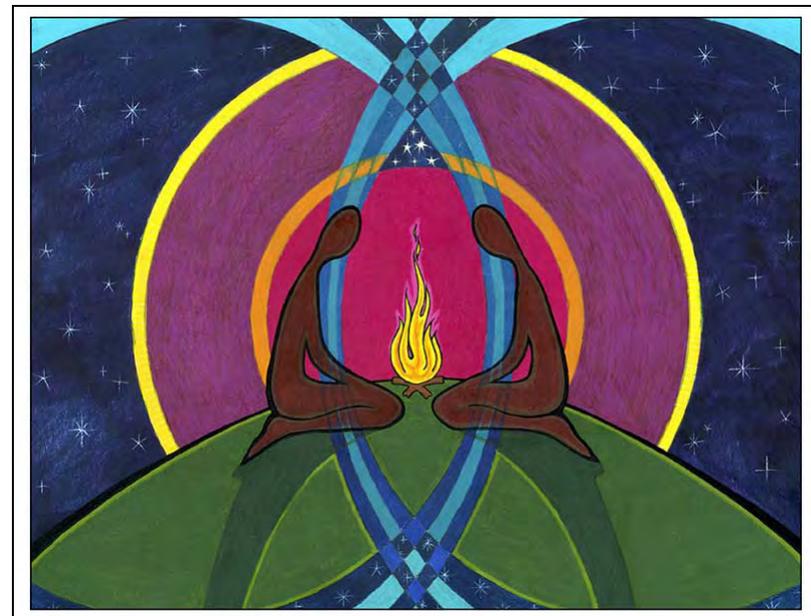


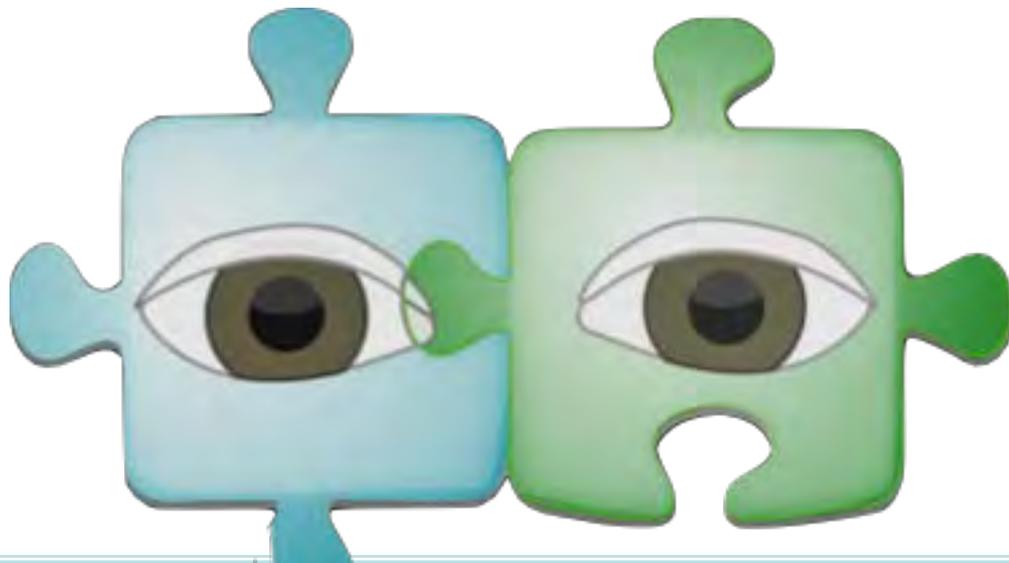
Royal Roads University; Vancouver, BC
2 December 2008



Cheryl Bartlett¹ & Albert Marshall²

¹ Cape Breton University, Sydney, NS, Canada

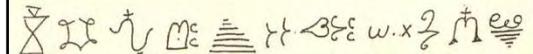
² Eskasoni Mi'kmaq First Nation, NS, Canada



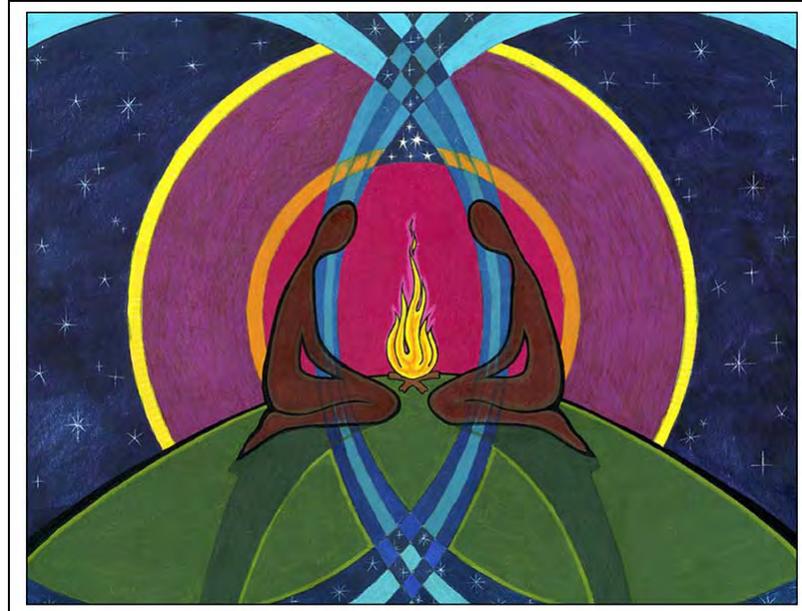
CAPE BRETON
UNIVERSITY

KECCA

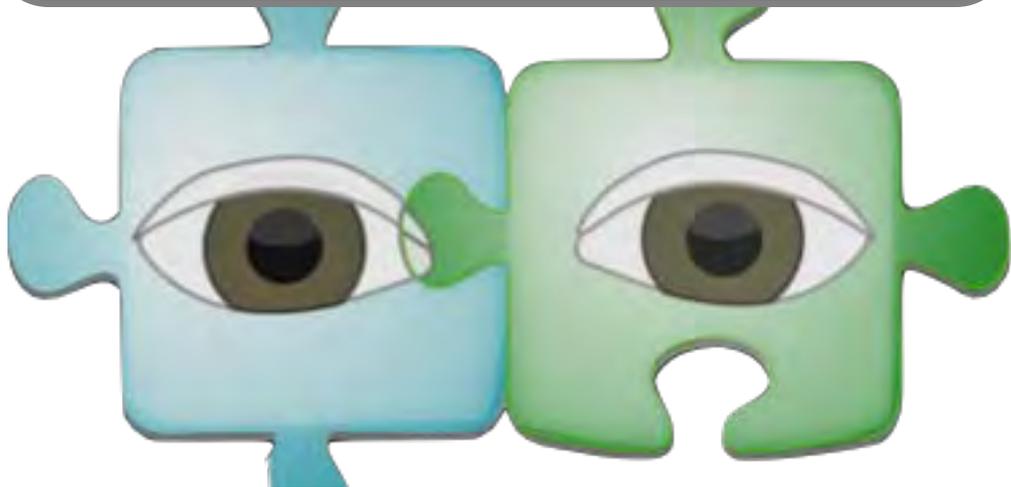
Knowledge: Education and Cultural Consultant Associates



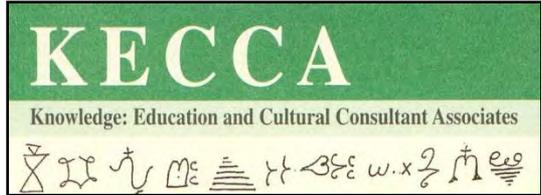
Royal Roads University; Vancouver, BC
2 December 2008



**Integrative Science
&
Two-Eyed Seeing**



CAPE BRETON
UNIVERSITY







Canada Research
Chairs

Chaires de recherche
du Canada



Social Sciences and Humanities
Research Council of Canada

Conseil de recherches en
sciences humaines du Canada

Canada
Canada

Thank you / Wela'liog

Mi'kmaq Elders



CIHR IRSC

Canadian Institutes of
Health Research Instituts de recherche
en santé du Canada



**NSERC
CRSNG**

Canada Foundation
for Innovation

Fondation canadienne
pour l'innovation



Membertou
Elementary



Mi'kmawey Debert



**IWK Health Centre
Foundation**



Eskasoni First Nation Detachment
Royal Canadian Mounted Police Gendarmerie royale
du Canada



Mi'kmaq College Institute
Mi'kmaq Espi Kina'matno'kuom

The support of various partners
and funding agencies is
gratefully acknowledged.

