Living Knowledge
Indigenous knowledge in science education

- Background & Research
- Indigenous knowledge in your teaching
- Technical Requirements

Contact Us | Copyright | Yirrkala Space
©2008 The Living Knowledge Project
About

Welcome to the Living Knowledge website. This site is part of a three year Australian Research Council (ARC) research project *Indigenous knowledge and Western science pedagogy: a comparative approach*. The project aims to determine the most effective ways of incorporating Indigenous knowledge within the NSW secondary school science curricula.

This project is dedicated to Dr R. Marika, the senior Indigenous consultant on this project. Dr R, Marika passed away whilst enjoying time with her family in 2008. Without her vision and knowledge, strengthened by her family, this project would not have been possible.

Project Themes

- Reconciliation and working together
- Indigenous people handling Indigenous knowledge
- Recognising the value, complexity and status of Indigenous knowledge traditions
- The possibilities and benefits of 'both' knowledge systems contributing to land and sea management
- A connected world

The Project aims to produce:

- *Living Knowledge: Indigenous Knowledge in science education*, a web site featuring a case study on Indigenous knowledge and online resources for teachers, students, researchers & interested others
- School and community-based workshops
- Academic and general papers/publications
- PhD thesis

©2008 The Living Knowledge Project
Aims

This project seeks to explore ways in which Indigenous knowledge can be introduced into the science curriculum in schools.

This will be done in 3 ways:

1. The first approach will be to explore the cross-cultural dialogue between areas of Western science and specific Indigenous knowledge systems: those of the Yolŋu people of northeast Arnhem Land and those of Indigenous communities of the South Coast of New South Wales. The investigation of communities with markedly different social and historical circumstances is a necessary part of engaging with the richness and diversity of Indigenous knowledge systems. The Yolŋu research will be carried out by the chief investigator, Howard Morphy. The Yuin research will be carried out by Daphne Nash, the APAI. The outcomes of their research will be delivered through academic papers, some of which will be made available on the project web site, and a doctoral thesis.

2. The second approach is to examine the ways in which Indigenous knowledge is being taught in a number of very different schools and communities.

'Both-ways' education at the Yirrkala Community Education Centre (CEC) and the 'Science in Context' initiative of the NSW Department of Education will be used as examples. Ideally, a dialogue will also take place between participating schools and researchers that will help to generate an innovative approach to the teaching of Indigenous knowledge, especially taking advantage of the potentials of digital media.

The 'both-ways' learning approach of the Yirrkala CEC and the work of schools participating in the 'Science in Context' project will be showcased on the project web site.

3. Thirdly, an online module will be developed as a way of investigating how networked curriculum materials can be used to introduce aspects of Indigenous knowledge into the NSW school science curriculum.

Background

Within Australia various cross-cultural categories are emerging in the context of discourse between members of different societies. In particular, we are witnessing the development of a cross-cultural category of science that enables discourse between Indigenous and non-Indigenous Australians.

The Aboriginal Programs Unit (APU) of the New South Wales Department of Education & Training has actively sought to include Indigenous science within the school curriculum. In 2001, the unit approached the Centre for Cross-Cultural Research (CCR) to collaborate in the development of a web-based module introducing elements of Indigenous science into the Years 7-10 science NSW curriculum. The initiative was inspired by the exhibition Saltwater Paintings — a series of bark paintings from Yirrkala acquired by the Australian National Maritime Museum (ANMM). These paintings illuminate in many obvious and in many subtle ways the detailed knowledge that the Yolŋu people of northeast Arnhem Land have of the coastal marine environment.

The CCR successfully applied to the Australian National University for a development grant co-funded by the APU and the ANMM. This has enabled the establishment of protocols for research with prospective Indigenous communities, and the development of a prototype web resource.

While this initial collaboration between the APU and the CCR has demonstrated the
potential of using the Saltwater paintings to create networked curriculum materials, it has underscored the need for research designed to resolve key cultural, ethical and educational problems associated with the creation and integration of on-line resources offering cross-cultural perspectives on science within the school curriculum.

The most significant research problem is the precise nature of the relations between Indigenous and Western science. While Indigenous knowledge custodians and leading non-Indigenous researchers agree that a degree of equivalence exists between these two knowledge systems, the problem of defining equivalence is a complex one: it requires the investigation of Indigenous and European sciences as discrete systems and then seeking to understand what relationships exist between them.

The interrogation of cross-cultural categories has been a major theme in the history of anthropology, beginning with the nineteenth-century discourse over the definition of such concepts as magic and religion, through to contemporary debates on the nature of economics, gender, art and aesthetics. Indigenous Australian ethnography has been at the heart of many of these debates. Considerable research has been done in the area of ethno-science, but the category ‘science’ itself has been largely taken for granted and it is an area open to major investigation and reinterpretation (Harding 1994 and Franklin 1995).

