertiary educational context. It also explored the potential of the Both-ways approach to generate and create new knowledge spaces within the Indigenous tertiary educational context.

As a Mamu/Djirribal woman from North Queensland, I am positioned as an insider within Aboriginal Australia and therefore brought to this study, a social, cultural, and professional connectedness with participants. It was important for me to create a culturally safe and supportive environment by bringing critical elements of the home environment into the research space. Indigenist Standpoint theory was used as the fundamental framework incorporating a Both-ways philosophy, narrative enquiry, and social linguistic theory throughout the research process.

Drawing on a narrative enquiry approach, a Kapati (cup of tea) methodology was developed for encouraging participants to share stories (individual and collective). These stories were collected and analysed to understand how Aboriginal student participants understand new professional constructs and conceptual understandings in a Both-ways teaching and learning space.

Two key findings emerged from this research. The first identified a process I have called 'Slipping and Sliding', which is a conceptual term coined during the data collection phase and illustrates how students moved in and out of diverse social, cultural, and linguistic spaces as they engaged in the academic discourse by drawing on their own repertoires. This act of slipping and sliding was supported by a Both-ways approach to learning and helped students to consolidate and validate new knowledge as they socially, culturally, and linguistically engaged with fellow students and Aboriginal and non-Aboriginal staff members.

The second key finding was the identification of a 'Contested Space of Language' which revealed that, even in a Both-ways learning context, there are tensions, struggles, frustration, and hardship when new professional knowledge confronts and challenges students' own knowledge systems. This contested space can become uncomfortable, awkward, and intimidating for Aboriginal students struggling to understand difficult professional concepts. However, it can be rewarding when students are empowered to take on professional roles while staying strong in their identity.

These key findings reinforce the fact that Aboriginal students enter tertiary education with their own truths, realities, assumptions, and values. Students' languages need to be inclusively accommodated by the academy to ensure their identities as Aboriginal people remain strong and their stories and knowledge contribute to and become an intrinsic part of the educational space.

An Indigenous Student Perspective by Samantha Armstrong

I am a Pitjantjatjarra and Pertame woman from Mparntwe (Alice Springs). I am currently a second-year student at Charles Darwin University majoring in Indigenous Resource Management. I was fascinated when hearing about the different narratives of women in the Top End applying their Indigenous knowledge and correlating it with Western practices. I have been aware of the role many Indigenous women engage in when working on country. Many of the women in my extended family are caretakers of various types. They have been my motivation for gaining an understanding about our way of being and how Indigenous knowledge can work together with Western knowledge, particularly in the higher education sector. I consider social science as a component of science because of the way it is applied to research, analysis, and the connections between people within societies.

The subject I would like to talk about is the transmission of Indigenous knowledge involving women and working on country and how their cultural and ecological skills represent an interconnected method in land and/or sea management. Overseeing the country is an influential space where Indigenous individuals' express culture. Many Traditional Owners articulate the significance of the country because it is inclusive of identity. It is where traditions and the way of life are implanted in people. For women it represents more than starting typical land/sea supervision activities, it incorporates caring for the values, narratives, customs, places, the past, affiliation, and ancestors connected with the country. This strengthens and reinforces Indigenous women's connection with their tangible, cultural, economic, social, and non-physical surroundings.

Indigenous women's valuable and complex expert knowledge of the environment and the dynamic operating within the land and/or sea present significant awareness in safeguarding the country for the future. Traditional knowledge has been combined with western scientific approaches in the management of biodiversity. This combination of knowledge, apart from the apparent land/sea management advantages, has developed into a bridge between traditional and modern, young, and old. This forms a structure where traditional knowledge that many Indigenous women possess can be transferred not only to the younger generation but also to researchers, conservationists, and others (Country Needs People, 2018).

Although many Indigenous women have a cultural responsibility as overseers to their traditional lands, the knowledge is often transmitted while on country to scientists and other interested parties. It is then taught to individuals in topics specific to the environment. It would be an advantage if the information were conveyed in an Indigenous voice rather than being translated without authentic meaning through a non-Indigenous lens. Indigenous women throughout Australia are the caretakers of their Indigenous knowledge and they are the custodians of centuries of wisdom. By appreciating and acknowledging Indigenous women, we recognize the importance each woman plays in Australian society, particularly when caring for the country.