collaboration

≈ 15 years





Elder Murdena Marshall





Artist Basma Kavanagh

Integrative Science

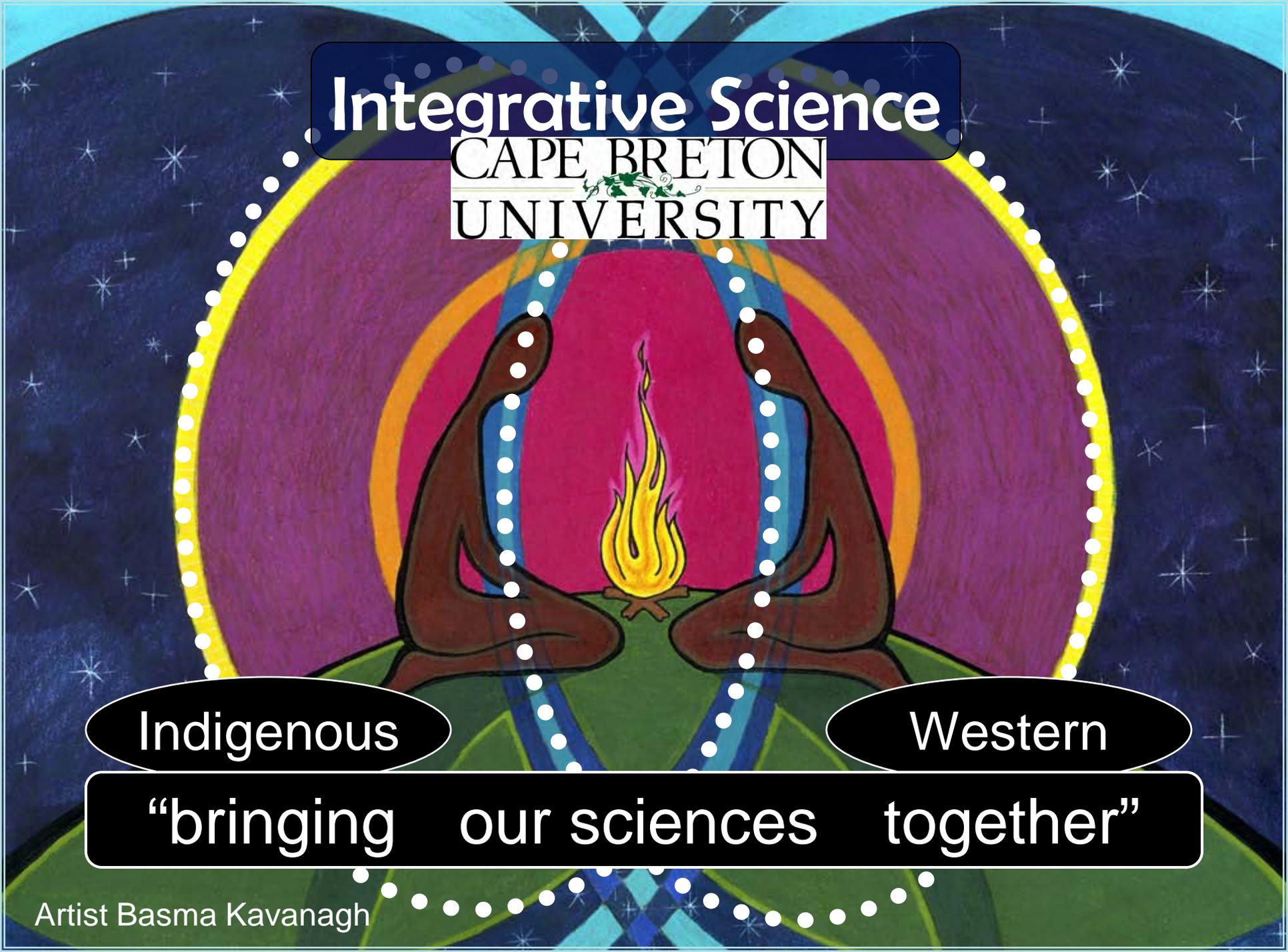
CAPE BRETON
UNIVERSITY

Indigenous

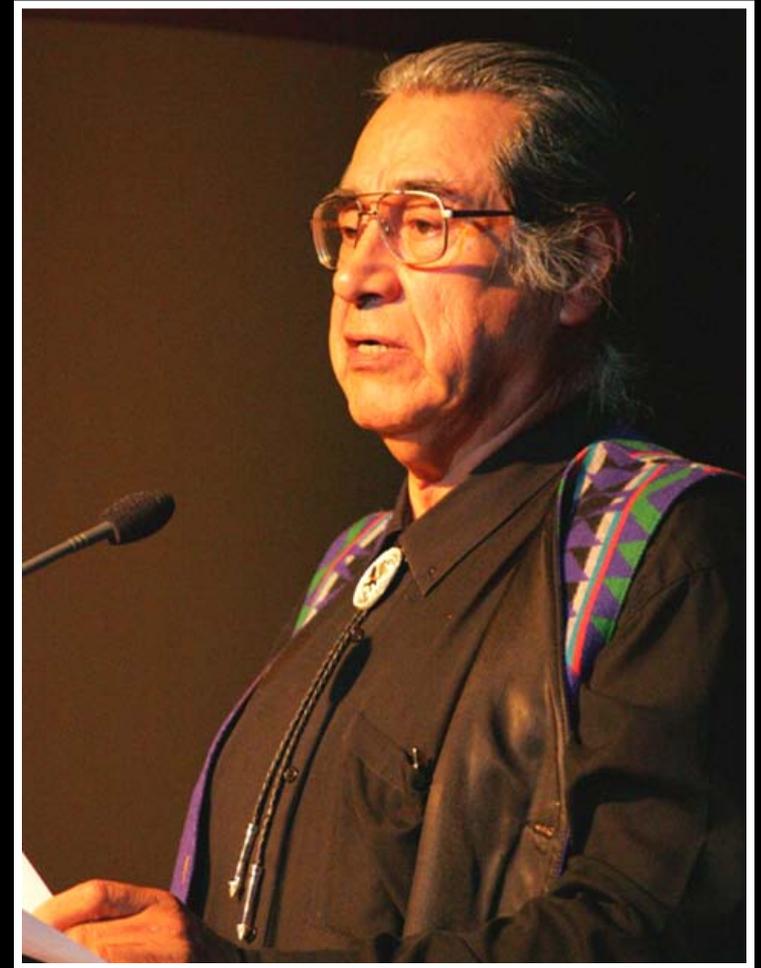
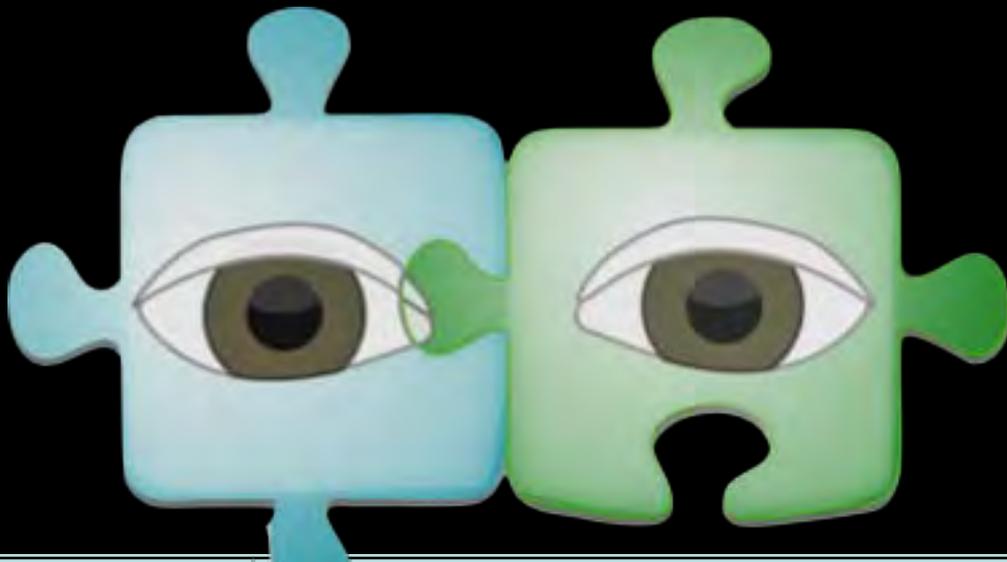
Western

“bringing our sciences together”

Artist Basma Kavanagh



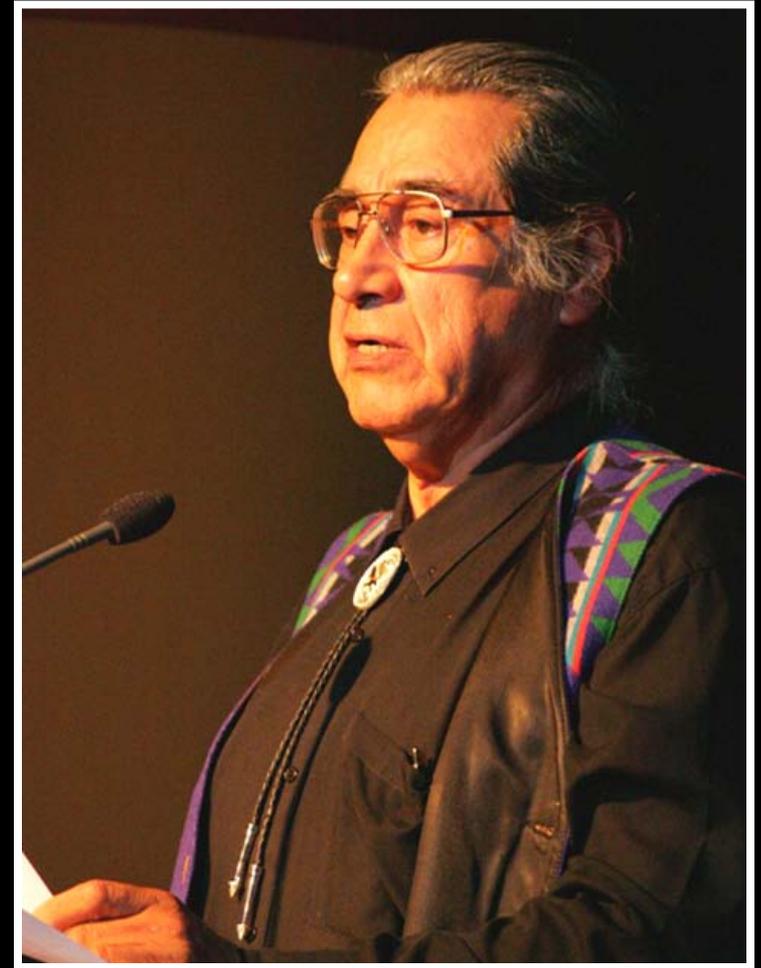
Two-Eyed *Seeing*



Elder Albert Marshall
Eskasoni community
Mi'kmaq Nation

TWO-EYED SEEING

“LEARN ... to see from one eye with the strengths of Indigenous knowledges and ways of knowing, and from the other eye with the strengths of Western (or Eurocentric or mainstream) knowledges and ways of knowing ... and LEARN to use both these eyes together, for the benefit of all.”



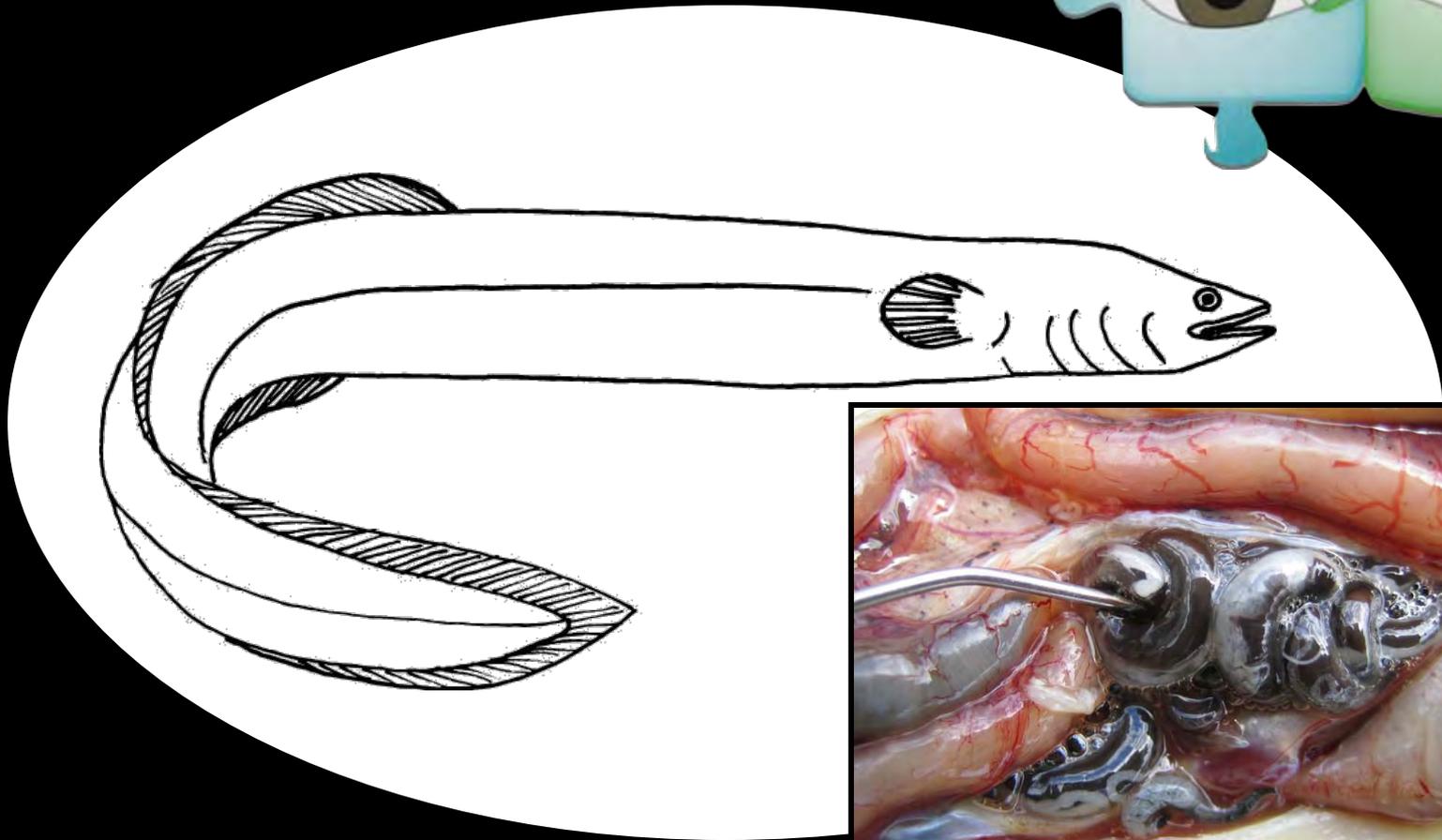
Indigenous

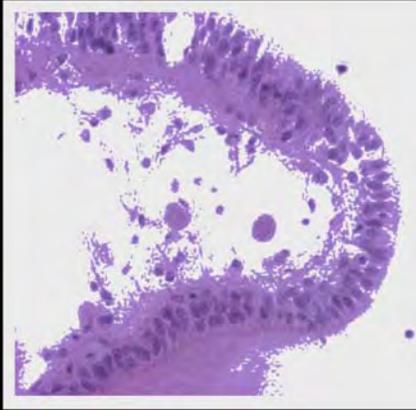
Western

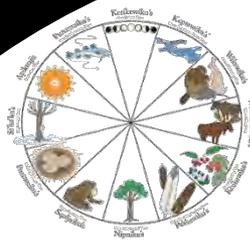


The central dilemma of science education today is the teaching of science from only one cultural perspective, and in an incomplete and non-connected manner.

