

Contextualising Aboriginal faunal stories with the Linnaean taxonomy: Culturally responsive pedagogy in zoology

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This article explores the contextualising of local Aboriginal animal stories with the zoology curriculum in Queensland within years 8 and 9 of one independent high school, where students' learning potential often remains untapped. Contextualisation, as used in this article, encompasses heritage, cultural knowledge, country and Linnaean zoology taxonomy to form a culturally responsive pedagogy that supports students' learning and pride in their heritage. To illustrate how secondary students can learn zoology in culturally responsive ways, a sinuous path encompassing six phases for collecting local faunal stories was necessary, prior to delivering the Linnaean zoology taxonomy. Elders' animal stories were documented and then contextualised into classificatory materials to integrate local faunal knowledge. Drawing on an Indigenist research framework—including storytelling, yarning, talking circles and interviewing—and action research methodology, transcribing, retranscribing and restorying was used to explore the effect of a culturally responsive approach on students' pride, culture and knowledge of local fauna. Findings indicated that the local animal stories became the foundation for the development of a first classification of animal kingdom chart from the non-Aboriginal animal knowledge tradition that tapped into students' learning potential through elders' stories about local culture. Real-life storytelling on country is preferable, as such contexts provide meaningful learning for students, rather than in decontextualised classroom spaces.

Keywords: Aboriginal stories, zoology, culturally responsive pedagogy

Introduction

For centuries in Australia, Indigenous and non-Indigenous people have tried and continue to try to reform systems of inequity, such as education (Gray & Beresford, 2008). However, these steps are just the first tugging away at these systems. How do children from Aboriginal and Torres Strait Islander cultures realise their potential in an education system that measures the knowledge “gap” against a Western curriculum and non-Indigenous children? The gap is not about Indigenous or non-Indigenous children. It is about a history of injustice and oppression. It is the education “debt” that has accumulated over time due to education exclusion and, for this paper, science education.

In Australia, Indigenous peoples identify as two distinct cultural groups made up of Aboriginal and Torres Strait Islander peoples with over 250 different language groups spread across the nation.

Aboriginal and Torres Strait Islander peoples also have their own laws and customs to determine the membership of their groups (AIATSIS, n.d.). In this article we use the term “Indigenous Australian” to encompass both Aboriginal people and Torres Strait Islander people. We recognise that this usage is problematic politically and economically, because to be sovereign peoples they need to be identified separately.

Curricula primarily based on Western worldviews work to exclude Aboriginal children and people worldwide (Aikenhead & Ogawa, 2007; Coff, 2021). Past and present state and federal government policies in Australia have and continue to suppress Aboriginal stories, cultural beliefs, customs and cultural artefacts passed down through generations of Aboriginal Nations (Boon & Lewthwaite, 2016). Although studies have shown the value of Aboriginal science knowledge, it is not adequately represented in Western science curricula (Harrison & Sellwood, 2016; Harrison & Skrebneva, 2020). The aim should be to promote diverse worldviews and facilitate two-way exchanges of knowledge and cultural understanding, rather than Western science dominating science teaching and learning in schools (Michie, 2002). The suppression of knowledge permeates Aboriginal communities throughout Queensland and, indeed, Australia (Forde, 1990). But these Nations continue to fight, hope, love, believe and dream, despite obstacles wrapped in racism. Aboriginal knowledge, skills, and faunal knowledge and stories endure and continue to be passed from generation to generation.

This endurance is where culturally responsive pedagogy (CRP) starts in the imaginations of Aboriginal and non-Indigenous teachers and researchers like ourselves, but only after deep and honest interrogation of Australia’s racism, privilege and curricula that created education exclusion. That imagination forms what is possible, rather than what is not possible, in science education for Aboriginal children—their potential. We focus on possibilities and potentials for students. As the teacher/researcher, I (Joël) share my experiences of working with community on country as we (Indigenous students, teachers, and I) learn and listen to elders’ local animal storytelling and interrogate the Western Linnaean¹ taxonomical zoology arrangement and how it works to exclude.

