

# Developing Traditional Curricula

24 October 2008



Social Studies Teachers' In-service  
Eskasoni First Nation

**Cheryl Bartlett, PhD**

Canada Research Chair in Integrative Science  
Professor of Biology

CAPE BRETON  
UNIVERSITY



# Developing Traditional Curricula

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 Foundation for Innovation / Fondation canadienne pour l'innovation

CAPE BRETON UNIVERSITY

Mi'kmaq College Institute / Mi'kmaq Espl Kina'matno'kuom

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

IAPH

ABORIGINAL Health Research Program

SABLE

UNAMA'KI INSTITUTE OF NATURAL RESOURCES

KECCA

Mi'kmaq Health Centre Foundation

NSERC CRSNG

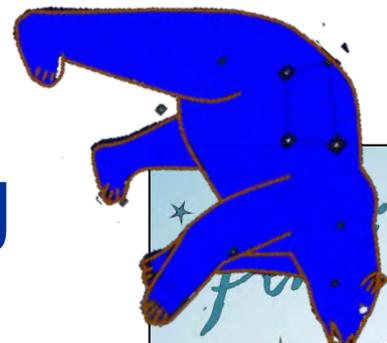
Mi'kma'wey Debert

Eskasoni Detachment / Royal Canadian Mounted Police / Gendarmerie royale du Canada



natural world, natural patterns: all our relationships

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INSTITUTE FOR INTEGRATIVE SCIENCE & HEALTH

NSWK Health Centre Foundation

NOVA SCOTIA Health Research FOUNDATION

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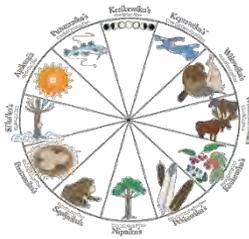
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natural world, natural patterns: all our relationships

# OUTLINE OF TALK



explore  
“pattern”

Science as  
“pattern stories”

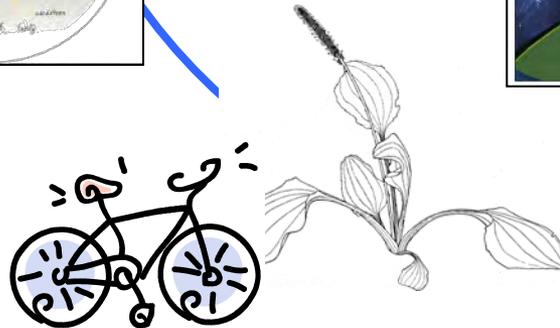
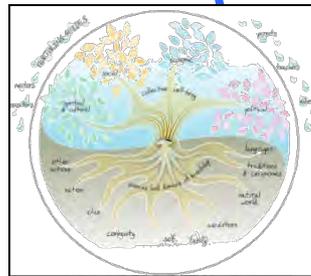
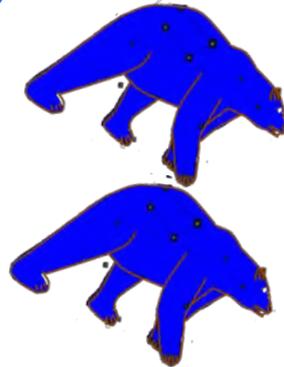
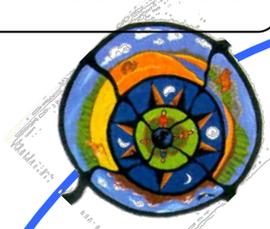
Two-Eyed Seeing



**Integrative Science**  
within an ongoing  
Co-Learning Journey

Conclusion

Introduction



**MESSAGE**

# patterns in natural world

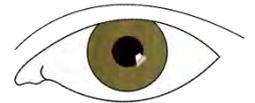
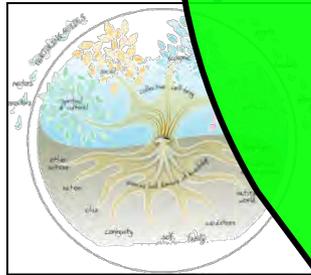
explore  
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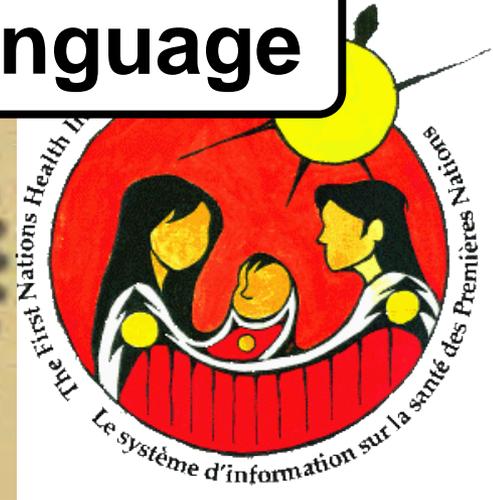
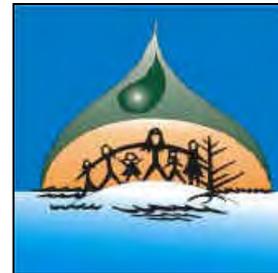
Two-Eyed Seeing



**Integrative Science**  
within an ongoing  
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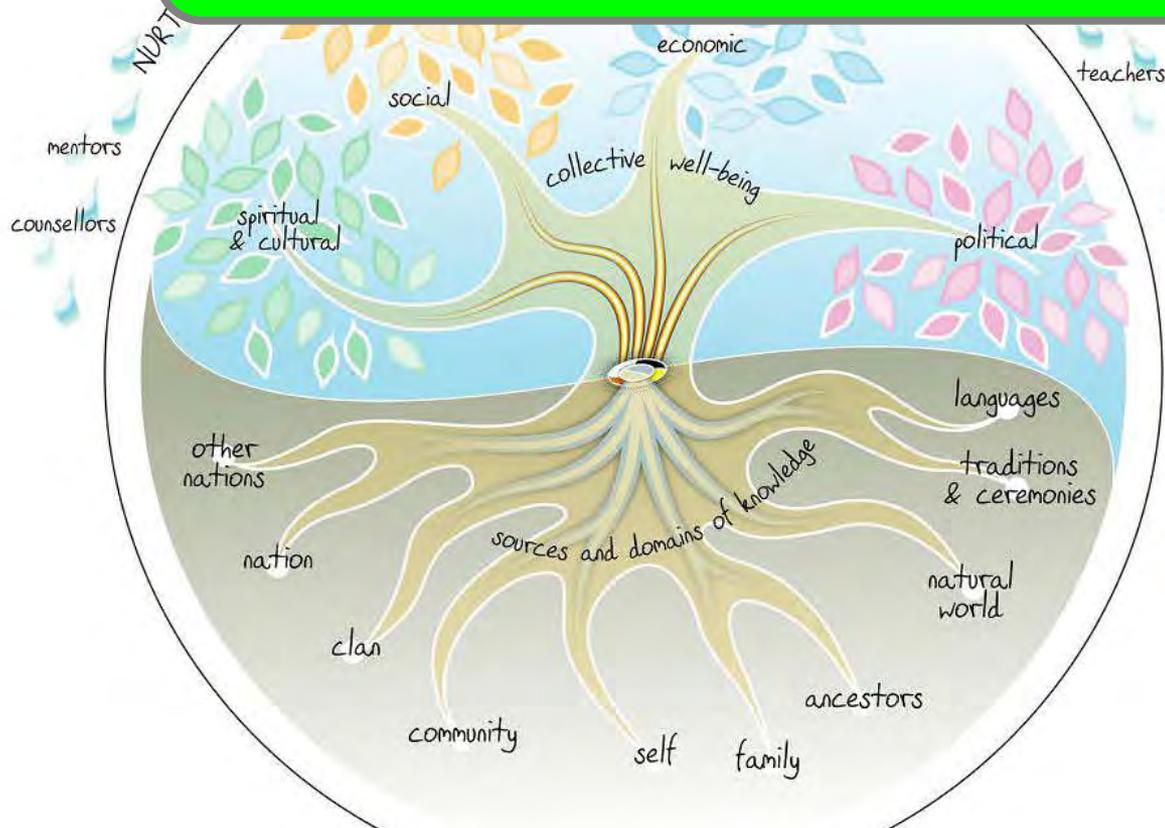


# Developing Traditional Curricula



logos from: Aboriginal organizations, various sources

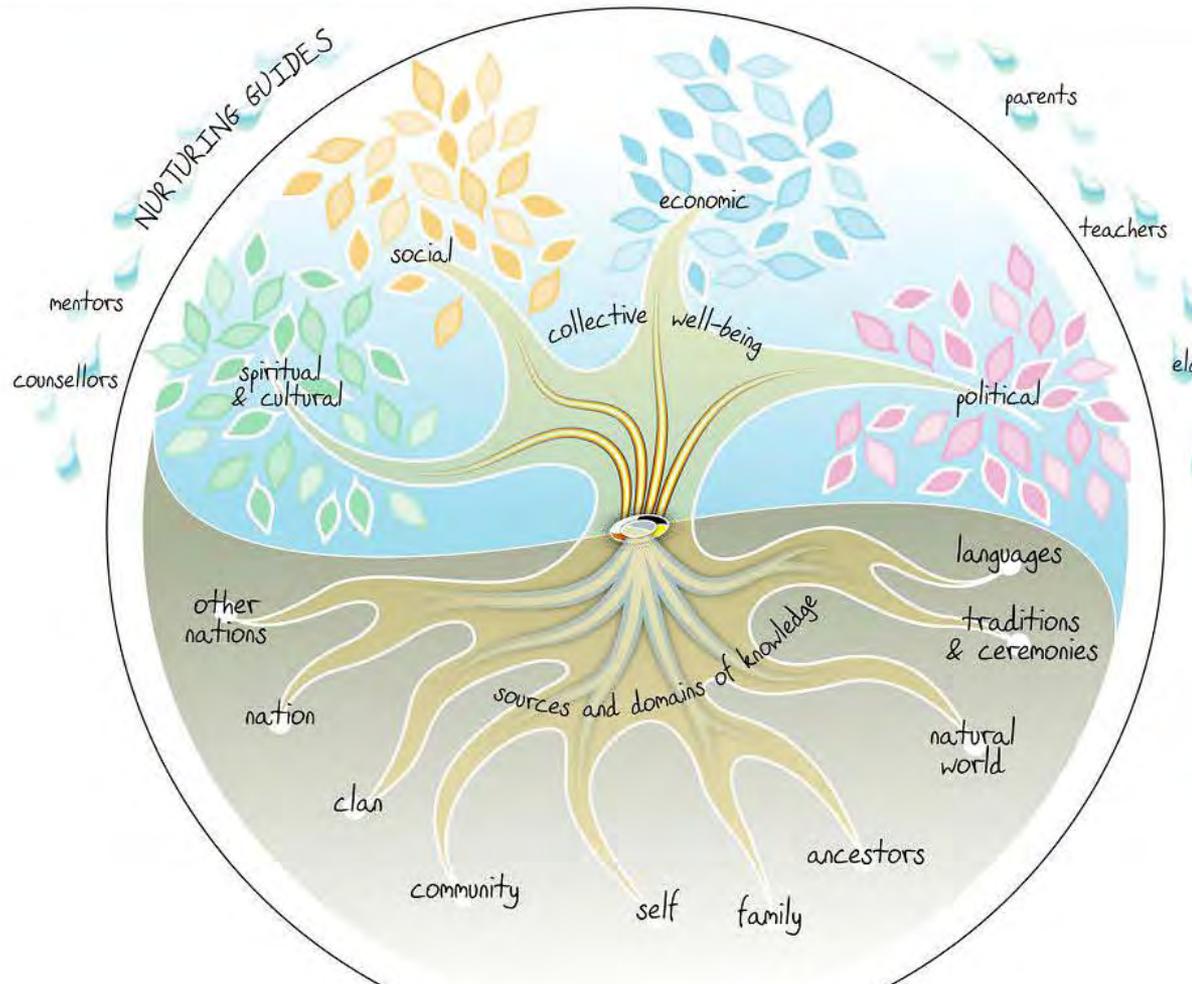
# Lifelong Learning knowledge model



## First Nations Holistic Lifelong Learning Model

from: Canadian Council on Learning: Aboriginal Learning Knowledge Centre

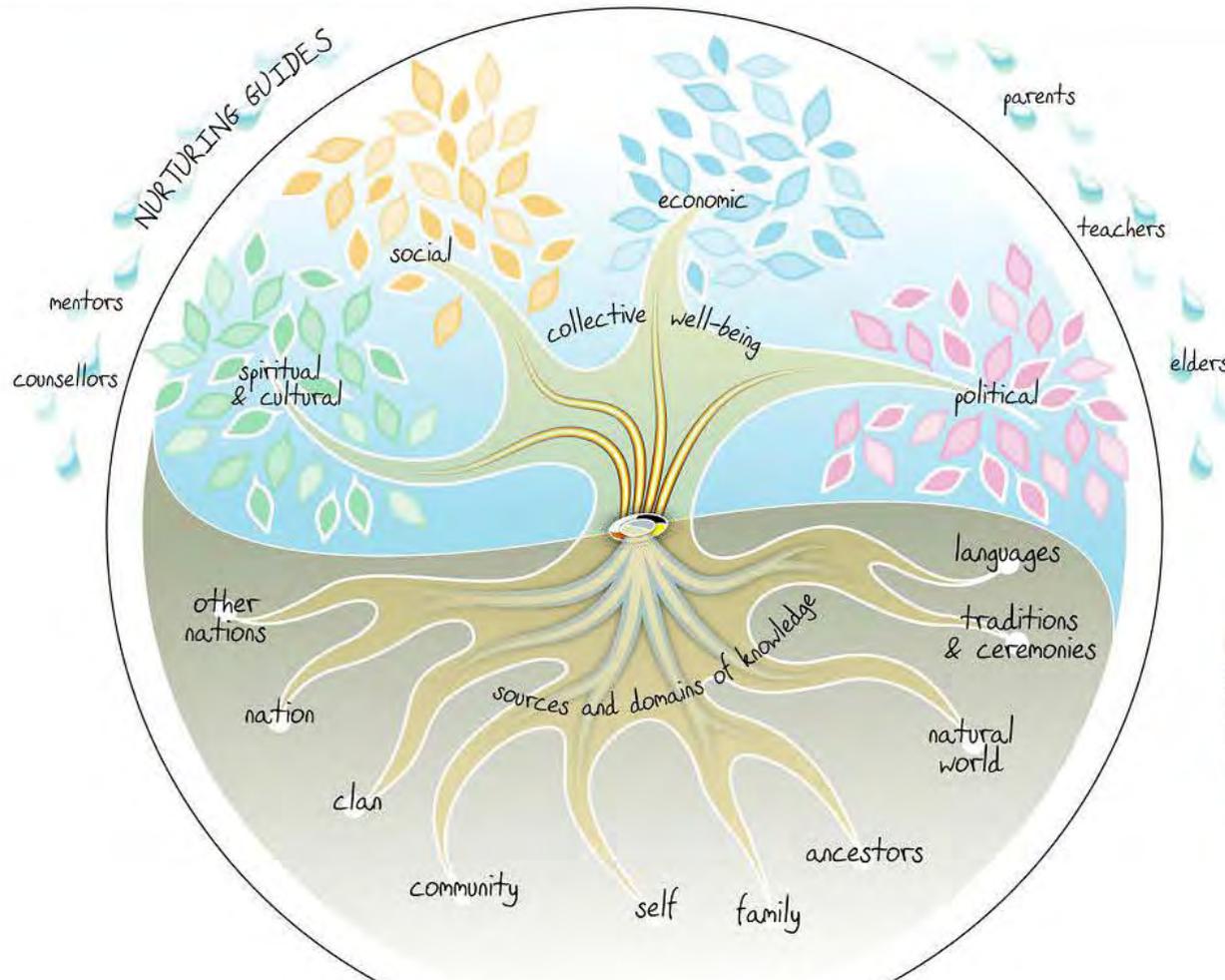
(<http://www.ccl-cca/CCL>)