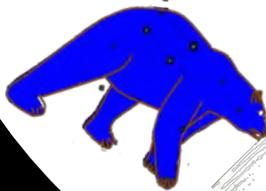
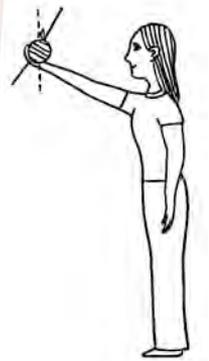
Gregory Cajete, PhD
Native American Scientist & Educator, Univ. of New Mexico



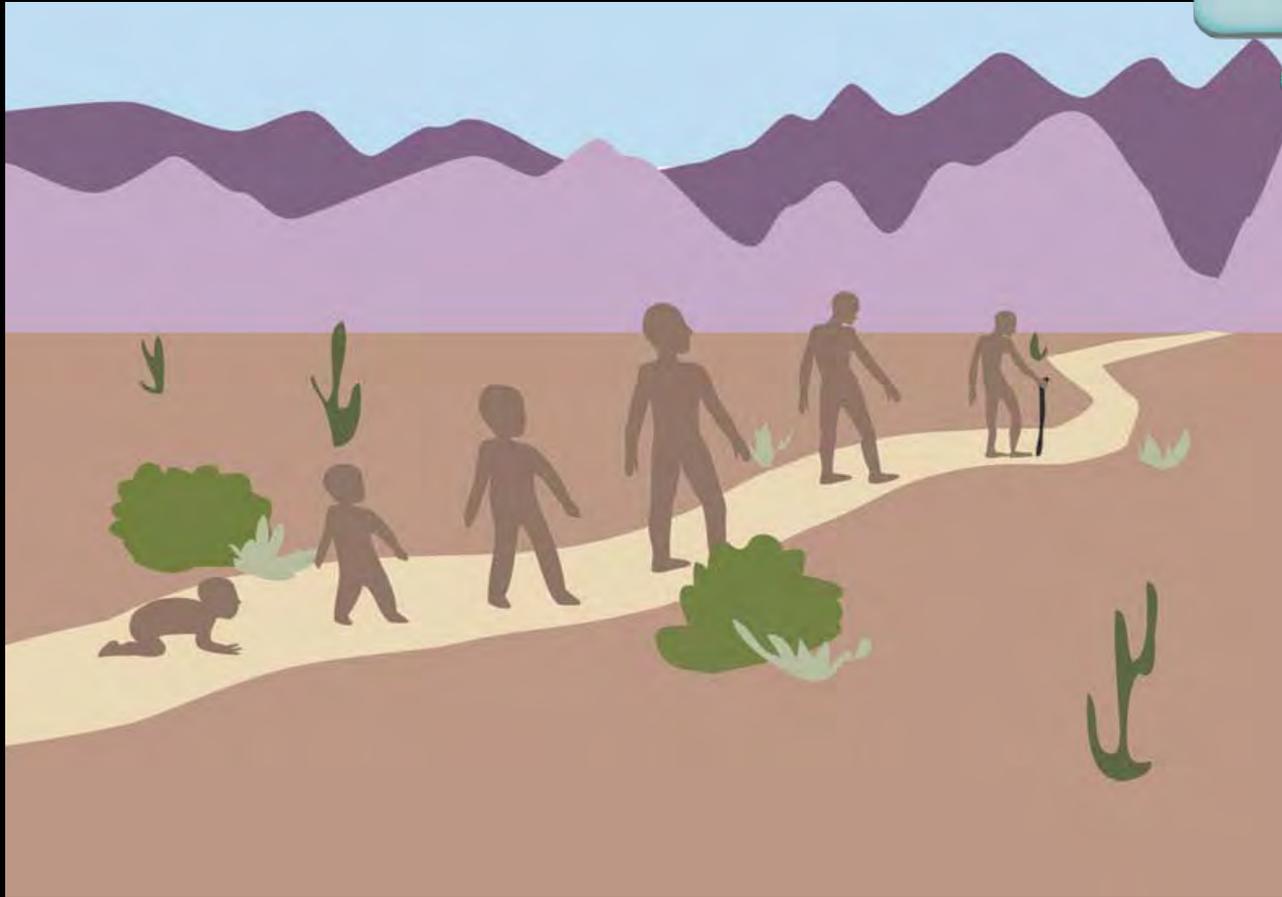




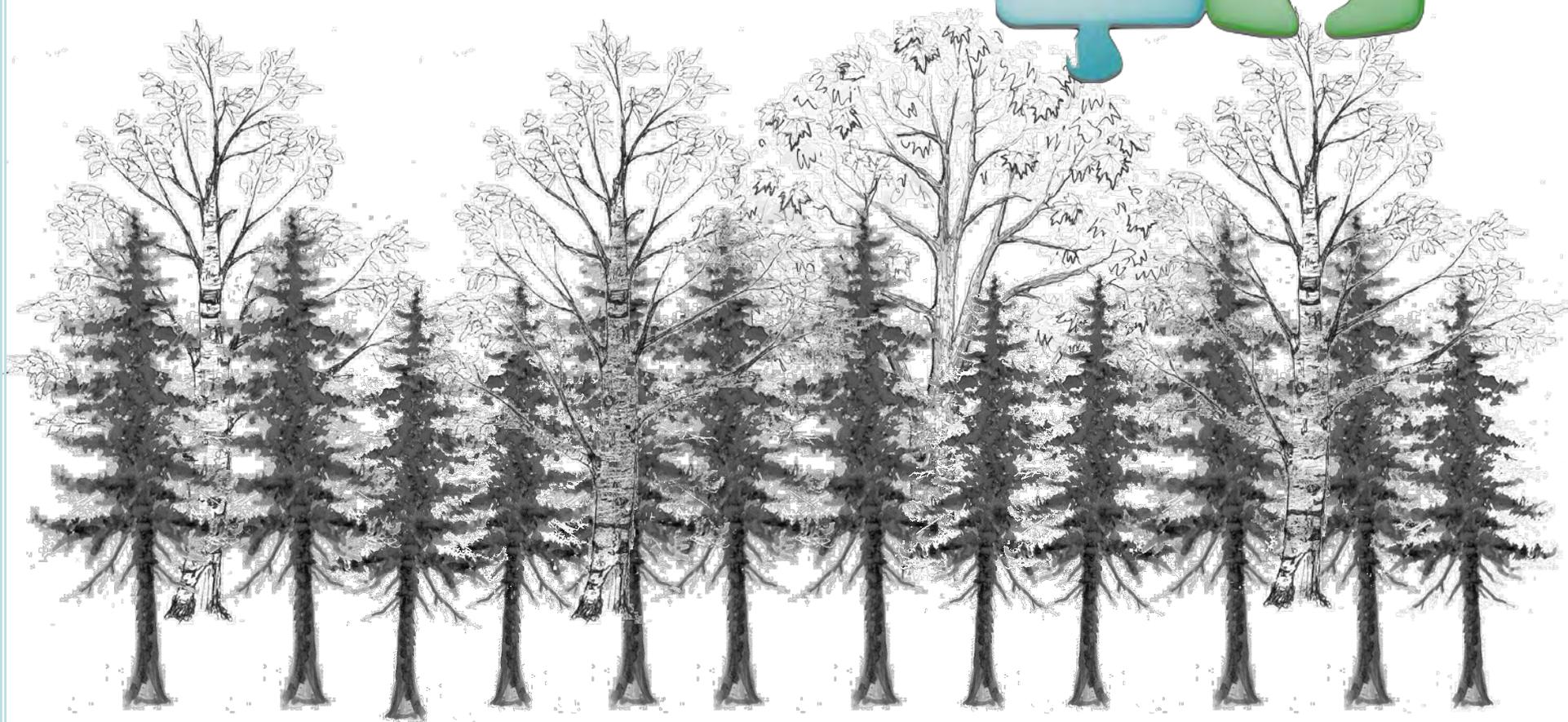
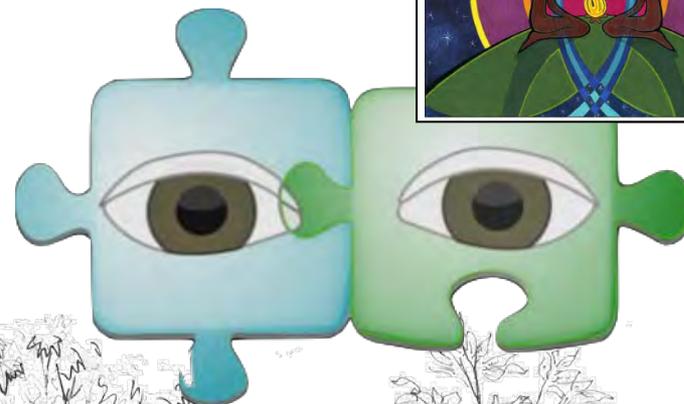
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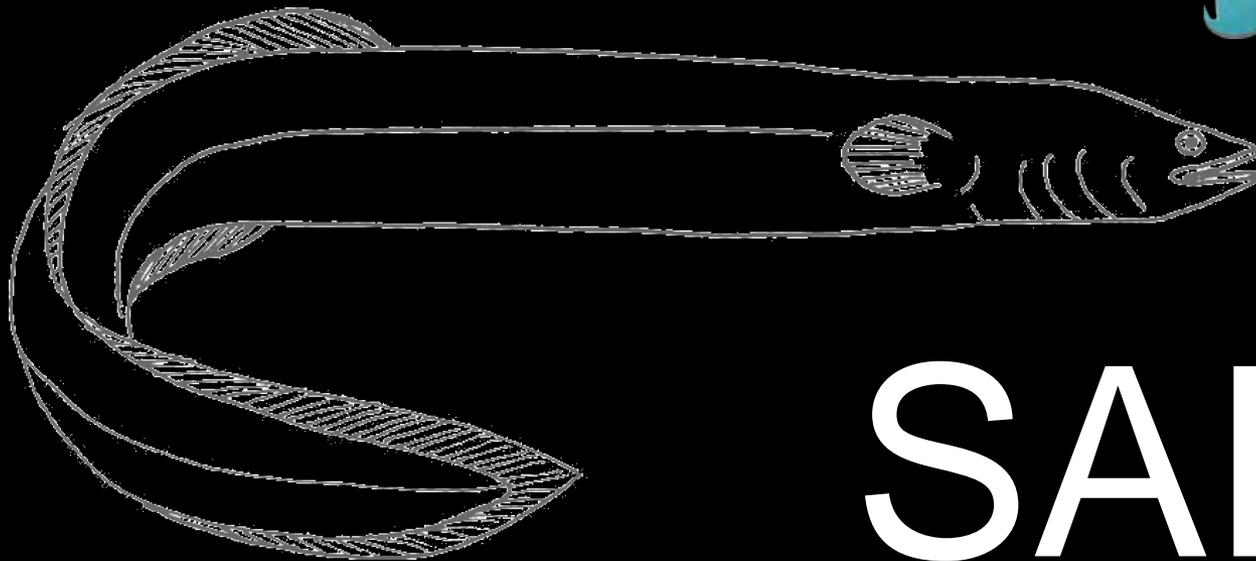
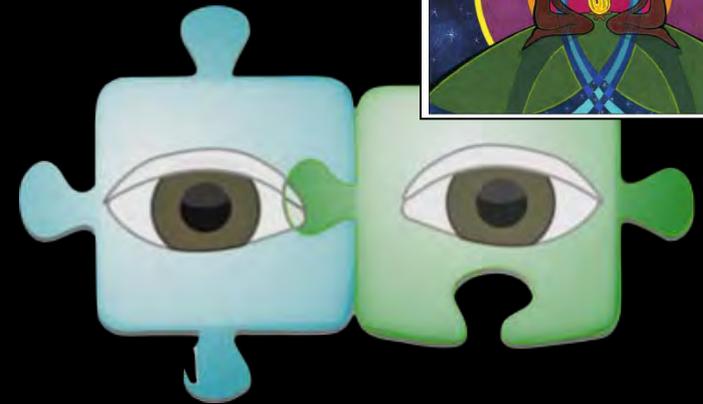


Health: Elders Aging



Forestry





SARA

new initiatives program



Canada Foundation
for Innovation

Fondation canadienne
pour l'innovation



COLLABORATIVE RESEARCH PROPOSALS UNDER REVIEW



Social Sciences and Humanities
Research Council of Canada

Conseil de recherches en
sciences humaines du Canada

Canada

CURA
program

community – university research alliance

collaborative research and training experience



NSERC
CRSNG

CREATE
program

INTERNATIONAL YEAR OF
ASTRONOMY 2009

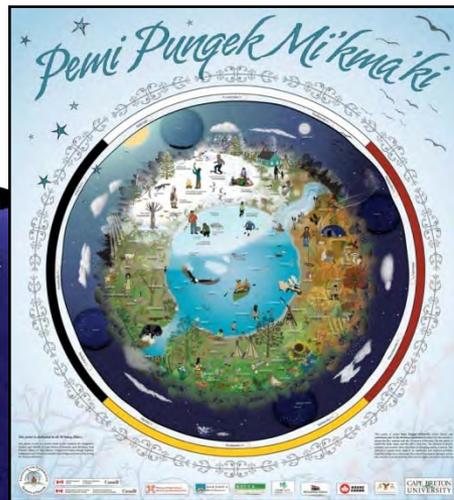


Canadian Aboriginal Participation



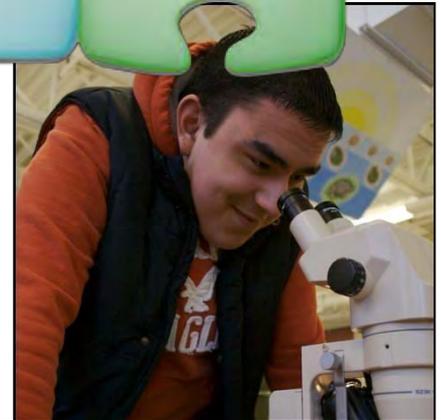
Jim Hesser & Andy Woodsworth
Cheryl Bartlett & Albert Marshall
Dunsmuir Lodge, University of Victoria
1 December 2008

INTERNATIONAL YEAR OF ASTRONOMY 2009



bringing together
our
star
stories

Youth
Elders
Educators
Astronomers



LESSONS LEARNED

7

over 15 years



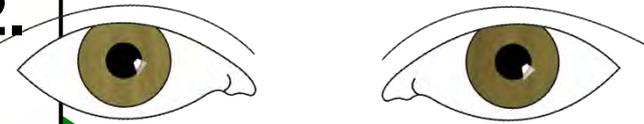
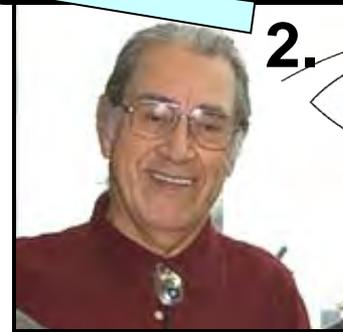
LESSONS LEARNED

1. **ACKNOWLEDGE
WE NEED
EACH OTHER ...**
co-learning journey

LESSONS LEARNED

Two-Eyed Seeing learning to see with the strengths of each & together

1.
**ACKNOWLEDGE
WE NEED
EACH OTHER ...**
co-learning journey



Albert Marshall, Elder, Mi'kmaq Nation

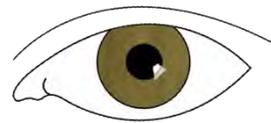
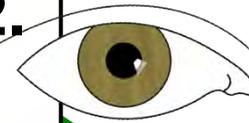
LESSONS LEARNED

Two-Eyed Seeing learning to see with the strengths of each & together

1. **ACKNOWLEDGE
WE NEED
EACH OTHER ...**
co-learning journey



2.