This paper, then, reflects on a small section of a much larger PhD study (see Rioux, 2015; the porky or short-beaked echidna lessons progressed along a continuum, extending participants a little further each time looking at a different perspective of the porky’s vertebrate). First, an elder and students organised a porky hunting party. This was followed by a porky cooking session and a porky tasting celebration, as well as the articulation of its skeleton (see Rioux et al., 2017). Embedding elders’ faunal stories, as an initial step into vertebrate classification, led the students from the known to the unknown Western Linnaean zoological charts constructed with vertebrates (see, for example, Rioux et al., 2019). Each porky lesson together with the elders’ stories prepared the faunal landscape for what was to come in future lessons. Their stories were then contextualised into animal classificatory materials. The echidna, its skeleton and the local animal stories became the foundation for the development of a first classification of animal kingdom chart from the non-Aboriginal animal knowledge tradition. Name and picture loose labels of kingdom, phyla, classes and orders of the vertebrates were presented for students to reconstruct the pyramidal Linnaean zoology taxonomical system (Rioux et al., 2019). Here, the animal stories that were related to students’ experiences were transformed into vertebrate photo cards that were used by them when doing vertebrate classificatory tasks during zoology lessons. Connections between the elders’

¹ The predominant and customary Western zoology lexicon in the Australian curriculum is also called Euro-American or Eurocentric Knowledge. In this paper, we will use the term Western.

stories and the introduction of the Linnaean way of viewing and understanding the local vertebrate world to students was made, thus strengthening their engagement in learning.

We argue in this article that local Aboriginal animal stories provide the foundation for studying animal classification. Further, we argue that the use of the students' community and its environs, culture and prior faunal experiences provide a bridge for learning Western Linnaean zoology arrangements and the unfamiliar Western Latin taxonomical language. The paper features the work of Aboriginal Bolinga High School (BHS) staff members at Koora (school and community pseudonyms) and their enduring support, reciprocity and involvement with students and community members to contextualise elders' animal stories into classificatory materials to integrate local faunal knowledge. To guide the reader, we start out by situating ourselves in the study, which is then followed by a review of the literature, methodology, analysis and discussion and conclusion.

Situating Ourselves in the Study

Joël Rioux: I am a French-Canadian researcher who began my career in the Canadian Arctic teaching French to Inuit eight-year-old students in Umiujaq, by the Hudson Bay. This First Nation initiation was the origin of my focus on social justice and equity. I have substantive experience with learning and teaching of the Montessori Method in the primary years (Brisbane, Gold Coast, Melbourne, and Auckland, New Zealand) and for eight years, I also taught the Aboriginal students of Koora, a small Queensland Aboriginal community. I am currently teaching Aboriginal and Torres Strait Islander pre-service teachers at Batchelor Institute (since 2012). In this study, I was teaching foreign zoology lexicon to Aboriginal students speaking Aboriginal English. I was also reviewing Latin classificatory nomenclature with Murri² students.

Bronwyn Ewing: I am a non-Indigenous researcher with ancestral ties to Scotland, Norway, England and Central Africa, my fourth great-grandfather's country. These ties have shaped my focus on justice and equity. Prior to becoming a researcher in Queensland, I was a primary school teacher in New South Wales who enjoyed teaching mathematics and unlocking the learning potential of all children. My research has primarily focused on the injustices of mathematics education and the impact on Indigenous children and children from low socioeconomic backgrounds. In the study that is the focus of this paper, I was Joël's PhD supervisor as he conducted this significant study in the school where he was a secondary science teacher. In my role as a researcher and supervisor to Joël, I learned about Rigney's Indigenist research framework and the importance of Aboriginal and Torres Strait Islander peoples having linguistic capital; that is, the intellectual and social skills attained through communication experiences in more than one language and using their voices to resist—resistance capital—knowledges and skills fostered through oppositional behaviour that challenges inequality. The term "we" is used in this paper in two ways. First, it refers to the authors of this article. Second, it refers to community, elders, teachers, students, and Joël Rioux (first author), who conducted the study at the research site. "I" refers to Joël, the first author.

A central tenet of the Indigenist research framework (Rigney, 1999) used in this study and explained later is power and control. The non-Indigenous authors do not have power over Aboriginal knowledge. During data collection, I (Joël) always had the presence of an Aboriginal person who understood the nuanced communicative mechanisms the students communicated through. Their knowledge was always represented with someone who knew what their intent was, and the vocabulary being used. We are

² Murri is a generic term which refers to Aboriginal people born in Queensland and north-western New South Wales.

aware that Indigenous peoples must be involved in defining, controlling, and owning epistemologies (ways of knowing), ontologies (ways of being) and axiology (ways of doing) that value and legitimise the Indigenous experience (Moreton-Robinson & Walter, 2010). We agree that Indigenous perspectives and culturally responsive pedagogy must infiltrate the structures and methods of the entire research academy.

