

PEDAGOGICAL PRACTICES:
RE-THINKING THE WORLDS OF TEACHING
A CONFERENCE ON TEACHER EDUCATION

11 February 2009; Surrey Campus

KEYNOTE PRESENTATION

SFU

SIMON FRASER UNIVERSITY
THINKING OF THE WORLD

**Growing Together:
Knowledge Gardening for
Integrative Science**

Cheryl Bartlett, PhD

**Canada Research Chair
in Integrative Science**

Professor of Biology, Sydney, Nova Scotia

CAPE BRETON
UNIVERSITY



PEDAGOGICAL PRACTICES: RE-THINKING THE WORLDS OF TEACHING

A CONFERENCE ON TEACHER EDUCATION

KEYNOTE PRESENTATION: Growing Together: Knowledge Gardening for Integrative Science (abstract)

“Integrative Science” was created at Cape Breton University in Sydney, Nova Scotia, in the mid-1990s. Its origins were in the post-secondary educational arena and it is the radical innovation that Mi’kmaw First Nation individuals suggested was required to begin to address the shocking under-participation by their people in university science programs and thus also in careers that require such education. Integrative Science is defined as “bringing together Indigenous and Western scientific knowledges and ways of knowing” and its arenas now extend beyond science education to include science research, applications, and outreach to Aboriginal youth and community. The presentation will share concepts developed and lessons learned over the past 15 years within a journey of “co-learning” by Integrative Science participants (university and Aboriginal community). Key insights have been to view our journey as a “growing forward” and much of our work as “knowledge gardening”. These will be explained and illustrated; consideration will also be given to “The Learning Spirit”.



PEDAGOGICAL PRACTICES: RE-THINKING THE WORLDS OF TEACHING A CONFERENCE ON TEACHER EDUCATION

KEYNOTE PRESENTATION



Canada Research
Chairs

Chaires de recherche
du Canada

Canada



Social Sciences and Humanities
Research Council of Canada

Conseil de recherches en
sciences humaines du Canada

Canada

Thank you / Wela'liq

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



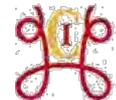
**IWK Health Centre
Foundation**



Mermaid Theatre
of Nova Scotia

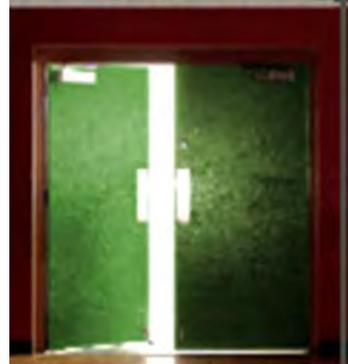


Eskasoni First Nation Detachment
Royal Canadian Mounted Police
Gendarmerie royale du Canada



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

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



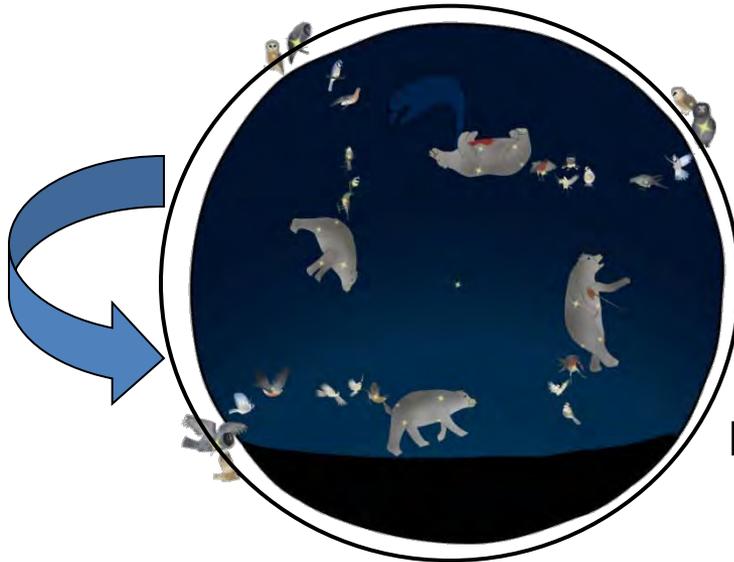
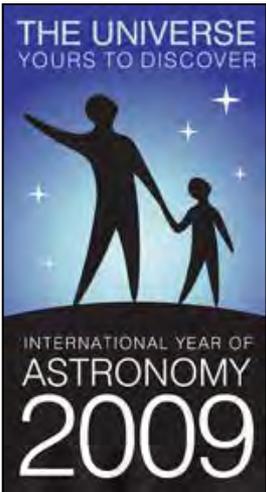
PEDAGOGICAL PRACTICES:
RE-THINKING THE WORLDS OF TEACHING
A CONFERENCE ON TEACHER EDUCATION

KEYNOTE PRESENTATION

SFU

SIMON FRASER UNIVERSITY
THINKING OF THE WORLD

**Growing Together:
Knowledge Gardening for
Integrative Science**



Lillian Marshall, Elder
Potlotek community
Mi'kmaq Nation



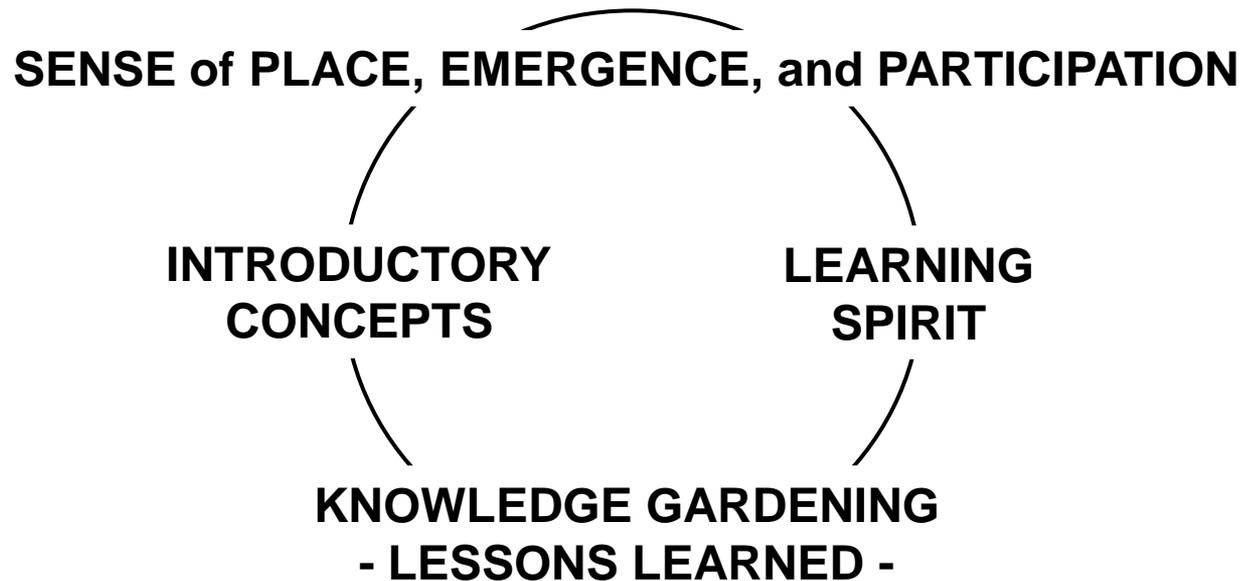
PEDAGOGICAL PRACTICES:
RE-THINKING THE WORLDS OF TEACHING
A CONFERENCE ON TEACHER EDUCATION

KEYNOTE PRESENTATION

SFU

SIMON FRASER UNIVERSITY
THINKING OF THE WORLD

Growing Together: Knowledge Gardening for Integrative Science



Territory of the Blackfoot Confederacy Siksika Nation (Treaty 7)



**INTRODUCTORY
CONCEPTS**

Territory of the Blackfoot Confederacy Siksika Nation (Treaty 7)

**INTRODUCTORY
CONCEPTS**



image from: <http://jan.ucc.nau.edu/~rcb7/namPres.jg>

Mi'kmaq Nation

**INTRODUCTORY
CONCEPTS**

PEDAGOGICAL PRACTICES: RE-THINKING THE WORLDS OF TEACHING A CONFERENCE ON TEACHER EDUCATION

SFU

SIMON FRASER UNIVERSITY
THINKING OF THE WORLD

INTRODUCTORY
CONCEPTS

phrases & words

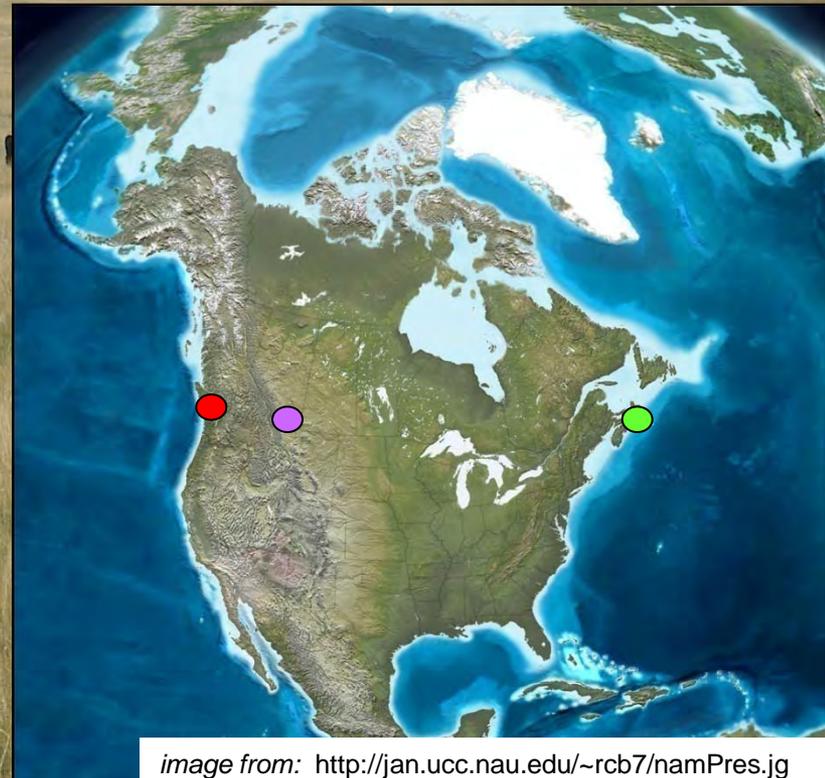


image from: <http://jan.ucc.nau.edu/~rcb7/namPres.jg>

PEDAGOGICAL PRACTICES:
RE-THINKING THE WORLDS OF TEACHING
A CONFERENCE ON TEACHER EDUCATION

SFU

SIMON FRASER UNIVERSITY
THINKING OF THE WORLD

**Growing Together:
Knowledge Gardening for
Integrative Science**



Growing Together:

**Go into a forest, you see the birch,
maple, pine. Look underground and
all those trees are holding hands.
We as people must do the same.**

(late Mi'kmaq Chief, Spiritual Elder
and Healer Charlie Labrador)





Growing Together:

**Go into a forest, you see the birch,
maple, pine. Look underground and
all those trees are holding hands.
We as people must do the same.**

(late Mi'kmaq Chief, Spiritual Elder
and Healer Charlie Labrador)





Growing Together:

**Go into a forest, you see the birch,
maple, pine. Look underground and
all those trees are holding hands.
We as people must do the same.**

(late Mi'kmaq Chief, Spiritual Elder
and Healer Charlie Labrador)





Growing Together:

Integrative Science





**bringing together
Indigenous and Western
scientific knowledges and ways of knowing**



Integrative Science

CAPE BRETON
UNIVERSITY

Indigenous

Western

“bringing our sciences together”



**INTRODUCTORY
CONCEPTS**

**KNOWLEDGE GARDENING
- LESSONS LEARNED -**

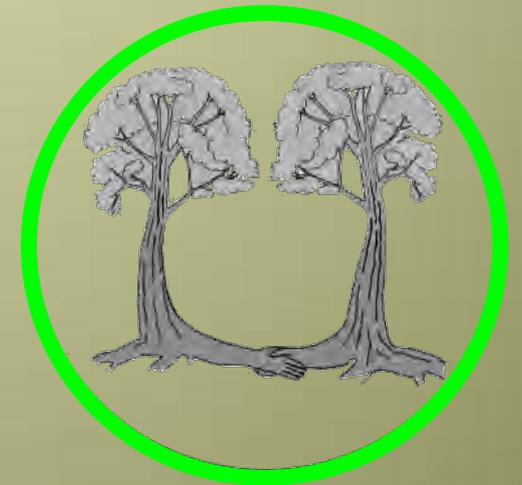
LESSONS LEARNED

Knowledge Gardening

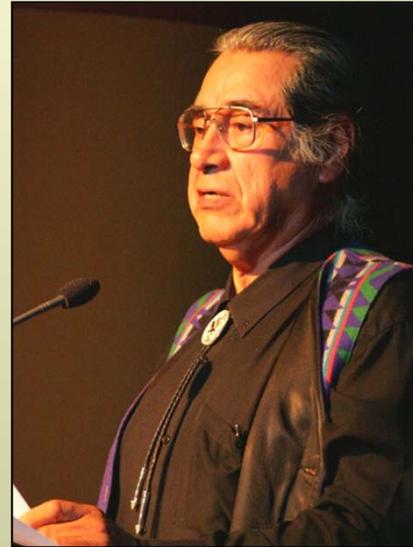
LESSONS LEARNED

7

over 15 years



Elders, Mi'kmaq Nation



Jane Meader





Elders, Mi'kmaq Nation and other Knowledge Holders plus various Knowledge Gatherings



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



Mi'kmawey Debert



Students, Mi'kmaq Nation



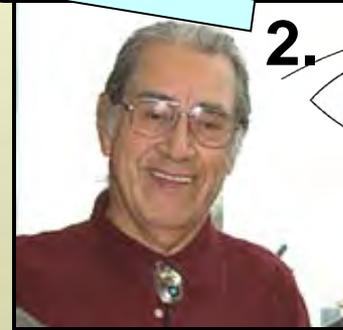
LESSONS LEARNED

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

LESSONS LEARNED

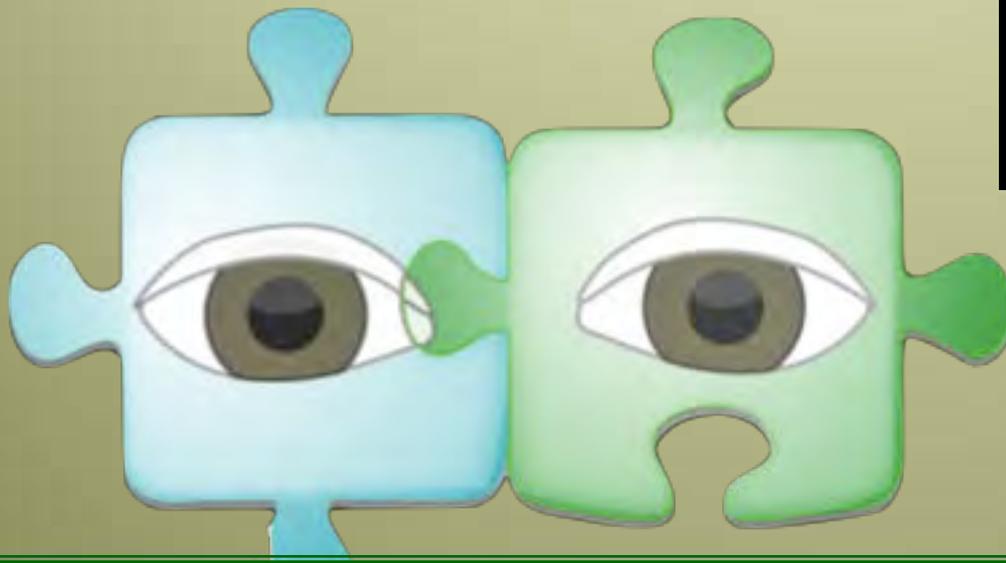
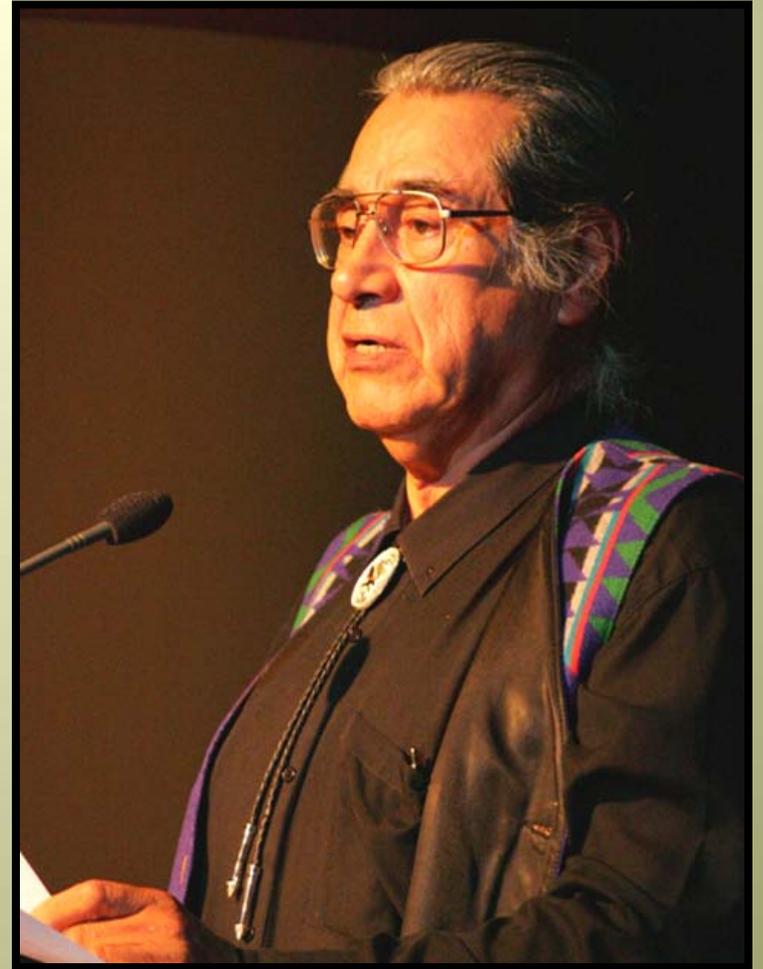
Two-Eyed Seeing learning to see with the strengths of each & together