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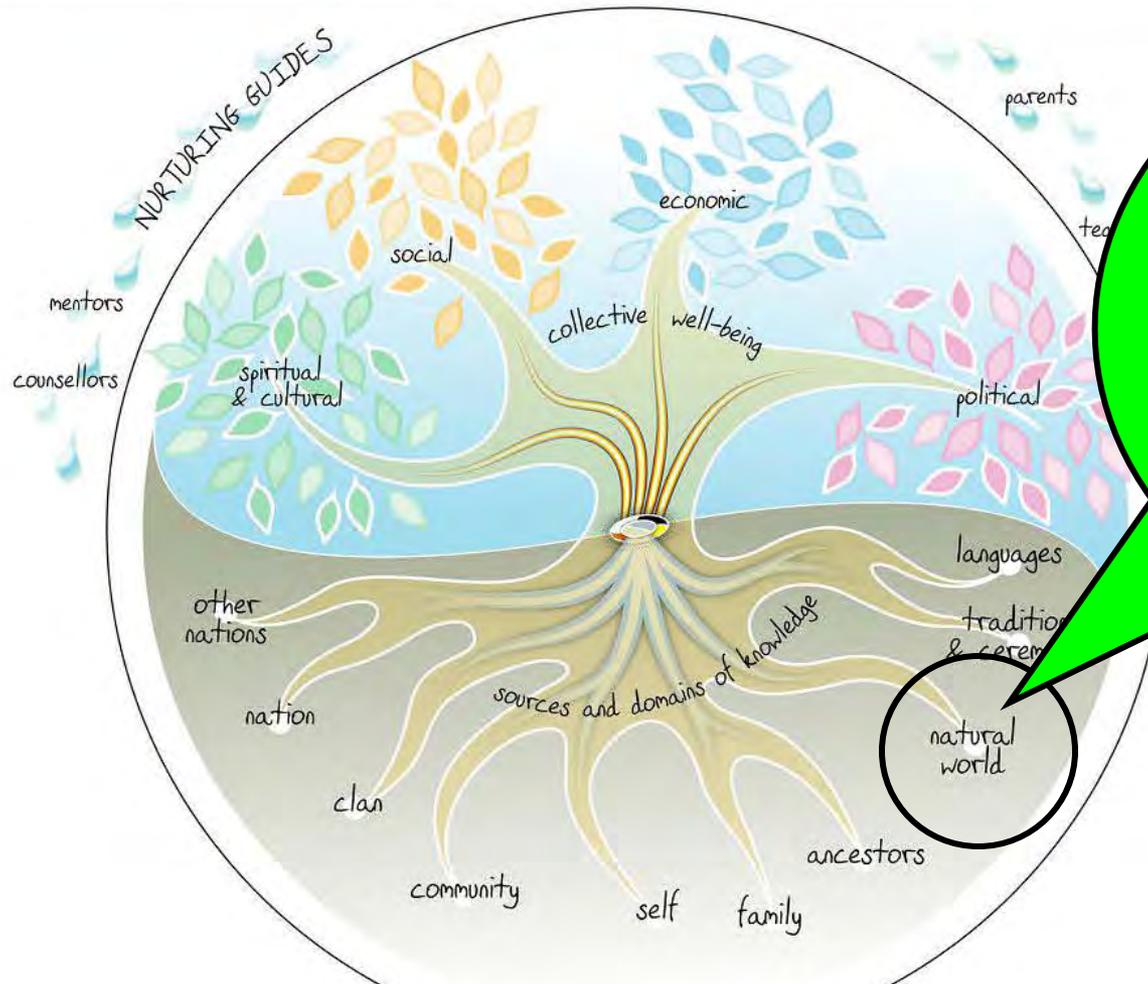
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natural world

## First Nations Holistic Lifelong Learning Model

from: Canadian Council on Learning: Aboriginal Learning Knowledge Centre

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

Elder Murdena Marshall, MEd  
Mi'kmaq Elder & Spiritual Leader  
Eskasoni First Nation



## Murdena's Story

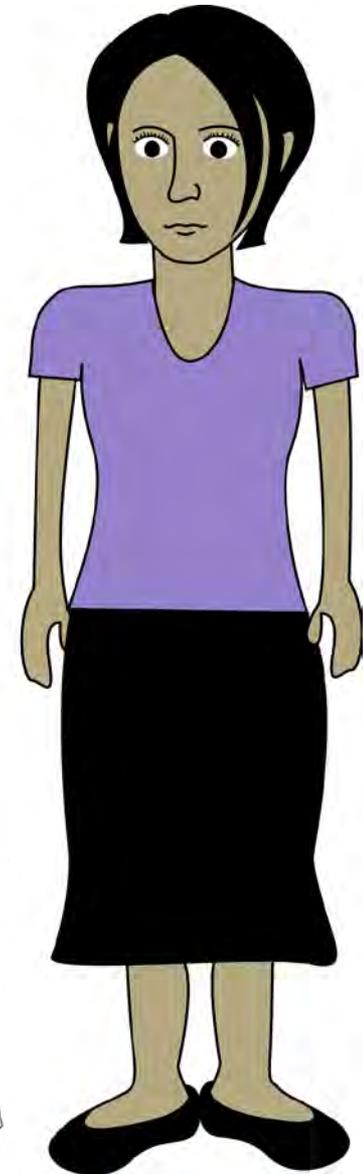
(with permission)

*from:* Marshall, M. 2008.  
Traditional Health & Healing  
and Women's Roles.  
Workshop Module Materials.

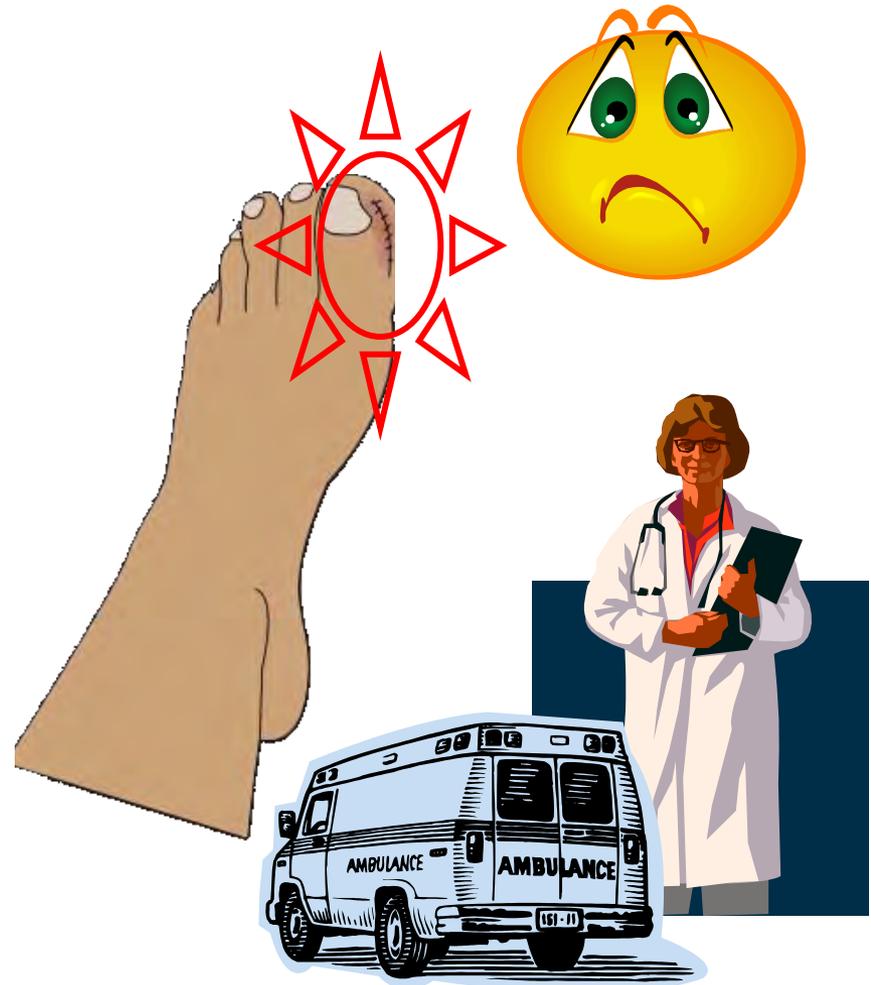
Murdena is a young girl.



Murdena has an Auntie.



Murdena is a Grandmother.

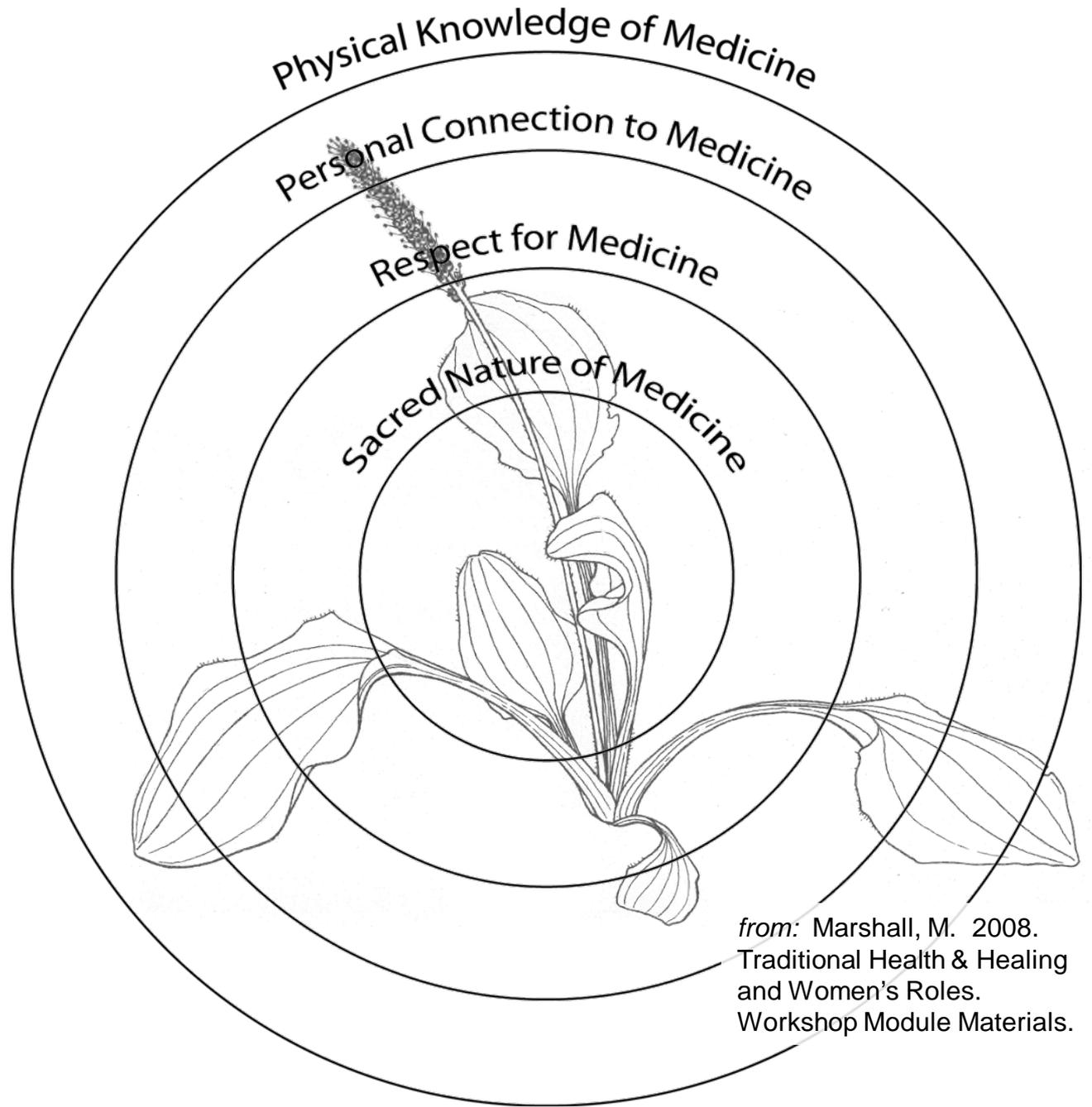


Murdena is a Grandmother whose Journey of Life has experienced many relations.



Murdena is a Grandmother whose Journey of Life has experienced many relations.