Culturally Responsive Pedagogy (CRP)

CRP is evolving in education and more specifically in science education in Australia. As more research emerges, it is yet to crystallise (Dore & McMurtrie, 2021; Gay, 2018; Harrison & Skrebneva, 2020; Morrison et al., 2019; Osborne et al., 2019; Pirbhai-Illich et al., 2017; Sarra & Ewing, 2021; Snyder & Fenner, 2021). This research seeks to document and understand the diversity of teaching practices of the very cultures it seeks to empower. In our study, we argue that CRP is an analytic tool to explain the complexities and the realities of education. It is about understanding school and community power, or its lack, and ensuring inclusivity and socially just education for all students. CRP is a way of building alliances in organising for social change for Indigenous students living remotely. To achieve incremental change, challenging old structures and having new forms of interaction and new ways to establish science education that works for everyone is vital to undoing education exclusion, especially for Indigenous students who are put at the edges of classrooms and yet have potential for inspiring futures. There is no blueprint or one way to be a CRP teacher, but change can occur if we all work together. In this paper, we show how a community, secondary high school, Indigenous students and teachers worked together and shared their capital to create culturally responsive science education.

Cultural Capital and CRP

One way to examine CRP is through what Yosso (2005) stresses as six types of cultural capital that teachers should know and understand to empower students, beyond Western education and curricula. These six types of capital are aspirational, linguistic, familial, social, navigational and resistance. Although we consider all capitals significant, for this paper we are focusing on linguistic, familial and resistance capital, which articulate with an Indigenist research framework, including yarning, interviewing and storytelling discussed later in the methodology section.

Linguistic capital focuses on the rich and beautiful storytelling and communication skills of linguistically diverse students, teachers, and community. In the study, the teaching and learning of zoology was made richer by the inclusion of Koora animal stories told by elders, community, and students, thereby connecting the linguistic and familial capital of the community (Yosso, 2005). Their stories were made visible through drawing on their cultural funds of knowledge and experiences to inform and guide planning, teaching and learning (Sarra & Ewing, 2021). Teachers were afforded opportunities to hear stories from the community and then intersect with the zoology curriculum—in short, starting with the curriculum in the community.

Understanding familial capital can help teachers find the strengths of Indigenous children in communities and within themselves (Love, 2019). Family members' wisdom, stories and traditions can be positive resources for students, because they support and prioritise Aboriginal knowledge systems and intergenerational transfer of Aboriginal knowledge (Milroy, 2013). These traditions bridge Aboriginal knowledge systems and Western science curricula, so that students can gain access to rich and meaningful learning. This local wisdom can help students to navigate difficult spaces, such as

schools and classrooms, thus becoming the students' greatest strengths. Animal stories as told by the elders and community and contextualised with the zoology curriculum provide an intellectual space to critique the marginalisation that Aboriginal secondary students experience in science lessons.

This space and resistance capital allows for understanding how marginalisation operates through the curriculum and also how to empower communities to ensure and affirm the wealth they have to fight against marginalisation and thrive. It is this endurance that CRP starts in the imaginations of teachers, but only after deep and honest interrogation of Australia's and other countries' racism and privilege that created education marginalisation. That imagination forms what is possible, rather than what is not possible, in zoology lessons for Indigenous students. Aboriginal methods and values situated at the forefront of lessons allow students to experience inclusion and cultural safety by seeing their culture represented in their learning (Ledoux, 2006; Perso, 2012).

CRP encompasses community cultural wealth and, more specifically, linguistic, familial and resistance capital as used in this study. CRP provides a space to critique how a Western curriculum marginalises Indigenous students in science. Education exclusion has become so rationalised and normalised – and against our common sense – it seems that nothing can be done to change this in science classrooms. We assert that it is attainable, and we try to show how it can be done in this paper.

Methodology: Indigenist Research Framework and Action Research

Indigenist research framework (IRF), as explained by Rigney (1999), focuses on two specific principles: (a) resistance as the emancipatory imperative, and (b) privileging Aboriginal voice. Following this discussion, action research will be described as it pertains to the study. Its interconnections with IRF are demonstrated.

Resistance as the Emancipatory Imperative

According to Rigney (1999), "Indigenist research is research undertaken as part of the struggle of Aboriginal Australians for recognition for self-determination" (p. 116). This framework emerged from "the long history of oppression of Aboriginal Australians which began after the invasion of Australia in 1788" (Rigney, 1999, p. 116). Indigenous peoples in many parts of the world continue to be systematically discriminated against and silenced.