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



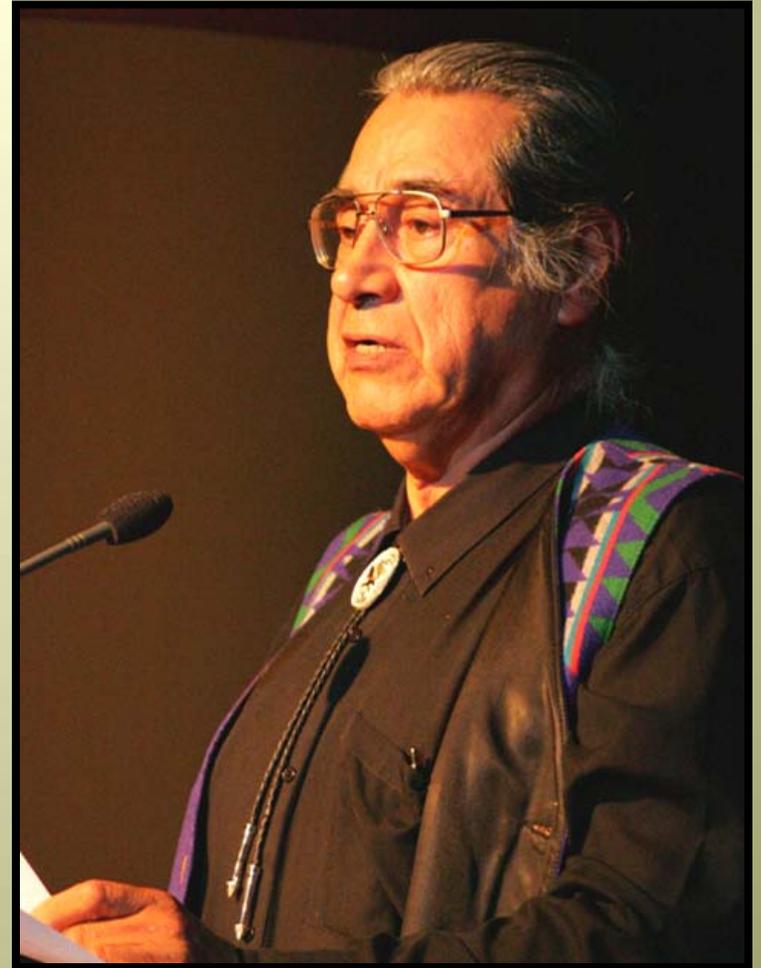
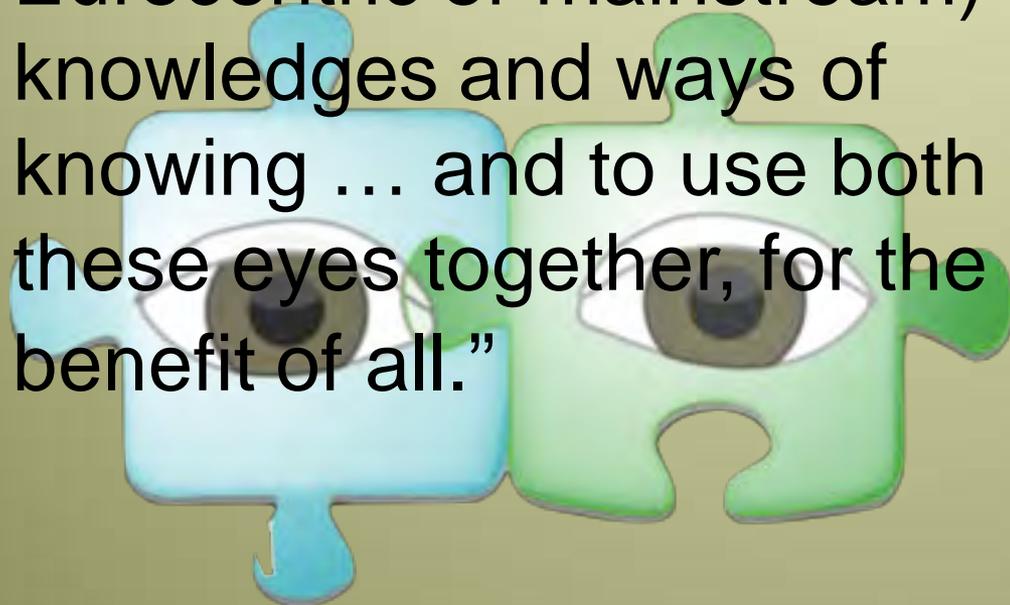
Albert Marshall, Elder, Mi'kmaq Nation

Two-Eyed *Seeing*



Elder Albert Marshall
Eskasoni community
Mi'kmaq Nation

“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 to use both these eyes together, for the benefit of all.”

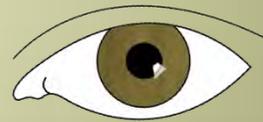
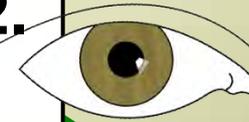
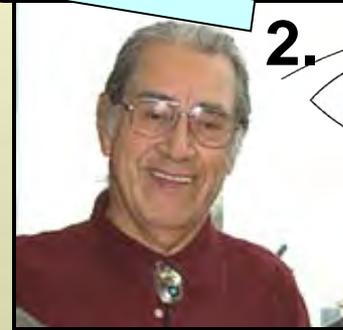


Elder Albert Marshall
Eskasoni community
Mi'kmaq Nation

LESSONS LEARNED

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

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



Albert Marshall, Elder, Mi'kmaq Nation

3. view "SCIENCE"
inclusively



Science?



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



“stories of our interactions with and within nature”

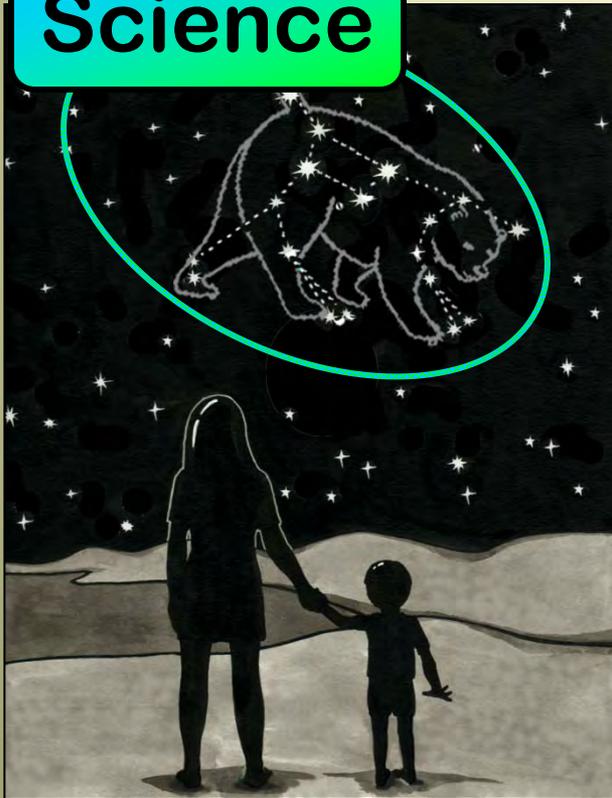
pattern smarts

Science is dynamic,
pattern-based knowledge.



stories of our interactions with and within nature

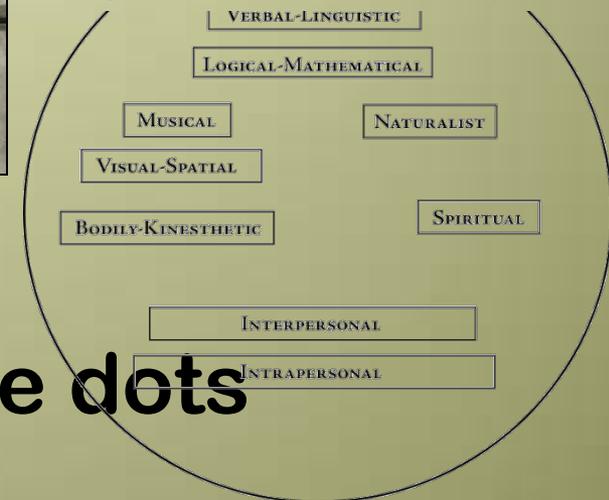
Science



pattern

- recognition
- transformation
- expression

Multiple Intelligences (Howard Gardner)

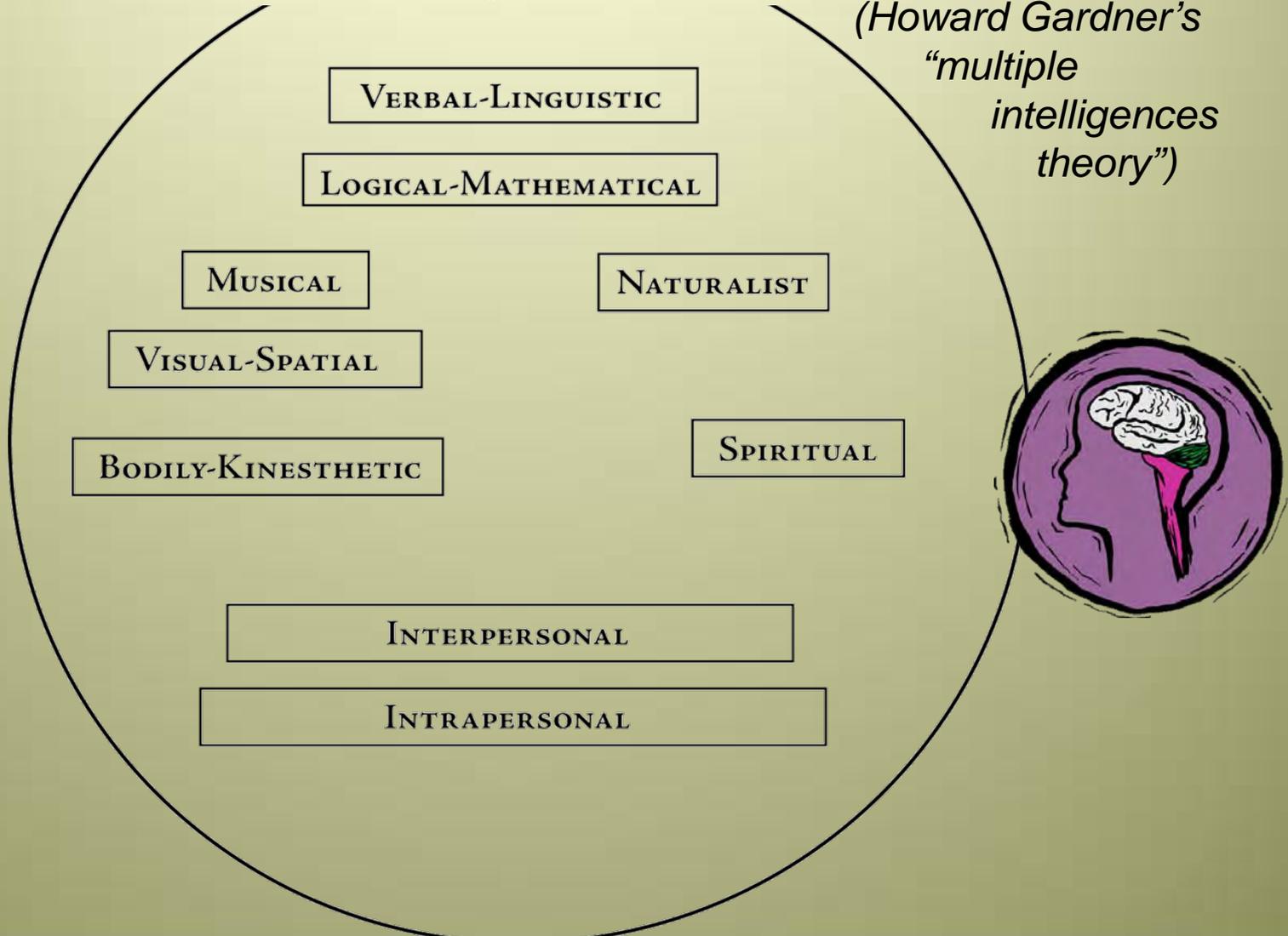


- **pattern smarts**
- various ways to connect the dots
- variety in our stories

our science stories ...

draw upon our **“pattern smarts”**

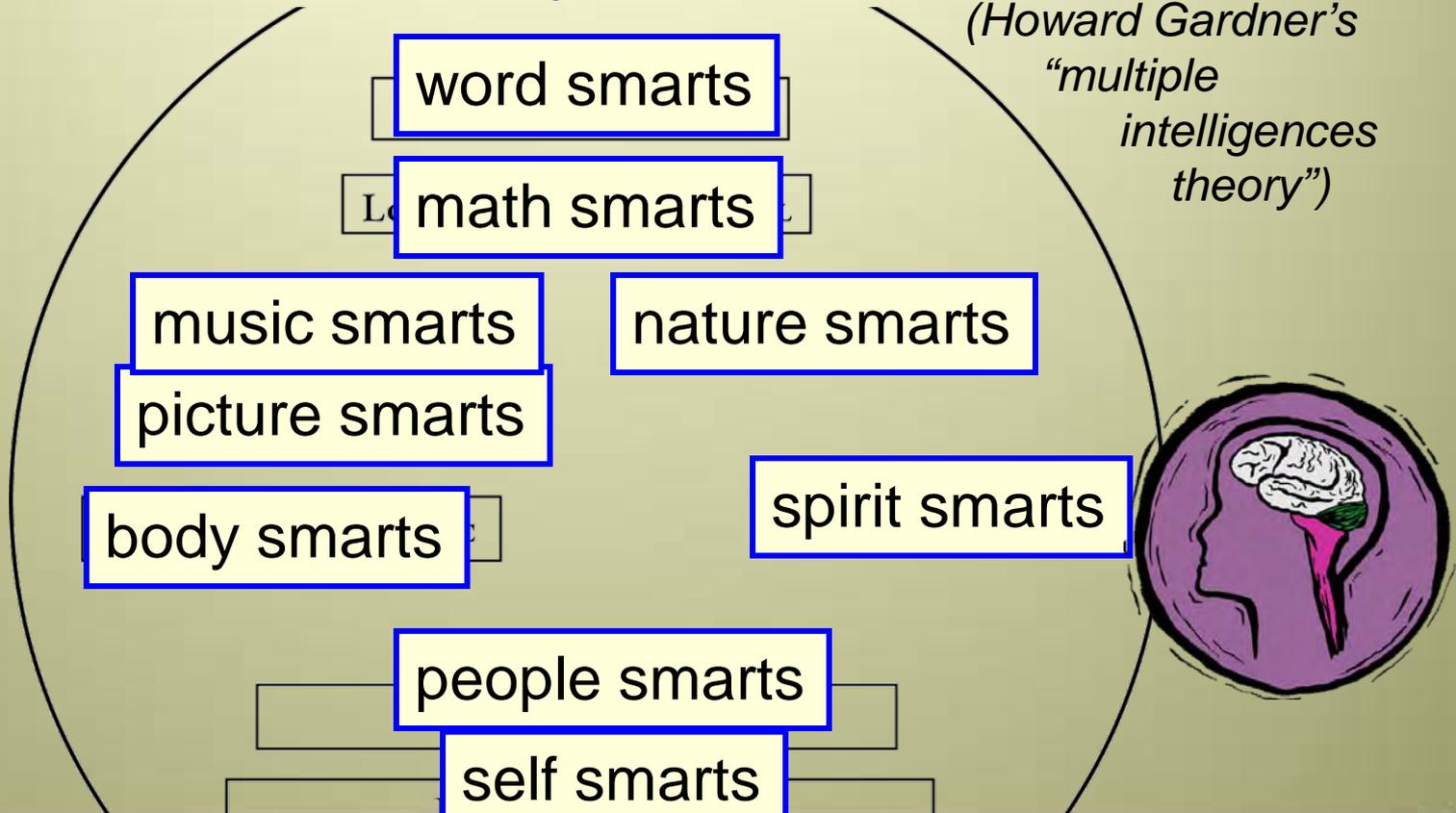
*(Howard Gardner’s
“multiple
intelligences
theory”)*



our science stories ...

draw upon our “**pattern smarts**”