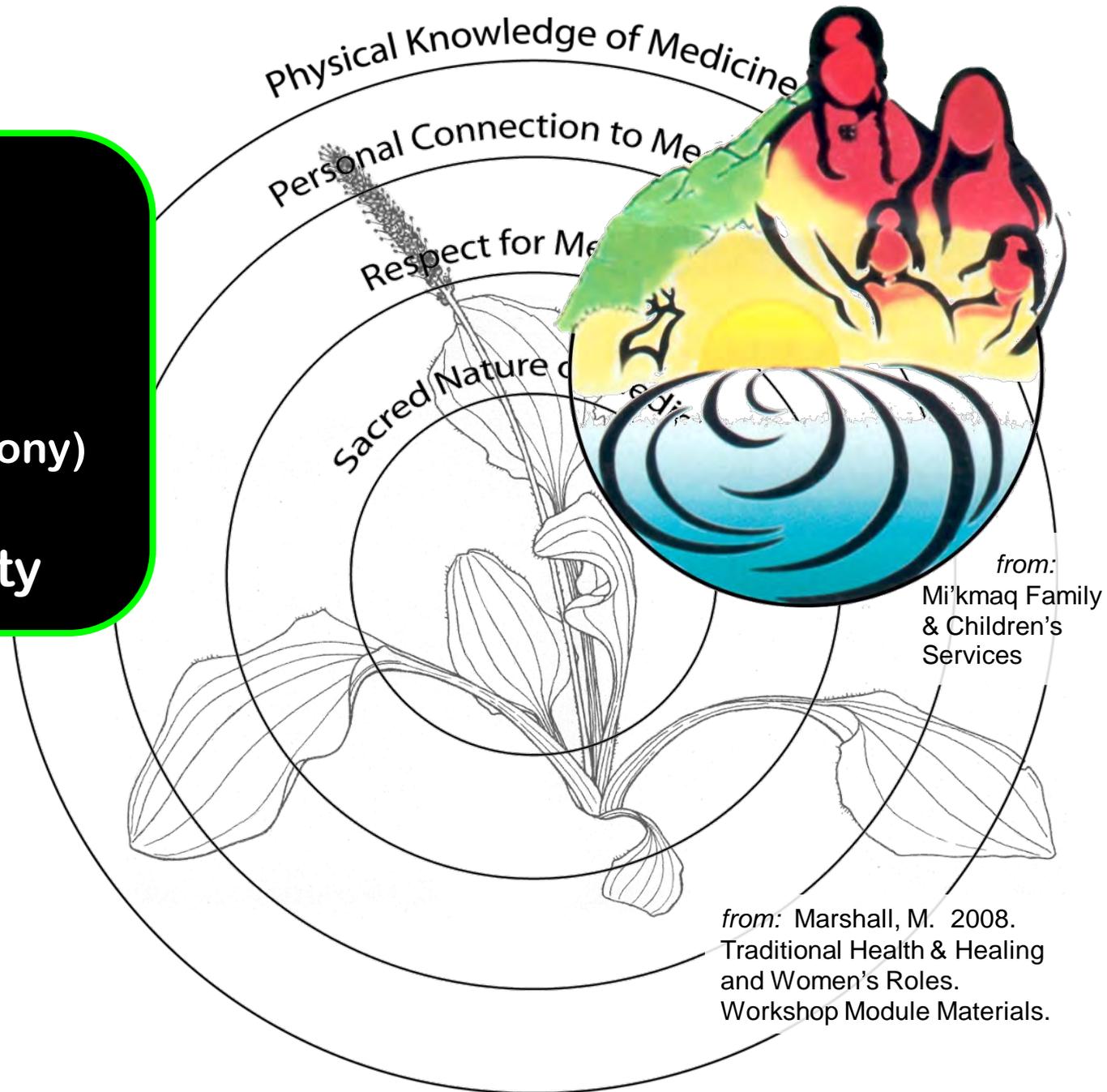




from: Marshall, M. 2008.  
Traditional Health & Healing  
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Workshop Module Materials.

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

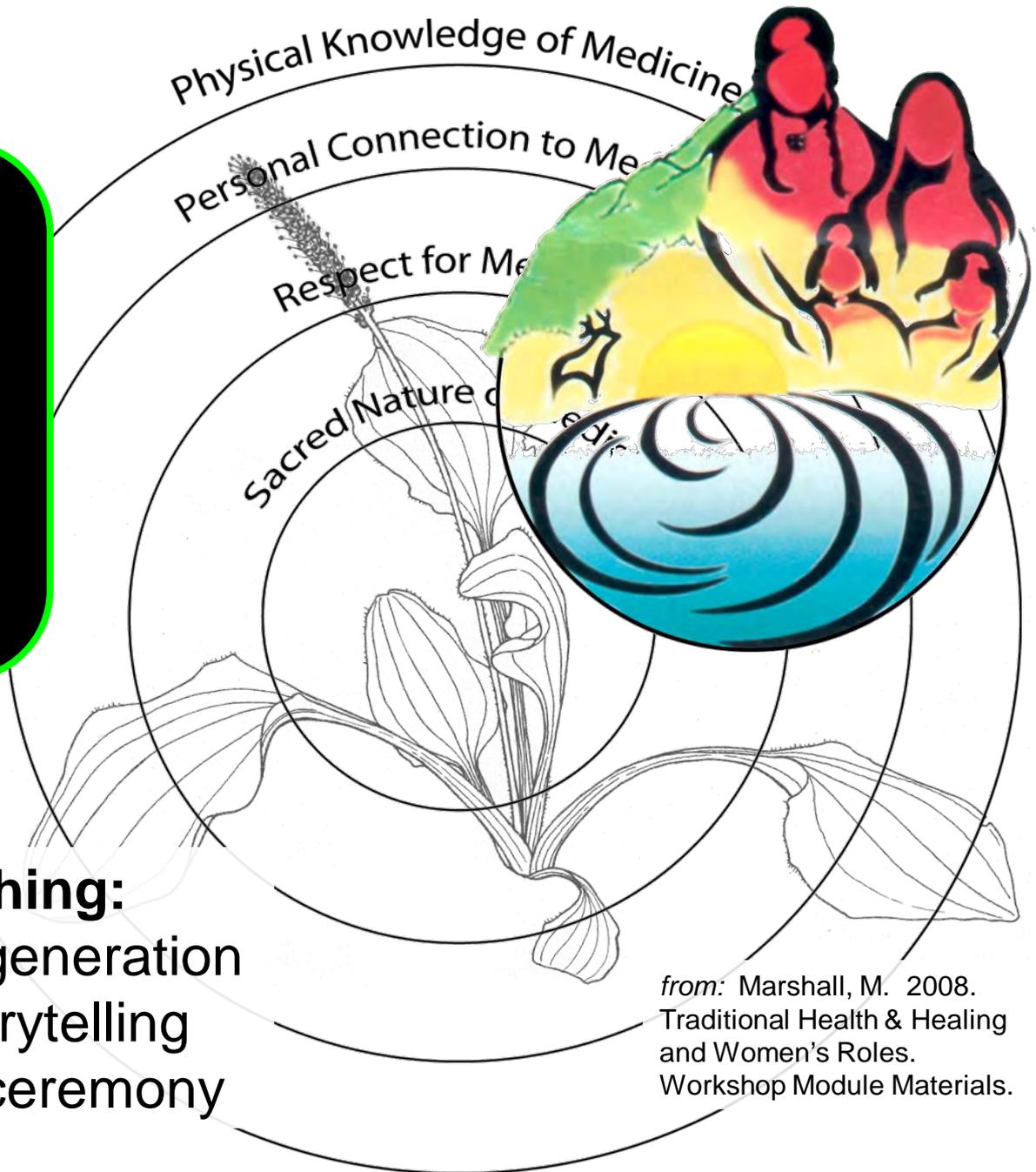
from: J. Archibald, 2001.  
Can. J. Native Ed. 25(1):1-5



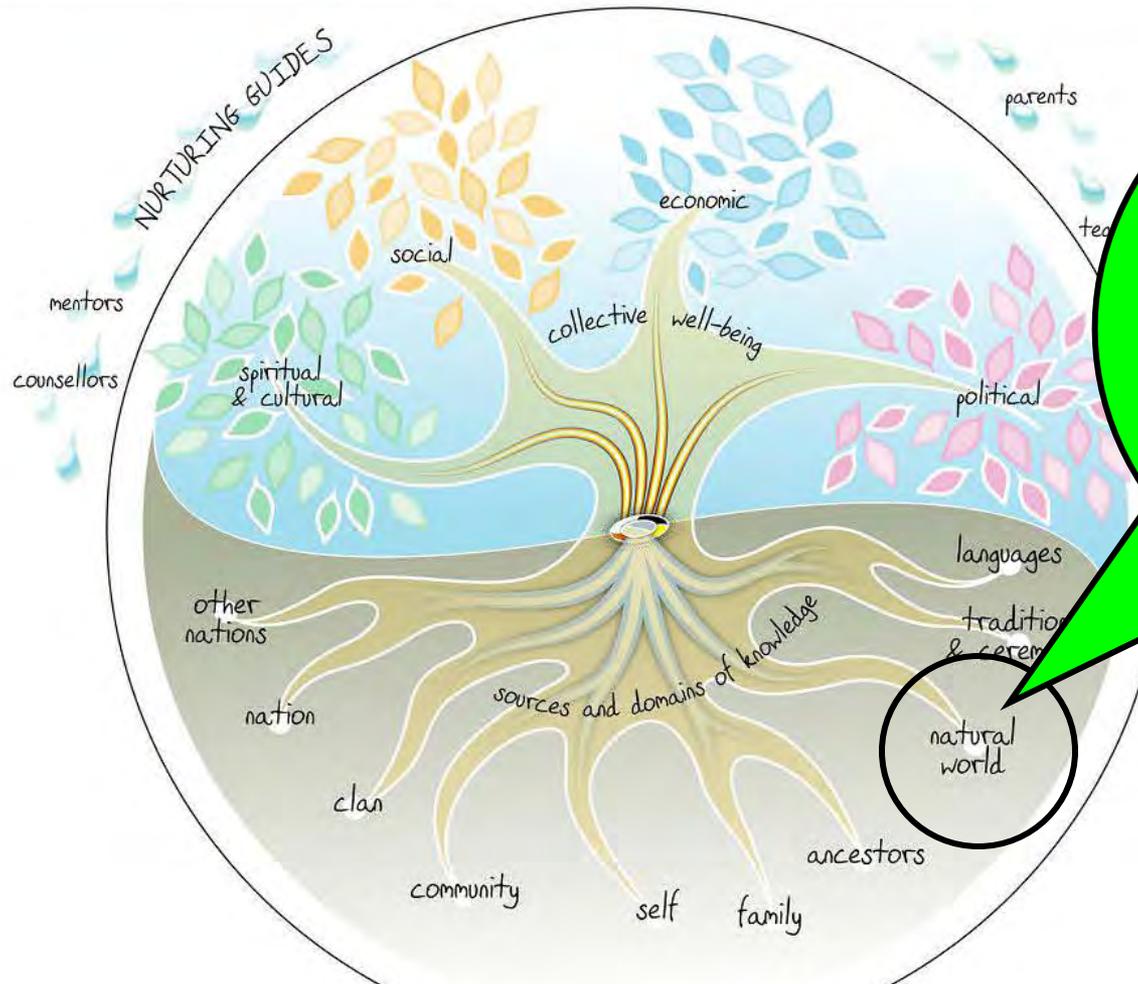
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- ritual (ceremony)
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Can. J. Native Ed. 25(1):1-5

**Sacred Circle Teaching:**  
reality passes from generation  
to generation via storytelling  
and participation in ceremony



from: Marshall, M. 2008.  
Traditional Health & Healing  
and Women's Roles.  
Workshop Module Materials.



natural world

# First Nations Holistic Lifelong Learning Model

from: Canadian Council on Learning: Aboriginal Learning Knowledge Centre

# Pemi Pungek Mi'kma'ki

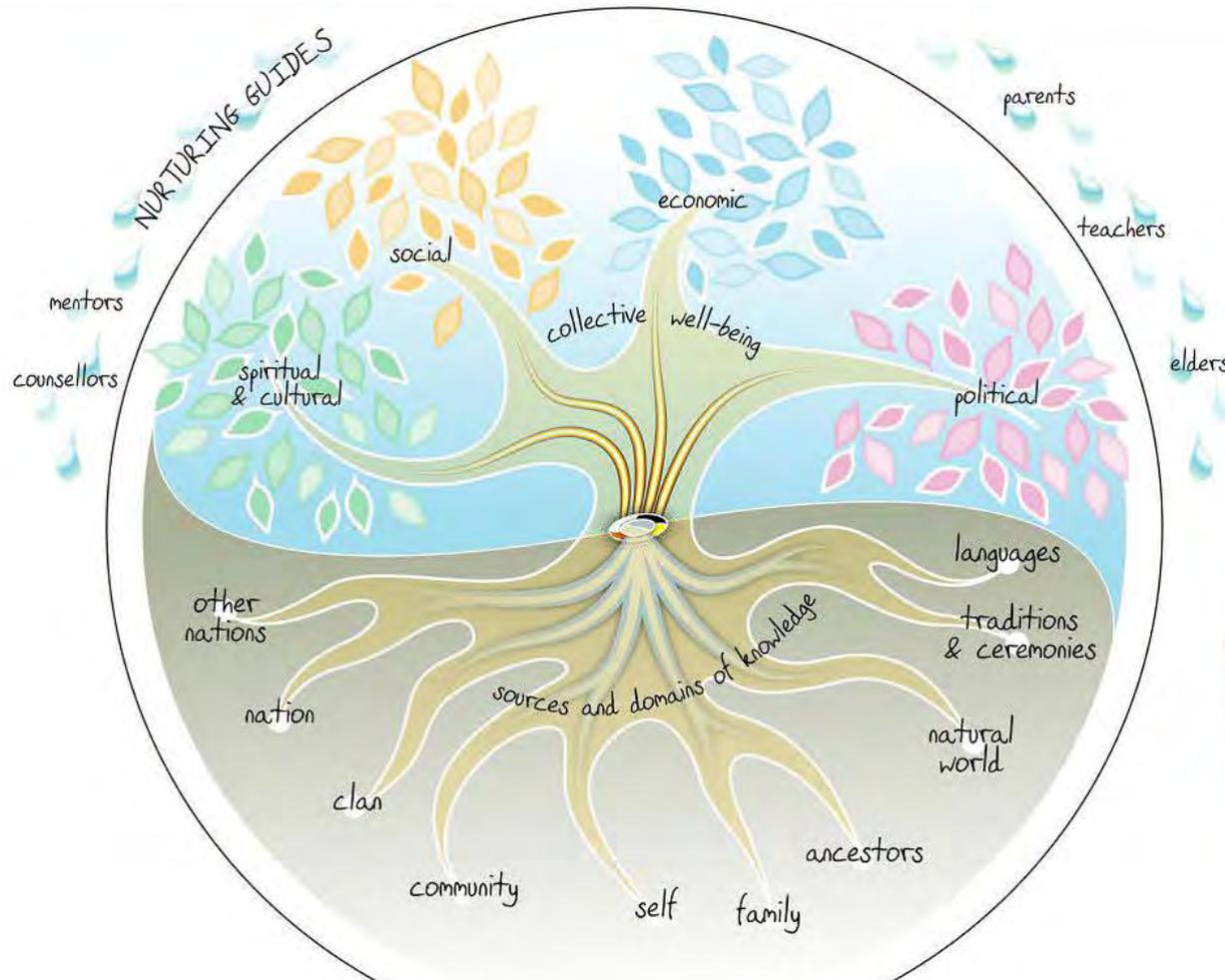


This poster is dedicated to all Mi'kmaq Elders.

This poster is one in a series made by the Institute for Integrative Science and Health at Cape Breton University and Mi'kmaq First Nations Elders of Cape Breton. Integrative Science brings together Indigenous and Western scientific knowledge and ways of knowing for science education.