Albert Marshall, Elder, Mi'kmaq Nation

3. view "SCIENCE"
inclusively

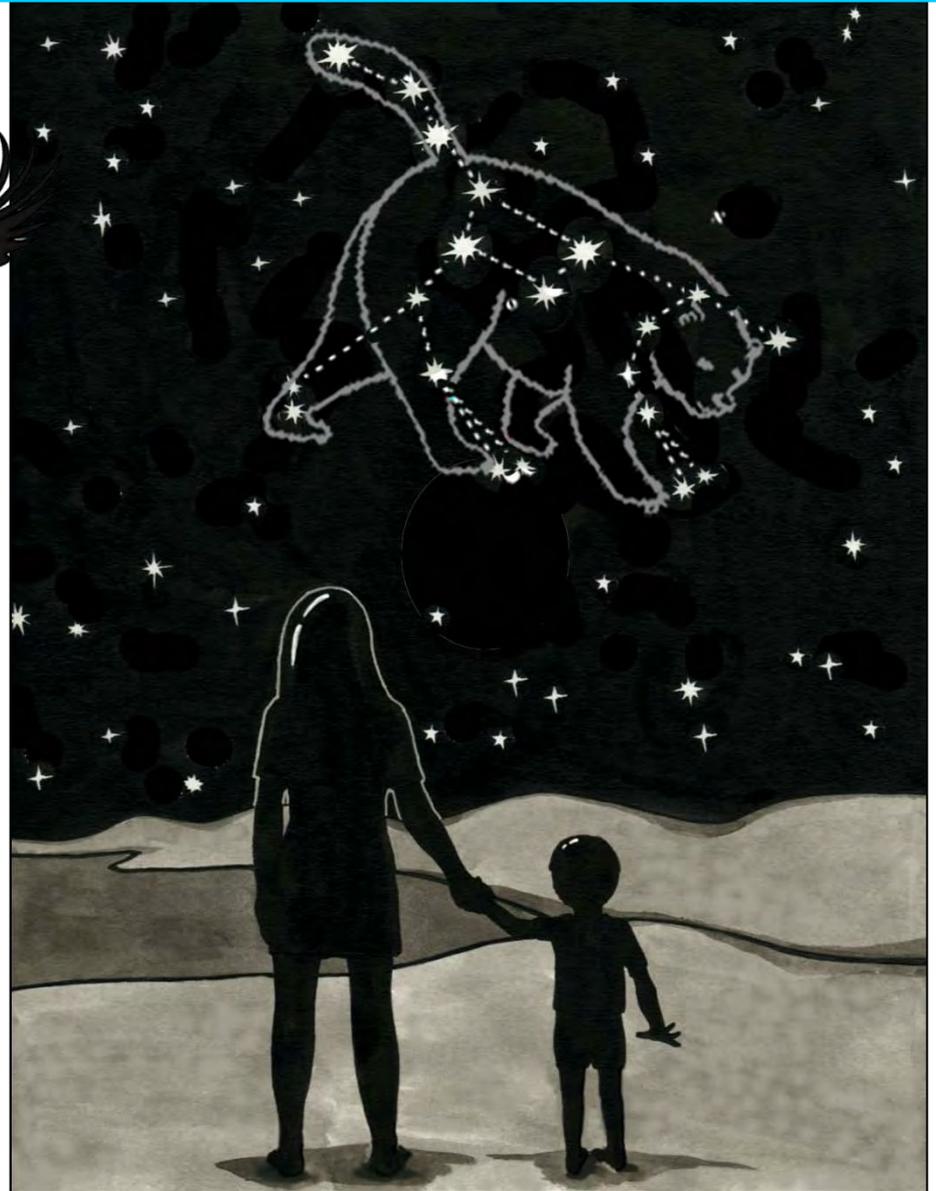


Science?

stories of our interactions with and within nature

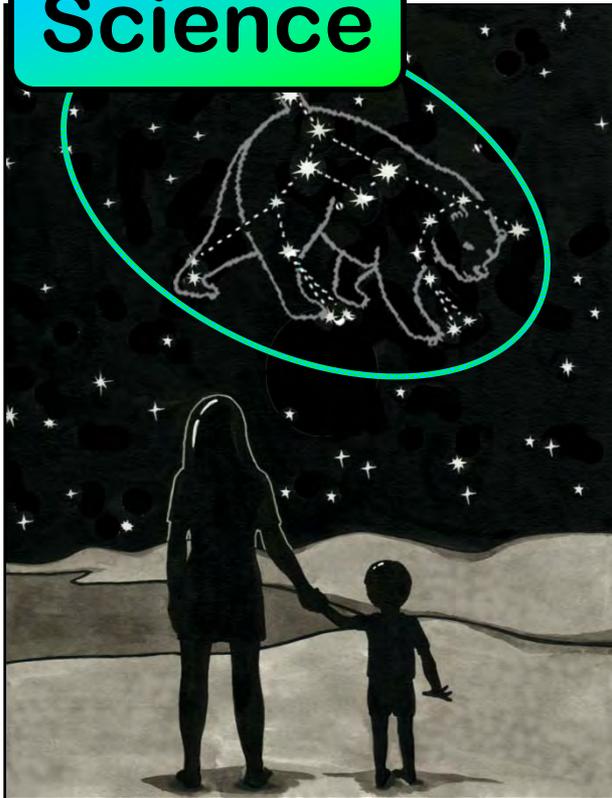


Science is
dynamic,
pattern-based
knowledge.



stories of our interactions with and within nature

Science



pattern

- recognition
- transformation
- expression

- various **pattern smarts**
- various ways to connect the dots
- variety in our stories

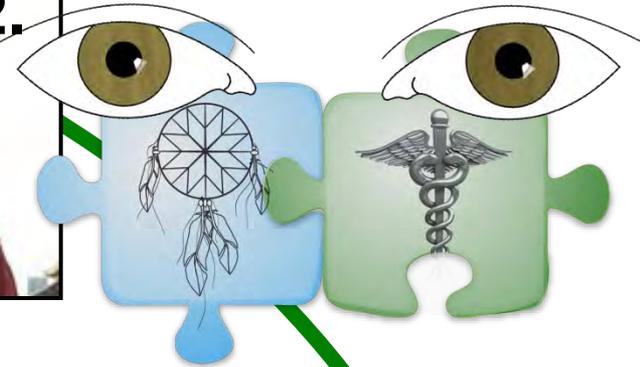
LESSONS LEARNED

Two-Eyed Seeing
learning to see with the
strengths of each & together

1. **ACKNOWLEDGE
WE NEED
EACH OTHER ...**
co-learning journey

4. **DO ... in a
CREATIVE, GROW
FORWARD WAY**

3. view "SCIENCE"
inclusively



Murdena Marshall, Elder, Mi'kmaq Nation

Together We Heal & Grow
seeing & acknowledging my deeds

“See, in the Mi’kmaq world, in all Native worlds, you have to give recognition to everything: misdeeds, good deeds, past deeds, you know? Anything. You have to give that acknowledgement. Everything that you do, you have to acknowledge it.”

5. put our *values + actions*
+ *knowledges* in front of
us ... like an object

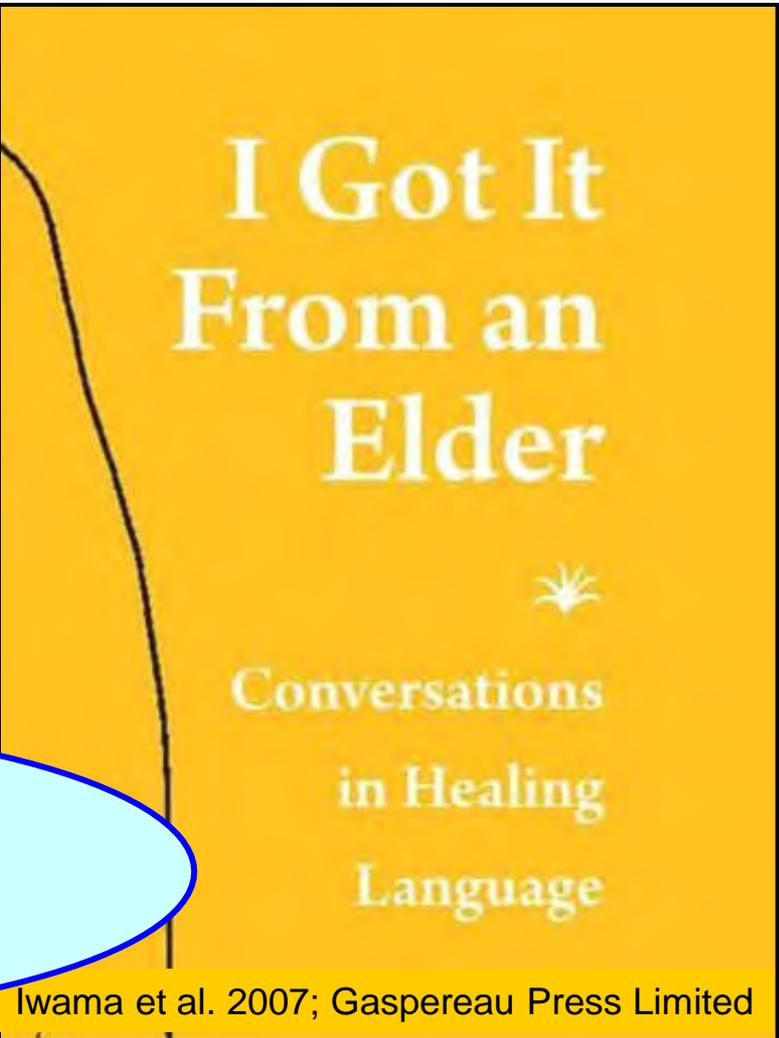


Murdena Marshall, Elder, Mi’kmaq Nation

Together We Heal & Grow
seeing & acknowledging my deeds

“See, in the Mi’kmaq world, you have to give everything: misdeeds, good deeds, you know? Anything you give that acknowledgement that you do, you have to

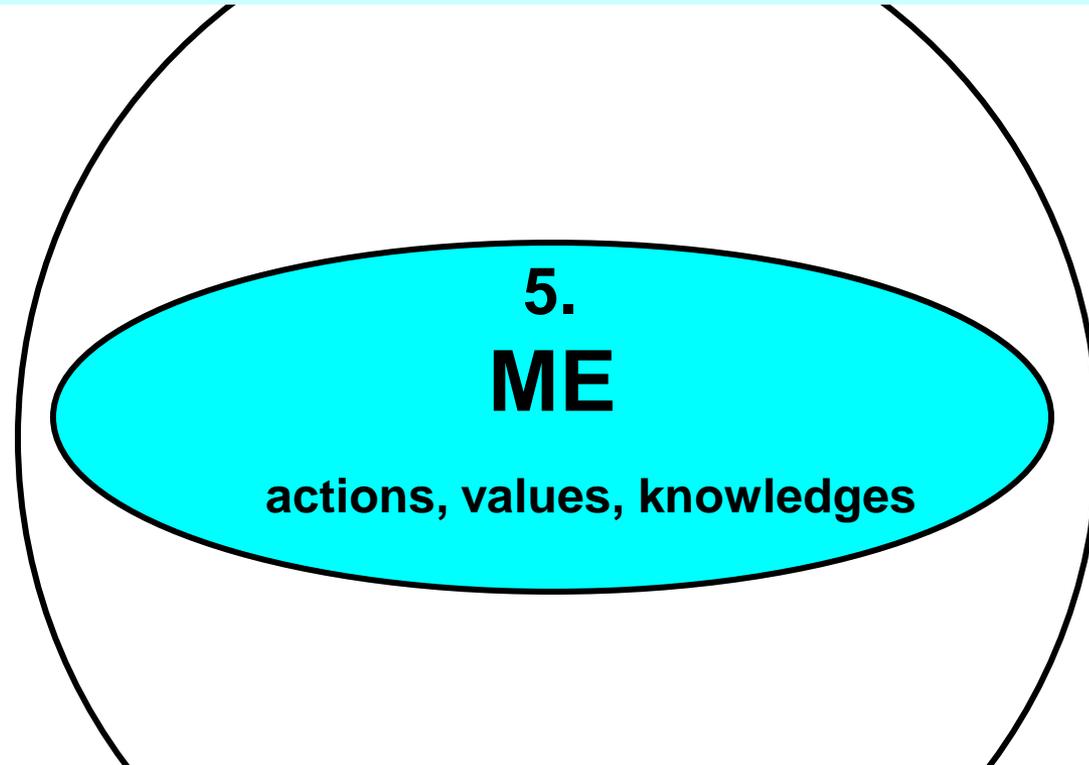
5. put our *values + actions + knowledges* in front of us ... like an object