An IRF represents a struggle for self-determination that draws on the past subjugation of the Koora people since early settlement. This means that the non-recognition of the local animal knowledge in school science affairs represents a struggle for self-determination for BHS Aboriginal staff and the local student population. The zoology lessons seek to address how local Aboriginal people and animal storytelling can interconnect with the Australian Curriculum, working towards improving educational outcomes of Indigenous students.

Privileging Aboriginal Voices

Rigney (1999) privileges the voices of local Aboriginal people: "Indigenist research focuses on the lived, historical experiences, ideas, traditions, dreams, interests, aspirations and struggles of Aboriginal Australians. It is Aboriginal Australians who are the primary subjects of Indigenist research" (p. 117). The local animal stories told by the Koora elders were stories of their culture, their history, and their traditions as Murri people. The stories were their epistemologies and ontologies linked by relationality

to others, ancestors, country and shared experience. Elders, BHS Aboriginal staff and students have the right to the dignity and histories of their cultures in their science classroom.

Storytelling, Yarning, Talking Circles and Interviewing

Storytelling, yarning and talking circles were used in the study because they interconnect with privileging Indigenous voices and IRF. As I was connected to the community through my role as a teacher, my axiological approach (ways of doing) meant I was accountable to the elders, the community and the school. The study was strongly informed by Indigenous knowledges that derive from within the community. Oral stories have been the text of Indigenous cultures worldwide. For Archibald (2008), oral stories are a methodology that is truly part of Indigenous education. Careful consideration as to how people are approached, engaged with and involved in the gathering of information is critical. In this study, the collection of local animal stories refers to “yarning” – an Aboriginal style of conversation and storytelling as a method for gathering information prior to, during and after the interview process (Bessarab & Ng’andu, 2010). Collecting local faunal stories will not simply decolonise the content of the science animal taxonomy curriculum. However, a warm, inviting, informal and localised approach to interviewing elders in a conversation style of in-depth interviews is a crucial step in a long decolonising process of learning Linnaean taxonomy in the science curriculum.

The interview process is a Western methodology. However, Chilisa (2012) contends that “postcolonial Aboriginal research techniques include a process of decolonizing the conventional interview technique, using Aboriginal interview methods such as talking circles and invoking Aboriginal knowledge to inform alternative research methods compatible with the worldviews of the colonized Other” (p. 23). We argue that discussion circles bring people together in a quiet, respectful manner for the purpose of teaching listening and sharing (speaking from the mind and from the heart). For Hogue (2018), “narrative is one of the most powerful teaching tools and ways of relating experience. The transformative effects of listening and telling, and the ability to reveal aspects of human experience are some of the strengths of narrative as text” (p. 31). Sima and Cordi (2003, pp. xxiii–xxviii) state that storytelling: (a) increases literacy, (b) serves as an effective conflict resolution model, (c) develops a sense of collaboration, (d) is a cooperative art, (e) builds imagination skills, (f) fosters cultural understanding, (g) is a personal experience, and (h) can teach spiritual lessons. According to these authors, storytelling instils appreciation, creates a sense of belonging, builds confidence, provides direction, fosters excellence, and is fun.

Action Research

The project adopted a mixed methods design aimed at benefitting research participants and included collaborative action research (Kemmis & McTaggart, 1988) and community research (Smith, 2021). Collaborative action research refers to a “collective, self-reflective enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own social and educational practices” (Kemmis & McTaggart, 1988, p. 5). Community research is described as an approach that “conveys a much more intimate, human and self-defined space” (Smith, 2021, p. 127) and relies on and validates the community’s own definitions. As the project was informed by the social and linguistic at a community level, it is described as community action research or emancipatory research.