This poster is called Pemi Pungek Mi'kma'ki, which means one continuous year in the Mi'kmaq traditional territory. On the outside, it shows the four seasons and the 12 months of the year. On the inside, it shows the land, water, and sky over a full year. The pictures of plants, animals, and weather show the areas of changing events in nature. The pictures of people show when to do traditional and modern activities. Read this poster in a circle to see the cycle of the seasons. Spring is on the left, summer is on the bottom, fall is on the right, and winter is at the top.

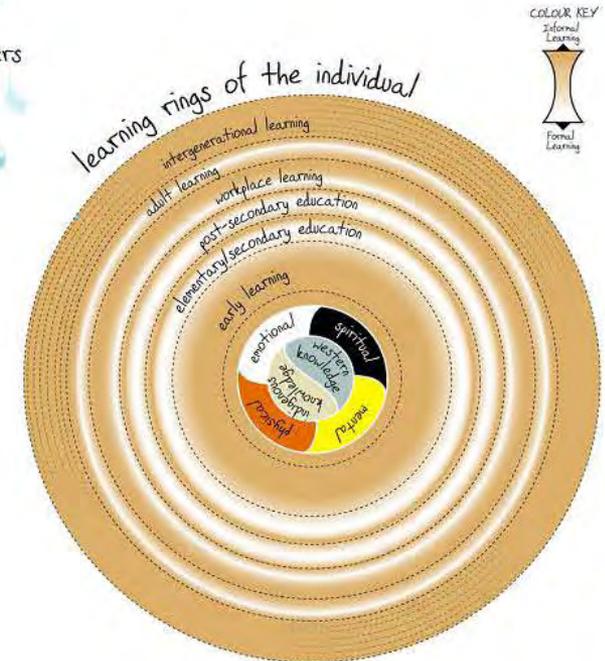
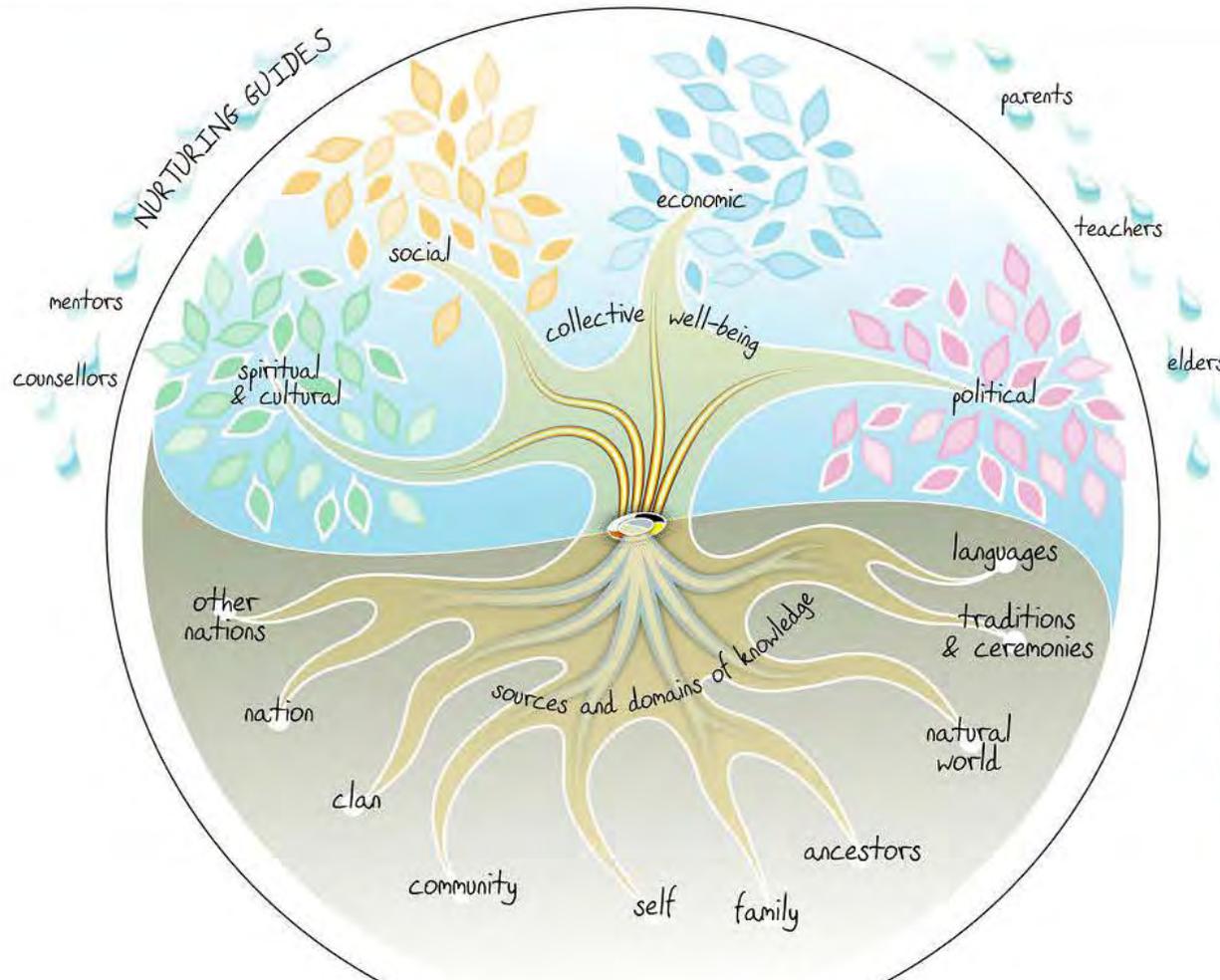




## First Nations Holistic Lifelong Learning Model

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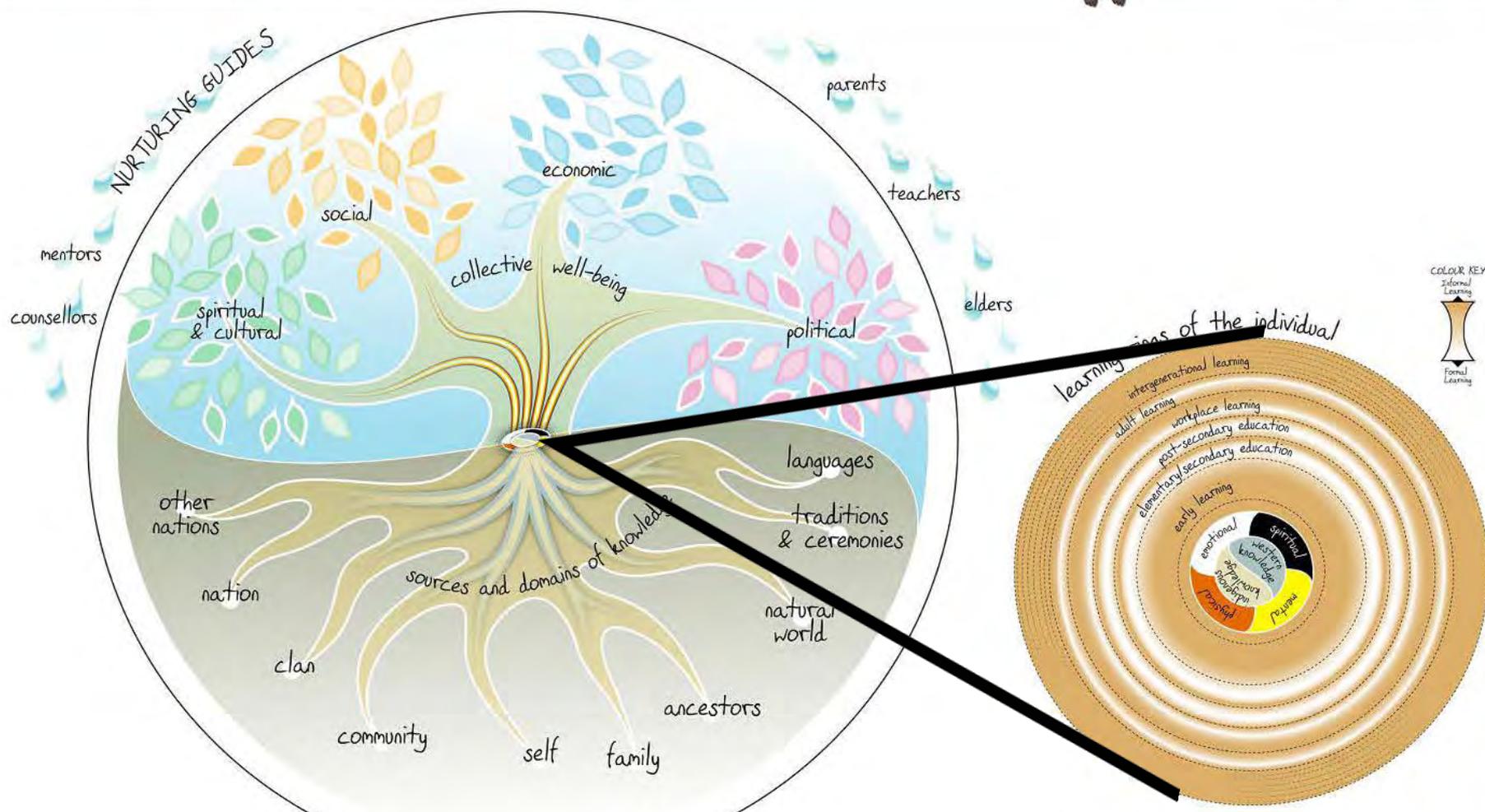
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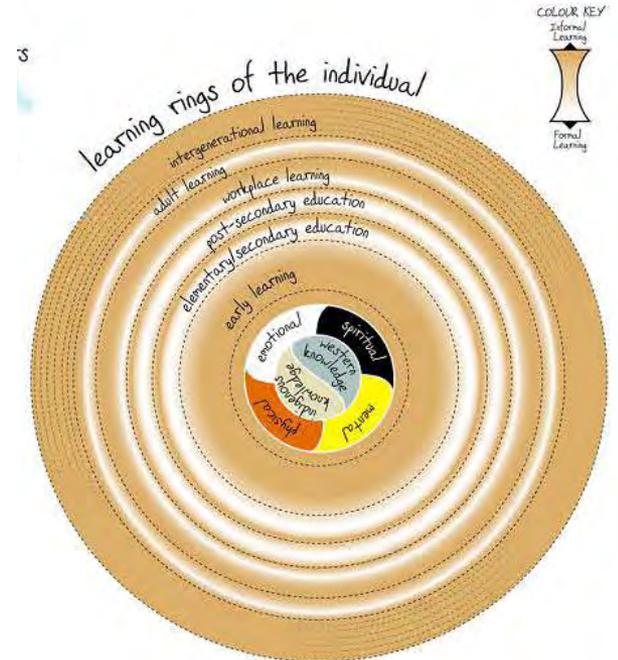
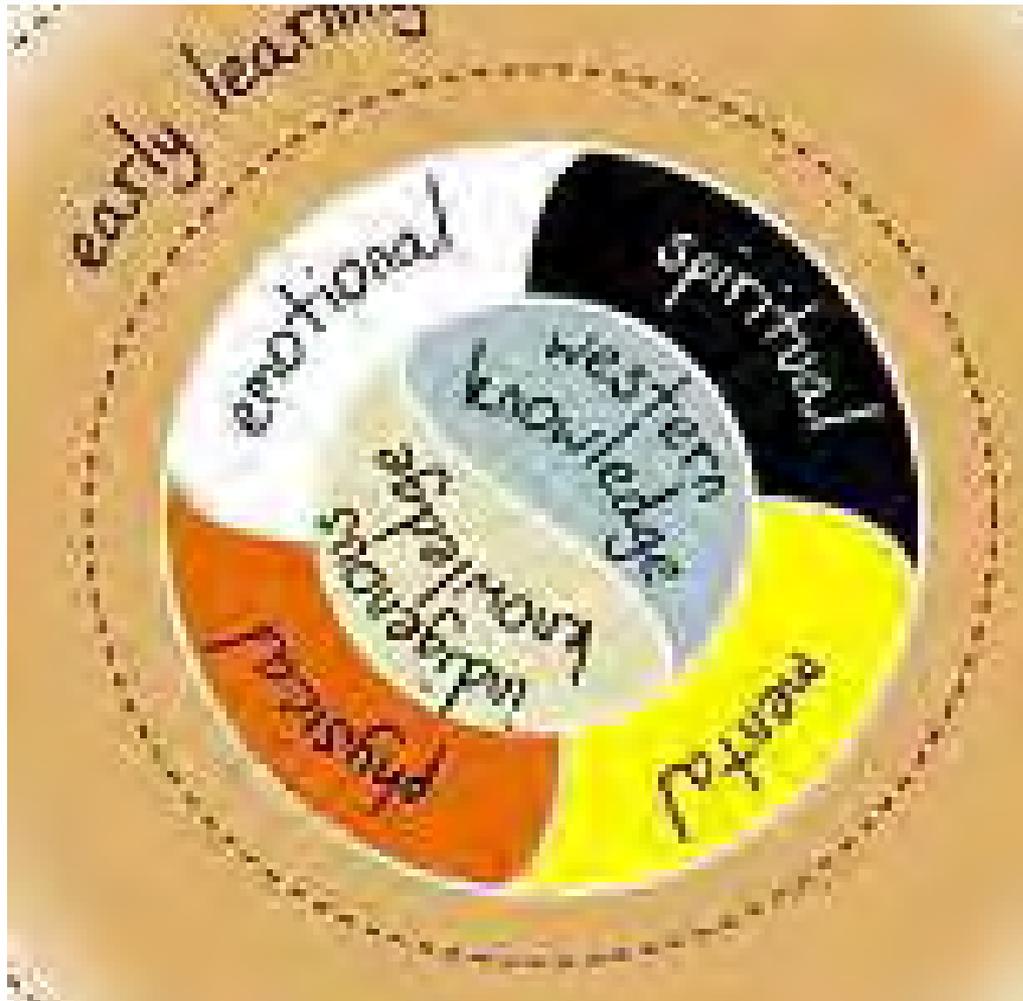
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# CAPE BRETON UNIVERSITY