Murdena Marshall, Elder, Mi’kmaq Nation

Together We Heal & Grow
seeing & acknowledging my deeds

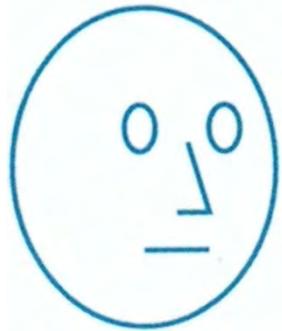
the “HEALING TENSE”



Murdena Marshall, Elder, Mi'kmaq Nation

Together We Heal & Grow
seeing & acknowledging my deeds

the "HEALING TENSE"



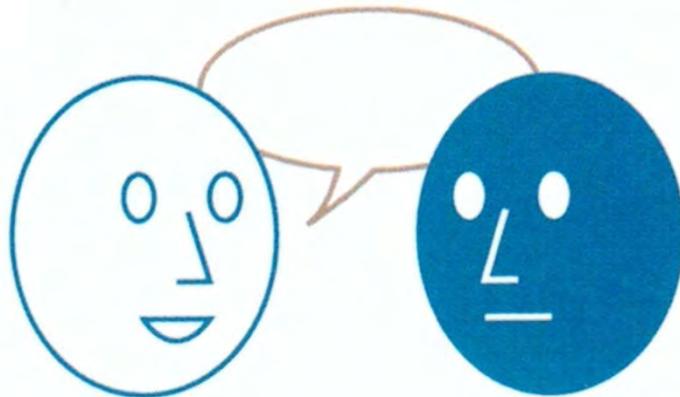
look at it, own it



5.
ME
actions, values, knowledges



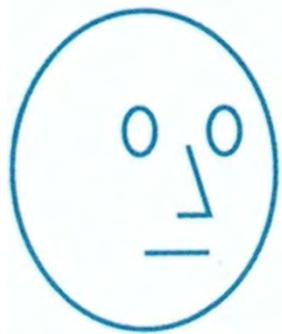
acknowledge
being it



talk to it, understand it



“together we heal & grow”



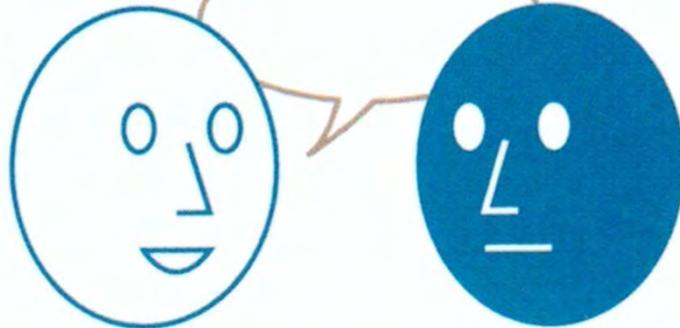
look at it, own it



5.
ME
actions, values, knowledges



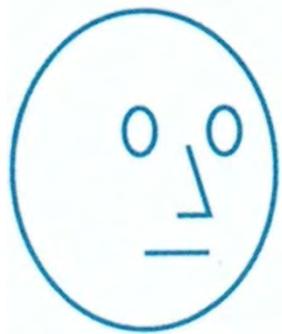
acknowledge
being it



talk to it, understand it



“together we heal & grow”



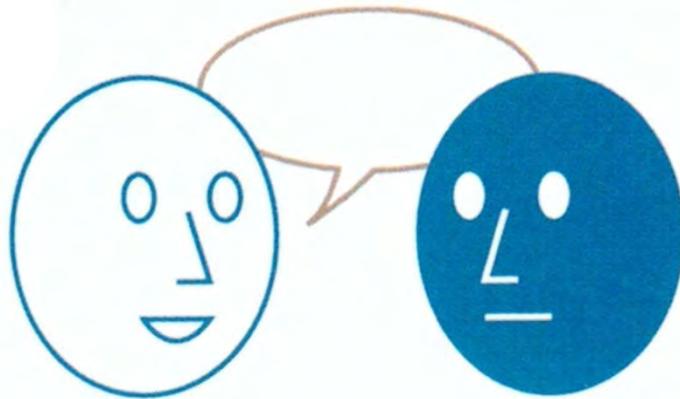
look at it, own it



5. **ME & YOU** actions, values, knowledges



**acknowledge
being it**



talk to it, understand it



LESSONS LEARNED

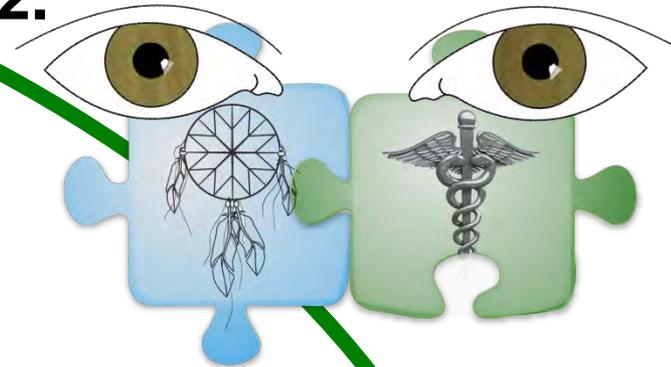
1. **ACKNOWLEDGE
WE NEED
EACH OTHER ...**
co-learning journey

4. **DO ... in a
CREATIVE, GROW
FORWARD WAY**

3. view "SCIENCE"
inclusively

5. put our *values + actions*
+ knowledges in front of
us ... like an object

2.



LESSONS LEARNED

1. **ACKNOWLEDGE
WE NEED
EACH OTHER ...**
co-learning journey

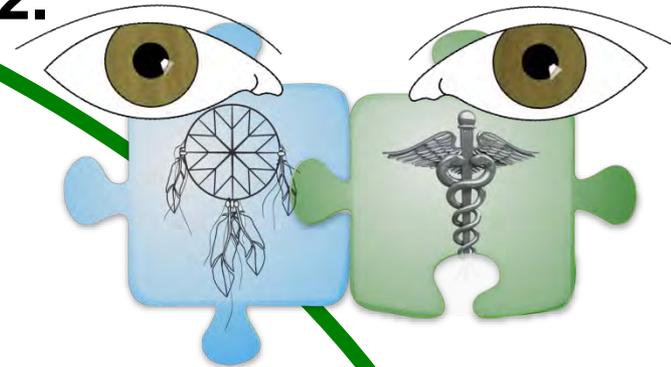
4. **DO ... in a
CREATIVE, GROW
FORWARD WAY**

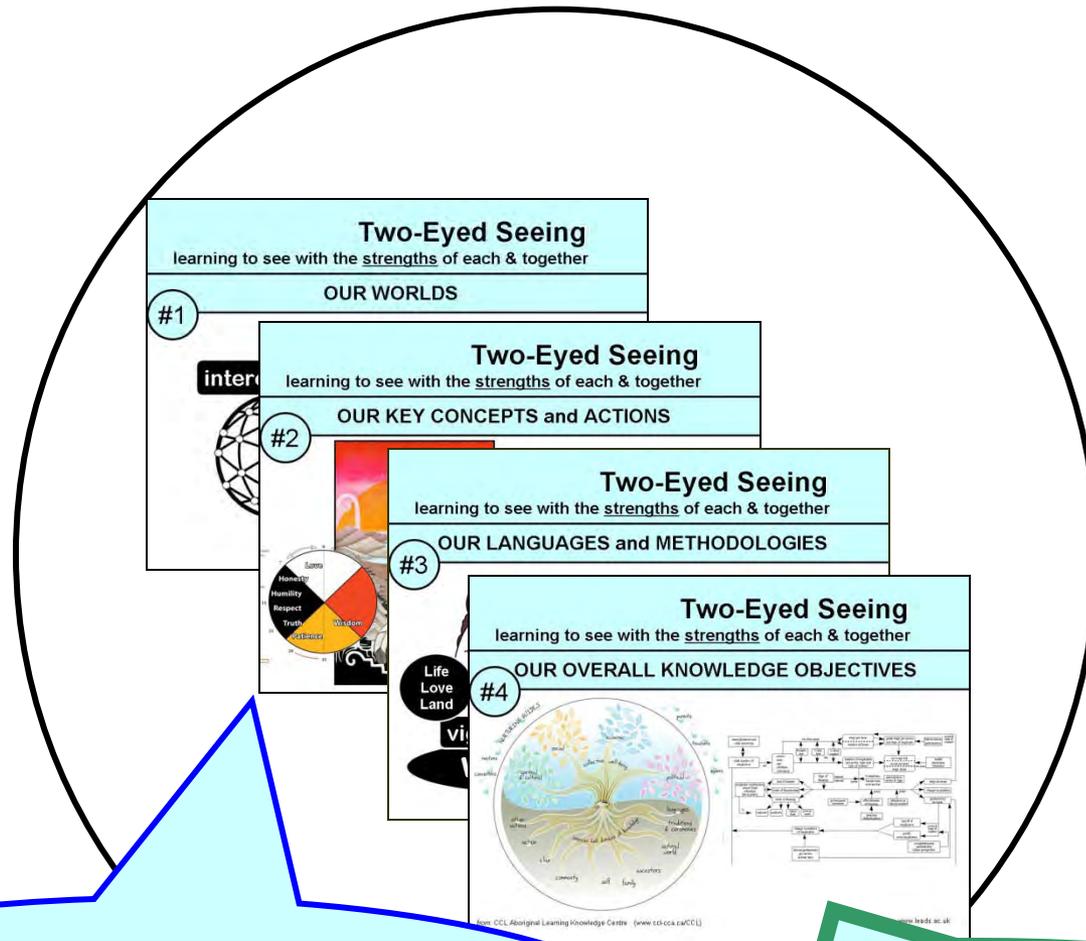
5. put our *values + actions*
+ knowledges in front of
us ... like an object

3. view "SCIENCE"
inclusively

6. use **VISUALS**

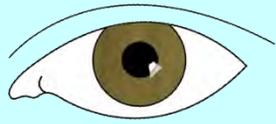
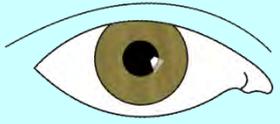
2.





5. put our *values + actions* + *knowledges* in front of us ... like an object

6. use **VISUALS**

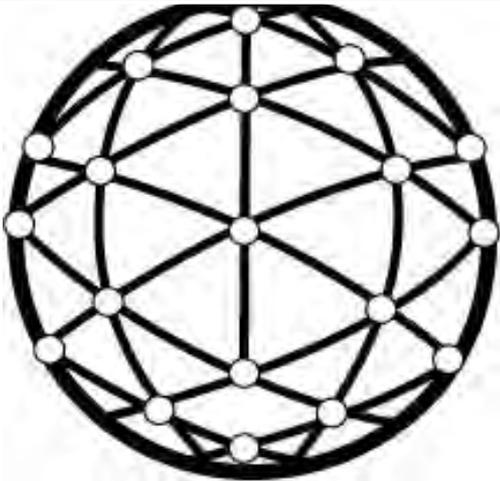


Two-Eyed Seeing

learning to see with the strengths of each & together

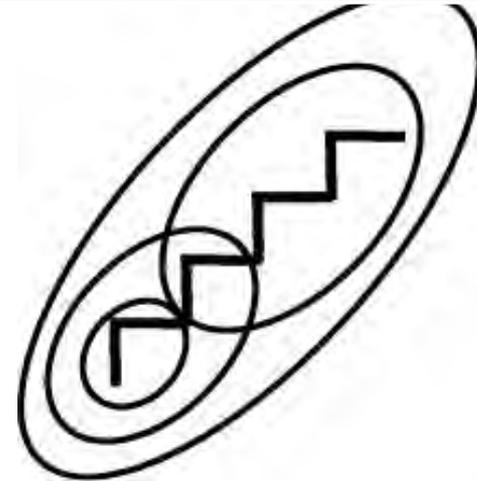
OUR NATURAL WORLD

interconnective

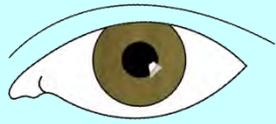
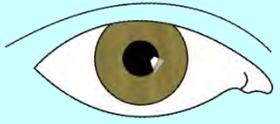


constant change

parts & wholes



ongoing evolution

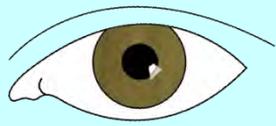
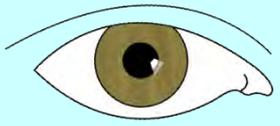