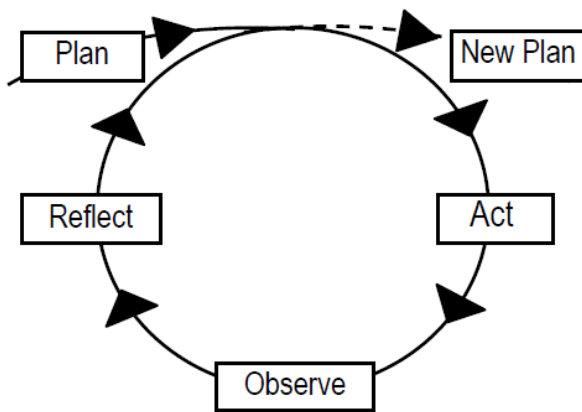
In this study and in my role as a teacher and researcher, I imagined and attempted to improve my pedagogy, learning how to be a culturally responsive teacher. Imagining gave me a collective space to challenge science education exclusion and collectively rebuild an education that loved all children and saw classrooms and the school as students’ homeplaces where they could bring their community’s

cultural wealth. I interrogated my beliefs, attitudes and taken-for-granted assumptions about Indigenous students and science and, in doing so, reflected on how I could be culturally responsive in and outside the classroom (Anderson, 2017; Kemmis et al., 2013; Lozenski, 2014). Being culturally responsive did not switch on when I walked into my classroom. Rather, it was about deep, personal reflection on the history of Australia. It was about coming to know and understand why meaningful, long-term change was hard to achieve in education because of antithetical forces to justice, love and equity – such as racism, linguistic discrimination and segregation; that is when culturally responsive teaching began for me.

Action Research Cycle

Action research as a “plan-act-observe-reflect” cycle (Kemmis et al., 2013) was an effective framework (see Figure 1) for gathering six phases of data related to the exploratory study. Action research may be started at any point in the cycle, although for this study each phase was in a sequence with each phase informing the next. The following figure and descriptive example explain this process.

Figure 1: Action Research Cycle



Action Research with Six Phases Example

Below is an example of an action research cycle from the study. It shows that action research cycles with the six phases of data collection are interconnected. The IRF principles of emancipation and privileging Indigenous voices are guiding the cycle and phases for exploring the contextualisation of Aboriginal stories with Western zoological science.

- **Plan - the preparatory (1) and drafting phases (2)** concerned following culturally sensitive procedures: (a) BHS Aboriginal staff, some elders and student participants defined what was understood by the term “Koorra stories”; (b) Student participants wrote their own animal stories; (c) BHS Aboriginal staff and students listed names of potential elders and community adults to interview (75 identified); (d) Everyone discussed appropriate protocols to adopt in the presence of elders. Everyone reviewed the appropriate types of questions and co-constructed an interview protocol to navigate in a Koorra way (see Table 1).

Table 1: Students’ Interview Protocol with Elders: Collecting Animal Stories

STUDENT NAME: _____	Offer the Elder a tea and damper prepared by the students.
DATE: ____/____/20__	
MY INTERVIEW QUESTIONS WITH AN ELDER	

NAME OF ELDER: _____

PLEASE TELL ME	ANSWERS
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Joël /BHS staff: Greetings and introduces the class to the Elder and explains what we are trying to do.

How do you want to be called? Miss, Aunty, Sir, Uncle? By your name?

Do you want us to record you talking? We can use Digital Voice Recorder (DVR).

Can we take a photo of you after the interview to put at the bottom of your story?

Can we use the video camera to film you?

You don't have to answer some questions if they are too personal.

Is it ok if we ask you questions about your family?

What is your full name?

Where were you born? Your country?

Do you have a big family?

Do you mind if we ask you how old you are? Your birthday?

What is your clan group? Where your parents come from?

Mum
Dad

What do you remember about your culture growing up in a community?

What is the most important thing in your culture?

What are the good things about your culture/the positives?

When you was a teenager, did you work back then?

What sort of work you used to do?

Did you always live in Koora?

Have you got an animal story you can tell us?

- **Act - the practising phase (3)** of conducting an interview with the culture teacher and an Aboriginal administration officer.
- **Observe - the collecting data phase (4)** involved the collection of local Koora animal stories from the elders by the student participants, the BHS Aboriginal staff and myself. The student interviewer followed the co-constructed interview protocol created by the seven BHS Aboriginal staff and students.
- **Reflect - the making changes phase (5) and retelling the story (6)**. The BHS Aboriginal staff and I examined individual elders' animal stories, as told to students. We wrote interim texts (the rewritten draft stories) prior to showing the authors the first versions of their story. The data (animal stories) was rewritten into an animal story card in the spirit of a brief animal yarning. Elders validated the accuracy of the words in order to lessen the potential gap between the narrative told and the narrative

reported by us. There was a need to return to some individuals often to clarify previously recorded stories and for final approval.