*(Howard Gardner’s
“multiple
intelligences
theory”)*



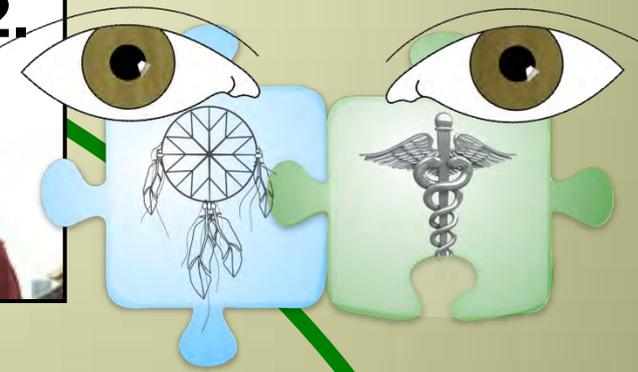
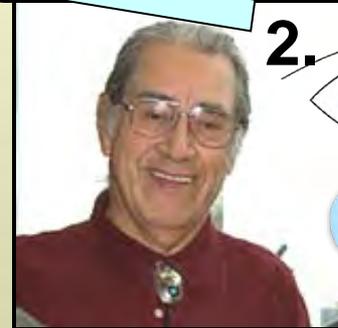
SANCTIONED PERSPECTIVES & INTELLIGENCES:

who we are; where we are; where we were;
what we know, do and value

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**

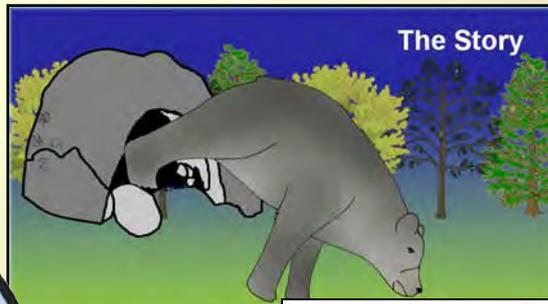
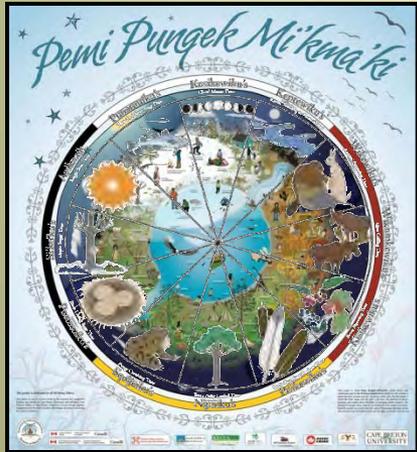
3. view "SCIENCE"
inclusively



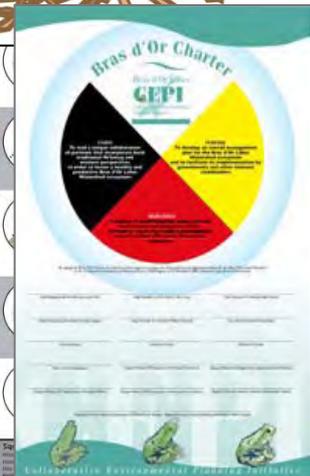
Murdena Marshall, Elder, Mi'kmaq Nation

Together We Heal & Grow
seeing & acknowledging my deeds

LESSONS LEARNED



This is the s
also known a



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



I Got It From an Elder
Contributions to Healing Language



er, Mi'km

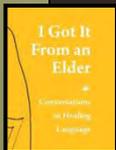
my

“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

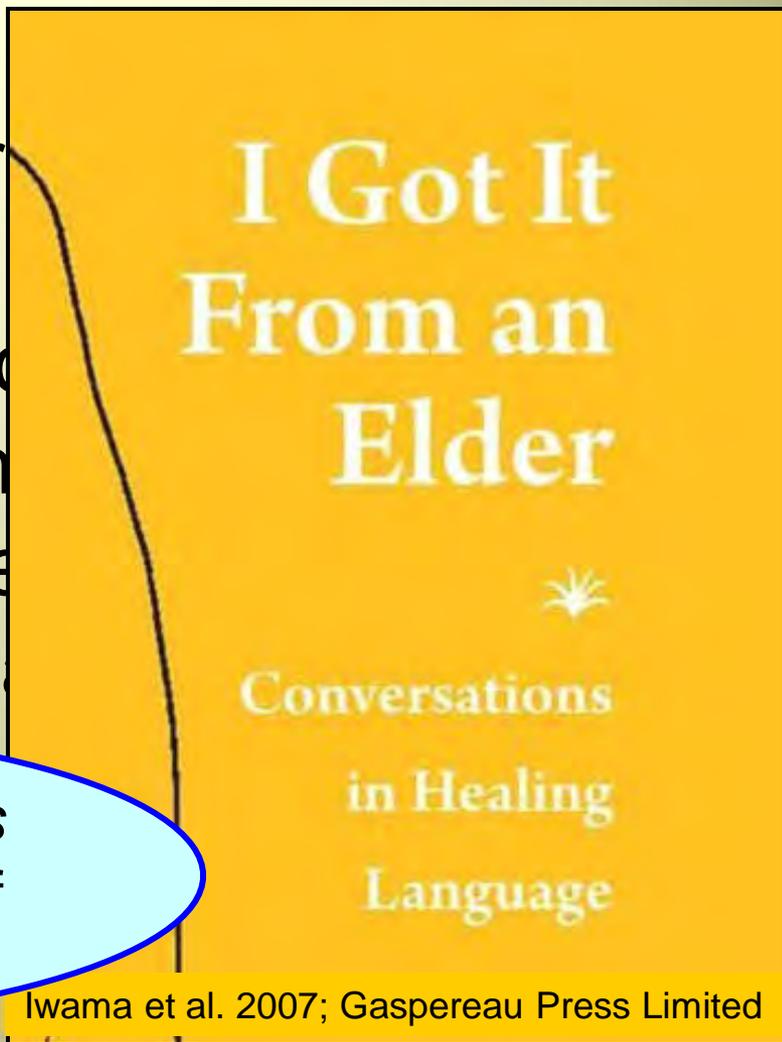
Murdena Marshall, Elder, Mi’kmaq Nation

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

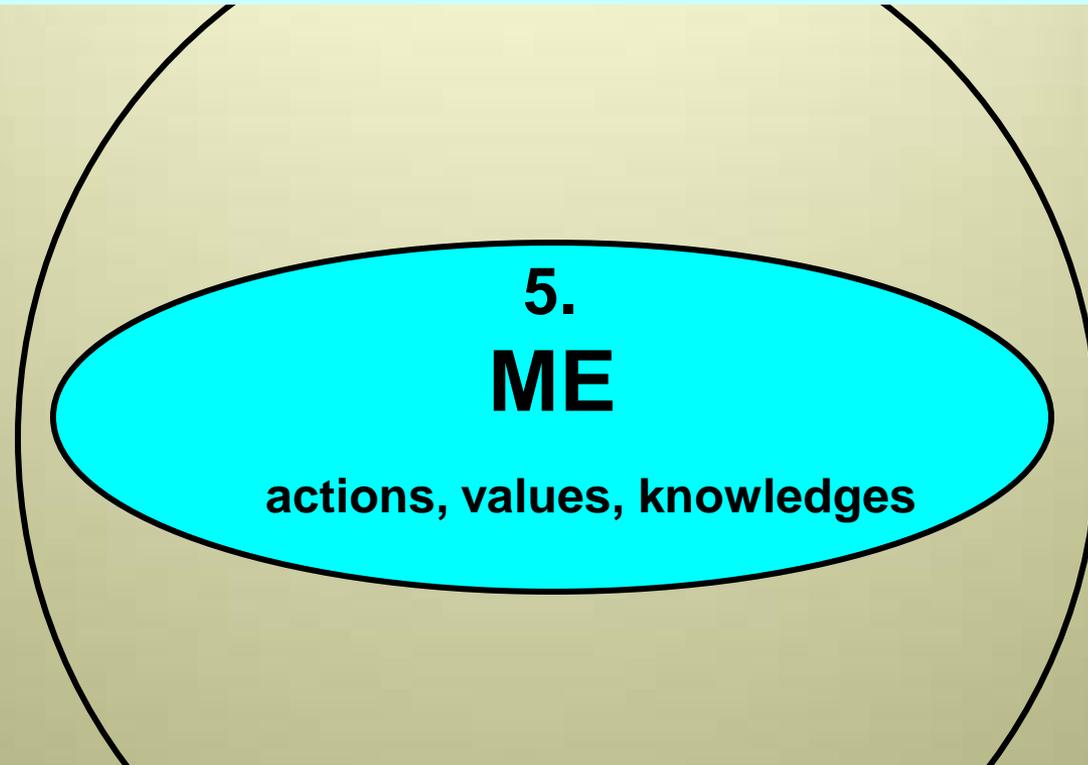


Murdena Marshall, Elder, Mi’kmaq Nation

Together We Heal & Grow
seeing & acknowledging my deeds



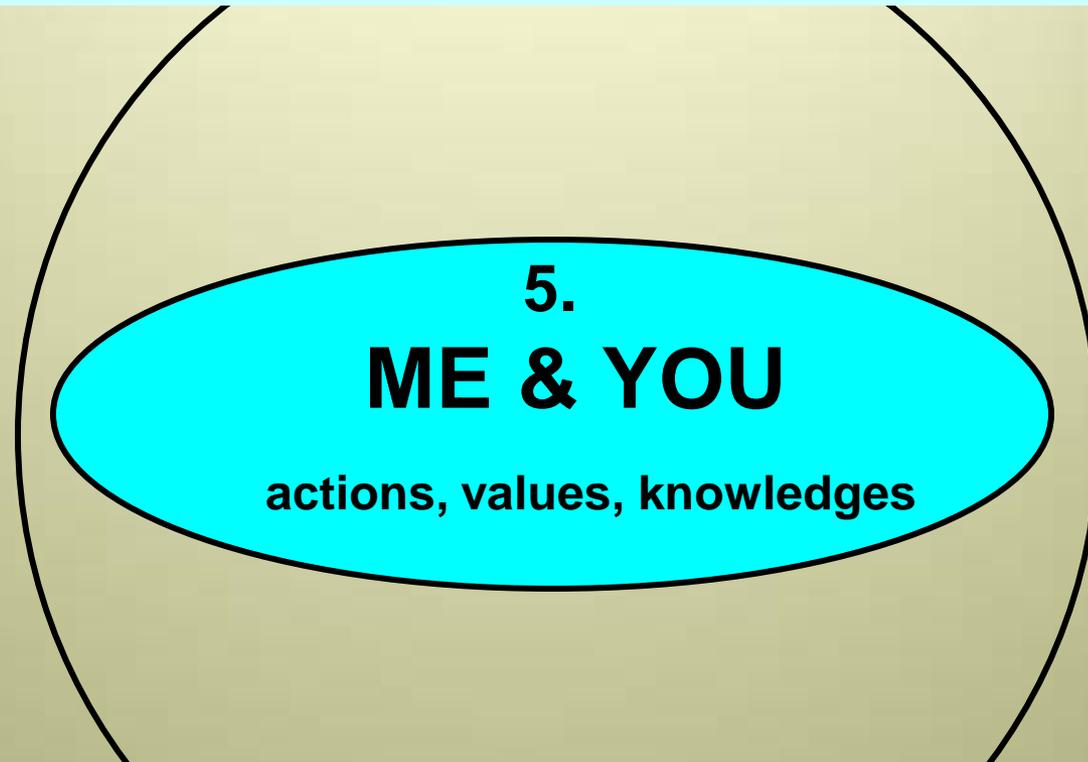
the “HEALING TENSE”



Murdena Marshall, Elder, Mi'kmaq Nation

Together We Heal & Grow
seeing & acknowledging my deeds

“together we heal & grow”



Murdena Marshall, Elder, Mi'kmaq Nation

Together We Heal & Grow
seeing & acknowledging my deeds

LESSONS LEARNED

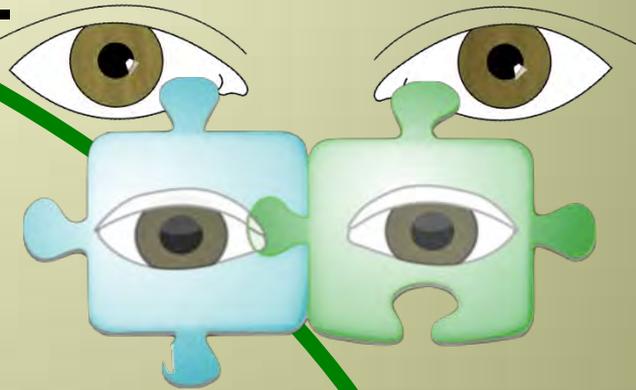
1. **ACKNOWLEDGE
WE NEED
EACH OTHER ...**
co-learning journey

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.



LANGUAGE

LESSONS LEARNED

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

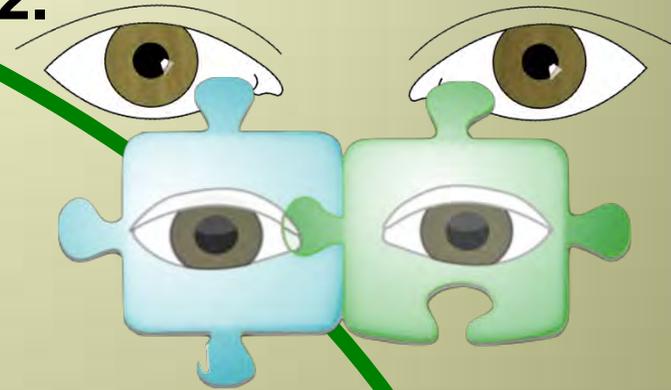
4. **DO ... in a
CREATIVE, GROW
FORWARD WAY**

3. view "SCIENCE"
inclusively

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

6. use **VISUALS**

2.



LANGUAGE

4 BIG QUESTIONS

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

ontologies

Two-Eyed Seeing
learning to see with the strengths of each & together
OUR KEY CONCEPTS and ACTIONS

epistemologies

Two-Eyed Seeing
learning to see with the strengths of each & together
OUR LANGUAGES and METHODOLOGIES

methodologies

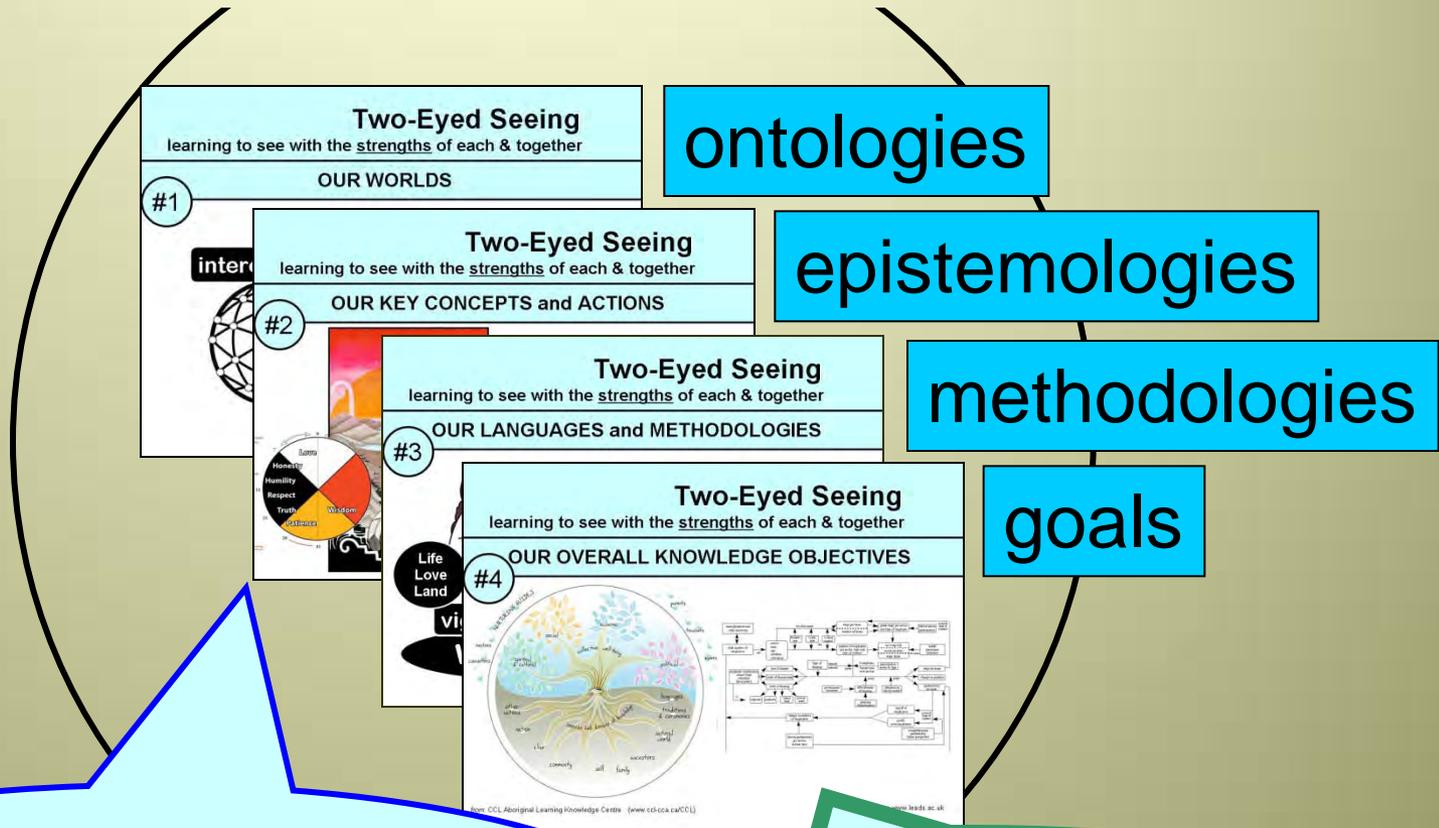
Two-Eyed Seeing
learning to see with the strengths of each & together
OUR OVERALL KNOWLEDGE OBJECTIVES

