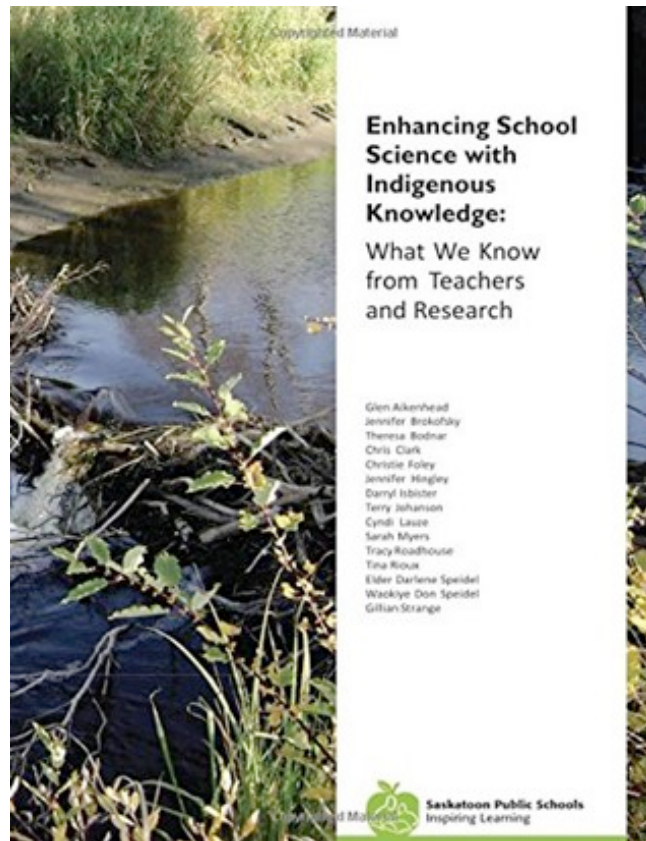


Enhancing School Science with Indigenous Knowledge: What We Know from Teachers and Research

Glen Aikenhead (Editor), Jennifer Brokofsky, Theresa Bodnar, Chris Clark, Christie Foley, Jennifer Hingley, Darryl Isbister, Terry Johanson, Cyndi Lauze, Sarah Myers, Tracy Roadhouse, Tina Rioux, Elder Darlene Speidel, Waokiye Don Speidel, Gillian Strange



Developed by the Saskatoon Public School Division, Saskatoon, Saskatchewan, Canada.
Published in 2014 with Amazon.ca.

The renewed 2008 Saskatchewan science curriculum combines Indigenous knowledge^{1, 2} with scientific knowledge. As a result, many teachers are wondering what is involved when implementing such a curriculum. This handbook provides a frank and honest summary of what we know from research into the experiences of teachers and students when such an enhanced science curriculum has been implemented.

Personal stories and other contributions also came from Saskatoon Public School teachers; the First Nations, Inuit and Métis Education unit; and other personnel involved in a 2011-2012 professional development project.

Each of the eight teachers who composed a story conveyed from the heart their challenges and successes when embarking upon a career-long journey into enhancing their science teaching with Indigenous knowledge; many for the first time, while a few had some initial experience. These eight stories arise from very different classrooms taught by diverse teachers, each with their own initial degree of cross-cultural competence. Their stories, one per chapter, form the backbone of the handbook with their compelling accounts of key moments and explanations; all very different, all very revealing, and all providing support for those who have not yet begun this type of professional journey.

The titles associated with these personal stories effectively highlight key ideas found throughout the book:

- Benefits from Interacting with Elders and Knowledge Keepers
- Connect to the Land and Nurture Self-Identities
- Teaching as Storytelling: Worldview, Spirituality, Metaphors
- Anti-Racist Education across the Curriculum
- Suburban Students, Indigenous Awareness: A Matter of Commitment
- The Power of Relationship Building in Learning
- Autonomous Learning Environments for All Students
- The Brain Needs the Heart

¹ In this handbook, the term “Indigenous” encompasses worldwide the original inhabitants of a place and their descendants who have suffered colonization. This follows the UN convention. The term includes Canada’s Aboriginal peoples who are the First Nations, Inuit, and Métis peoples of Canada. It is spelled with a capital “I” to follow and respect how Indigenous scholars spell it (see Chapter 3 for more details on respectful spelling of terms). Indigenous and Aboriginal are interchangeable terms in this handbook.

² The phrase “Indigenous knowledge” is also called Indigenous knowledges, Indigenous science, Aboriginal science, Native science, traditional ecological knowledge, Indigenous ways of living in nature, etc. in some publications.

These shared stories make excellent resources for initiating discussions among science teachers during formal or informal professional development; not only to learn from the authors, but to learn as well from colleagues when exchanging personal reflections and offering mutual support.