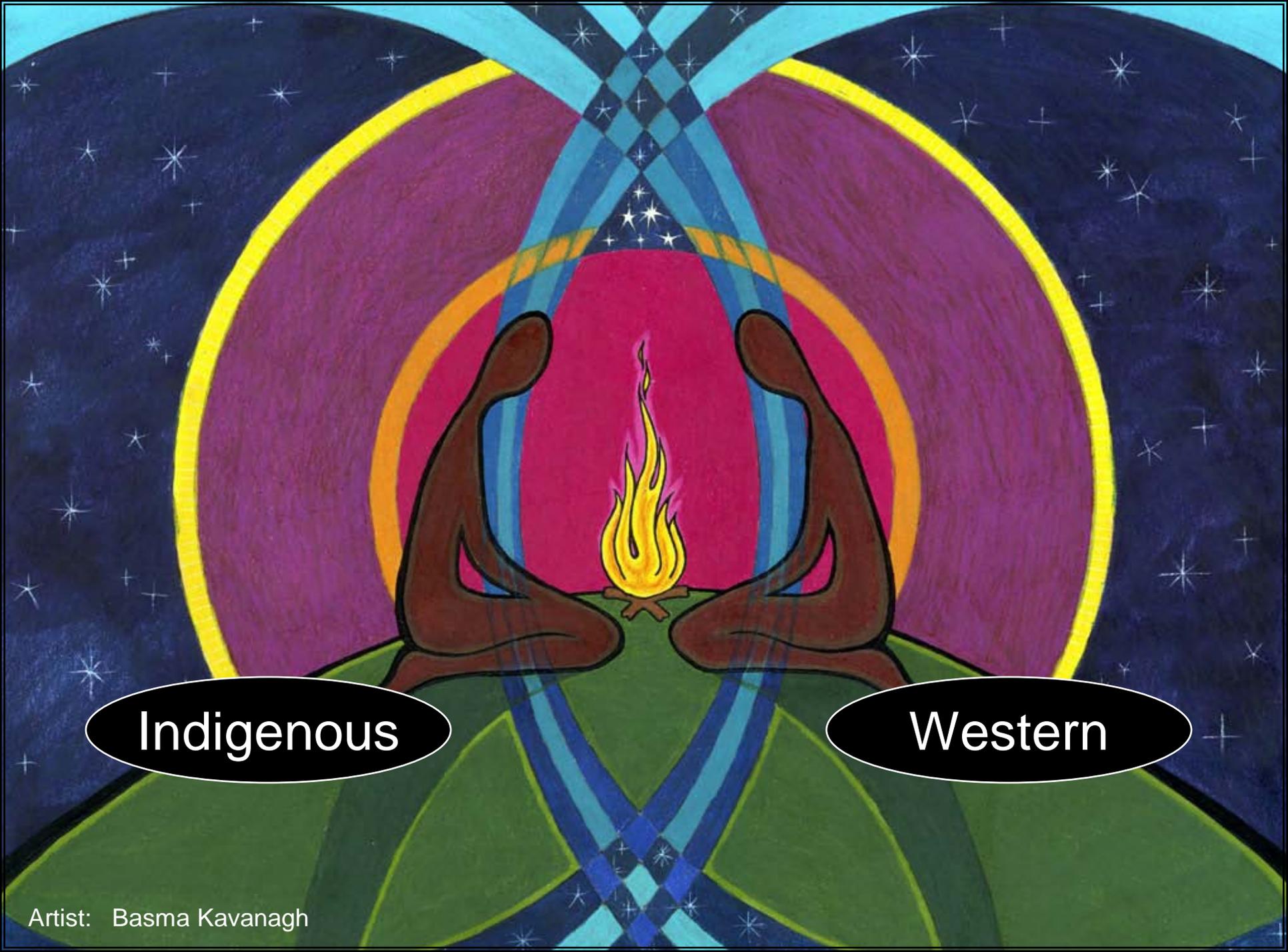
## Integrative Science



### First Nations Holistic Lifelong Learning Model

from: Canadian Council on Learning: Aboriginal Learning Knowledge Centre

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



Indigenous

Western

# Integrative Science

## SCIENCE

education, research, applications,  
youth and community outreach

Indigenous

Western

“bringing our knowledges together”

**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, scientist & educator, Univ. of New Mexico

**Indigenous**

**Western**

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Gregory Cajete, PhD, scientist & educator, Univ. of New Mexico

Indigenous

Western

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Merrim Theatre of Nova Scotia

Membertou Elementary

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

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

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Mi'kmaq Elders

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SABLE OFFSHORE ENERGY INCORPORATED

UNAMA'KI INSTITUTE OF NATURAL RESOURCES

KECCA / Knowledge: Education and Cultural Consultant Associates

NSERC CRSNG

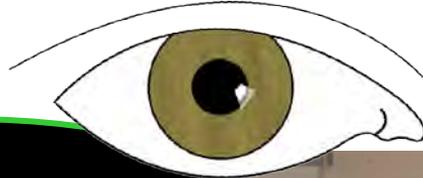
Mi'kmawey Debert

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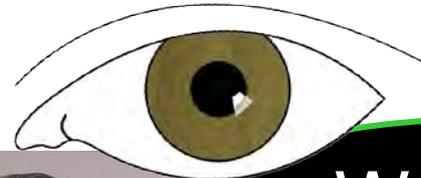


# “Two-Eyed Seeing”

learning to see with the strengths of each & together



Indigenous

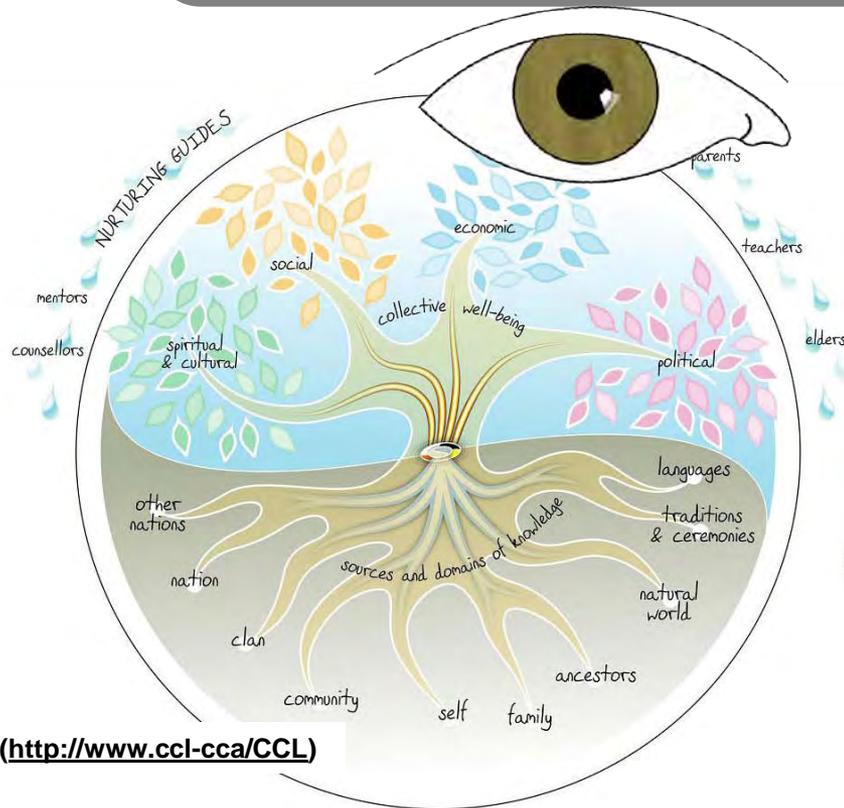


Western

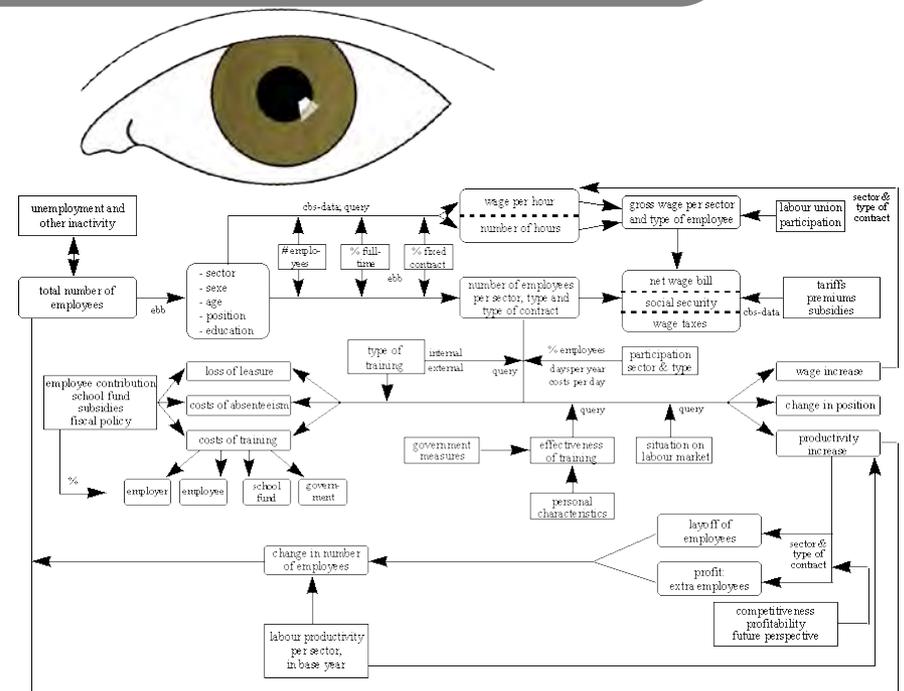


Mr. Albert Marshall, Mi'kmaq Elder  
Eskasoni First Nation

# Lifelong Learning knowledge models



(<http://www.ccl-cca/CCL>)



from: [www.leads.ac.uk](http://www.leads.ac.uk)

natural  
world



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



stories of our interactions with and within nature

photo credit: NRC



# Western Science

|                      |                       |                       |                            |                            |                           |                            |                           |                           |  |  |  |  |  |  |                     |                   |                   |
|----------------------|-----------------------|-----------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|---------------------------|--|--|--|--|--|--|---------------------|-------------------|-------------------|
| 1<br>H<br>Hydrogen   |                       |                       |                            |                            |                           |                            |                           |                           |  |  |  |  |  |  |                     |                   | 2<br>He<br>Helium |
| 3<br>Li<br>Lithium   | 4<br>Be<br>Beryllium  |                       |                            |                            |                           |                            |                           |                           |  |  |  |  |  |  |                     | 10<br>Ne<br>Neon  |                   |
| 11<br>Na<br>Sodium   | 12<br>Mg<br>Magnesium |                       |                            |                            |                           |                            |                           |                           |  |  |  |  |  |  |                     | 18<br>Ar<br>Argon |                   |
| 19<br>K<br>Potassium | 20<br>Ca<br>Calcium   | 21<br>Sc<br>Scandium  | 22<br>Ti<br>Titanium       | 23<br>V<br>Vanadium        | 24<br>Cr<br>Chromium      | 25<br>Mn<br>Manganese      | 26<br>Fe<br>Iron          | 27<br>Co<br>Cobalt        |  |  |  |  |  |  | 36<br>Kr<br>Krypton |                   |                   |
| 37<br>Rb<br>Rubidium | 38<br>Sr<br>Strontium | 39<br>Y<br>Yttrium    | 40<br>Zr<br>Zirconium      | 41<br>Nb<br>Niobium        | 42<br>Mo<br>Molybdenum    | 43<br>Tc<br>Technetium     | 44<br>Ru<br>Ruthenium     | 45<br>Rh<br>Rhodium       |  |  |  |  |  |  | 54<br>Xe<br>Xenon   |                   |                   |
| 55<br>Cs<br>Cesium   | 56<br>Ba<br>Barium    | 57-71<br>Lanthanides  | 72<br>Hf<br>Hafnium        | 73<br>Ta<br>Tantalum       | 74<br>W<br>Tungsten       | 75<br>Re<br>Rhenium        | 76<br>Os<br>Osmium        | 77<br>Ir<br>Iridium       |  |  |  |  |  |  | 86<br>Rn<br>Radon   |                   |                   |
| 87<br>Fr<br>Francium | 88<br>Ra<br>Radium    | 89-103<br>Actinides   | 104<br>Unq<br>Unnilquadium | 105<br>Unp<br>Unnilpentium | 106<br>Unh<br>Unnilhexium | 107<br>Uns<br>Unnilseptium | 108<br>Uno<br>Unniloctium | 109<br>Une<br>Unnilennium |  |  |  |  |  |  |                     |                   |                   |
|                      |                       | 89<br>La<br>Lanthanum | 90<br>Ce<br>Cerium         | 91<br>Pr<br>Praseodymium   | 92<br>Nd<br>Neodymium     | 93<br>Pm<br>Promethium     | 94<br>Sm<br>Samarium      |                           |  |  |  |  |  |  |                     |                   |                   |
|                      |                       | 95<br>Ac<br>Actinium  | 96<br>Th<br>Thorium        | 97<br>Pa<br>Protactinium   | 98<br>U<br>Uranium        | 99<br>Np<br>Neptunium      | 100<br>Pu<br>Plutonium    |                           |  |  |  |  |  |  |                     |                   |                   |

|                       |                    |                     |                      |                       |                      |                       |                      |                     |  |  |  |  |  |  |  |                       |                        |                        |                          |                          |                      |                          |                       |                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------|--------------------|---------------------|----------------------|-----------------------|----------------------|-----------------------|----------------------|---------------------|--|--|--|--|--|--|--|-----------------------|------------------------|------------------------|--------------------------|--------------------------|----------------------|--------------------------|-----------------------|-------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|                       |                    |                     |                      |                       |                      |                       |                      |                     |  |  |  |  |  |  |  | 1<br>H<br>Hydrogen    |                        |                        |                          |                          |                      |                          |                       |                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                       |                    |                     |                      |                       |                      |                       |                      |                     |  |  |  |  |  |  |  | 2<br>He<br>Helium     |                        |                        |                          |                          |                      |                          |                       |                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                       |                    |                     |                      |                       |                      |                       |                      |                     |  |  |  |  |  |  |  | 3<br>B<br>Boron       | 4<br>C<br>Carbon       | 5<br>N<br>Nitrogen     | 6<br>O<br>Oxygen         | 7<br>F<br>Fluorine       | 8<br>Ne<br>Neon      |                          |                       |                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                       |                    |                     |                      |                       |                      |                       |                      |                     |  |  |  |  |  |  |  | 9<br>Al<br>Aluminum   | 10<br>Si<br>Silicon    | 11<br>P<br>Phosphorus  | 12<br>S<br>Sulfur        | 13<br>Cl<br>Chlorine     | 14<br>Ar<br>Argon    |                          |                       |                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28<br>Ni<br>Nickel    | 29<br>Cu<br>Copper | 30<br>Zn<br>Zinc    | 31<br>Ga<br>Gallium  | 32<br>Ge<br>Germanium | 33<br>As<br>Arsenic  | 34<br>Se<br>Selenium  | 35<br>Br<br>Bromine  | 36<br>Kr<br>Krypton |  |  |  |  |  |  |  |                       |                        |                        |                          |                          |                      |                          |                       |                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46<br>Pd<br>Palladium | 47<br>Ag<br>Silver | 48<br>Cd<br>Cadmium | 49<br>In<br>Indium   | 50<br>Sn<br>Tin       | 51<br>Sb<br>Antimony | 52<br>Te<br>Tellurium | 53<br>I<br>Iodine    | 54<br>Xe<br>Xenon   |  |  |  |  |  |  |  |                       |                        |                        |                          |                          |                      |                          |                       |                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 78<br>Pt<br>Platinum  | 79<br>Au<br>Gold   | 80<br>Hg<br>Mercury | 81<br>Tl<br>Thallium | 82<br>Pb<br>Lead      | 83<br>Bi<br>Bismuth  | 84<br>Po<br>Polonium  | 85<br>At<br>Astatine | 86<br>Rn<br>Radon   |  |  |  |  |  |  |  |                       |                        |                        |                          |                          |                      |                          |                       |                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                       |                    |                     |                      |                       |                      |                       |                      |                     |  |  |  |  |  |  |  | 89<br>Eu<br>Europium  | 90<br>Gd<br>Gadolinium | 91<br>Tb<br>Terbium    | 92<br>Dy<br>Dysprosium   | 93<br>Ho<br>Holmium      | 94<br>Er<br>Erbium   | 95<br>Tm<br>Thulium      | 96<br>Yb<br>Ytterbium | 97<br>Lu<br>Lutetium    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                       |                    |                     |                      |                       |                      |                       |                      |                     |  |  |  |  |  |  |  | 99<br>Am<br>Americium | 100<br>Cm<br>Curium    | 101<br>Bk<br>Berkelium | 102<br>Cf<br>Californium | 103<br>Es<br>Einsteinium | 104<br>Fm<br>Fermium | 105<br>Md<br>Mendelevium | 106<br>No<br>Nobelium | 107<br>Lr<br>Lawrencium |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