goals

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

6. use **VISUALS**

LANGUAGE



LESSONS LEARNED

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

#1
OUR WORLDS

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

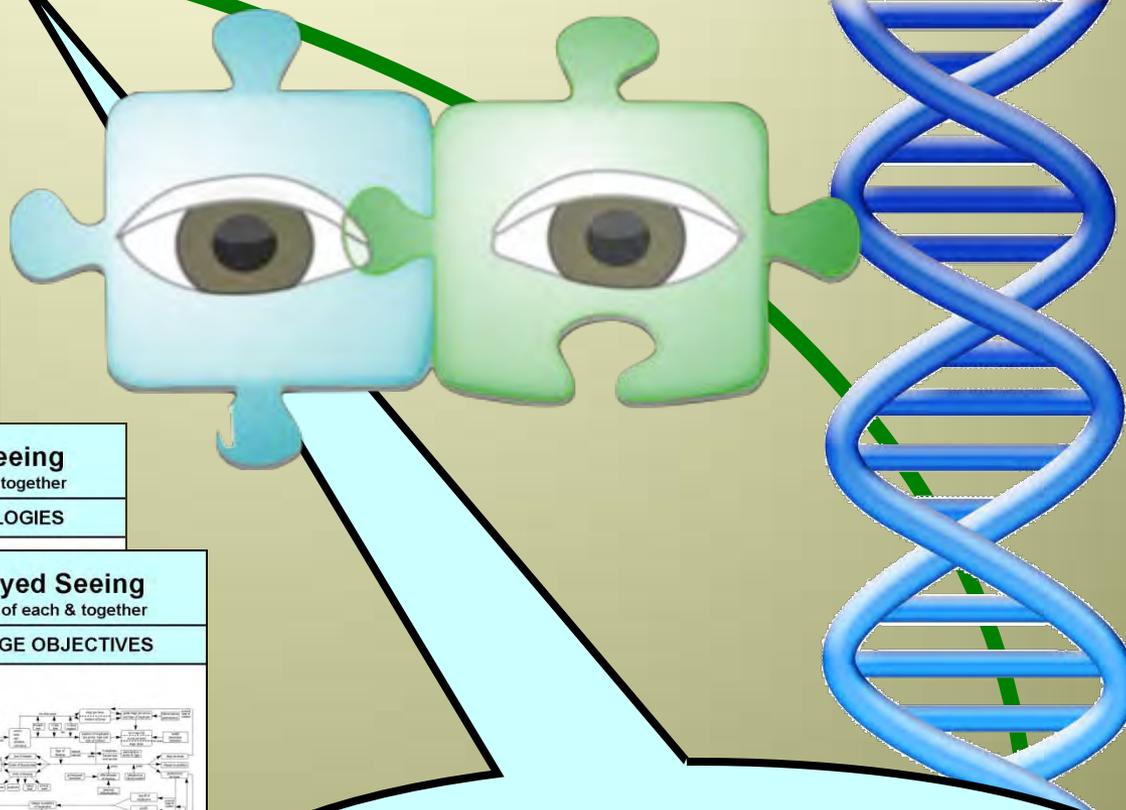
#2
OUR KEY CONCEPTS and ACTIONS

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

#3
OUR LANGUAGES and METHODOLOGIES

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

#4
OUR OVERALL KNOWLEDGE OBJECTIVES



7. WEAVE
back and forth between
our worldviews

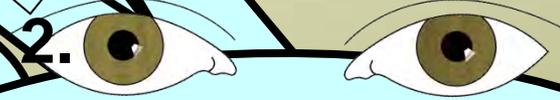
7 basic or fundamental LESSONS LEARNED

Knowledge Gardening

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

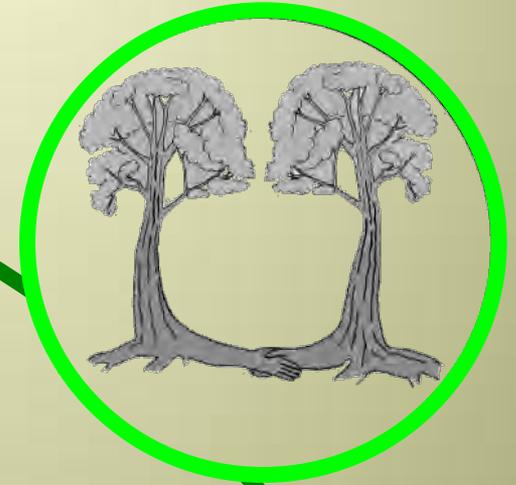
4. **DO ... in a
CREATIVE, GROW
FORWARD WAY**

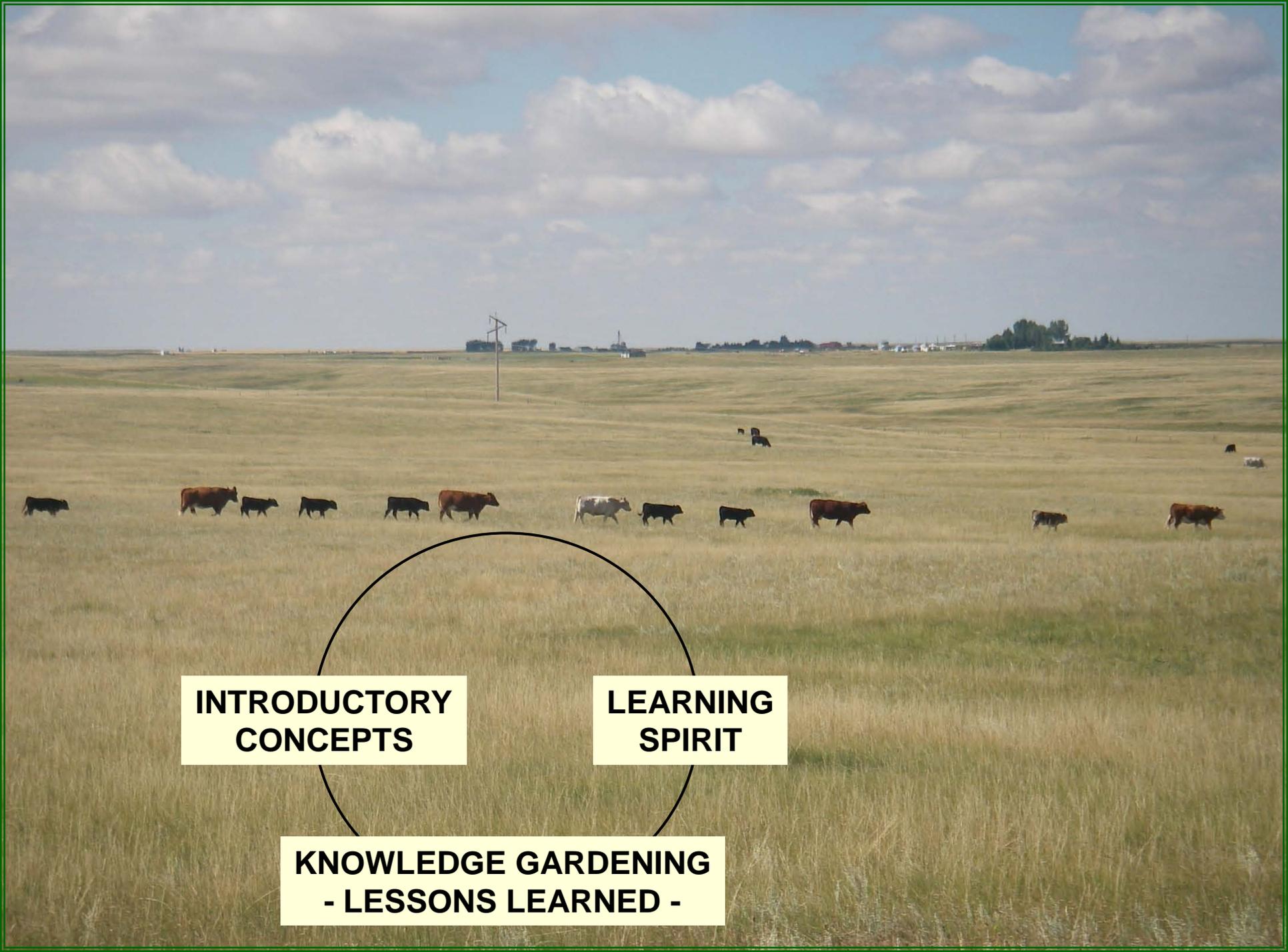
5. put our *values + actions*
+ knowledges in front of
us ... like an object

2.  3. view "SCIENCE"
inclusively

6. use **VISUALS**

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





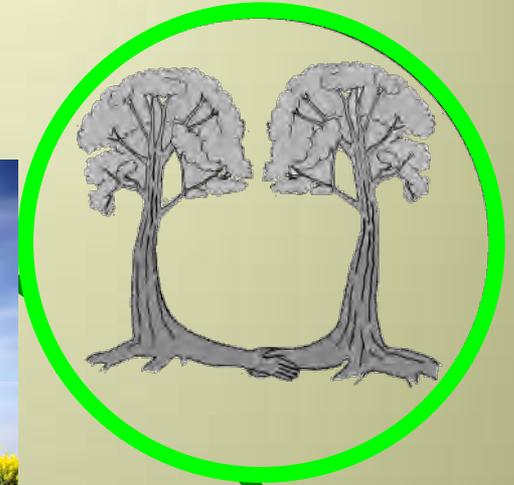
**INTRODUCTORY
CONCEPTS**

**LEARNING
SPIRIT**

**KNOWLEDGE GARDENING
- LESSONS LEARNED -**

basic or fundamental LESSONS LEARNED

Knowledge Gardening

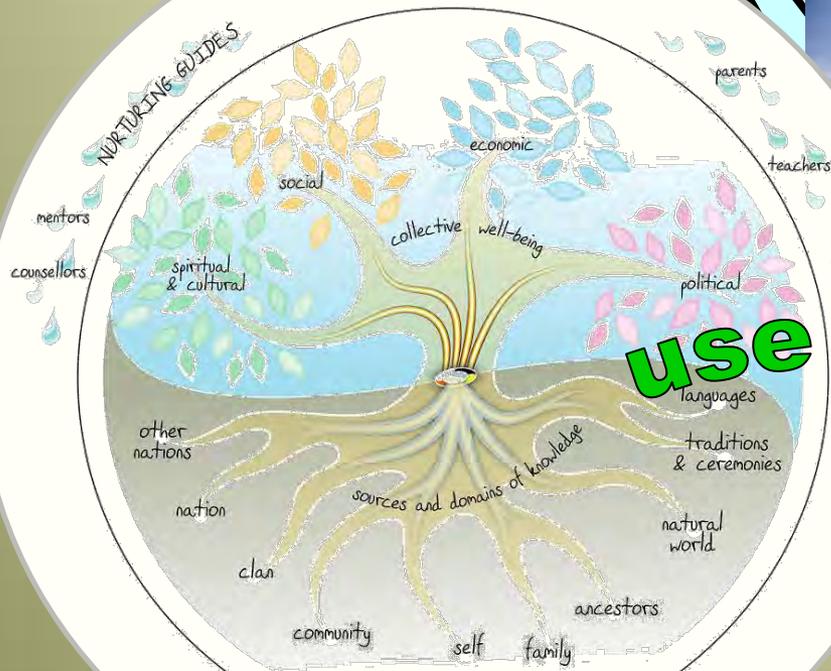
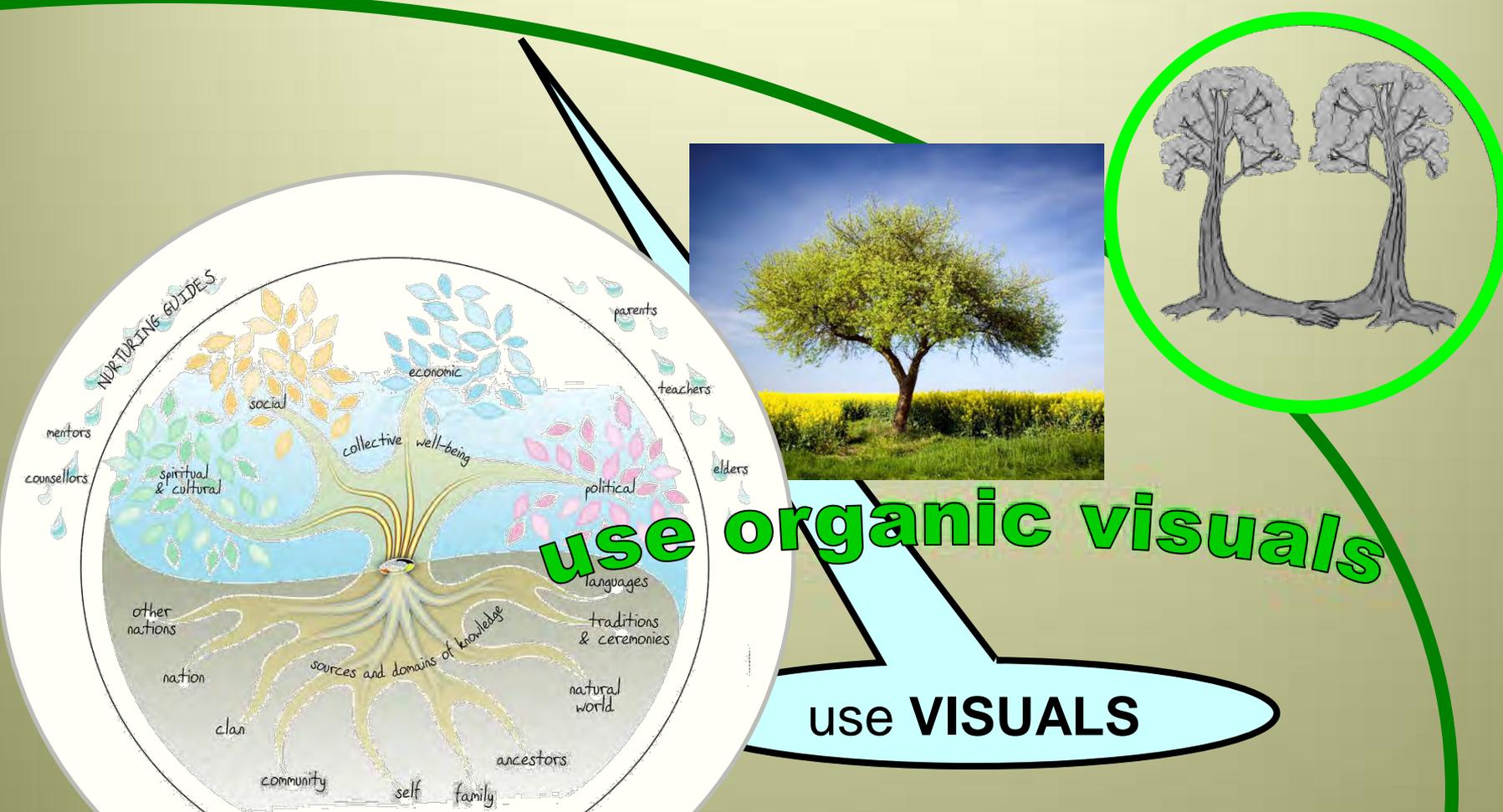


use organic visuals

use VISUALS

basic or fundamental LESSONS LEARNED

Knowledge Gardening



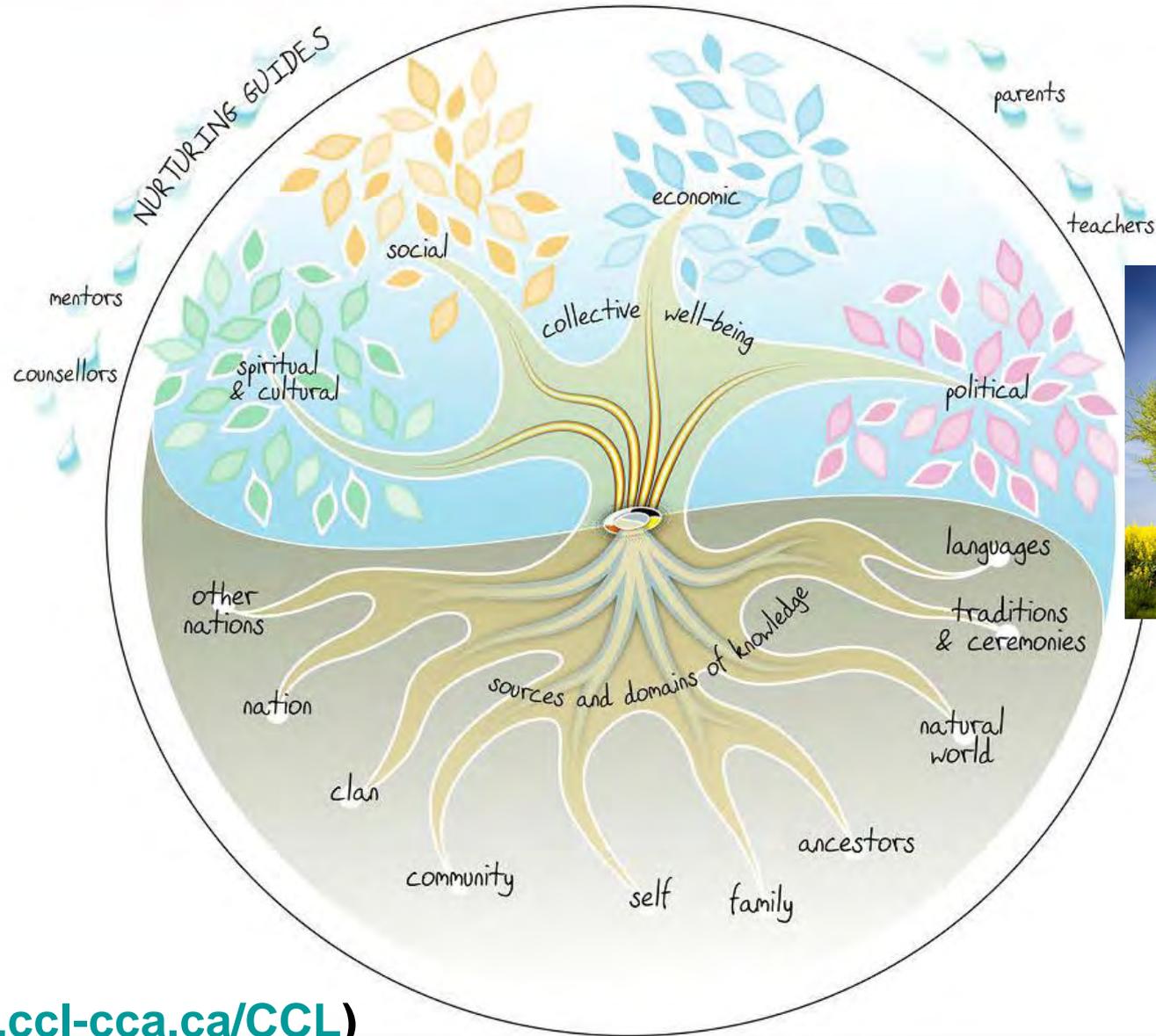
use organic visuals

use VISUALS

First Nations Life Long Learning Model
Aboriginal Learning Knowledge Centre
Canadian Council on Learning