As Indigenous and Western science are equally the products of particular social and cultural contexts, understanding their meaning and values in cross-cultural perspective requires the undertaking of research drawing on the research methods and knowledge of various fields of anthropology, including Indigenous knowledge systems, cross-cultural categories and applied anthropology, especially in the area of education. It is essential if components of Indigenous knowledge are to be included in non-Indigenous teaching and learning that they be thoroughly researched in the context of their own socio-cultural system. This is partly in order to provide richer resources for curriculum designers, but more importantly to provide them with a detailed understanding of the implications of integrating knowledge produced in specific cultural contexts within school curricula by means of networked digital media.

To this achieve these goals this project brings together as industry partners the NSW Education Department & Training (APU), the CCR, the Yirrkala Community Education Centre (YCEC) the Australian National Maritime Museum (ANMM). The industry partners have complementary objectives. The APU wishes to include an Indigenous component in its years 7-10 science curriculum. It aims to do this in part by using on-line resources based on the Saltwater Collection to demonstrate Yolŋu environmental knowledge and aspects of the Yolŋu world-view. The YCEC intends to take advantage of this opportunity to develop materials that can be used in its own science curriculum in the main community school and in the schools associated with the more remote homelands communities such as Yilpara and Gängan. The ANMM have joined this research venture with a view to using its outcomes to develop materials informing museum audiences of the cultural significance of the Saltwater Collection.

While the industry partners’ ultimate goal is the creation of high quality curriculum and educational materials in networked digital formats, the aim of this project is to undertake the background research that will facilitate the production of these materials by the industry partners.

©2008 The Living Knowledge Project
Project partners

Linkage grant partners

Australian Government
Australian Research Council

THE AUSTRALIAN NATIONAL UNIVERSITY
Centre for Cross-Cultural Research
Research School of Humanities

Aboriginal Education and Training Directorate
and the Science Directorate

Yirrkala Community Education Centre

The Australian National Maritime Museum

Other partners:

Boolarng Nangamai Aboriginal Art and Culture studio, Gerringong NSW
Buku-Larrnggay Mulka Centre, Yirrkala NT

©2008 The Living Knowledge Project
Acknowledgements

Northeast Arnhem Land:

Organisations: Buku-Larrŋgay Mulka Art Centre, Yirrkala Community Education Centre, Yirrkala Dhanbul Council, Dhimurry Land Management Aboriginal Corporation, Laynh-Air, Yirrkala IGA and Manny's Car Hire.

NSW South Coast:
Don Atkinson, Kerry Boyenga and Broulee Primary School, Bonny Brennan, Lorraine Brown, Debbie Callaghan, Beryl Cruse, Linda Cruse, Ossie Cruse, Cheryl Davison, Mabel Dungay, Mary Duroux, Trisha Ellis, Lila Lawrence, Noel Lonesborough, Anthony Moore, Graham Moore, Symeline Nye, Steve Russell, Kelli Ryan, Annette Scott, Jimmy Scott, Jodie Stewart, Phyllis Stewart and Esma Timbery.


ANU development team:
Pip Deveson, Katie Hayne, Howard Morphy, Daphne Nash.

Senior Indigenous consultant:
Dr R. Marika

Australian National Maritime Museum:
Michael Crayford, Diane Fenton, Jeff Fletcher, Johanna Nettleton and John Waight.

New South Wales Department of Education and Training:
Bob Percival, John Lester and the NSWDAT Aboriginal Education Directorate. Joe Merlino, Glenn Sawle, Steve Vassalo and the NSWDAT Science Directorate.

Yirrkala Community Education Centre:

Also thanks to:
Marcus Barber, Pat Faulkner, Ursula Frederick, Julie Gorrell, Kim McKenzie, Frances Morphy, Anne-Maree O'Brien, Greg Wearne and Alan Wyburn.

©2008 The Living Knowledge Project
Discussion papers

Pip Deveson (2005) "Where's the science in this?", unpublished paper.


Published papers:


©2008 The Living Knowledge Project
Films

The following films and kiosk were produced as a part of the ARC Living Knowledge project.


_Saltwater (2007)_

_Remaking the Yambirrp (2005)._ Directed by Pip Deveson and Katie Hayne, DVD 50mins.


_Gapu (2005)._ Directed by Yirrkala Community Education Centre, DVD 30mins.
Related online projects

Teaching from Country, Charles Darwin University
http://learnline.cdu.edu.au/inc/tfc/
This program sets up and evaluates distance education in reverse: the Yoil?u (northeast Arnhemland Aboriginal) lecturers are in remote places and the students of Yoil?u languages, culture and fine arts, are (mostly) on campus.

Contested Knowledges, Charles Darwin University
http://learnline.cdu.edu.au/units/contestedknowledges/
Contested Knowledges is primarily concerned with issues of knowledge production and its relationship to the management of resources in northern Australia. The aim is to introduce you to issues of knowledge and the philosophies relating to knowledge production, and then to investigate the impact these ideas may have on the way we approach the management of resources, particularly in different cultural contexts..