- The retelling of the story to the students by one of the seven BHS Aboriginal staff was critical. BHS Aboriginal staff, the students and I identified key elements of each narrative using a 5W+1H (where, when, what, why, who and how) story planner framework (Teach Starter, n.d.) to orally reconstruct the meaning of the stories. Therefore, the stories were co-analysed by students and BHS Aboriginal staff by breaking them down in terms of time, place, scene and characters within the framework of chronology (i.e., a beginning, a middle and an end). This means that the elders' animal stories were "restored" with an animal classificatory purpose, as explained in the introduction.

Research Context

The research site is an independent Aboriginal high school in a remote Queensland community of approximately 1,000 people (Koora). BHS is unique because the high school is a council-run educational facility and a co-educational, non-denominational Aboriginal community school. The student population at BHS during my eight years' stay was 100% Aboriginal, led by five non-Aboriginal teachers. The BHS student population of 100 fluctuates from year to year.

Participants

There were three sets of participants: (a) 12 Aboriginal student volunteers (six males and six females) aged between 13 and 15 years who lived in Koora; (b) elders and community members; and (c) seven Aboriginal BHS staff (or gatekeepers), being two school liaison officers, two Aboriginal education workers or teacher-assistants, two administrative staff and one culture teacher. According to Creswell (2015), "gatekeepers are individuals who have an official or unofficial role at the site, provide entrance to a site, help researchers locate people, and assist in the identification of places to study" (p. 617).

Data Analysis: Transcribing, Retranscribing and Restorying

If I was to genuinely privilege Indigenous voices, I needed to listen and hear the voices of the Koora community members, elders and students. Their stories, shared in the yarning and talking circles, assisted me with identifying the contextualising stories that interconnected with the Linnaean taxonomy. By privileging their voices and stories as expressions of importance, I was respectfully showing a valuing of their cultural faunal stories. After interviewing elders, the stories were analysed using Creswell's (2007) three-phase method of transcribing, retranscribing and restorying.

Creswell (2007) states that restorying a transcript efficiently helps to "interpret the meaning of a particular research focus from participant interviews" (p. 157). The process of restorying a story from the original data set includes reading the transcript and analysing this story to understand the lived experiences (Clandinin & Connelly, 2000). For Phillips (2012), restorying is about the long procedure of gathering, categorising, and analysing stories for key commonalities. The retranscribing and restorying of a transcript process is outlined below:

- **Transcription by the researcher** - raw data and transcription from audio recorder or digital voice recorder and/or video camera. Stories that people tell do not necessarily appear in chronological order (Liamputtong, 2009), so this was important to consider when transcribing the stories. Therefore, retranscription by BHS Aboriginal staff and myself into a format appropriate for student participants was important. During the process of transcribing a story and rewriting it,

attention was directed to not alter its composition. The idea to re-form the same story for the students meant synthesising the elders’ stories into manageable reading of zoology artefacts. The BHS Aboriginal staff and I attempted to not make any interpretations of the story, but simply reported the elder’s words (see Figure 2 below for a sample animal story).

- **Restorying to student participants.** The actual retelling of the animal story was presented by one of the seven BHS Aboriginal staff, as this was accompanied by a negotiation of interpretations occurring in the science classroom (restorying). The process of restorying data was performed by breaking down the stories into themes or content (see Table 2 for explanation of these two terms).

Table 2: Stories: Themes and Content Combination

Themes: Compiled by myself		Content (5W+1H story planner)^a: Co-constructed by the students, BHS Aboriginal staff and myself	
Who were the authors?	Where were the stories told?	What types of stories? Examples:	Characters, the actors Plot
1. Elders	1. In classroom	1. Dreaming stories	Experiences, including feelings, images, meanings and reactions; accounts, explanations, excuses, ... metaphorical form of telling the stories
2. Community adults	2. Inside community	2. Koora history	
3. Students	3. Out bush within Koora boundary	3. Poem 4. ...	

^aA template unpacking the animal stories prior to re-telling the students.

A local animal photo card pasted at the bottom of the stories was visually appealing and aesthetically pleasing to the eyes. The animal stories were laminated and provided engaging materials for student participants. Elders were invited to a special ceremony at the end of the study. The BHS Aboriginal staff suggested a meal and provision of a complimentary copy of all animal stories collected as a give-back gesture of appreciation.