Two-Eyed Seeing

learning to see with the strengths of each & together

OUR NATURAL WORLD

Question:
What do we believe
the world or cosmos to be?
(ontology)



Two-Eyed Seeing

learning to see with the strengths of each & together

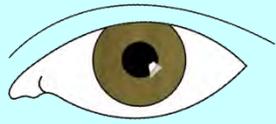
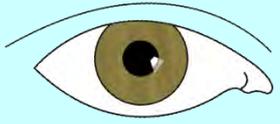
OUR NATURAL WORLD

interconnective

subject ...
interconnective
and animate:
spirit +
energy + matter
constant change

parts & wholes

object ...
comprised of parts and
wholes characterized by
systems and emergences:
energy + matter
ongoing evolution



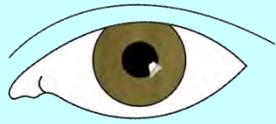
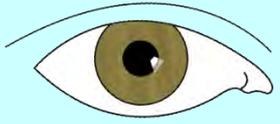
Two-Eyed Seeing

learning to see with the strengths of each & together

OUR KEY CONCEPTS and ACTIONS

Question:

**What do we value as
“ways of coming to know”
the cosmos?
(epistemology)**



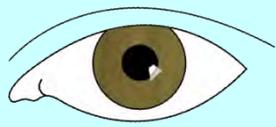
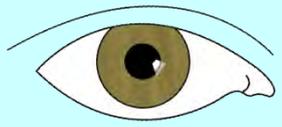
Two-Eyed Seeing

learning to see with the strengths of each & together

OUR KEY CONCEPTS and ACTIONS

- respect
- relationship
- reverence
- reciprocity
- ritual (ceremony)
- repetition
- responsibility

- hypothesis
(making & testing)
- data collection
- data analysis
- model & theory
construction



Two-Eyed Seeing

learning to see with the strengths of each & together

OUR KEY CONCEPTS and ACTIONS

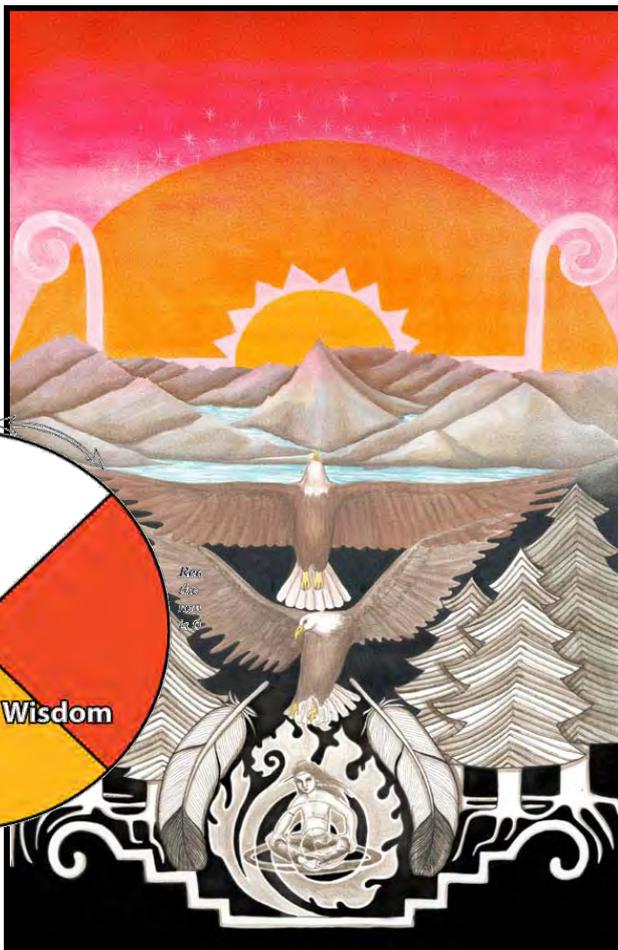
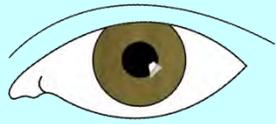
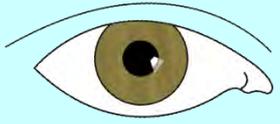


photo credit: NRC



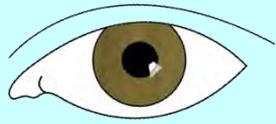
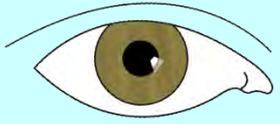
Two-Eyed Seeing

learning to see with the strengths of each & together

OUR LANGUAGES and METHODOLOGIES

Question:

**What can remind us
of the complexity within
our ways of knowing?**



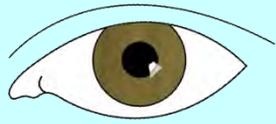
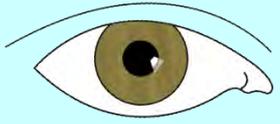
Two-Eyed Seeing

learning to see with the strengths of each & together

OUR LANGUAGES and METHODOLOGIES

weaving of patterns within nature's patterns via creative relationships and reciprocities among ***love, land, and life (vigour)*** that are constantly reinforced and nourished by Aboriginal languages

un-weaving of nature's patterns (especially via analytic logic and the use of instruments) to cognitively reconstruct them, especially using ***mathematical language (rigour)*** and computer models



Two-Eyed Seeing

learning to see with the strengths of each & together

OUR LANGUAGES and METHODOLOGIES

Life
Love
Land

vigour

WEAVING

Math
&
Instruments

rigour

UN-WEAVING



Two-Eyed Seeing

learning to see with the strengths of each & together

OUR LANGUAGES and METHODOLOGIES



Life
Love
Land

vigour

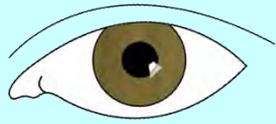
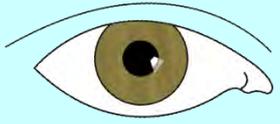
WEAVING



Math
&
Instruments

rigour

UN-WEAVING

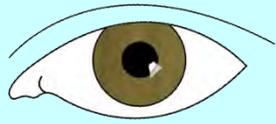
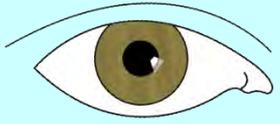


Two-Eyed Seeing

learning to see with the strengths of each & together

OUR OVERALL KNOWLEDGE OBJECTIVES

Question:
What overall goals
do we have for
our ways of knowing?



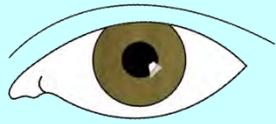
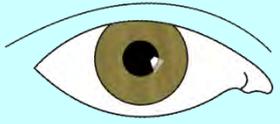
Two-Eyed Seeing

learning to see with the strengths of each & together

OUR OVERALL KNOWLEDGE OBJECTIVES

collective, living
knowledge to enable
nourishment of one's
journey within expanding
sense of "place, emergence
and participation" for
wholeness and
interconnectiveness

dynamic, testable,
published knowledge
independent of
personal experience
that can enable
prediction and control



Two-Eyed Seeing

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collective, living
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**towards resonance
of understanding
within environment**

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**towards construction
of understanding
of environment**



Two-Eyed Seeing

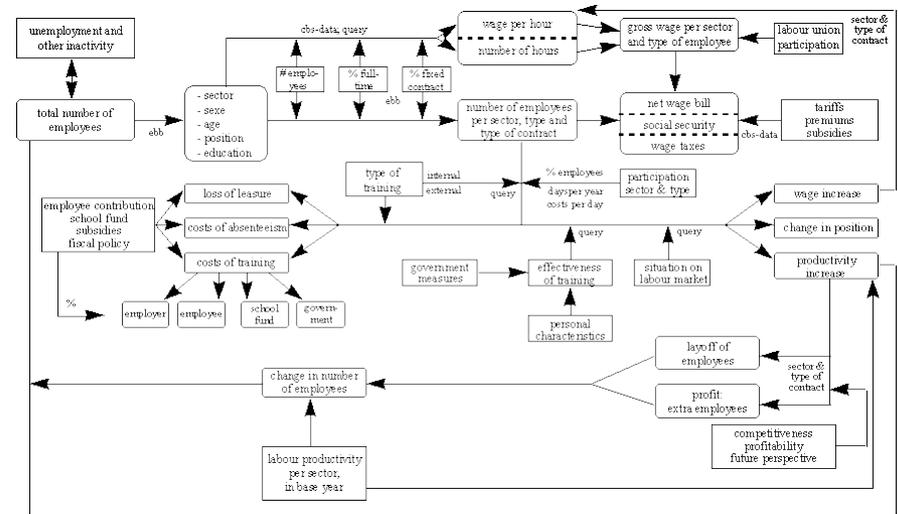
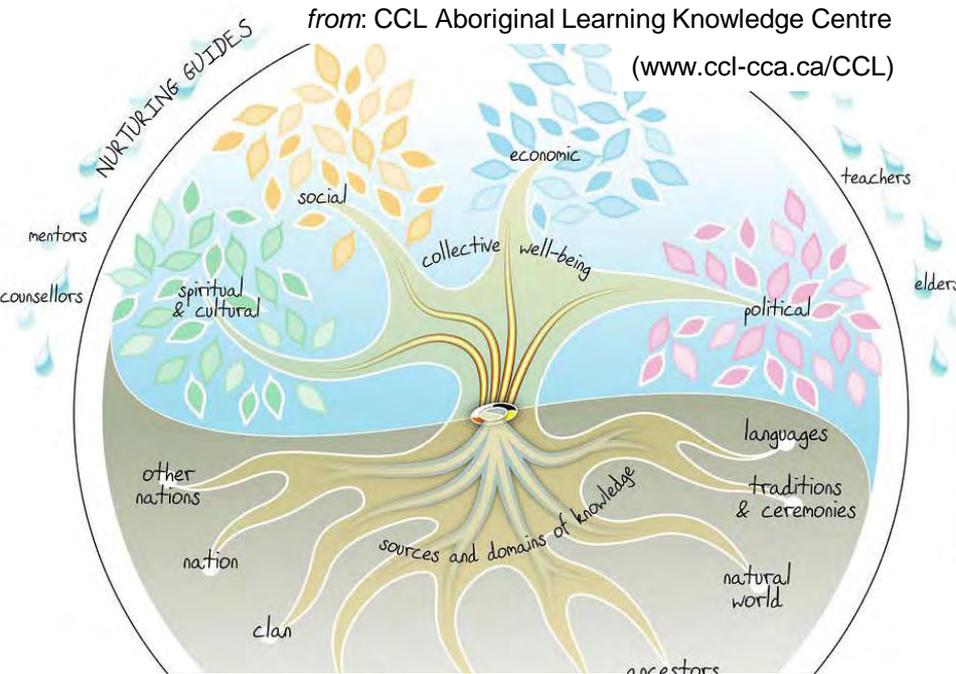
learning to see with the strengths of each & together

OUR OVERALL KNOWLEDGE OBJECTIVES

from: CCL Aboriginal Learning Knowledge Centre

(www.ccl-cca.ca/CCL)