<http://www.ccl-cca.ca/ccl>

First Nations Holistic Lifelong Learning Model

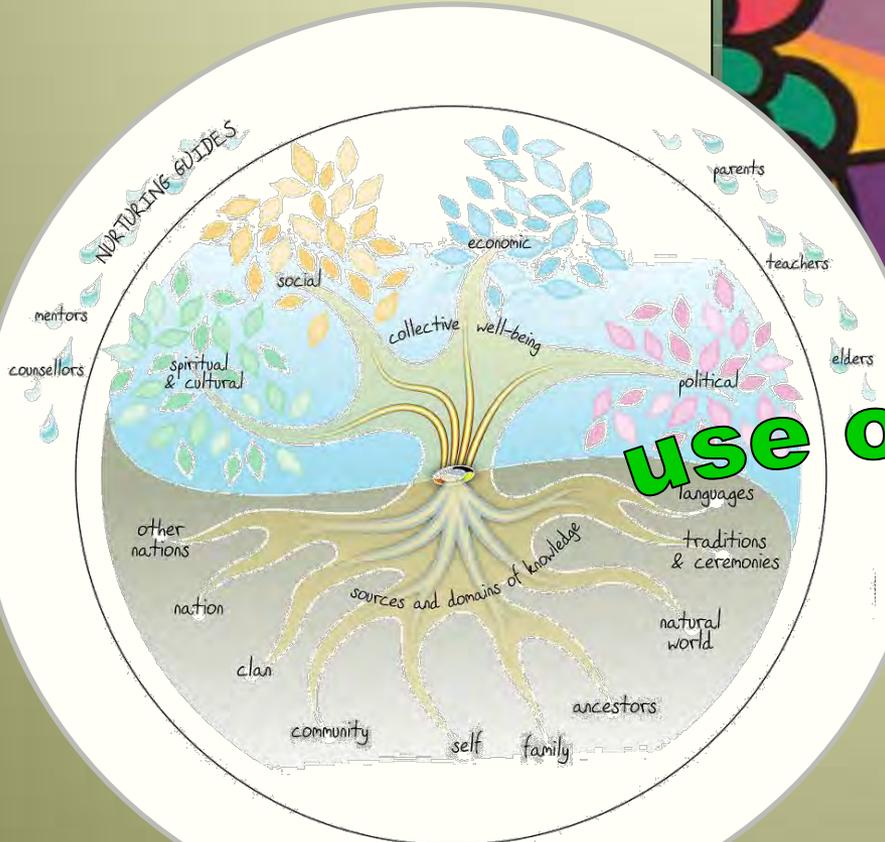
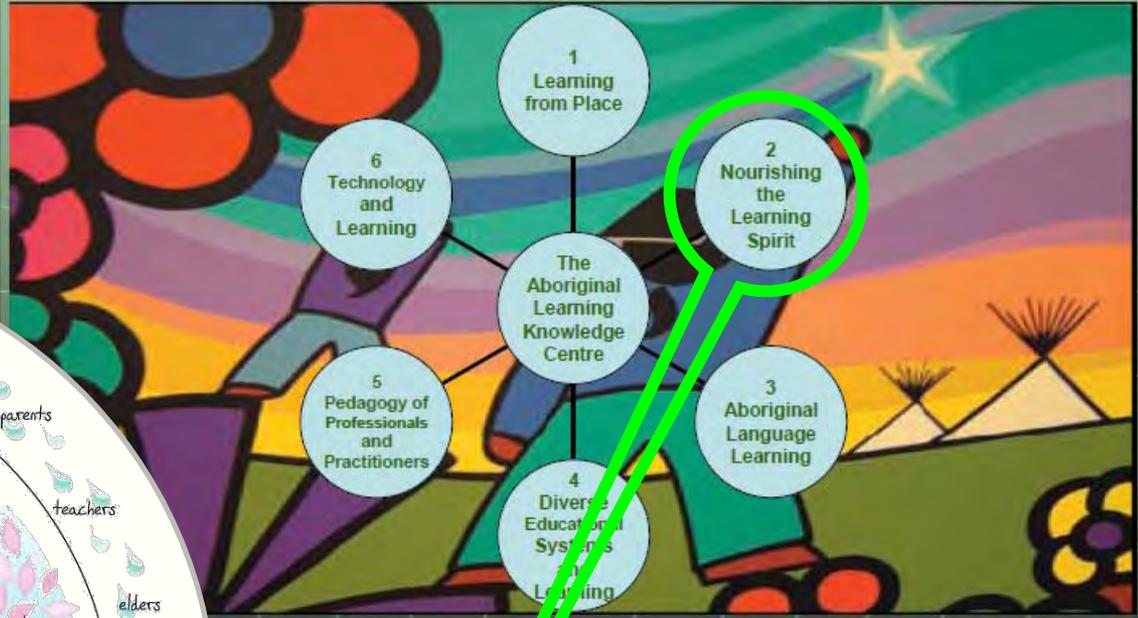


from:

Aboriginal Learning Knowledge Centre
Canadian Council on Learning

<http://www.ccl-cca.ca/ccl>

Six Animation Theme Bundles Intersecting and Interdependent



use organic visuals

Nourishing
the
Learning
Spirit

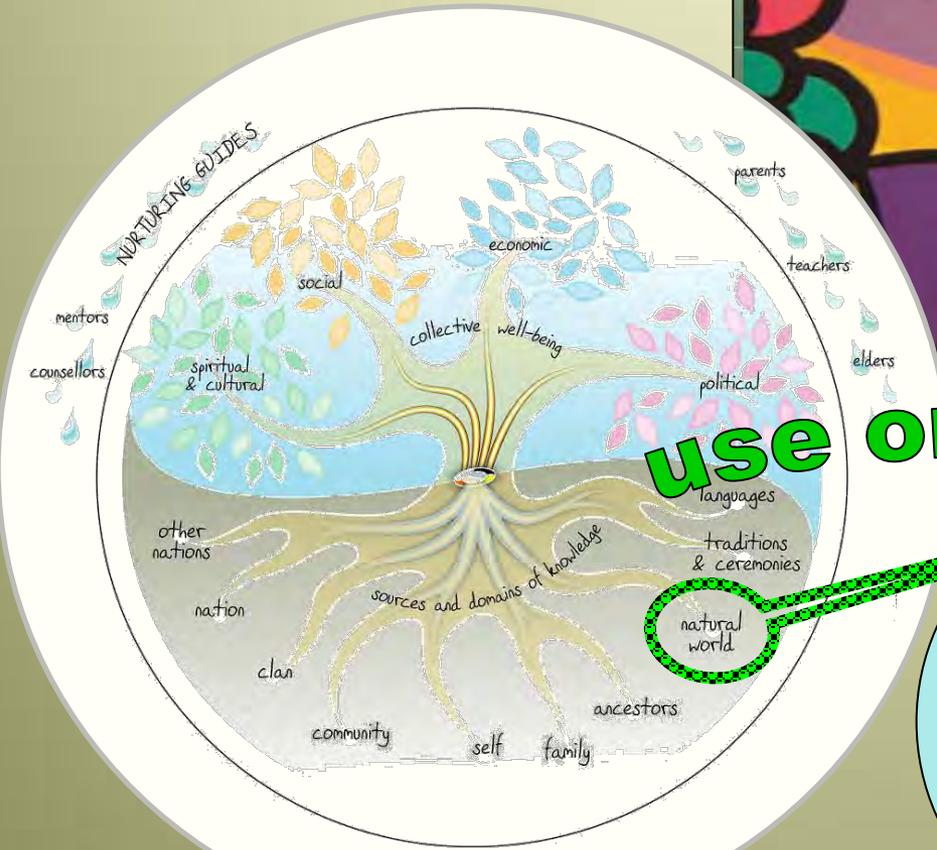
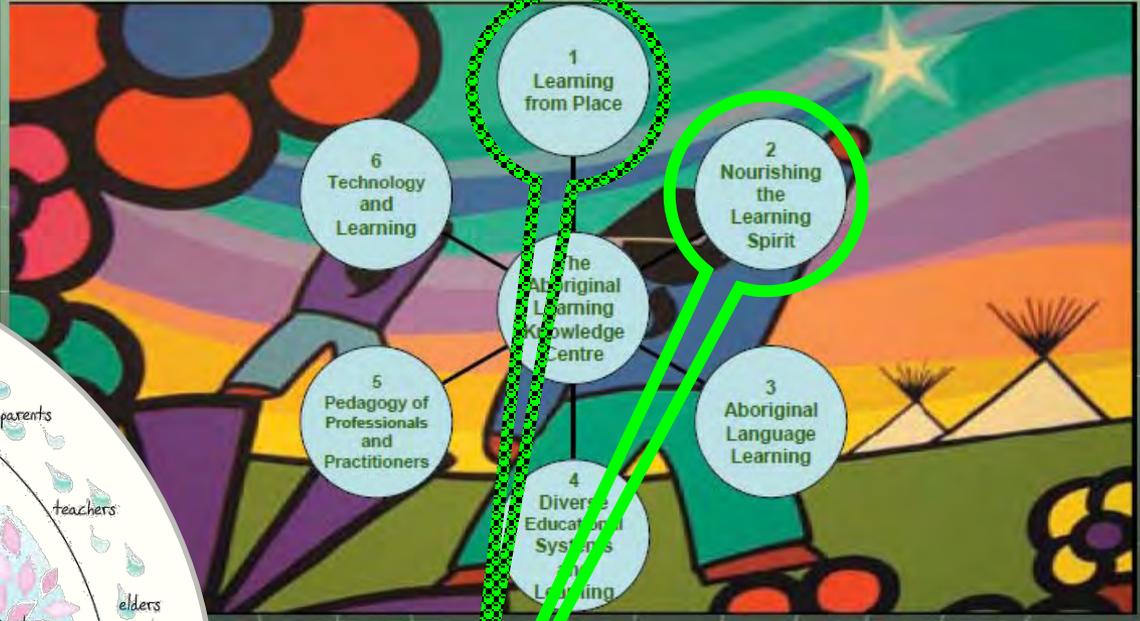
First Nations Life Long Learning Model

from:

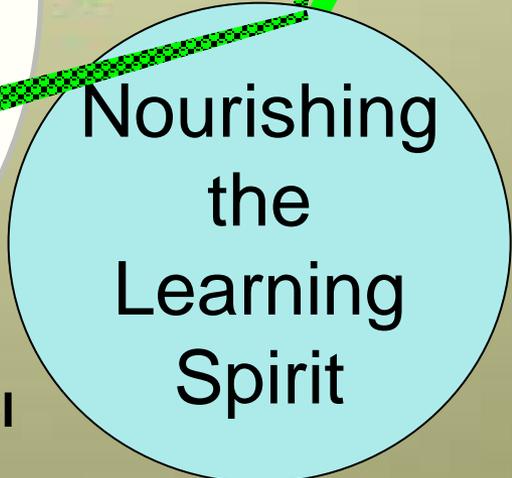
Aboriginal Learning Knowledge Centre
Canadian Council on Learning