The stories demonstrate what it means to become a culturally responsive science teacher. Initially defined in Chapter 1, culturally responsive science teaching is a major theme throughout the book. It is *centred on* the cultural self-identity of students, particularly the cultural resources they bring into the classroom from their home and community.

The handbook mentions some very specific further reading for teachers if they wish to pursue some ideas of interest to them. One example is a book written for teachers that describes important general ideas about Indigenous *and* scientific perspectives that science teachers likely need to know for implementing the curriculum. The book also offers advice on what to do in order to *prepare* for teaching the curriculum's Indigenous content.

In short, *Enhancing School Science with Indigenous Knowledge* realistically paints the big picture of what lies ahead. At the same time, it connects teachers to specific resources and strategies that will help them get started, and that will nurture them during the years to come.

*The real voyage of discovery
consists not in seeking new landscapes
but in having new eyes.*

French novelist Marcel Proust (1871-1922)

Table of Contents

Prologue: Brenda Green

Foreword: Jennifer Hingley

Purpose of This Handbook

Chapter 1: Introduction

Theresa's Story: Benefits from Interacting with Elders and Knowledge Keepers
Culturally Responsive Science Teaching
Postcolonial Education
A Look Ahead

Chapter 2: Combining Indigenous Knowledge and Science

Tracy's Story: Connect to the Land and Nurture Self-Identities
General Guidance and Support for Teachers
Self-Monitoring
 Rubric A – Cross Cultural Competence Continuum
 Rubric B – Culture Shock
General Strategies to Achieve “Adaptation” and “Interdependence”

Chapter 3: Some Initial Concerns of Teachers

Indigenous, Aboriginal, Indian, or Native?
Unlearning Entrenched Narrow Beliefs about Science
Infusion of Indigenous knowledge into *All* Topics Taught in Science?
Unlearning Eurocentric Beliefs and Attitudes about Indigenous Cultures
Possible Conflicts When Discussing Indigenous Spirituality
Elder Darlene Speidel: Some Nakota, Dakota, Lakota Perspectives
Christie's Story: Teaching as Storytelling: Worldview, Spirituality, Metaphors
Avoiding the Appearance of Appropriating Indigenous Knowledge
Protocols with Tobacco: Waakiye Don Speidel

Chapter 4: Challenges Faced by Teachers

Challenges that Are Resolvable
Challenges that Are More Difficult to Resolve
Challenges that Will Continue
Sarah's Story: Anti-Racist Education across the Curriculum

Chapter 5: Guidance by Indigenous Cultures, Resulting Student Outcomes

Cultural Resources Indigenous Students Bring to Class
Documented Effects of Culturally Responsive Science Teaching
Cyndi's Story: Suburban Students, Indigenous Awareness: A Matter of Commitment

Chapter 6: Critical Elements that Produce Student Achievement

Gillian's Story: The Power of Relationship Building in Learning
Student Voices
Teacher Views

Chapter 7: Culturally Valid Assessment

Assessing an Understanding of Science

Scientific Ideas

Ideas *about* Science

Assessing an Understanding *about* Indigenous Knowledge

Assessing Achievement in Coming to Know

Assessing with Portfolios

Chris's Story: Autonomous Learning Environments for All Students

Chapter 8: Conclusion

Tina's Story: The Brain Needs the Heart

Summary: Stay Calm, Be Brave, Wait for the Signs

References

Appendices

APPENDIX A: Excerpts from *Handbook for Culturally Responsive Science Curriculum*

APPENDIX B: Cross Cultural Competence Continuum

APPENDIX C: A Summary of *Practising the Law of Circular Interaction*

APPENDIX D: Recurrent Learning Strengths

APPENDIX E: Portfolio Assessment and Evaluation Tool

APPENDIX F: Portfolio Product Rubric

Figures

Figure 1.1. A Model Depicting Culturally Responsive Science Teaching (CReST)

Figure 2.1. A Developmental Model of Intercultural Sensitivity

Figure 7.1. Sample Form to be Filled Out and Attached to a Portfolio Entry

This book for teachers and teacher candidates is about:

- The in's and out's of culturally responsive science teaching
- Building on individual strengths and pedagogical gifts
- Providing realistic, informative, encouraging, and thoughtful ideas
- Highlighting the voices of teachers and students
- Commonsense generalizations balanced with real teaching events
- Benefiting both Indigenous and non-Indigenous students

Available from Amazon.ca (CAN\$ 35) at:

www.amazon.ca/Enhancing-School-Science-Indigenous-Knowledge/dp/149957343X

or from

Amazon.com (US\$ 27)

http://www.amazon.com/s/ref=nb_sb_noss?url=search-alias%3Dstripbooks&field-keywords=Enhancing+School+Science+with+Indigenous+Knowledge