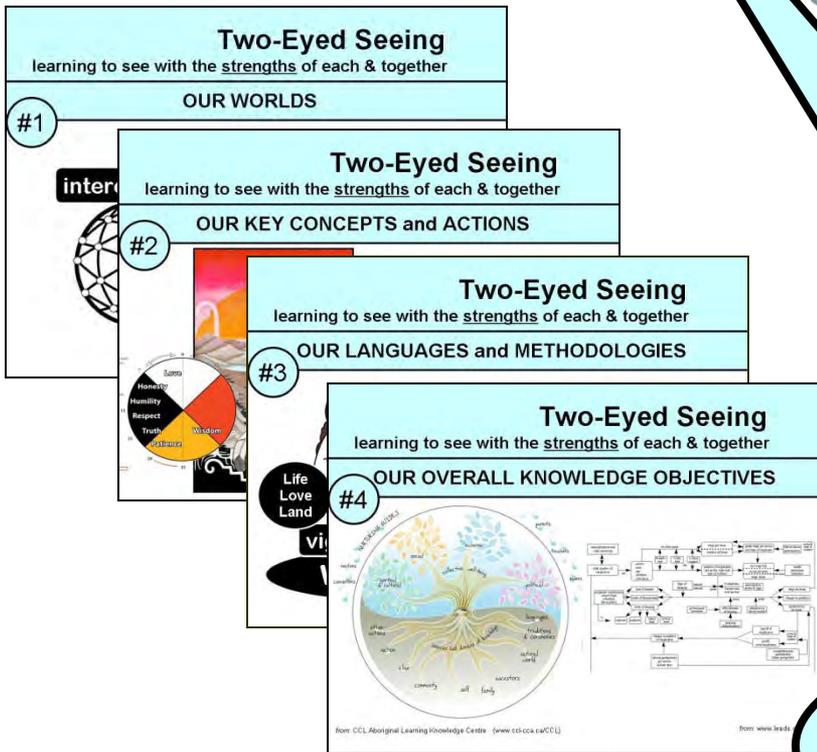
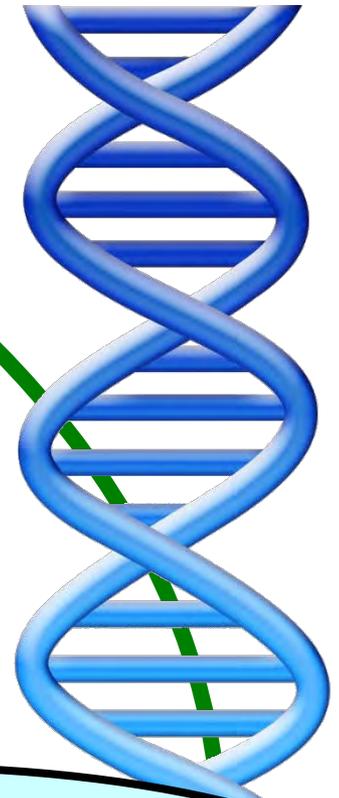
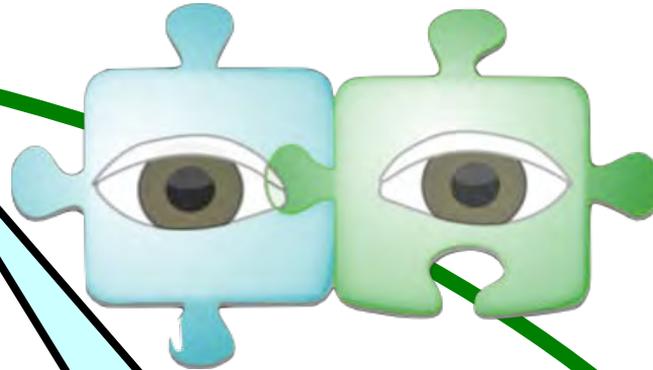
from: www.leads.ac.uk



**towards resonance
of understanding
within environment**

**towards construction
of understanding
of environment**

LESSONS LEARNED



7. WEAVE
back and forth between
our worldviews

7 basic or fundamental LESSONS LEARNED



1. **ACKNOWLEDGE
WE NEED
EACH OTHER ...**
co-learning journey

4. **DO ... in a
CREATIVE, GROW
FORWARD WAY**

2. 
3. view "SCIENCE"
inclusively

5. put our *values + actions*
+ knowledges in front of
us ... like an object

6. use **VISUALS**

7. **WEAVE**
back and forth between
our worldviews



Science:
“stories of our interactions
with and within nature”

**Indigenous and Western
scientific knowledges are
based in observations
of the natural world.**

**Science is dynamic,
pattern-based knowledge.**



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PATTERN

Sherman's Lagoon

OKAY, WE'RE HERE AT THE MALL. WHERE'S THIS WATCH YOU WANT TO BUY?

PATIENCE. PATIENCE.

ONE DOESN'T JUST RUSH INTO THE MALL FOR A QUICK ITEM AND LEAVE. IT'S NOT A CONVENIENCE STORE.

ONE MUST TAKE IT ALL IN. MEASURE THE VIBE. SOAK UP THE AMBIENCE. FIND PATTERNS AND IDENTIFY THE DISTURBANCES.

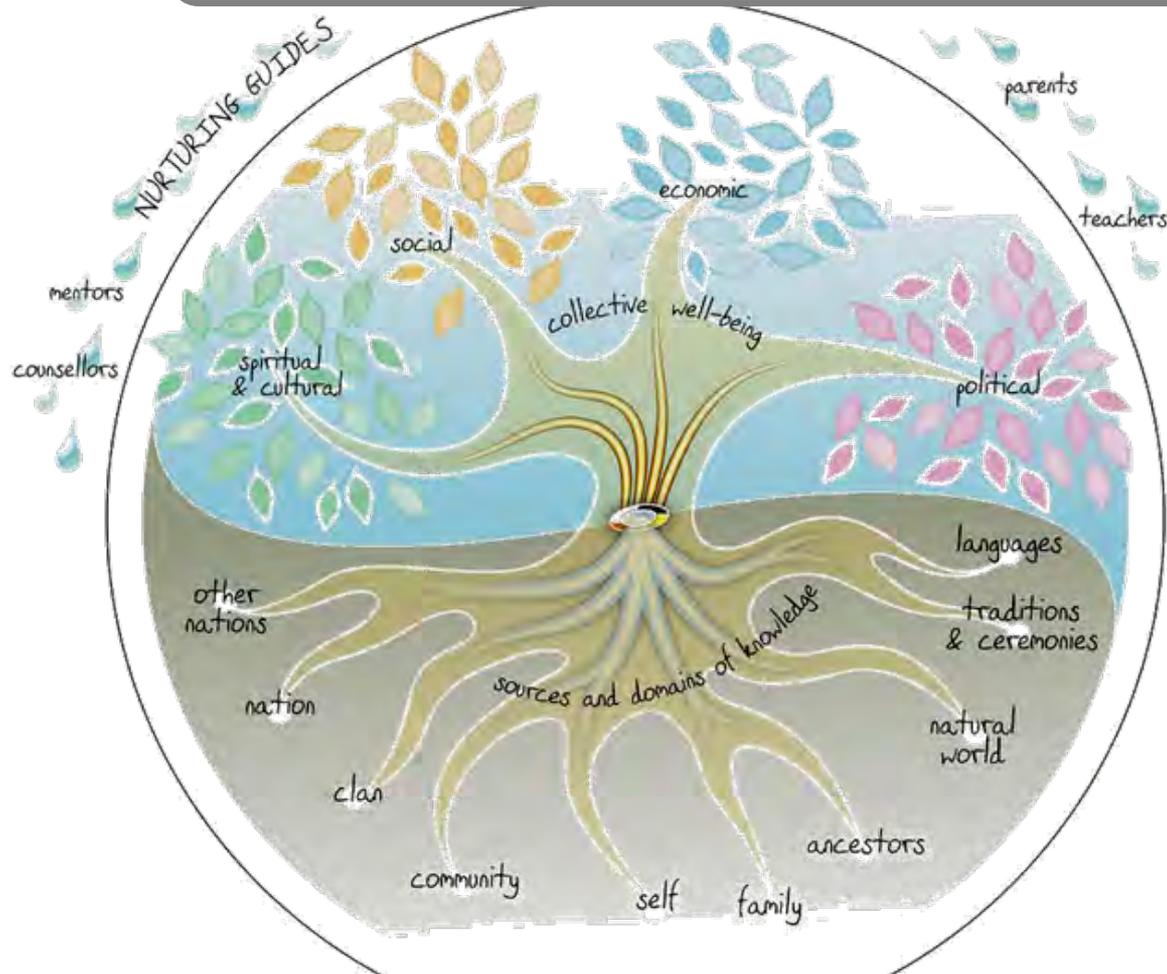
TRANSLATION?

YOU'RE HERE ALL DAY, PAL.

<http://www.shermanslagoon.com>

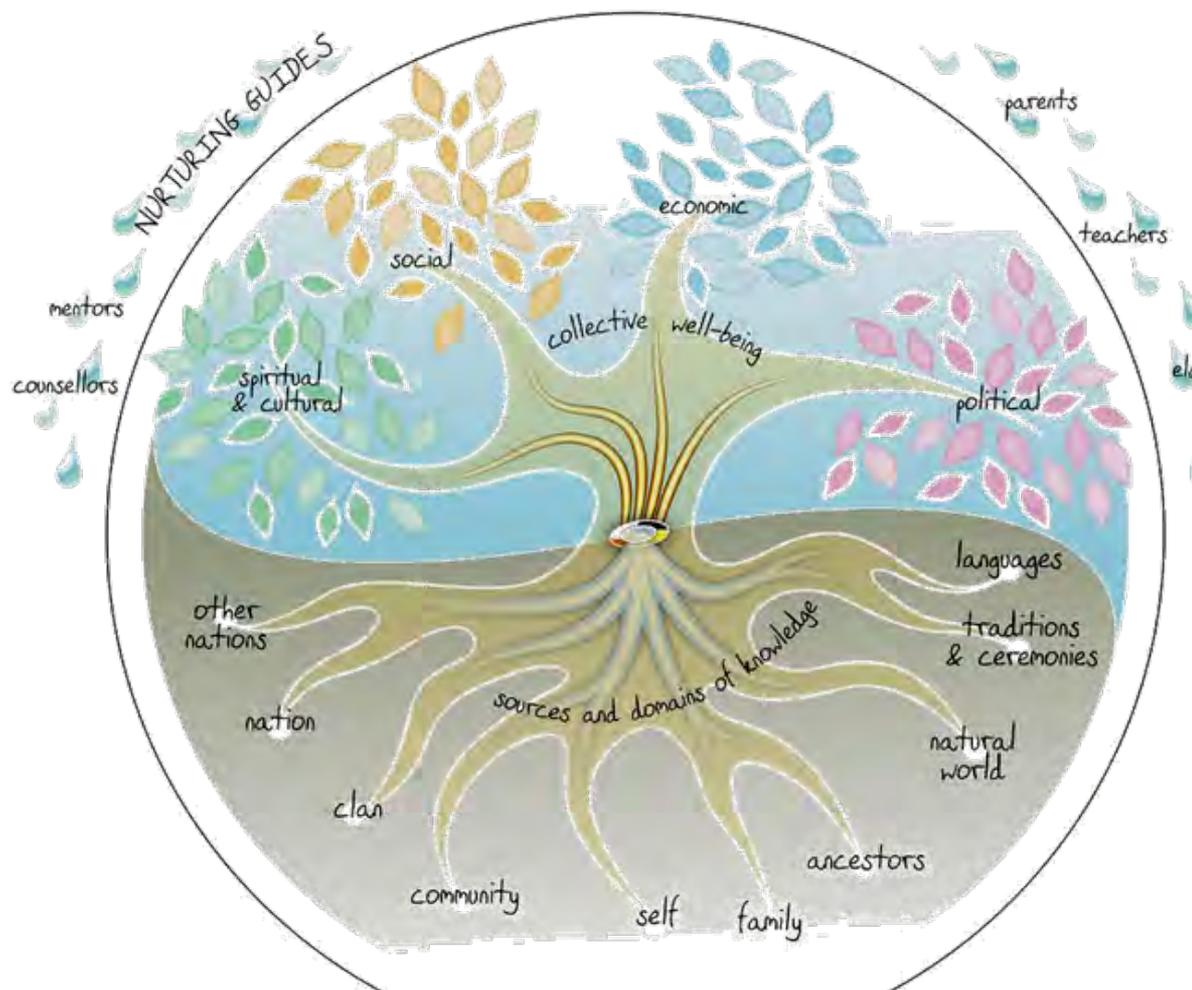
1-11 ©2004 Jim Toomey. Dist. by King Features Syndicate, Inc.

Lifelong Learning Model



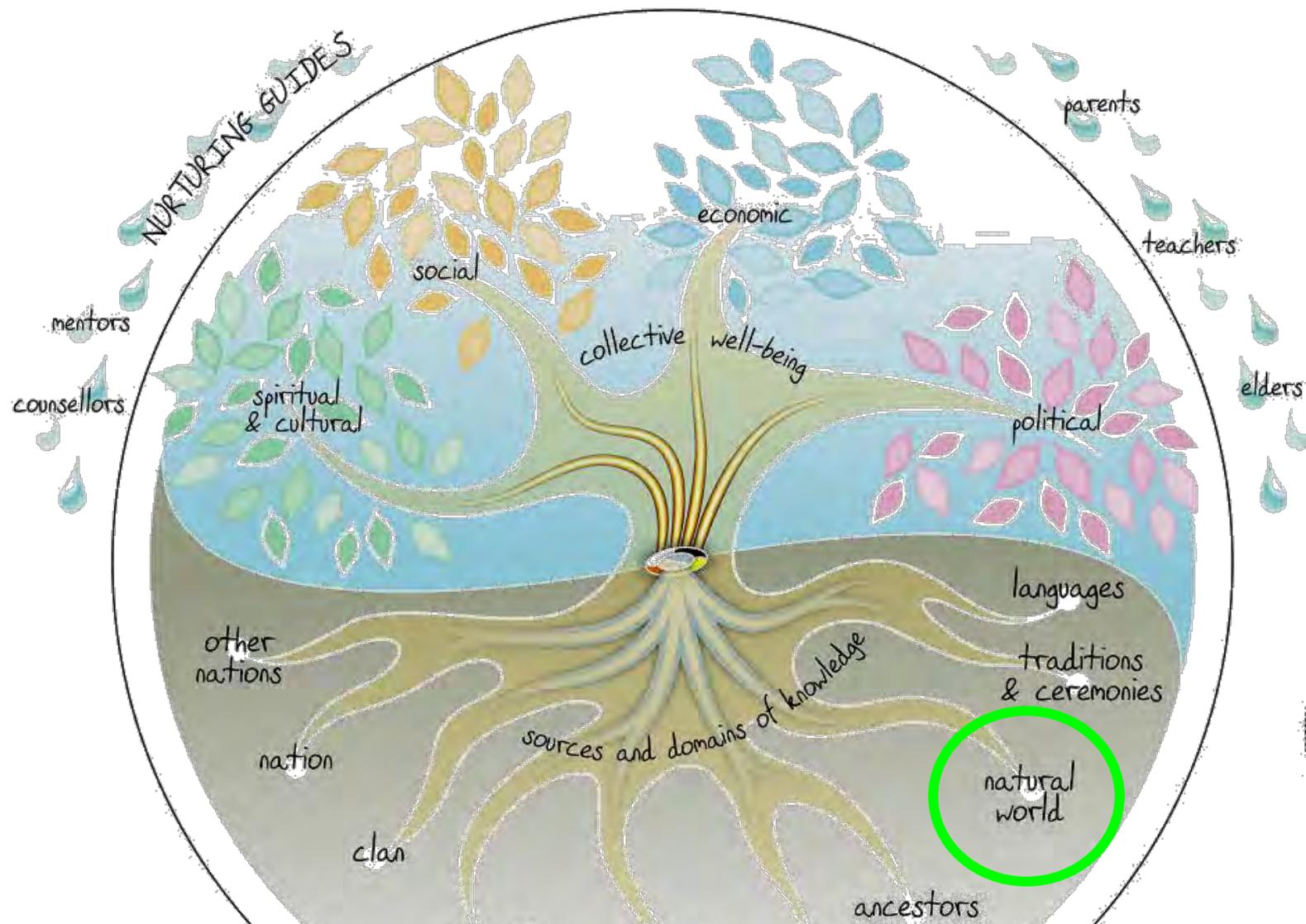
First Nations Holistic Lifelong Learning Model