<http://www.ccl-cca.ca/ccl>

Six Animation Theme Bundles Intersecting and Interdependent



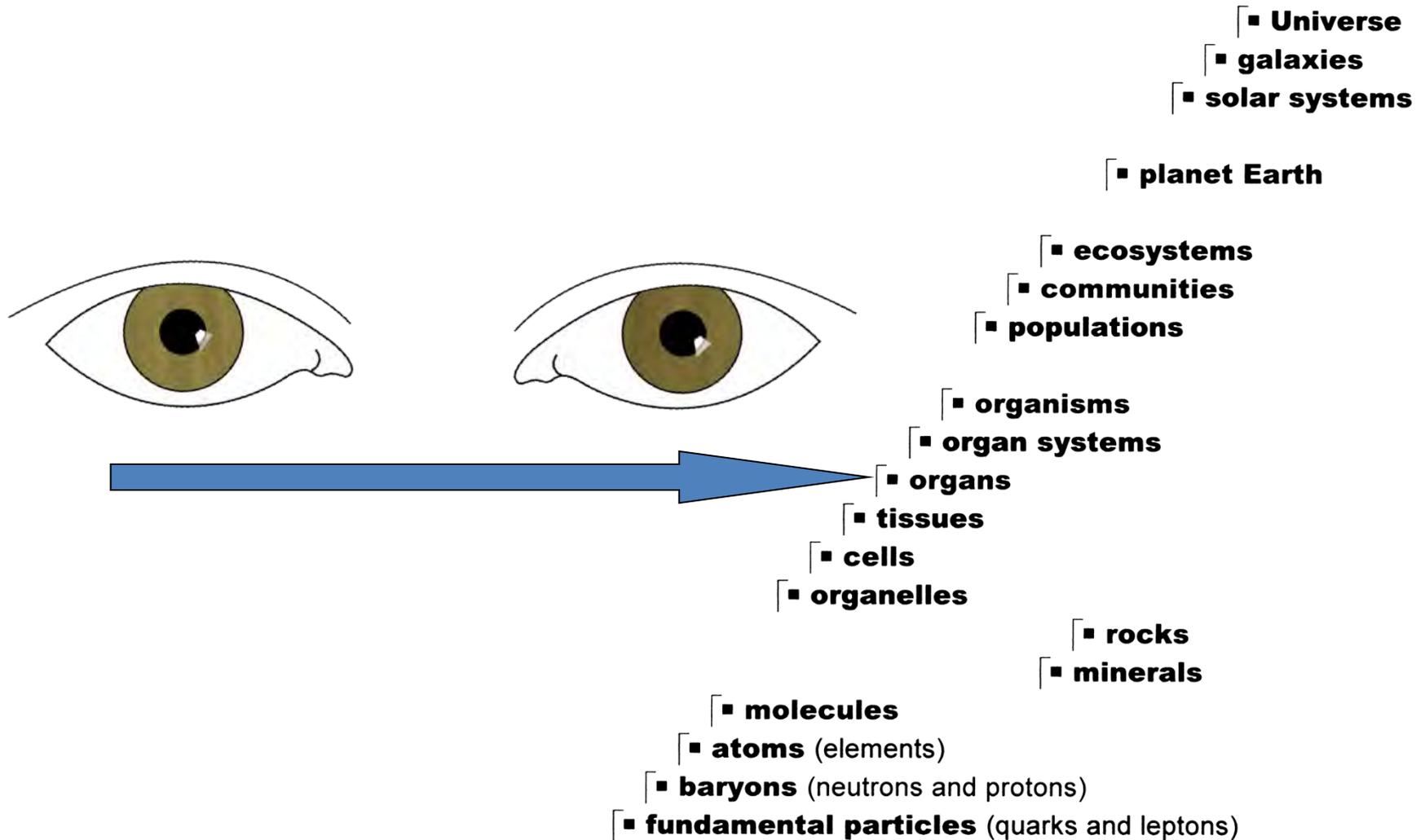
use organic visuals



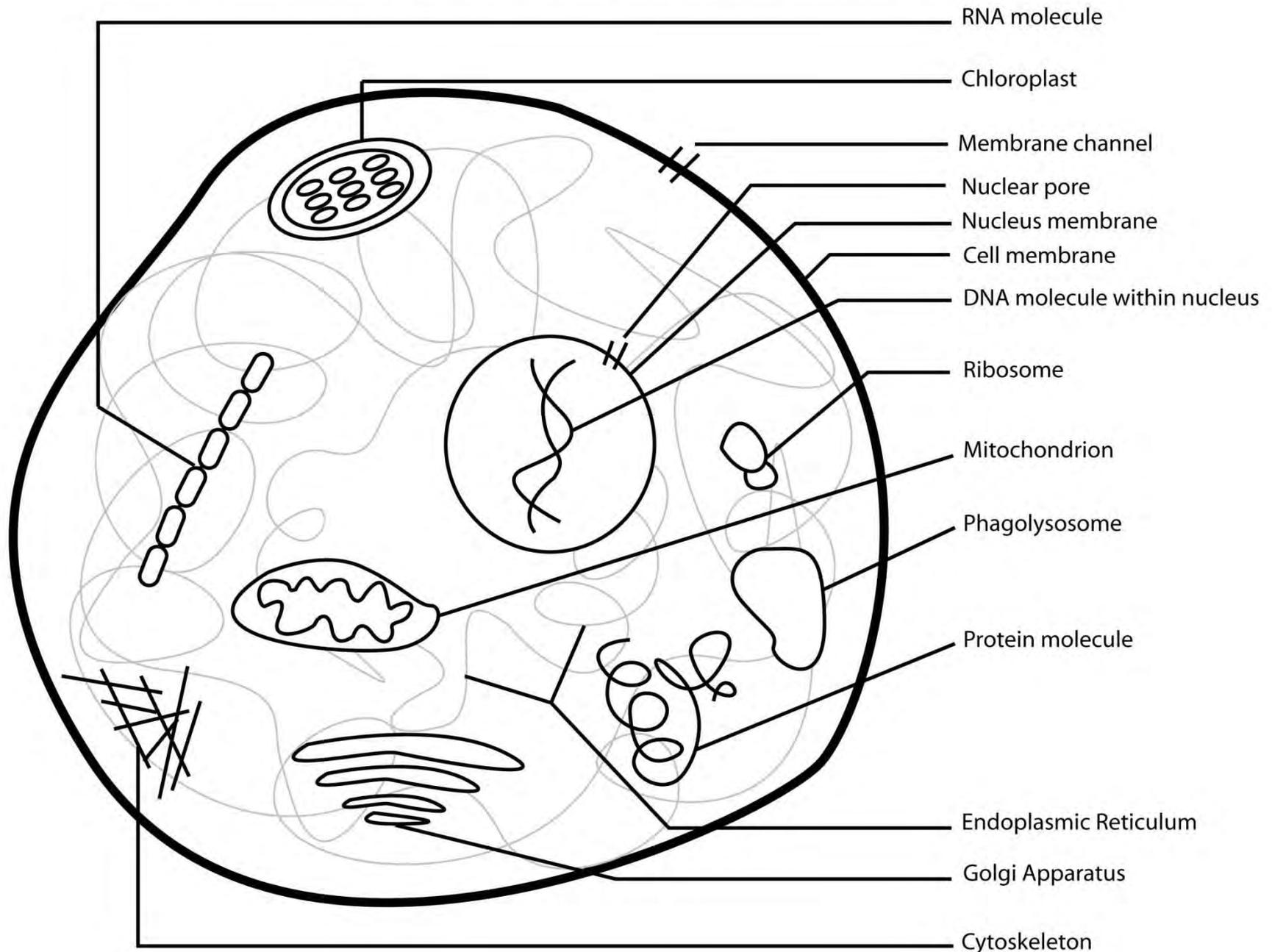
First Nations Life Long Learning Model

HOLARCHY

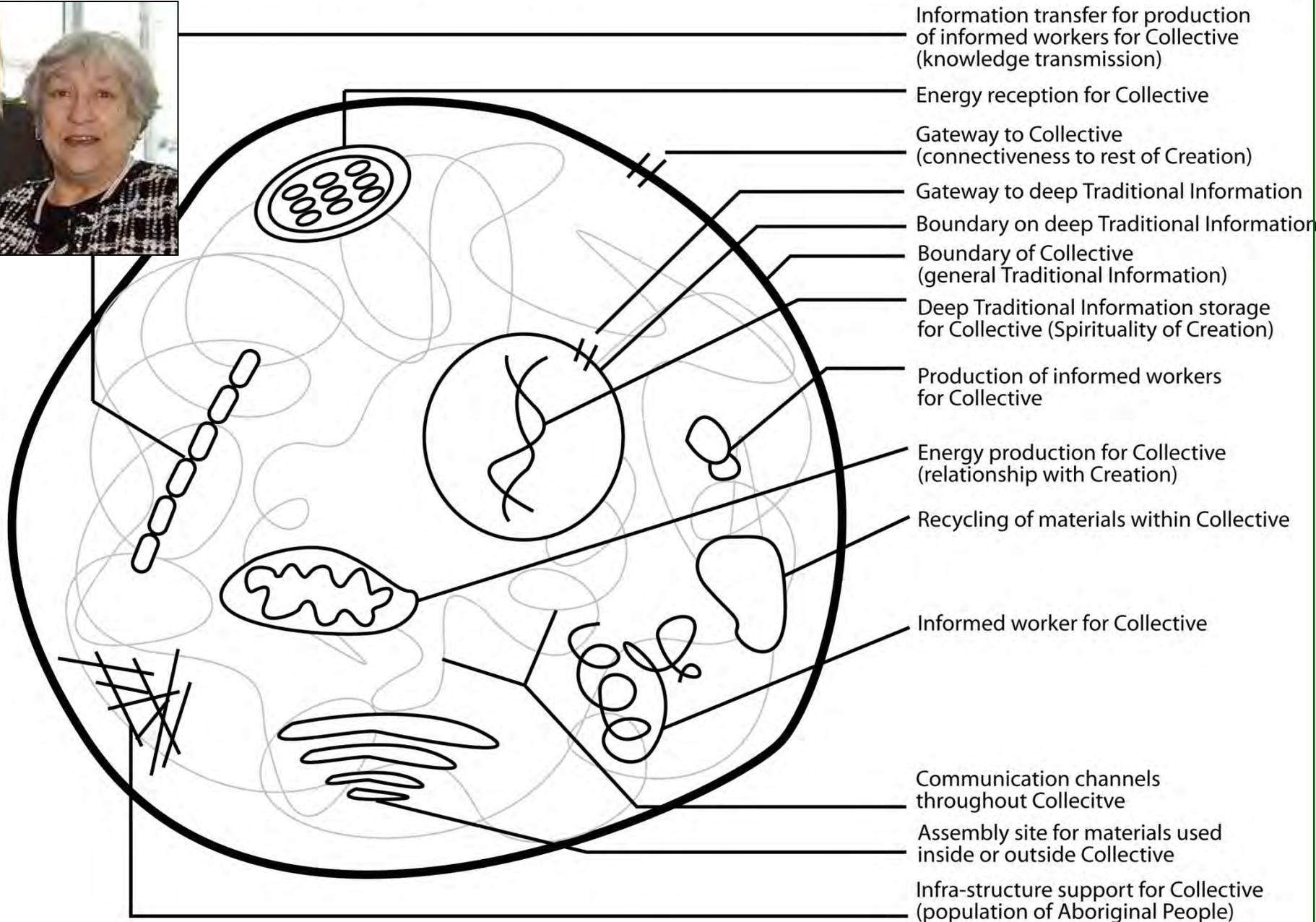
- VISIBLE MATTER IN THE UNIVERSE -



The Collective: Its Parts (example = the living cell)

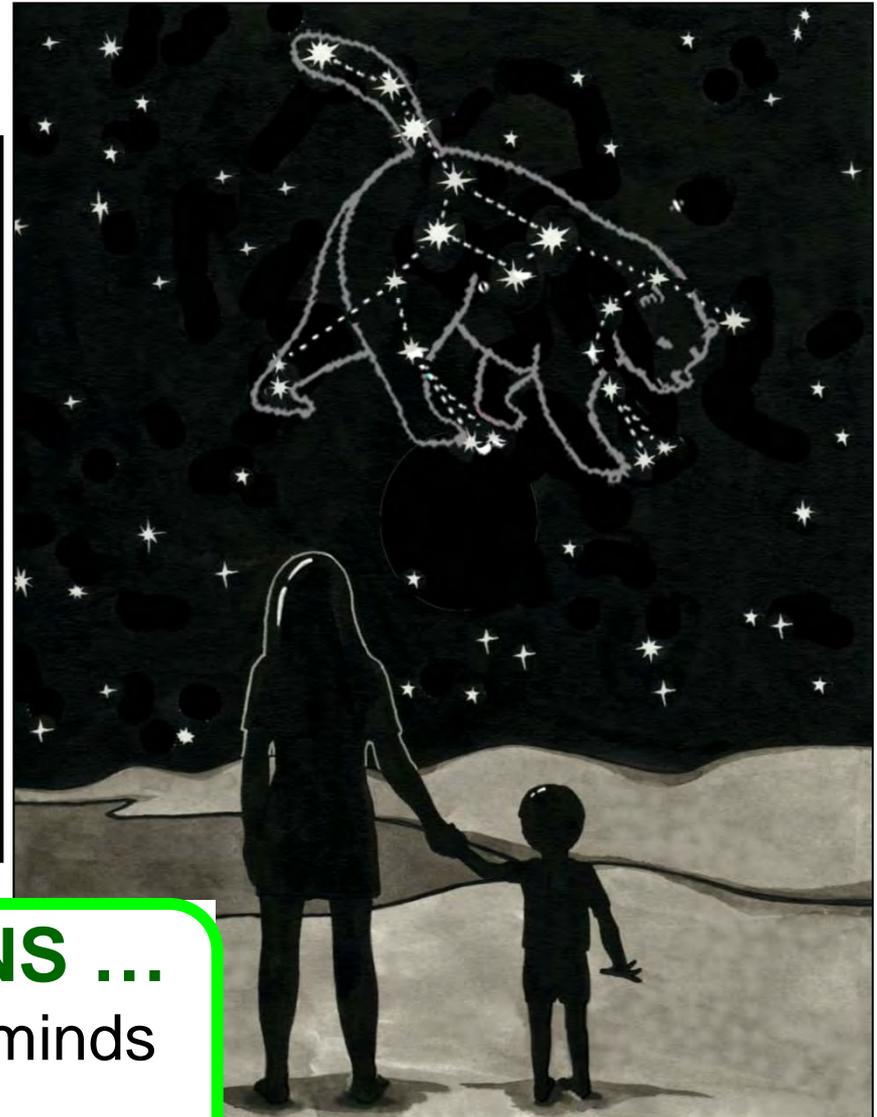
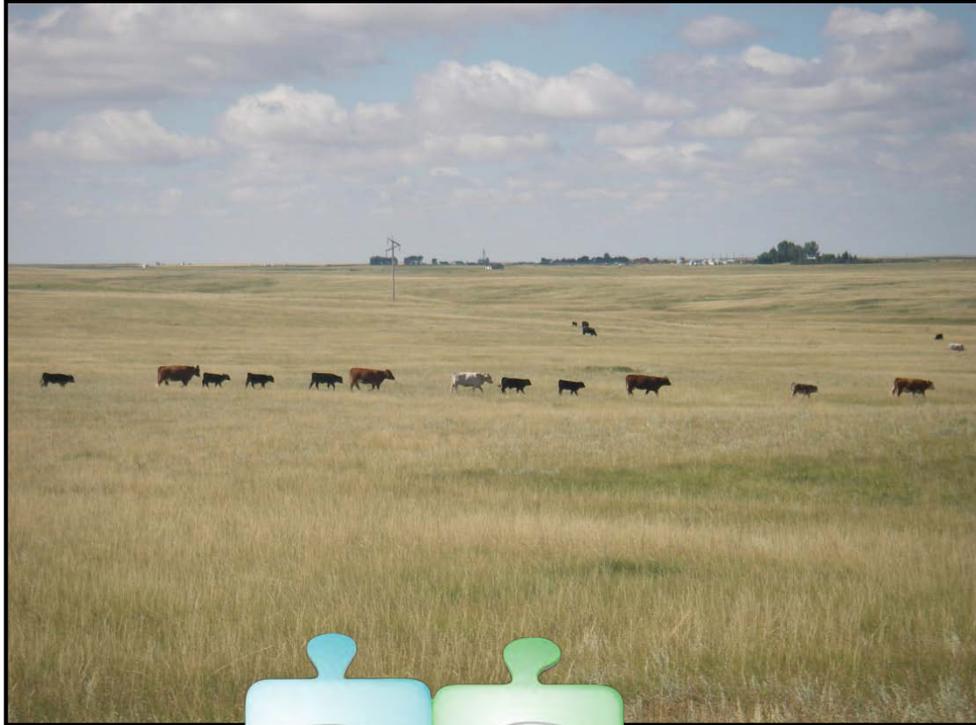


The Collective: Its Functions, e.g. Mi'kmaq Traditional Knowledge



stories of our interactions with and within nature

Science

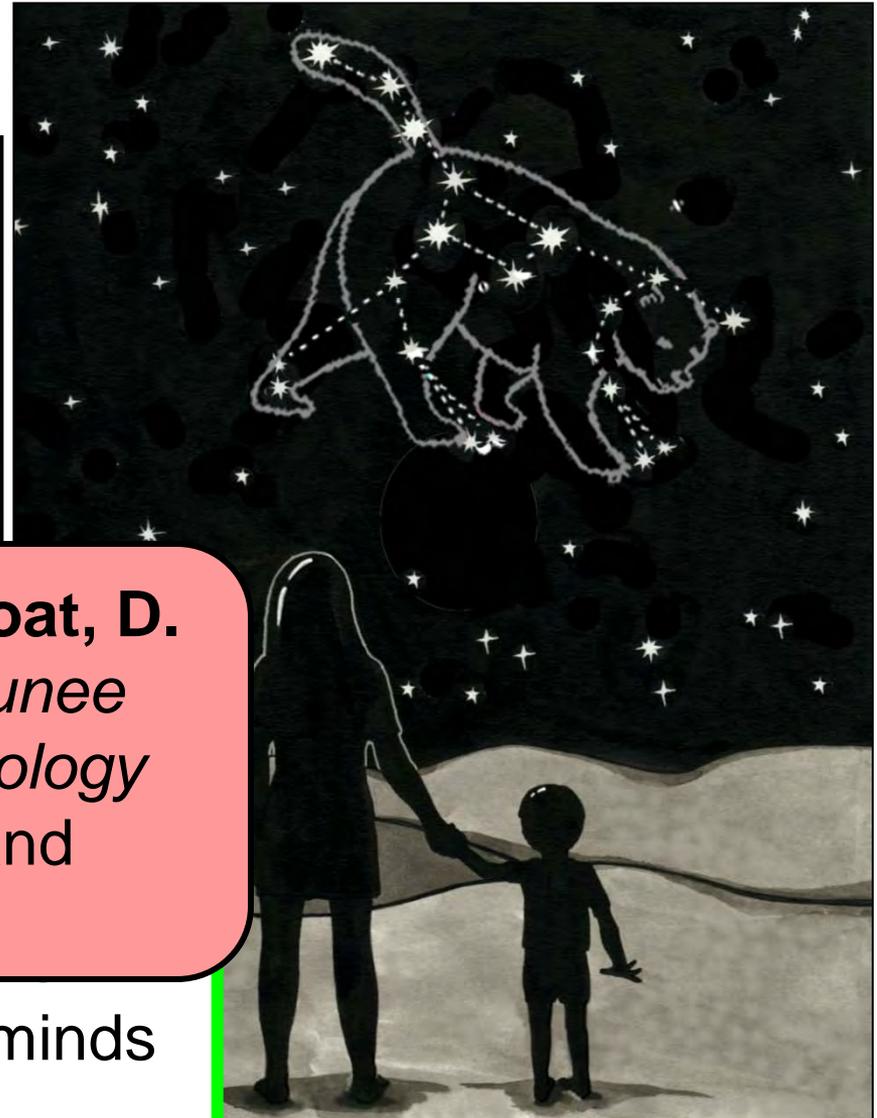
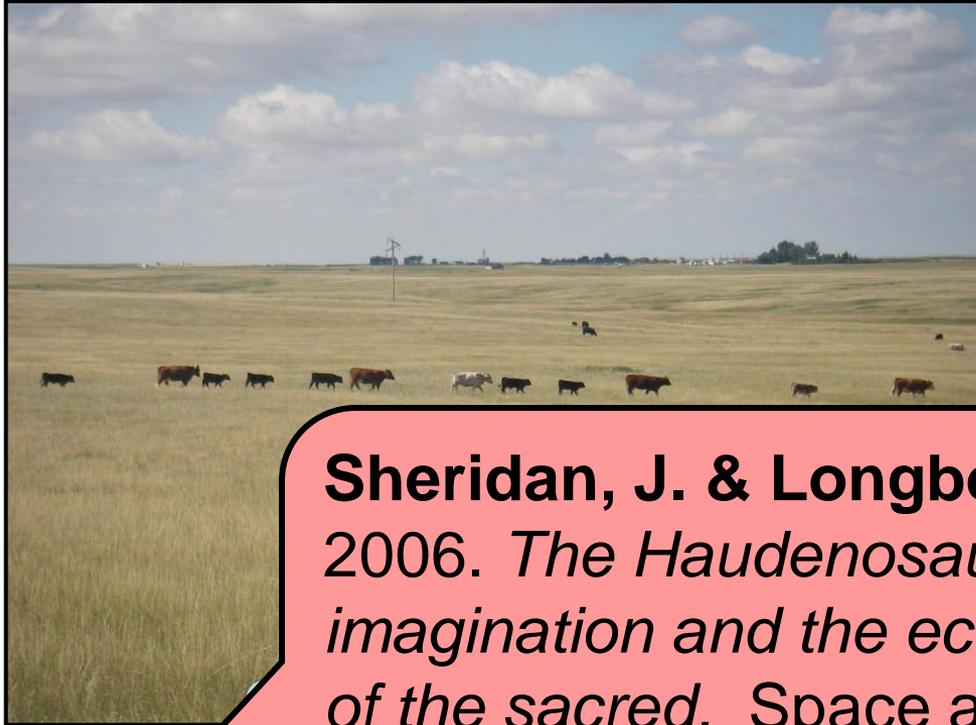


PATTERNS ...