Results and Discussion

The results from the analysis of data provided interesting insights into the provision of CRP and how, through privileging Indigenous voices, elders, community, teachers and students were enabled to share stories of their local animals and strengthen science teaching and learning. The collection of 72 stories was managed by the BHS staff and myself; however, all faunal stories were collected by one of the student participants, who was always mentored by one of the seven BHS staff present. In Koora, an Aboriginal worldview emphasised country and interrelationships. The dingo, or Australian wild dog, storytelling (see Figure 2) demonstrated how three approaches were always interwoven during the data collection of local animal stories. These types of animal stories ground the study in a way of thinking about country and interrelationships that is usually not appreciated in Western contexts.

Figure 2: Boongarra, Uncle Wallace’s Dingo or Wuyu: Freedom and Reverence for the Bush

Wuyu means “dingo” in language. The name of my pet dingo is Boongarra! Dingoes lived with Aboriginal people for many thousands of years. Dingo helped Aboriginal people hunt porky and was also good company as a pet. Dingoes were well domesticated but became wild as Aboriginal people were put in missions because they did not need them anymore. My nephew found Boongarra in a log. The mother must have been gone for a while or something. It is a privilege to see him walk side by side as my pet and feed him when he is hungry.

Boongarra is a dominant animal and a wise one as well. He knows his role in the mob. He is a survivor. He is not like a domesticated animal. When Boongarra is around you, you feel the energy. He is different from a dog. He growls and he does not bark, does not go chase car like dogs. He does not bite people as well. I don't make eye contact with him. I look at him and then straight away, I look on the side. Boongarra kept his personality. The environment has not changed what he is and his personality. I give him an environment where his personality, his dignity is not disturbed or affected. It is different for my people and their culture today. We are affected and disturbed by the environment. Boongarra kept his original behaviour like his natural instincts, and I respect that by giving him freedom. I don't put him on a rope like you do for a dog. I don't keep him by force in my yard. Boongarra is free to roam and go bush if he feels like it. If he decides one day to leave for good, that is ok with me. When my nephew goes to the dump to get parts for his bike, Boongarra might follow him out bush. I don't want to be attached to him too much. I want him to be free. He is not my slave. He is just a friend. He is not my property or my belonging. He is different from a domesticated animal like a dog at your feet all the time. He belongs to the bush.



Story by Koora Elder Uncle Wallace



Uncle Wallace's ways of knowing entailed a close relationship with nature and Koora country. This approach to collect stories was directed by local insiders and was privileging the voice of the Koora knowers. This dingo story reinforces connections to country. Uncle Wallace's ways of doing demonstrated strong values, for example, adopting a detached view of the carnivore and being very considerate about nature. Uncle Wallace demonstrated respect for the land, for life and for the people in the dingo story. The narrative embodied ways of being: reverence for the bush, for animals and for freedom. The various ways of being were constructed around the local ways of living or ways of viewing and understanding nature, as well as the people's spiritual and physical connections to land and water. The BHS Aboriginal staff acknowledged the many Aboriginal Nations' ancestral links to country, in or around Koora. For instance, the Koora elders reminded local people that their cultural beliefs, land, water, sky, and all life forms have been created by the Moonda Gudda and all are interconnected (Uncle Wallace, personal communication, June 2009); Uncle Wallace adds, "The Moonda Gudda is our local Rainbow Serpent, The Spirit Protector, The Healer of All, or The Spirit Creator". Uncle Wallace's ways of being, thinking and acting continue to influence his life and those of many other Aboriginal peoples in Koora. The ontological approach means that local people are valuable and are distinct knowledge holders, regardless of age, qualification or social status within the community. Below, I review the variety of collected local faunal stories (types of local stories), local authors and the spaces where the stories were presented to the student participants.

Types of Koora Stories and Literature

The variety of collected local stories is obvious. Aboriginal elders from various local Aboriginal Nations came together to share their stories about the animal world. A total of 72 zoology stories were gathered and nine types of stories or themes embedded. The themes were local Koora history and/or personal recount (18/72 or 25%), Creation (7/72 or 10%) and other Dreaming stories (9/72 or 12.5%), local sacred sites stories (9/72 or 12.5%), present-day stories (5/72 or 7%), procedure (8/72 or 11%), poems (5/72 or 7%), narrative description from students (9/72 or 12.5%) and spiritual animals (2/72 or 3%).

Authors of the Koora Stories

The authors of the Koora animal stories were nine elders (46/72 or 64% of all stories), eight community adults (14/72 or 19% of all stories) and 10 students (12/72 or 17% of all stories). They offered 72 stories

for a total of 27 different storytelling authors (13 males and 14 females), creating a bank of animal stories from which to pull out local vertebrates for classificatory purposes.