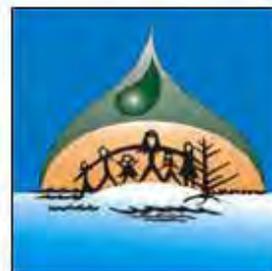
photo credit: NRC



# Western Science

|                      |                       |                       |                            |                            |                           |                            |                           |                           |                             |                           |                           |                           |                             |                           |                           |                           |                           |
|----------------------|-----------------------|-----------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|---------------------------|-----------------------------|---------------------------|---------------------------|---------------------------|-----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
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| 3<br>Li<br>Lithium   | 4<br>Be<br>Beryllium  |                       |                            |                            |                           |                            |                           |                           |                             |                           |                           | 5<br>B<br>Boron           | 6<br>C<br>Carbon            | 7<br>N<br>Nitrogen        | 8<br>O<br>Oxygen          | 9<br>F<br>Fluorine        | 10<br>Ne<br>Neon          |
| 11<br>Na<br>Sodium   | 12<br>Mg<br>Magnesium |                       |                            |                            |                           |                            |                           |                           |                             |                           |                           | 13<br>Al<br>Aluminum      | 14<br>Si<br>Silicon         | 15<br>P<br>Phosphorus     | 16<br>S<br>Sulfur         | 17<br>Cl<br>Chlorine      | 18<br>Ar<br>Argon         |
| 19<br>K<br>Potassium | 20<br>Ca<br>Calcium   | 21<br>Sc<br>Scandium  | 22<br>Ti<br>Titanium       | 23<br>V<br>Vanadium        | 24<br>Cr<br>Chromium      | 25<br>Mn<br>Manganese      | 26<br>Fe<br>Iron          | 27<br>Co<br>Cobalt        | 28<br>Ni<br>Nickel          | 29<br>Cu<br>Copper        | 30<br>Zn<br>Zinc          | 31<br>Ga<br>Gallium       | 32<br>Ge<br>Germanium       | 33<br>As<br>Arsenic       | 34<br>Se<br>Selenium      | 35<br>Br<br>Bromine       | 36<br>Kr<br>Krypton       |
| 37<br>Rb<br>Rubidium | 38<br>Sr<br>Strontium | 39<br>Y<br>Yttrium    | 40<br>Zr<br>Zirconium      | 41<br>Nb<br>Niobium        | 42<br>Mo<br>Molybdenum    | 43<br>Tc<br>Technetium     | 44<br>Ru<br>Ruthenium     | 45<br>Rh<br>Rhodium       | 46<br>Pd<br>Palladium       | 47<br>Ag<br>Silver        | 48<br>Cd<br>Cadmium       | 49<br>In<br>Indium        | 50<br>Sn<br>Tin             | 51<br>Sb<br>Antimony      | 52<br>Te<br>Tellurium     | 53<br>I<br>Iodine         | 54<br>Xe<br>Xenon         |
| 55<br>Cs<br>Cesium   | 56<br>Ba<br>Barium    | 57-71<br>Lanthanides  | 72<br>Hf<br>Hafnium        | 73<br>Ta<br>Tantalum       | 74<br>W<br>Tungsten       | 75<br>Re<br>Rhenium        | 76<br>Os<br>Osmium        | 77<br>Ir<br>Iridium       | 78<br>Pt<br>Platinum        | 79<br>Au<br>Gold          | 80<br>Hg<br>Mercury       | 81<br>Tl<br>Thallium      | 82<br>Pb<br>Lead            | 83<br>Bi<br>Bismuth       | 84<br>Po<br>Polonium      | 85<br>At<br>Astatine      | 86<br>Rn<br>Radon         |
| 87<br>Fr<br>Francium | 88<br>Ra<br>Radium    | 89-103<br>Actinides   | 104<br>Unq<br>Unnilquadium | 105<br>Unp<br>Unnilpentium | 106<br>Unh<br>Unnilhexium | 107<br>Uns<br>Unnilseptium | 108<br>Uuo<br>Unniloctium | 109<br>Uuh<br>Unnilennium | 110<br>Uuq<br>Unnilquadrium | 111<br>Uuh<br>Unnilhexium | 112<br>Uuo<br>Unniloctium | 113<br>Uuh<br>Unnilhexium | 114<br>Uuq<br>Unnilquadrium | 115<br>Uuh<br>Unnilhexium | 116<br>Uuo<br>Unniloctium | 117<br>Uuh<br>Unnilhexium | 118<br>Uuo<br>Unniloctium |
|                      |                       | 89<br>La<br>Lanthanum | 90<br>Ce<br>Cerium         | 91<br>Pr<br>Praseodymium   | 92<br>Nd<br>Neodymium     | 93<br>Pm<br>Promethium     | 94<br>Sm<br>Samarium      | 95<br>Eu<br>Europium      | 96<br>Gd<br>Gadolinium      | 97<br>Tb<br>Terbium       | 98<br>Dy<br>Dysprosium    | 99<br>Ho<br>Holmium       | 100<br>Er<br>Erbium         | 101<br>Tm<br>Thulium      | 102<br>Yb<br>Ytterbium    | 103<br>Lu<br>Lutetium     |                           |
|                      |                       | 99<br>Ac<br>Actinium  | 100<br>Th<br>Thorium       | 101<br>Pa<br>Protactinium  | 102<br>U<br>Uranium       | 103<br>Np<br>Neptunium     | 104<br>Pu<br>Plutonium    | 105<br>Am<br>Americium    | 106<br>Cm<br>Curium         | 107<br>Bk<br>Berkelium    | 108<br>Cf<br>Californium  | 109<br>Es<br>Einsteinium  | 110<br>Fm<br>Fermium        | 111<br>Md<br>Mendelevium  | 112<br>No<br>Nobelium     | 113<br>Lr<br>Lawrencium   |                           |

# Indigenous Science



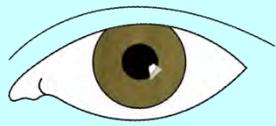
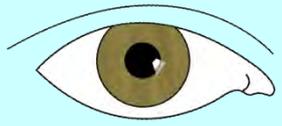
Life  
Love  
Land

Language



images from: Aboriginal organizations/artists, various sources



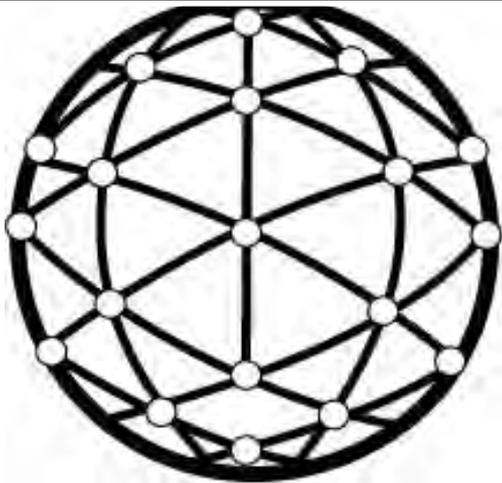


# Two-Eyed Seeing

learning to see with the strengths of each & together

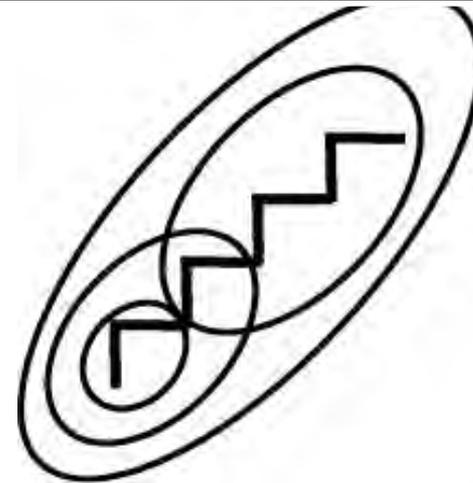
## OUR NATURAL WORLD

**interconnective**

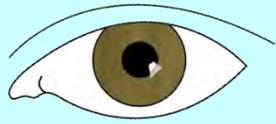
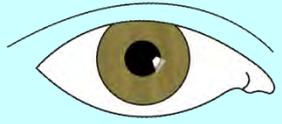


*constant change*

**parts & wholes**



*ongoing evolution*

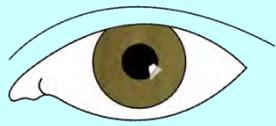
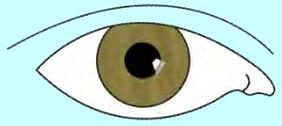


# Two-Eyed Seeing

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

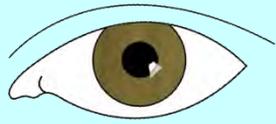
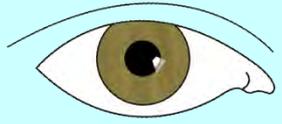
## OUR NATURAL WORLD

**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*

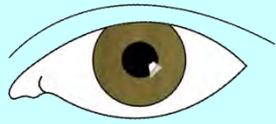
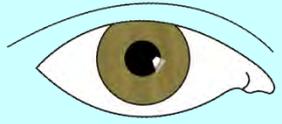


# Two-Eyed Seeing

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)**



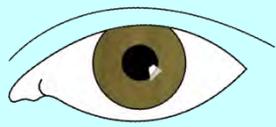
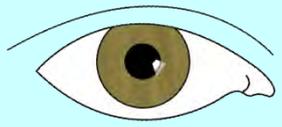
# Two-Eyed Seeing

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

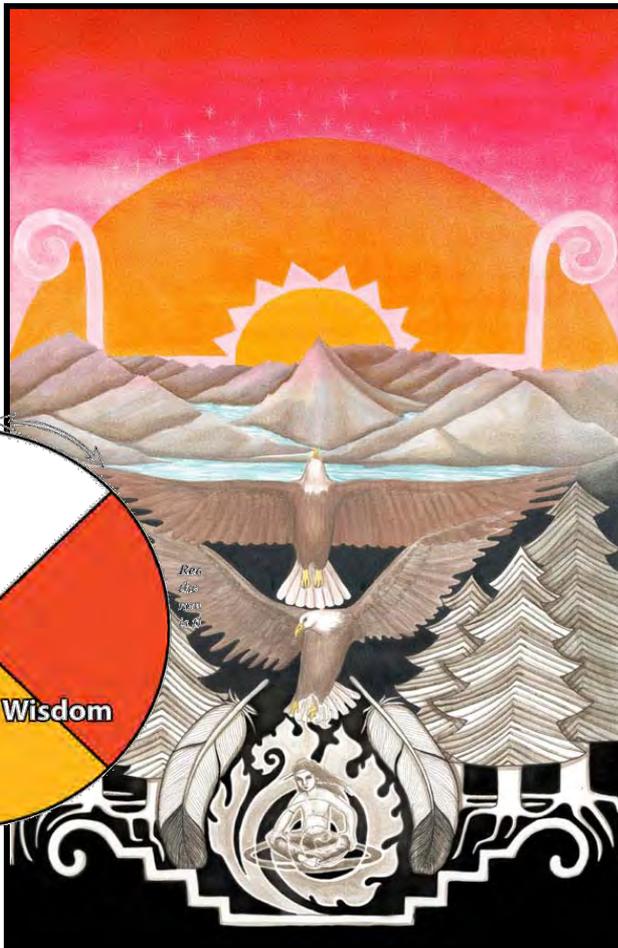
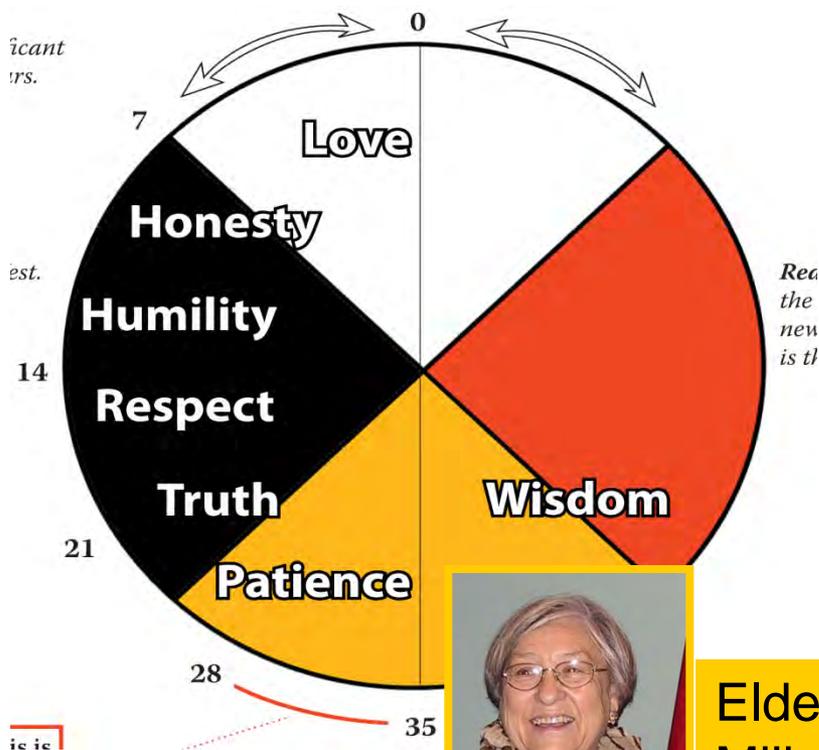