- spirits within ecosystem-wide minds
- ideas in brain-based minds

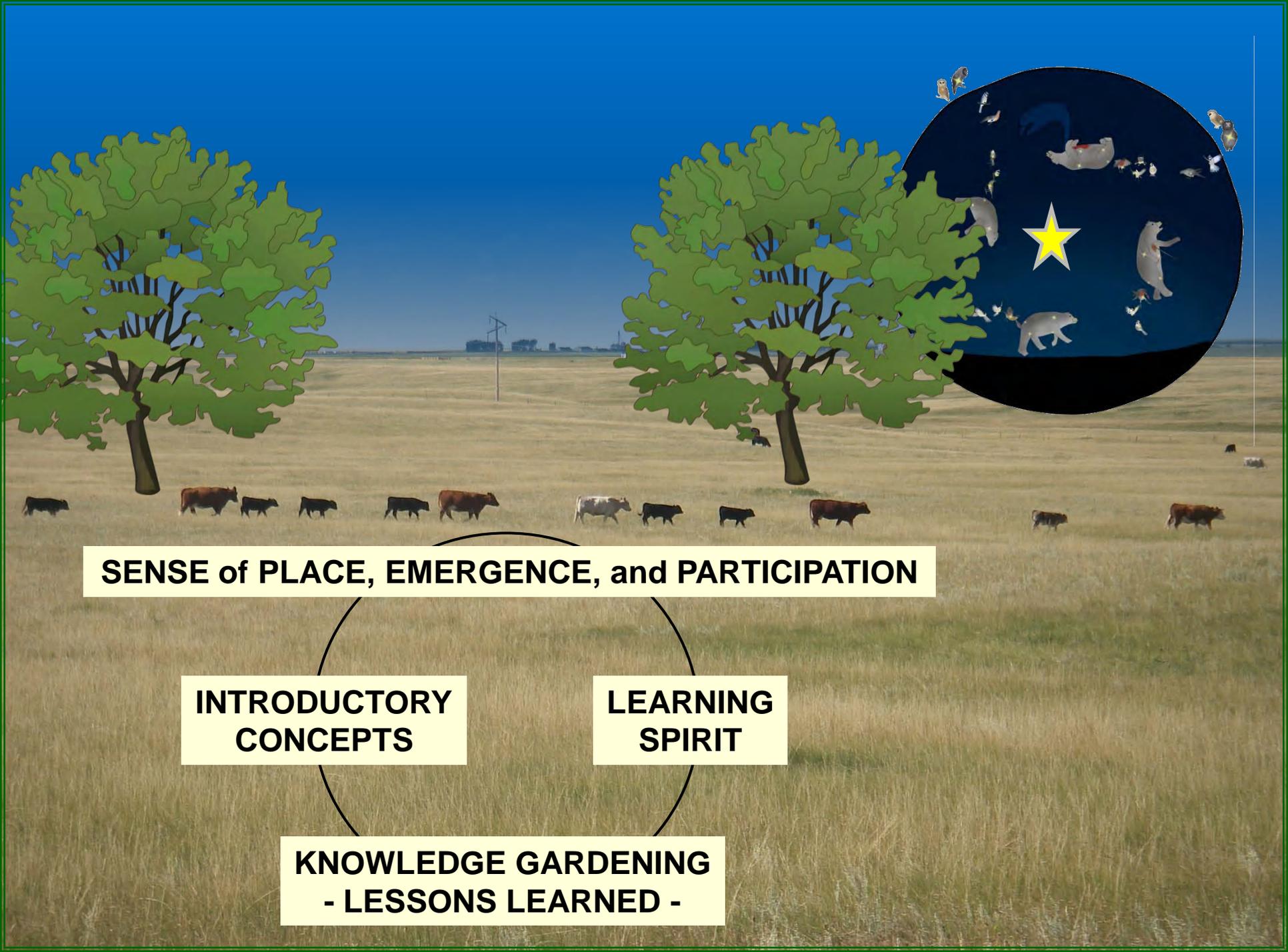
stories of our interactions with and within nature

Science



Sheridan, J. & Longboat, D.
2006. *The Haudenosaunee
imagination and the ecology
of the sacred*. *Space and
Culture* 9(4): 365-381.

- spirits within ecosystem-wide minds
- ideas in brain-based minds

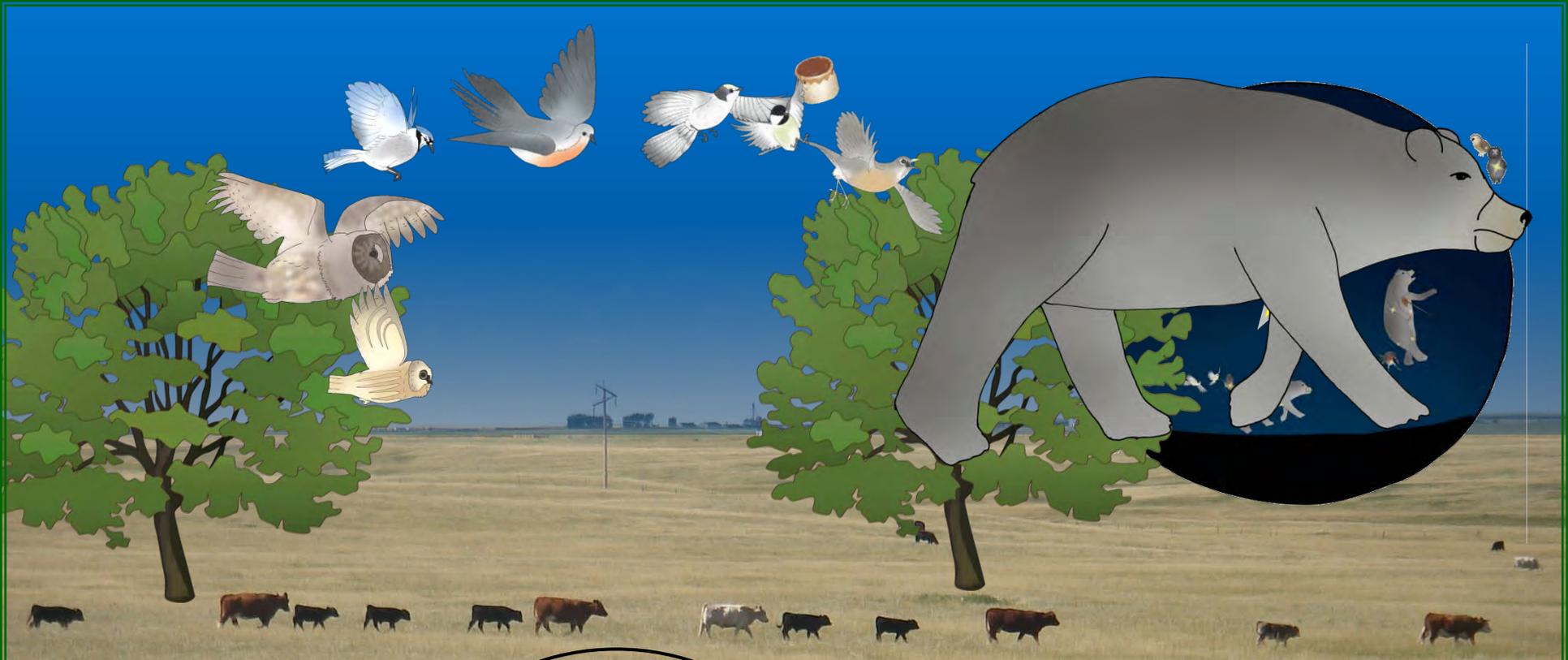


SENSE of PLACE, EMERGENCE, and PARTICIPATION

**INTRODUCTORY
CONCEPTS**

**LEARNING
SPIRIT**

**KNOWLEDGE GARDENING
- LESSONS LEARNED -**



SENSE of PLACE, EMERGENCE, and PARTICIPATION

**INTRODUCTORY
CONCEPTS**

**LEARNING
SPIRIT**

**KNOWLEDGE GARDENING
- LESSONS LEARNED -**



SENSE of PLACE, EMERGENCE, and PARTICIPATION

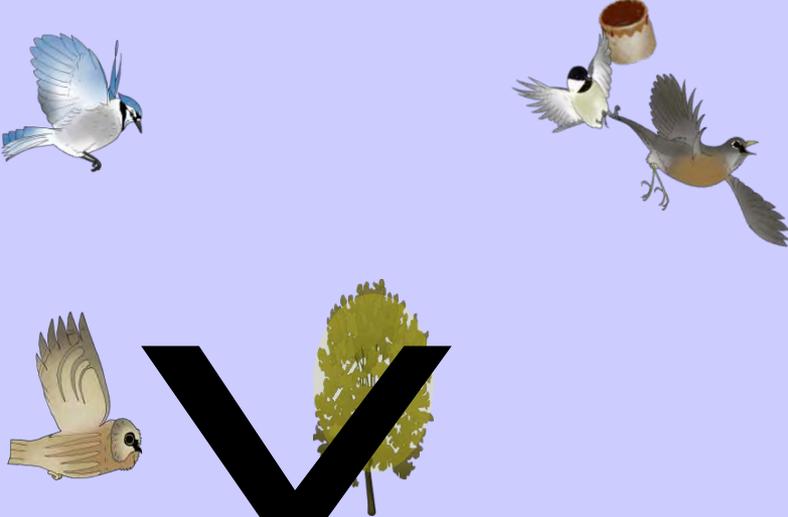
**INTRODUCTORY
CONCEPTS**

**LEARNING
SPIRIT**

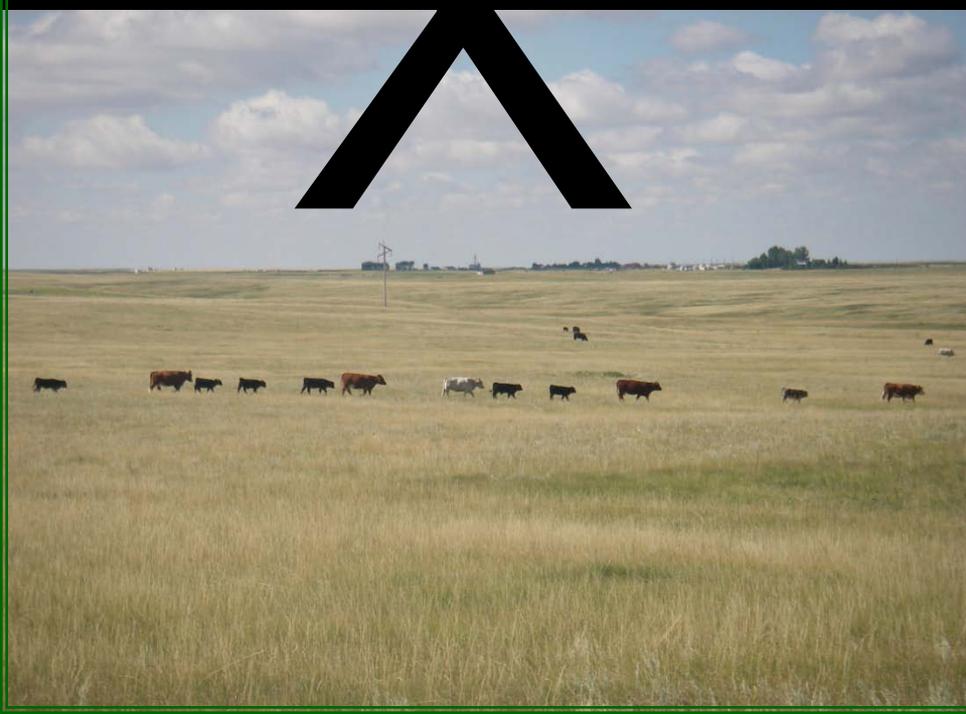
**KNOWLEDGE GARDENING
- LESSONS LEARNED -**



southern Alberta / Blackfoot



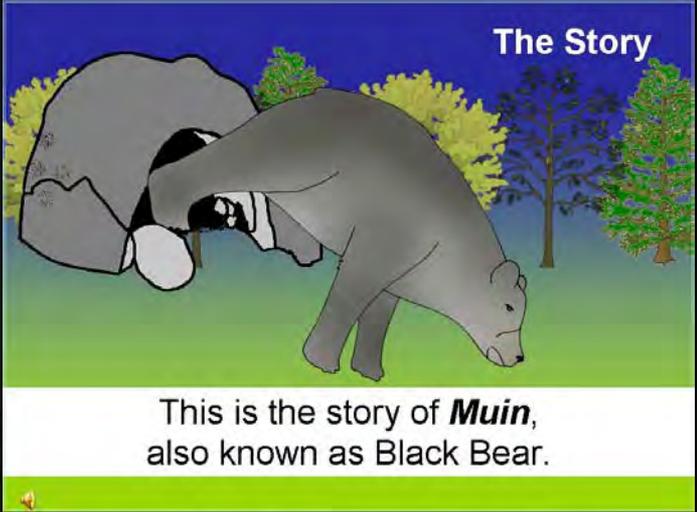
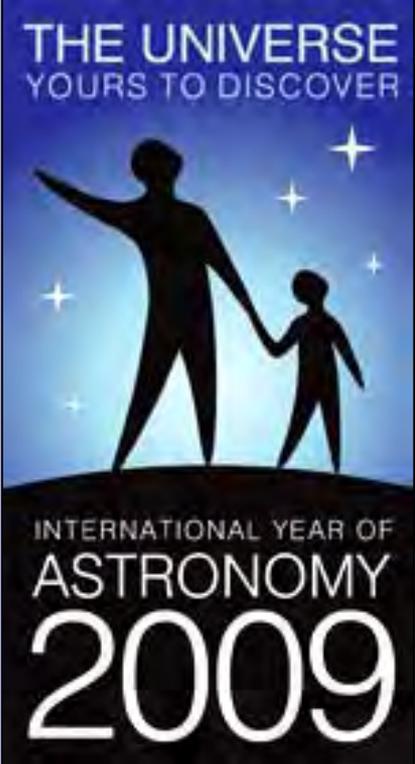
Nova Scotia / Mi'kmaq



video of Mi'kmaq Night Sky Story (in Mi'kmaq, English, French) available at:

<http://www.integrativescience.ca>

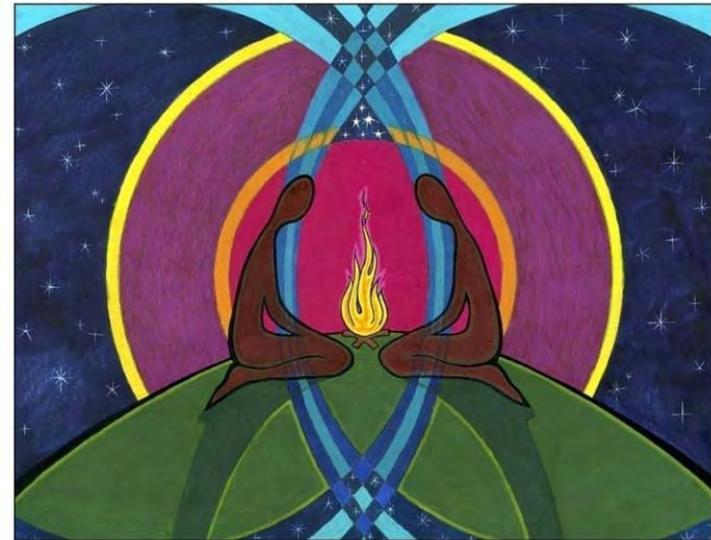
<http://www.astronomy2009.ca/>



INTERNATIONAL YEAR OF ASTRONOMY 2009



**Let us reconnect with our
Night Sky Stories.**



**Reconnections
will be legacies for children
long after the close of
International Year of Astronomy.**

Stories help us see the stars in new ways ...