Embracing Aboriginal leadership means welcoming the presence and wisdom of elders as an effective way to preserve and foster traditional knowledge (Hyde et al., 2014). In this study, I honoured the elders' role as storytellers representing 64% of all collected stories. Sutherland and Swayze (2013) claim that elders must not be viewed as decorative or symbolic and must be acknowledged as leaders, as repositories of traditional knowledge, and as primary providers and transmitters of information; they must be "treated as professionals, respected for their expertise, unique knowledge and skills and as authoritative community stakeholders" (p. 186). Local Aboriginal BHS staff and elders were resourceful people in the science classroom. Nine elders and eight community adults for a total of 17 adult Koora community members supported everyone to produce a total of 60 animal stories out of 72 (83.3% of all stories).

Local Stories and Koora

The students collected local faunal stories about Koora and interviews were conducted at three locations: at BHS (33/72 stories or 46%), inside the Koora community (23/72 stories or 32%) or out bush within the Koora boundary (16/72 stories or 22%). Aboriginal people came to class to be interviewed and were not threatened by the non-Aboriginal "science classroom" environment because of the always mediating presence of the BHS Aboriginal staff.

The Koora country was a key factor to learning meaningful science in the Aboriginal community. The importance of country is critical in the development of meaningful curricula for Aboriginal students (Harrison & Skrebneva, 2020). Elders have detailed knowledge of and an intimate connection to the place they call "our country". A critical pedagogy where country is central seeks to create learning experiences that decolonise and rehabilitate (Gruenewald, 2003). Perso (2012) claims, "it is clear that when students can make connections to the curriculum through what they know, their culture and their experiences, they are more engaged and learn better" (p. 42).

Conclusion

Collecting and embedding local animal stories can only be achieved meaningfully with the building of respectful relationships that value the culture, histories, ancestors, language and country to ensure cultural knowledge is integrated in sensitive ways into a science program. Culturally safe methods of engagement first require genuine acknowledgment by local elders and Aboriginal staff in schools prior to gathering community stories. Respect of Aboriginal Koora animal stories is a necessary step that ensures culturally inclusive science education practices. This is critical for equitable practices and opportunities for Aboriginal and Torres Strait Islander peoples within education in Australia.

The zoology lessons valued an approach for students schooled in remote Aboriginal settings where "the schooling connects with the knowledge of the community and to support local aspirations" (Fogarty, 2010, p. 6). Student participants learned through culture, rather than being taught about local culture, as they learned about the country they inhabit. Real-life storytelling in specific "bush" contexts is preferable, rather than in solely decontextualised learning spaces, such as schoolrooms, as this is more meaningful and engaging for Aboriginal students.

This paper argued that the way of collecting local Aboriginal traditional stories in a Queensland community and how this is used with year 8 and year 9 students is critical in the science classroom. A co-constructed interview protocol (Table 1) as well as a local Koora animal story collection (sample Figure 2) conducted by the Murri students and BHS Aboriginal staff can provide transformative learning experiences for students. The study privileged the community's cultural capital, practices and connections with students and their families, which worked to enhance student engagement in their learning. The animal stories that emerged from the participants' milieu revealed rich and authentically engaging discussions, or close to the reality and experiences of the students, that is, from the familiar animal scenes and the students' after-school and night-time animal experiences. The suggestion was that the everyday experiences of students, such as discussion circles and animal stories, were considered mandatory lessons prior to classifying vertebrates extracted from Koora Aboriginal stories and long before the introduction of the foreign Linnaean classificatory arrangement.

The restoried stories process occurred prior to the presentation of the Western pyramidal teaching of the kingdom, phyla, classes and orders of the vertebrates. Interviewing elders led student participants to a collection of local animal stories and these became the "backbone" of students' animal classificatory systems. Students classified familiar vertebrate photo cards that were extracted from the collected stories and playing games (see Rioux et al., 2019).

The story materials were appropriate mediators, the true "cartilage" that would link all participants' experiences to their Murri identity. Orality, CRP and discussion circles were selected as inclusive keystone activities. The stories were central in Koora, because they led the way toward a modest attempt to decolonise the predominant zoology taxonomical Linnaean curriculum. IRF and privileging the local people's voice helped to develop stories in a culturally sensitive manner. Koora, with its rich storytelling history, was valorised and naturalised in the pedagogy and in the zoology curriculum.

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