Teaching and Learning for a Sustainable Future
http://www.unesco.org/education/tlsf/index.htm
http://www.unesco.org/education/tlsf/theme_c/uncofrm_c.htm
Teaching and Learning for a Sustainable Future is a multimedia teacher education programme published by UNESCO. It contains 100 hours (divided into 25 modules) of professional development for use in pre-service teacher courses as well as the in-service education of teachers, curriculum developers, education policy makers, and authors of educational materials.

Indigenous Knowledge
A teacher in-service module which was part of the project ‘Learning for a sustainable environment: a professional guide for teacher educators’ developed by the UNESCO-Asia Pacific Centre of Educational Innovation for Development & Griffith University, Queensland.

The Alaska Native Knowledge Network
http://www.ankn.uaf.edu/
The Alaska Native Knowledge Network is designed to serve as a resource for compiling and exchanging information related to Alaska Native knowledge systems and ways of knowing. It has been established to assist Native people, government agencies, educators and the general public in gaining access to the knowledge base that Alaska Natives have acquired through cumulative experience over millennia.

Indigenous Weather Network
Seasonal weather calendars, developed over thousands of years by Indigenous communities, are displayed on this new Bureau of Meteorology Indigenous Weather Knowledge website.

©2008 The Living Knowledge Project
Suggested reading

The references listed below are relevant for teaching the concept of Indigenous knowledge, particularly through the science curriculum.


Baker recognises the science in Indigenous knowledge and argues that Indigenous knowledge can complement science on the basis of his research on Yanyuwa environmental management in northern Australia.


The basis of Christie's view is that Western science is based on hard data and Aboriginal science is based on context. Furthermore, if the world's environmental problems are to be solved, science must take all human needs into account.


Harding examines western and non-western origins of modern science and the possibility of culturally distinctive sciences. She also addresses the question of whether modern science is culturally western.


Throughout his exploration of 'two-way' schooling, Harris is convinced that it is the best way to promote success for Aboriginal students. Although he focuses on both the theory and practice of education in the Northern Territory in the 80s, his discussion on the role of culture in education is very relevant today.


The authors advocate the recognition and inclusion of Indigenous knowledge in the science curriculum in Alaska. They provide background on Alaskan native culture and education, detail Indigenous contributions to science and technology and describe the Yupiaq worldview with suggestions for effective inclusion in the curriculum.


After exploring the history of ideas on Aboriginal land use, Langton goes on to argue for the recognition of Indigenous knowledge and its application in environmental management strategies. Case studies from Arnhem Land demonstrate the integrity of Indigenous fire regimes.


Dr R. Marika briefly describes the history of Yolngu interaction with outsiders in their land and introduces aspects of Yolngu worldview. She explains how she works within two knowledge systems and how Yolngu concepts are being incorporated into the curriculum at Yirrkala school. Also available at


In twenty highly illustrated pages, Michie addresses broad topics in the environmental knowledge of Aboriginal people across Australia: Who are Australia's Indigenous people?; Indigenous Australians as scientists; The earth is our Mother; Indigenous people and fire; Bush tucker; Bush medicines; Indigenous tools and weapons; Indigenous geologists.

**Michie, M.** (2002) Why Indigenous science should be included in the school science curriculum. *Australian Science Teachers Journal* 48 (2):36. This article discusses the importance of including Indigenous science in the school science curriculum, noting that Indigenous science presents a different way of understanding the world. Michie describes what Indigenous science tells teachers and students about Western science and science education, and notes that the study of Indigenous science can be a vehicle for social justice.


**Neidjie, Bill, Stephen Davis, and Allan Fox.** (1985) *Kakadu man...Bill Neidjie*. Queanbeyan, N.S.W.: Mybyrood. Through photography and poetry this book explores the environmental worldview of a senior elder of the Kakadu area, the last speaker of Gagadju who died in 2002.


**Snively, Gloria, and John Corsiglia.** (2001) Discovering Indigenous science: implications for science education. *Science Education* 85 (1):6-34. The authors argue that Indigenous knowledge has been kept out of science education and describe Canadian and other examples where the traditional knowledge of Indigenous people has contributed to scientific understanding. They present ways in which teachers can integrate Indigenous knowledge in the science curriculum.

**Stanley, W.B., and Brickhouse, N.W.** (2001) Teaching sciences: the multicultural question revisited. *Science Education* 85:35-49. Stanley and Brickhouse prefer a multicultural approach rather than a universalist view as the basis for the science curriculum. They put the case for including an understanding of the social and political dimensions of science to explain how different knowledge systems interact.

**Turnbull, D.** (2000). *Masons, tricksters and cartographers: comparative studies in the sociology of scientific and Indigenous knowledge*. Amsterdam, Harwood Academic. Turnbull argues that all knowledge is relative and further that traditional knowledges must be revalidated and modern technoscience correspondingly devalued. He traces some aspects of the history of western scientific domination and Eurocentrism. His research provides a relevant background for attempting to see ways in which there can be a discourse across knowledge systems.
Reference List

The following are referenced in the 'Learning sites' on this website:

**Yolŋu Sea Country section:**


**Koori Coast section:**

Pallingjang Saltwater catalogue (1997), Wollongong City Gallery.


©2008 The Living Knowledge Project