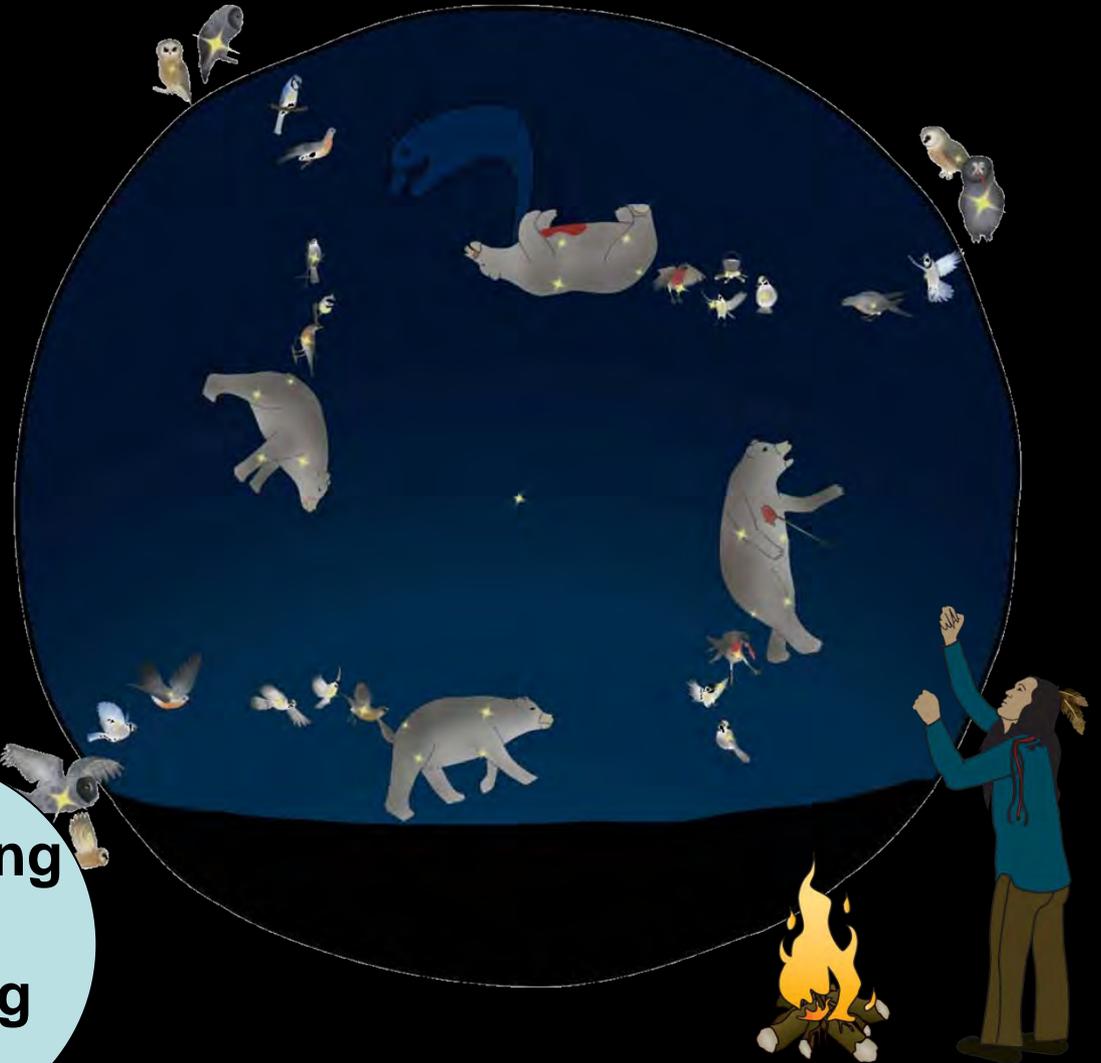


as telescopes help us see the stars in new ways.

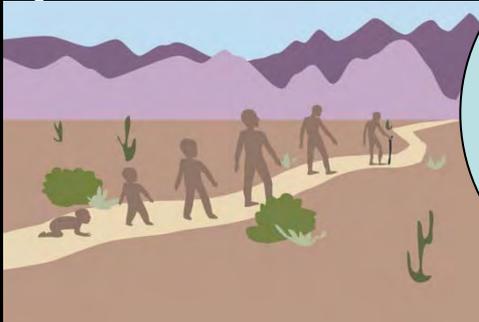
Knowledge
is spirit.

It is a gift,
passed on
through
many people.

We must
pass it on.



**Nourishing
the
Learning
Spirit**

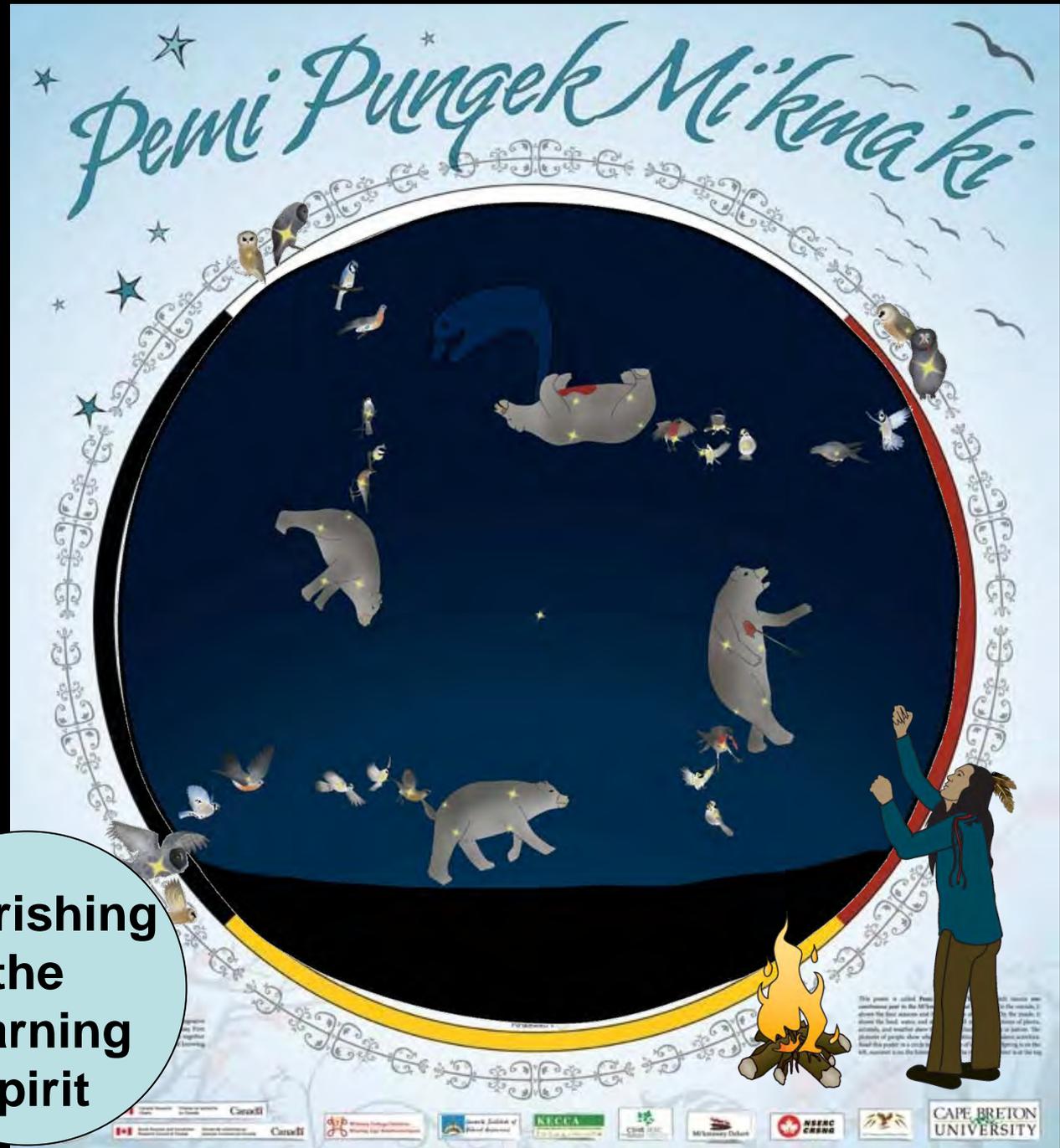


Knowledge
is spirit.

It is a gift,
passed on
through
many people.

We must
pass it on.

Nourishing
the
Learning
Spirit



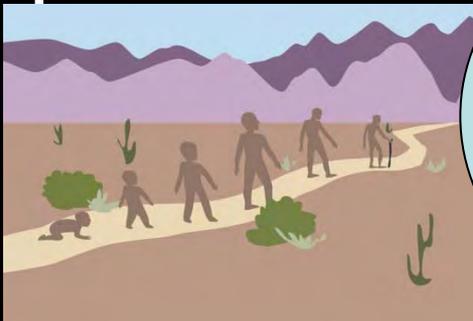
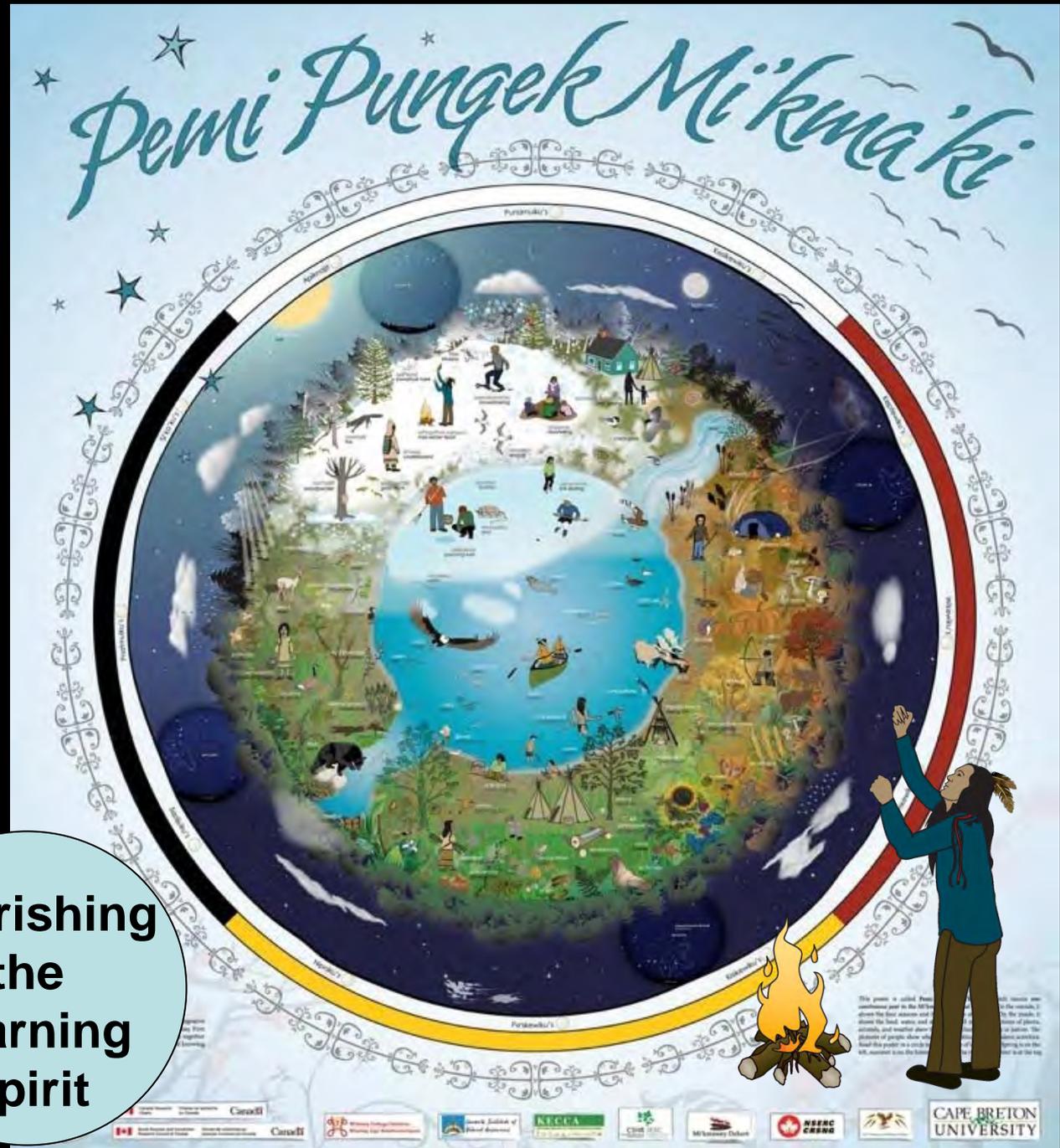
This poster is a collaboration between the Mi'kmaq and the Atlantic Institute of Education. It is a gift to the people of Cape Breton. The illustrations are by the artist [name]. The text is by the artist [name]. The design is by the artist [name].

Knowledge
is spirit.

It is a gift,
passed on
through
many people.

We must
pass it on.

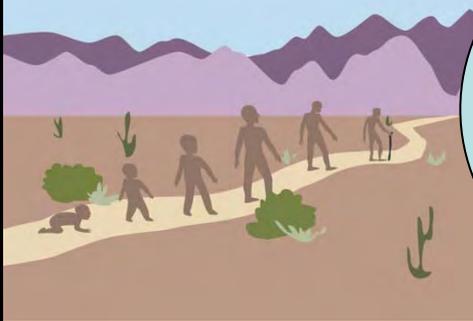
Nourishing
the
Learning
Spirit



Knowledge
is spirit.

It is a gift,
passed on
through
many people.

We must
pass it on.



**Nourishing
the
Learning
Spirit**

Importance of Ancestors, Elders, Knowledge Holders



Knowledge is spirit.

It is a gift, passed on through many people.

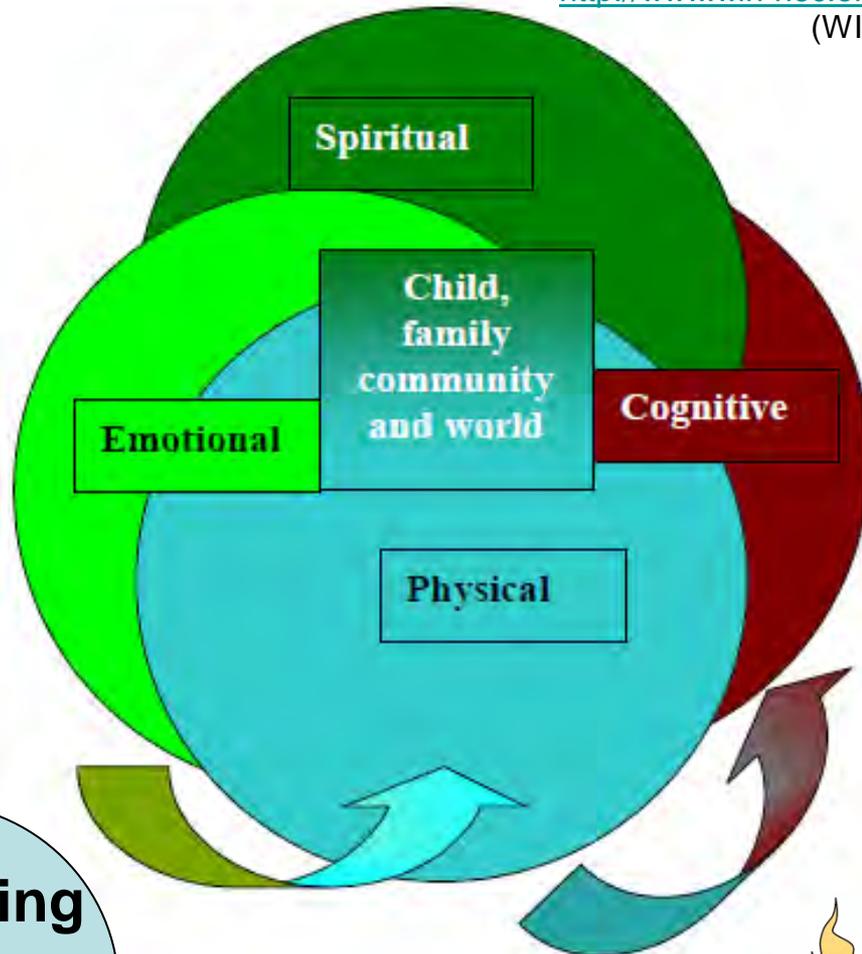
We must pass it on.

Ecological approach centered in Aboriginal Epistemology

FROM: Cindy Blackstock

<http://www.win-hec.org/docs/pdfs/cindy.pdf>

(WIN-HEC Journal 2007)



Nourishing the Learning Spirit

Ancestral Knowledge

Passing on Ancestral Knowledge



Importance of Ancestors, Elders, Knowledge Holders

Importance of Ancestors, Elders, Knowledge Holders

Six Animation Theme Bundles Intersecting and Interdependent

from:

Aboriginal Learning Knowledge Centre
Canadian Council on Learning

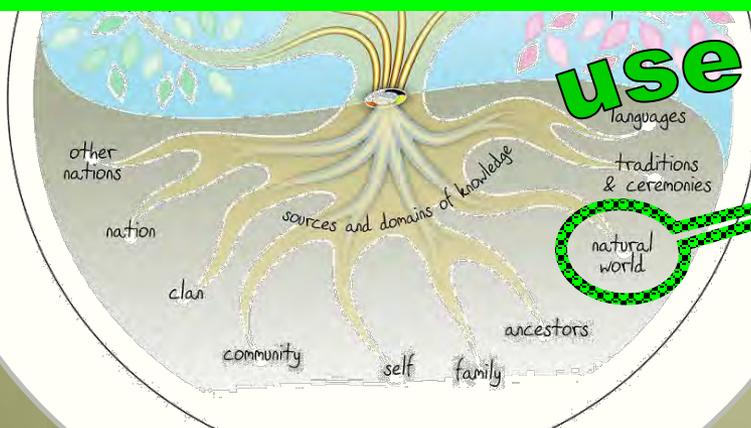
<http://www.ccl-cca.ca/ccl>



- **Re-generation of the learning spirit.** (Re-connecting values to Elders' and traditional teachings, connecting to community, to 'place', to Indigenous peoples' languages, building on dreams, visions, mediation, and aspirations contribute to learning. The gauge for this type of learning is performance and service).

use organic visuals

**Nourishing
the
Learning
Spirit**



First Nations Life Long Learning Model

Importance of Ancestors, Elders, Knowledge Holders



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



Mi'kma'wey Debert



Membertou
Elementary



**IWK Health Centre
Foundation**



Mermaid Theatre
of Nova Scotia



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.