from: Canadian Council on Learning: Aboriginal Learning Knowledge Centre



First Nations Holistic Lifelong Learning Model

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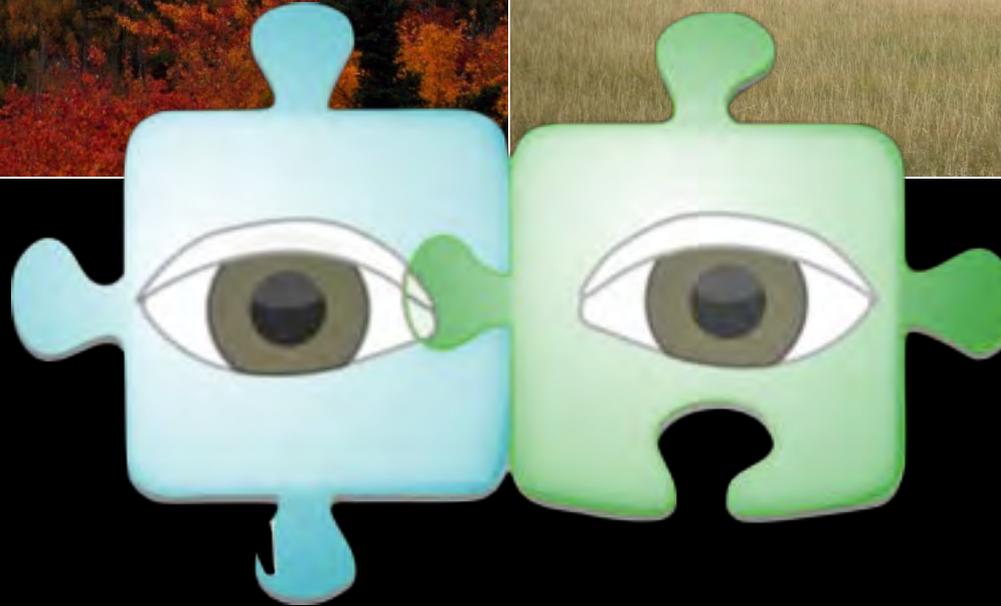


First Nations Holistic Lifelong Learning Model

from: Canadian Council on Learning: Aboriginal Learning Knowledge Centre



Albert

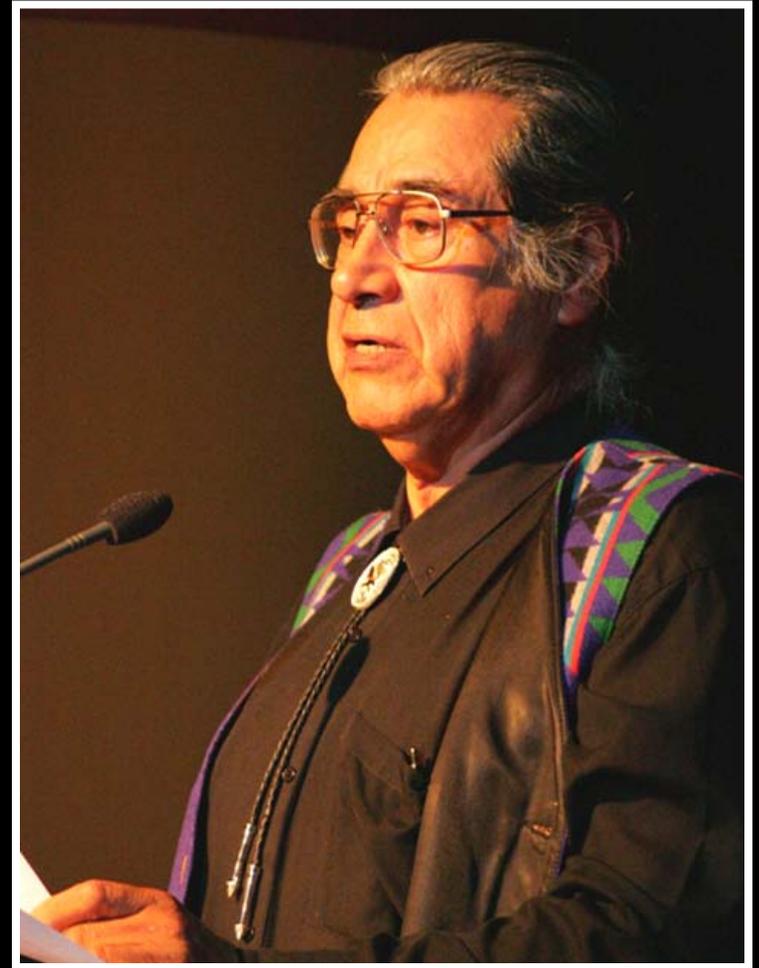
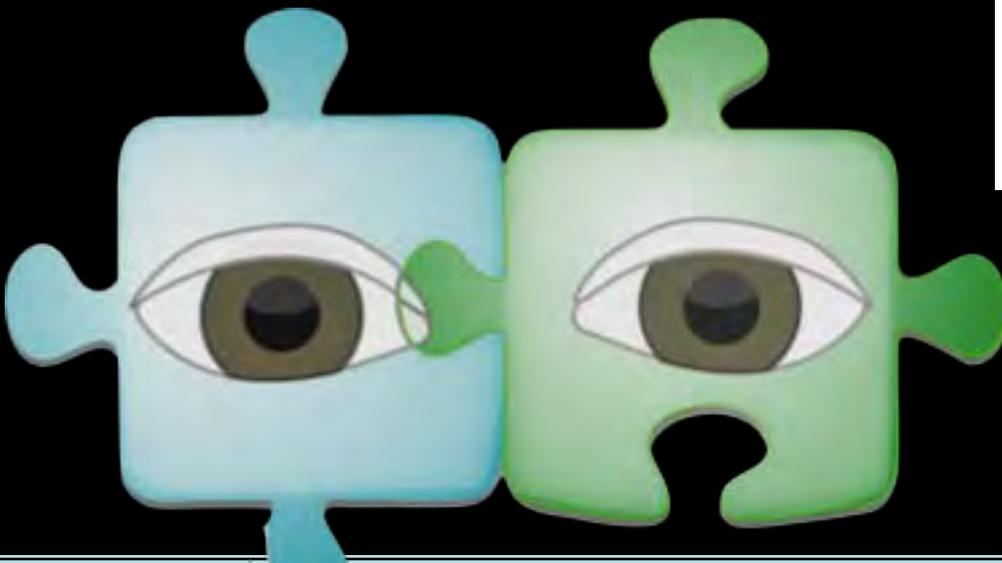


Cheryl



Eskasoni,
Unama'ki,
Mi'kmaq Nation

Two-Eyed *Seeing*



Elder Albert Marshall
Eskasoni community
Mi'kmaq Nation



Aboriginal perspectives must be put forward.

Knowledge
is spirit.

It is a gift,
passed on
through
many people.

We must
pass it on.



Knowledge
is spirit.

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passed on
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We must
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stars are the “time-givers”
... they are the calendar



Knowledge
is spirit.

It is a gift,
passed on
through
many people.

We must
pass it on.



Pemi Pungek Mi'kma'ki

**stars are the "time-givers"
... they are the calendar**

This poster is dedicated to all Mi'kmaq...
The poster is made by the...
... Cape Breton University...
... Mi'kmaq...
... Cape Breton University...
... Mi'kmaq...
... Cape Breton University...

CAPE BRETON UNIVERSITY

Knowledge
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Pemi Pungek Mi'kma'ki

This poster is dedicated to all Mi'kmaq Elders.

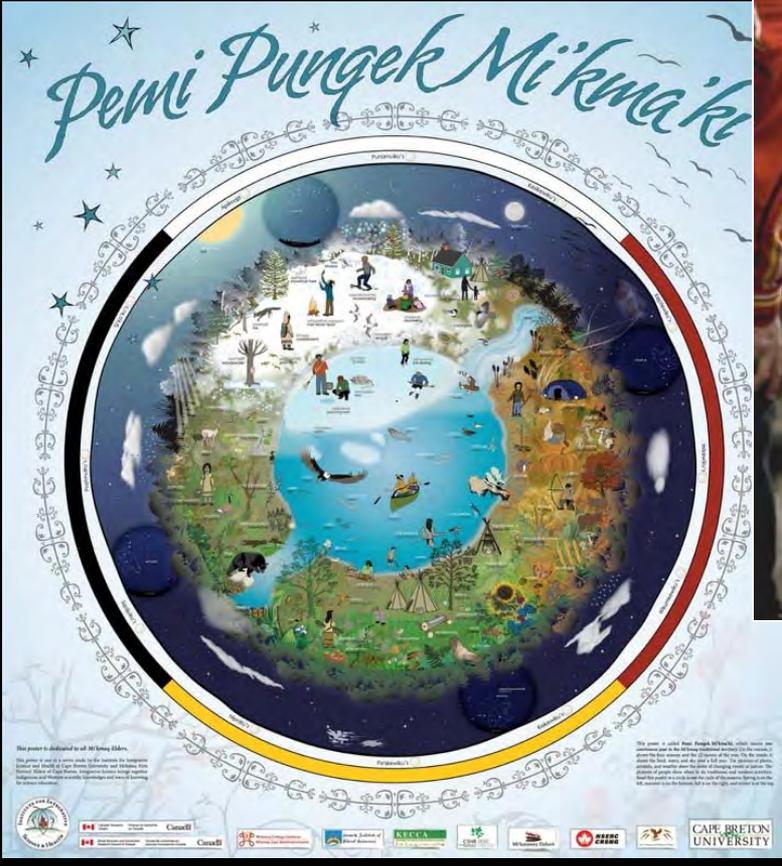
This poster is one of a series made by the Institute for Language, Culture and Health at Cape Breton University and Mi'kmaq from Mi'kma'ki. Elders of Cape Breton, Innu/Micmacs from the Mi'kmaq Nation, and Mi'kmaq from the Mi'kmaq Nation have gathered together to share their knowledge and wisdom with the people of Cape Breton.

This poster was created by Ben Pungek Mi'kmaq. It is a traditional Mi'kmaq calendar. It shows the four seasons and the 12 months of the year. On the inside, it shows the four winds and also a full moon. The pictures of plants, animals, and people show what is going on in the world. Spring is on the left, summer is on the bottom, fall is on the right, and winter is on the top.

CAPE BRETON UNIVERSITY

Logos for various organizations: University of Cape Breton, Cape Breton University, CIBC, Scotiabank, Caracall, APP, Nova Scotia Department of Education, KECCA, Cape Breton University, Mi'kmaq Culture, NSERC, and others.

We are equal to, and also part and parcel of, the whole.



This poster is distributed in all 10 Cree dialects.

This poster is a work of art created by the artist, Mikma'ki, who lives in the traditional territory of the Mi'kmaq people of the Mi'kmaq Nation. The poster is a work of art created by the artist, Mikma'ki, who lives in the traditional territory of the Mi'kmaq people of the Mi'kmaq Nation. The poster is a work of art created by the artist, Mikma'ki, who lives in the traditional territory of the Mi'kmaq people of the Mi'kmaq Nation.

UNIVERSITY OF CAPE BRETON

DEPARTMENT OF HEALTH AND SOCIAL SERVICES

CAPE BRETON UNIVERSITY

Education towards rivers of knowledge





Wela'liog

Thank you