Discussion

The varied experiences and choice of focus from each of the participants still has one key thread, the understanding that each of the examples of Indigenous engagement with the westernised ideas of education and science should be founded in Indigenous knowledge for Indigenous people. There is no single way to see the world, but unfortunately that is what we are led to believe if all we are given is only one right way to engage with and be assessed in the Australian education system.

For Australian Indigenous people to engage with equal standing alongside their non- Indigenous counterparts, there needs to be a cultural shift in the way knowledge is perceived in education. This will involve the way that knowledge is defined, transmitted, and received. Indigenous people's world views and perspectives are based on their Indigenous ways of knowing, being and doing which is defined as their Indigenous knowledge (Martin, 2003). Indigenous people do not stop being Indigenous once they engage with higher education. Indigenous knowledge is central to who we are and the inclusion of Indigenous knowledge in the Australian education system is necessary to be inclusive of all Australians. Rigney (2001, p.3) asserts that 'Indigenous realities that are unique and may appear to defy the logic of science are challenged as legitimate systems of knowledge.' Successful international examples of a more inclusive education system are the decolonizing practices in Canada and the bicultural agreement embedded in the New Zealand education system resulting from the implementation of the Treaty of Waitangi.

There are assumptions about Australian Indigenous engagement with higher education. There is the assumption that all Indigenous people know what higher education is, understand the processes and requirements for admission, and understand the relevance of participating. There is an assumption that Indigenous people operate within Western knowledge systems and that they leave their own culture at the door. There is an assumption that we all share the same opinions and goals with regards to education with a one size fits all system.

The concept of a dual academy approach to higher education was revealed to be complex, requiring innovation and investigation into the effective implementation of a successful program within higher education in the Northern Territory. This is reflected in the fact that the Indigenous communities, broadly defined as Darwin (urban), Alice Springs (regional) and Galiwin'ku (remote), are a limited representation of the Indigenous diversity found in the Northern Territory, let alone in the rest of Australia. And although some overarching statements can be made, diversity and differentiation also need to be considered in any research.

Conclusions and Indigenous Significance

Achieving a dual academy approach to higher education will need to be one that both acknowledges Indigenous knowledge as valid and credible and that is flexible enough to recognise and embrace the diversity of Indigenous culture in the Northern Territory (and the rest of Australia). Geographic location impacts further on access and engagement with higher education (Fredericks, et al., 2015).

When considering a way forward into a dual academy system of tertiary education, Table 1 outlines some of the more fundamental concepts to be navigated. Most important is the recognition that Indigenous women are passionate about education and confident in their Indigenous knowledge

and perspectives, and that Indigenous women may prefer to be part of a collegial network where Indigenous concerns are prioritised. The need for continued networking was raised by Indigenous women at all three Northern Territory workshops.

The Australian education system is Western, honoring and promoting Western knowledge and ideals. This knowledge system comes with fixed understandings about which knowledge is valued and taught, as well as Western pedagogical approaches. The difficulty is that this system of education largely excludes other knowledge and people who learn differently. Central to that is exclusion from engagement in higher education for those who do not have a high level of confidence in standard Australian English. Indigenous languages and culture are intertwined and there may be the need for intensive English support such as that given to international students, if teaching, learning, and assessment is required in standard Australian English. Alternatively, other arrangements could be devised such as instruction and assessment in an Indigenous student's first language or even provision for oral assessment. If this is the case, more Indigenous educators will need to be employed.

The mode of learning delivery to Indigenous students is significant, with workshop participants in both Alice Springs and Galiwin'ku voicing a preference for face-to-face learning. Factors impacting on engagement can also be linked with achievement. The reason that Indigenous students are studying may not be the same as non-Indigenous students. It was stated by workshop participants particularly in Galiwin'ku, and to a lesser degree in Darwin that an educational priority for them is to continue culture for the benefit of community.

The workshop conversations emphasised the need to investigate the concept of a dual academy in depth as a future research project to explore the themes in more detail and test the framework. Further research could not only test but also eventually expand on the framework and explore implementation strategies.

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