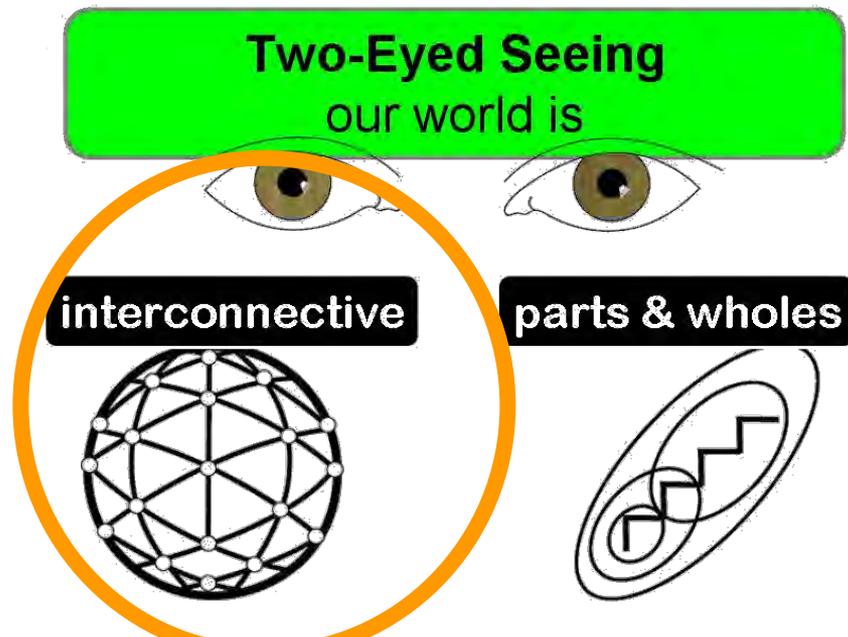
photo credit: NRC

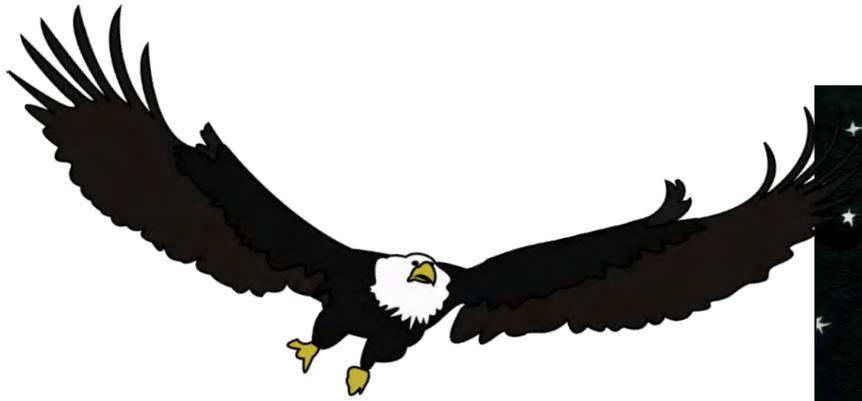
**participatory & creative choice**

**JOURNEY OF LIFE:  
Seven Sacred Gifts  
offered ... up to  
you to accept or not**



Elder Murdena Marshall, MEd  
Mi'kmaq Elder & Spiritual Leader  
Eskasoni First Nation





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



stories of our interactions with and within nature

# PATTERN

## Sherman's Lagoon

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

PATIENCE. PATIENCE.

<http://www.shermanslagoon.com>

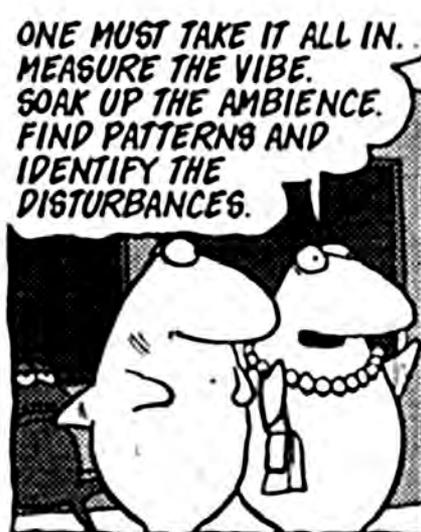
ONE DOESN'T JUST RUSH INTO THE MALL FOR A QUICK ITEM AND LEAVE. IT'S NOT A CONVENIENCE STORE.

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

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TRANSLATION?

YOU'RE HERE ALL DAY, PAL.



# PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

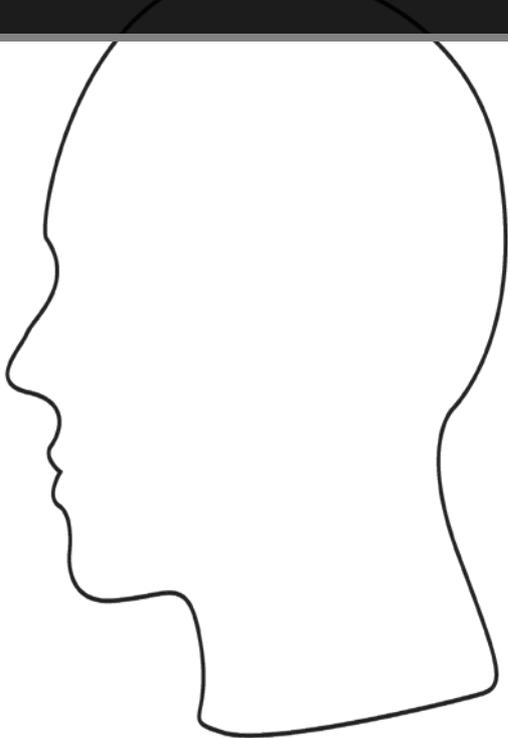


# PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

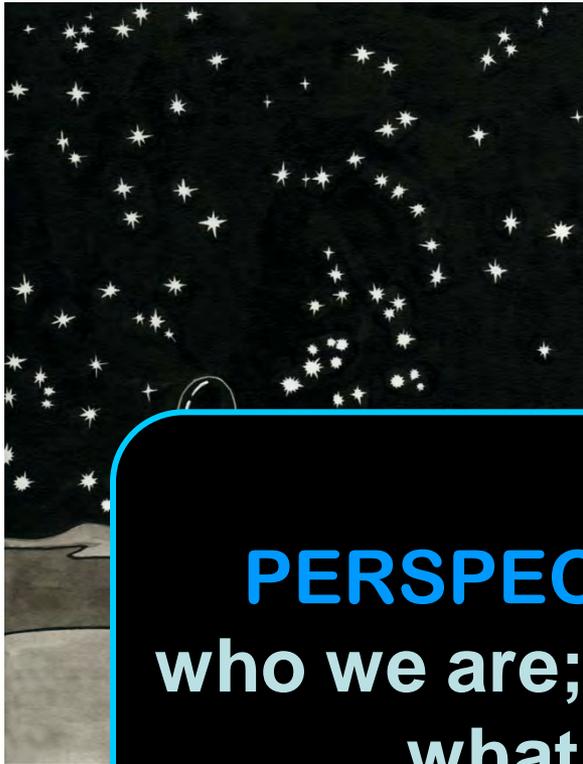


# PATTERN CONCEPTUAL FRAMEWORK

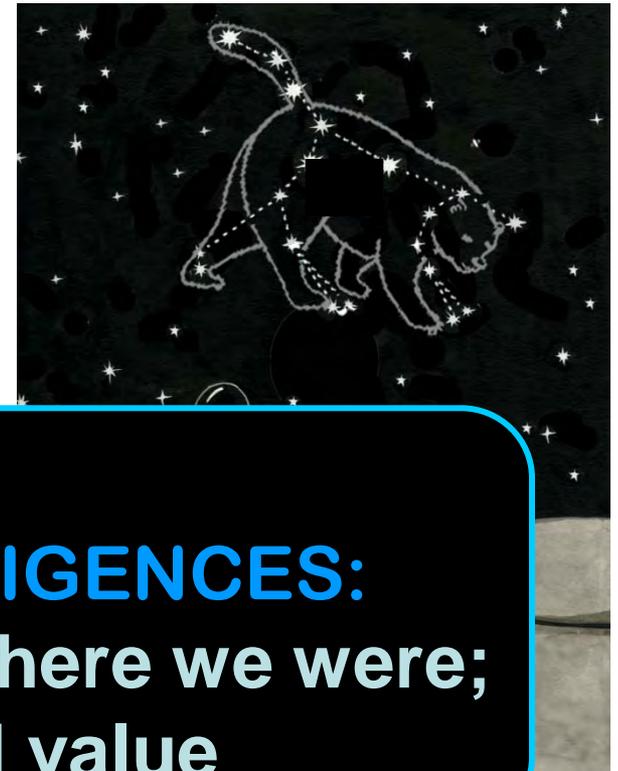
outer

inner

outer



muin / *Ursa major*



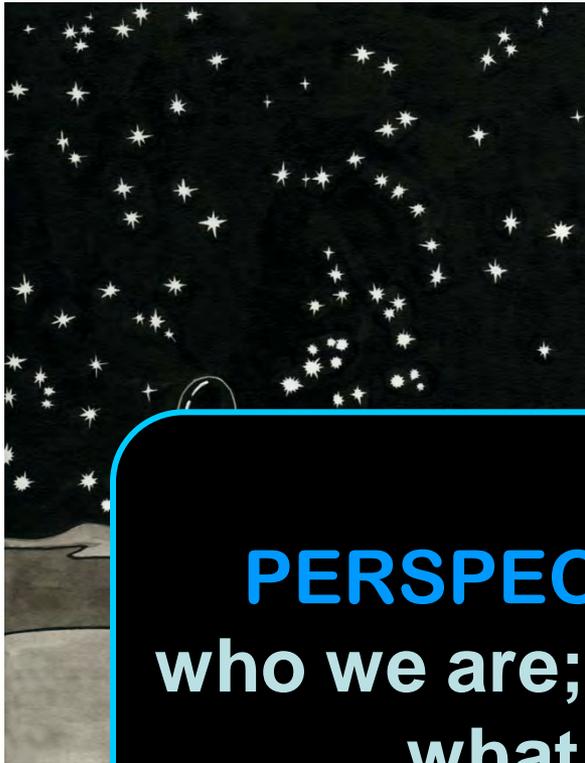
**SANCTIONED  
PERSPECTIVES & INTELLIGENCES:**  
who we are; where we are; where we were;  
what we know, do and value

# PATTERN CONCEPTUAL FRAMEWORK

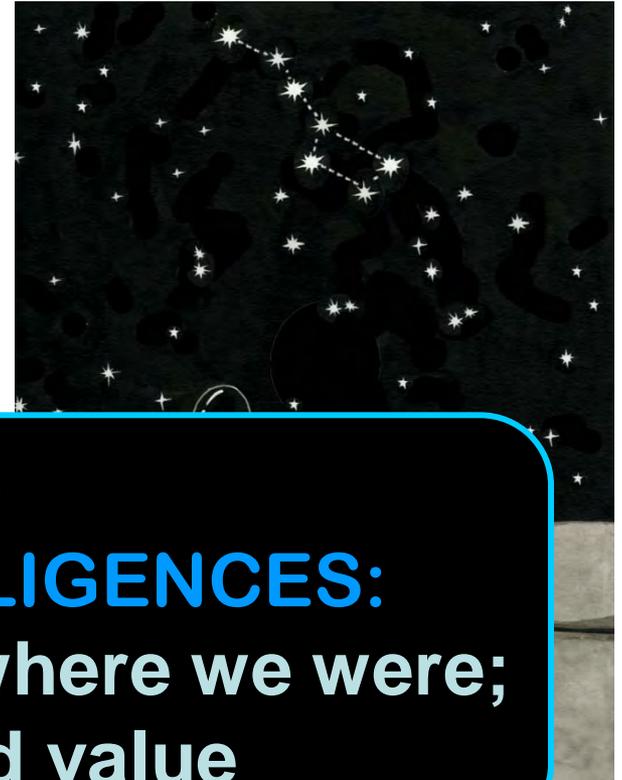
outer

inner

outer



dipper



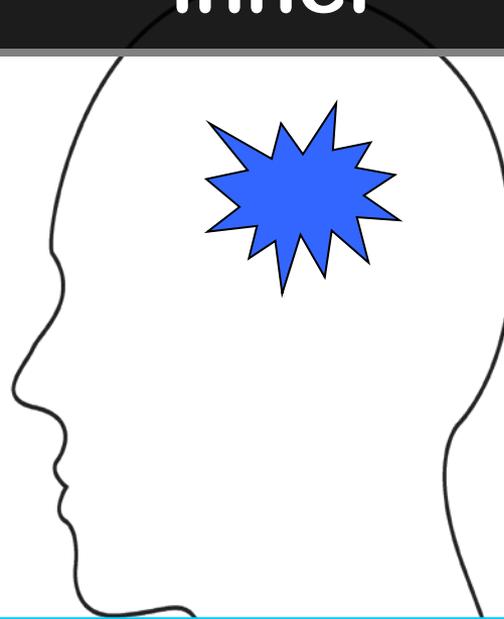
**SANCTIONED  
PERSPECTIVES & INTELLIGENCES:**  
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# PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer



**SANCTIONED**

**PERSPECTIVES & INTELLIGENCES:**

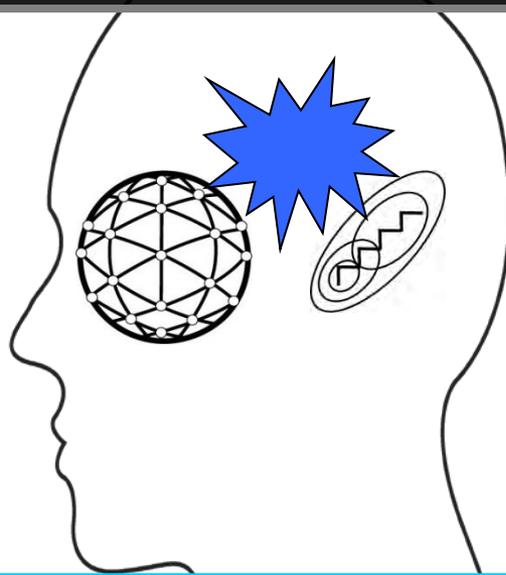
who we are; where we are; where we were;  
what we know, do and value

# PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer



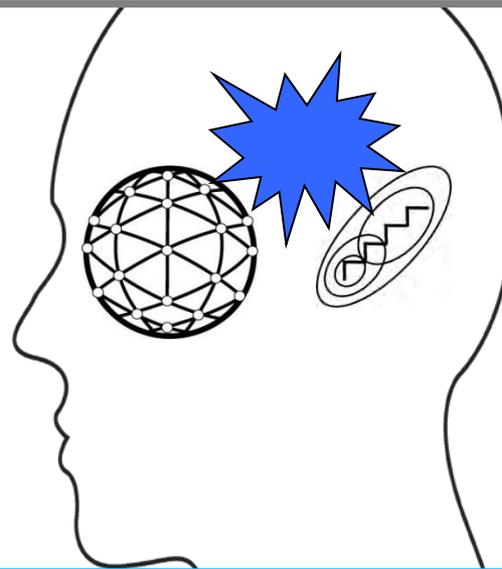
**SANCTIONED  
PERSPECTIVES & INTELLIGENCES:**  
who we are; where we are; where we were;  
what we know, do and value

# PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer



| Year | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec | Total |
|------|-----|-----|-----|-----|-----|------|------|-----|------|-----|-----|-----|-------|
| 1970 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1971 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1972 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1973 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1974 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1975 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1976 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1977 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1978 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1979 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1980 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1981 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1982 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1983 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1984 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1985 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1986 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1987 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1988 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1989 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1990 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1991 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1992 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1993 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1994 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1995 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1996 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1997 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1998 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 1999 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2000 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2001 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2002 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2003 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2004 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2005 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2006 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2007 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2008 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2009 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2010 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2011 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2012 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2013 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2014 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2015 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2016 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2017 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2018 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2019 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2020 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2021 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |
| 2022 | 100 | 100 | 100 | 100 | 100 | 100  | 100  | 100 | 100  | 100 | 100 | 100 | 1200  |

**SANCTIONED**  
**PERSPECTIVES & INTELLIGENCES:**  
who we are; where we are; where we were;  
what we know, do and value

**participatory &  
creative choice**



**Wjipenuk Etek  
Lnuimlkikno'ti  
- Spirit of the East -**

**East (sunrise)**

**... a place of  
beginnings and  
enlightenment**

**... where new  
knowledge can be  
created or received  
to bring about  
harmony or right  
relations.**

**participatory &  
creative choice**

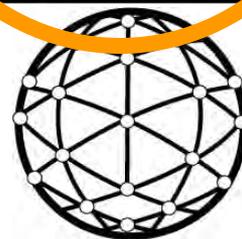


**Wjipenuk Etek  
Lnuimlkikno'ti  
- Spirit of the East -**

**Two-Eyed Seeing**  
our key concepts & actions

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

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



# Physical Direction

# detached & instrumental

East (sunrise)

... measurement of the time of sunrise

... for each new day over the course of one full year.

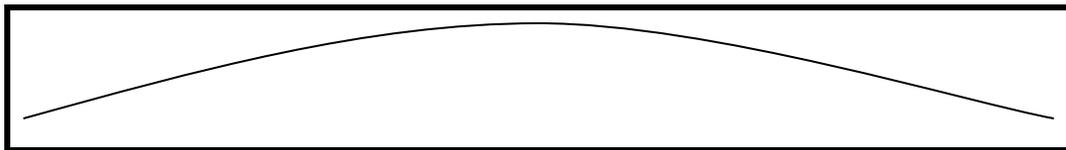
SYDNEY, NS  
Rise and Set for the Sun for 2004

Location: W060 11, N46 09      Zone: 4h West of Greenwich

Astronomical Applications Dept.  
U. S. Naval Observatory  
Washington, DC 20392-5420

| Day | Jan. |      | Feb. |      | Mar. |      | Apr. |      | May  |      | June |      | July |      | Aug. |      | Sept. |      | Oct. |      | Nov. |      | Dec. |      |
|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|------|------|------|------|------|------|
|     | Rise | Set  | Rise  | Set  | Rise | Set  | Rise | Set  | Rise | Set  |
| 01  | 0743 | 1625 | 0724 | 1705 | 0639 | 1748 | 0540 | 1830 | 0447 | 1910 | 0413 | 1945 | 0413 | 1956 | 0443 | 1930 | 0522  | 1839 | 0600 | 1740 | 0642 | 1646 | 0723 | 1617 |
| 02  | 0743 | 1626 | 0723 | 1706 | 0637 | 1749 | 0538 | 1831 | 0445 | 1911 | 0412 | 1946 | 0414 | 1955 | 0444 | 1929 | 0523  | 1837 | 0601 | 1738 | 0644 | 1644 | 0724 | 1616 |
| 03  | 0743 | 1627 | 0722 | 1708 | 0635 | 1750 | 0536 | 1833 | 0444 | 1912 | 0412 | 1947 | 0415 | 1955 | 0446 | 1927 | 0524  | 1835 | 0602 | 1736 | 0645 | 1643 | 0725 | 1616 |
| 04  | 0743 | 1628 | 0720 | 1709 | 0634 | 1752 | 0534 | 1834 | 0442 | 1913 | 0411 | 1947 | 0415 | 1955 | 0447 | 1926 | 0525  | 1833 | 0604 | 1734 | 0646 | 1642 | 0727 | 1616 |
| 05  | 0743 | 1629 | 0719 | 1711 | 0632 | 1753 | 0532 | 1835 | 0441 | 1915 | 0411 | 1948 | 0416 | 1954 | 0448 | 1925 | 0527  | 1831 | 0605 | 1732 | 0648 | 1640 | 0728 | 1615 |
| 06  | 0743 | 1630 | 0718 | 1712 | 0630 | 1755 | 0530 | 1837 | 0439 | 1916 | 0410 | 1949 | 0417 | 1954 | 0449 | 1923 | 0528  | 1829 | 0606 | 1730 | 0649 | 1639 | 0729 | 1615 |
| 07  | 0743 | 1631 | 0716 | 1714 | 0628 | 1756 | 0528 | 1838 | 0438 | 1917 | 0410 | 1950 | 0418 | 1953 | 0450 | 1922 | 0529  | 1827 | 0607 | 1729 | 0651 | 1638 | 0730 | 1615 |
| 08  | 0743 | 1632 | 0715 | 1715 | 0626 | 1757 | 0527 | 1839 | 0437 | 1919 | 0410 | 1950 | 0418 | 1953 | 0452 | 1920 | 0530  | 1825 | 0609 | 1727 | 0652 | 1636 | 0731 | 1615 |
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| 12  | 0741 | 1637 | 0709 | 1721 | 0619 | 1803 | 0519 | 1845 | 0431 | 1924 | 0409 | 1953 | 0422 | 1951 | 0457 | 1914 | 0535  | 1817 | 0614 | 1719 | 0658 | 1631 | 0734 | 1615 |
| 13  | 0741 | 1638 | 0708 | 1723 | 0617 | 1804 | 0517 | 1846 | 0430 | 1925 | 0409 | 1953 | 0423 | 1950 | 0458 | 1912 | 0537  | 1815 | 0616 | 1717 | 0659 | 1630 | 0735 | 1615 |
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X



y

# Physical Direction

# detached & instrumental

## Two-Eyed Seeing our key concerns & actions



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



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



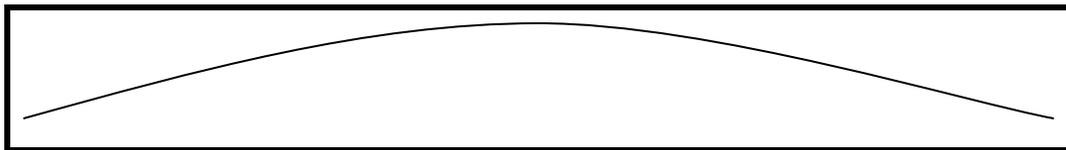
SYDNEY, NS  
Rise and Set for the Sun for 2004

Location: W060 11, N46 09      Zone: 4h West of Greenwich

Astronomical Applications Dept.  
U. S. Naval Observatory  
Washington, DC 20392-5420

| Day | Jan. |      | Feb. |      | Mar. |      | Apr. |      | May  |      | June |      | July |      | Aug. |      | Sept. |      | Oct. |      | Nov. |      | Dec. |      |
|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|------|------|------|------|------|------|
|     | Rise | Set  | Rise  | Set  | Rise | Set  | Rise | Set  | Rise | Set  |
| 01  | 0743 | 1625 | 0724 | 1705 | 0639 | 1748 | 0540 | 1830 | 0447 | 1910 | 0413 | 1945 | 0413 | 1956 | 0443 | 1930 | 0522  | 1839 | 0600 | 1740 | 0642 | 1646 | 0723 | 1617 |
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| 04  | 0743 | 1628 | 0720 | 1709 | 0634 | 1752 | 0534 | 1834 | 0442 | 1913 | 0411 | 1947 | 0415 | 1955 | 0447 | 1926 | 0525  | 1833 | 0604 | 1734 | 0646 | 1642 | 0727 | 1616 |
| 05  | 0743 | 1629 | 0719 | 1711 | 0632 | 1753 | 0532 | 1835 | 0441 | 1915 | 0411 | 1948 | 0416 | 1954 | 0448 | 1925 | 0527  | 1831 | 0605 | 1732 | 0648 | 1640 | 0728 | 1615 |
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| 07  | 0743 | 1631 | 0716 | 1714 | 0628 | 1756 | 0528 | 1838 | 0438 | 1917 | 0410 | 1950 | 0418 | 1953 | 0450 | 1922 | 0529  | 1827 | 0607 | 1729 | 0651 | 1638 | 0730 | 1615 |
| 08  | 0743 | 1632 | 0715 | 1715 | 0626 | 1757 | 0527 | 1839 | 0437 | 1919 | 0410 | 1950 | 0418 | 1953 | 0452 | 1920 | 0530  | 1825 | 0609 | 1727 | 0652 | 1636 | 0731 | 1615 |
| 09  | 0742 | 1633 | 0714 | 1717 | 0624 | 1759 | 0525 | 1841 | 0435 | 1920 | 0409 | 1951 | 0419 | 1952 | 0453 | 1919 | 0532  | 1823 | 0610 | 1725 | 0654 | 1635 | 0732 | 1615 |
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| 15  | 0740 | 1641 | 0705 | 1726 | 0613 | 1807 | 0514 | 1848 | 0428 | 1927 | 0409 | 1954 | 0424 | 1948 | 0500 | 1909 | 0539  | 1811 | 0618 | 1714 | 0702 | 1628 | 0737 | 1615 |
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| 26  | 0731 | 1656 | 0646 | 1742 | 0551 | 1822 | 0455 | 1903 | 0417 | 1939 | 0411 | 1956 | 0436 | 1938 | 0514 | 1850 | 0553  | 1750 | 0634 | 1655 | 0717 | 1619 | 0742 | 1621 |
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X



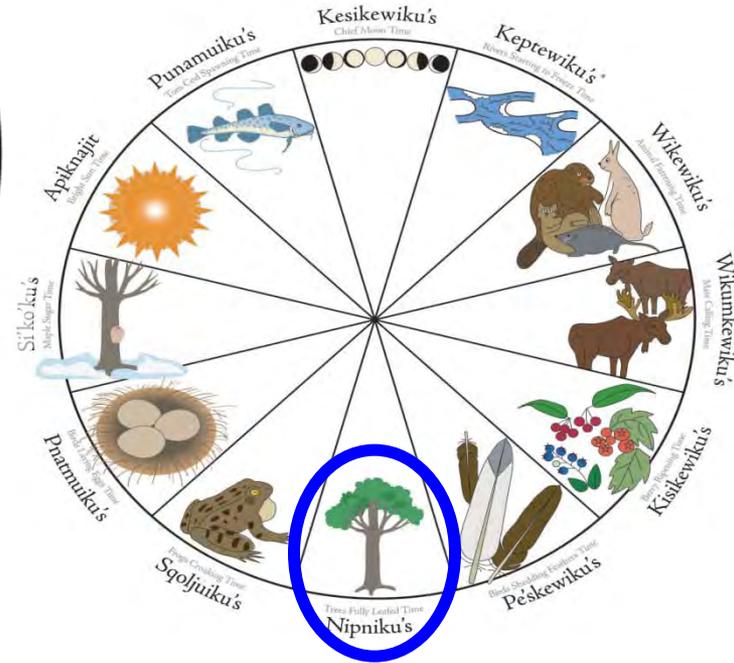
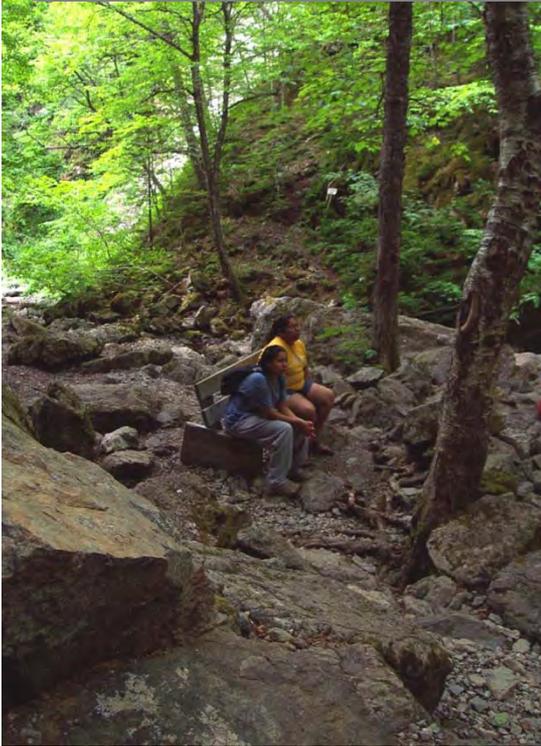
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# PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer





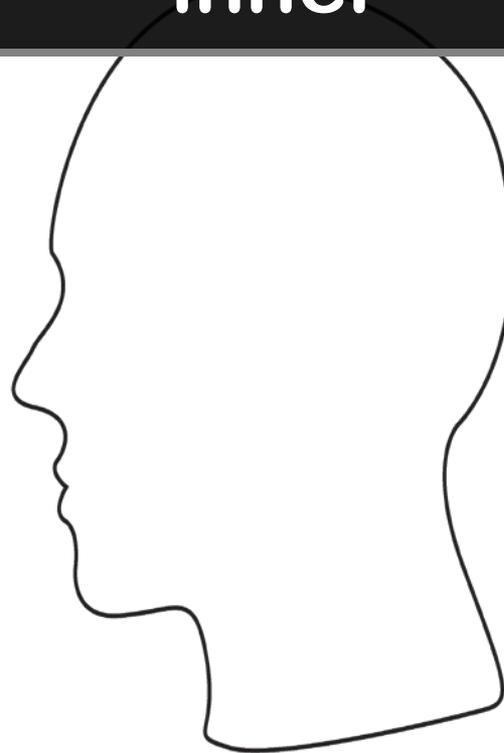
# PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

**X**



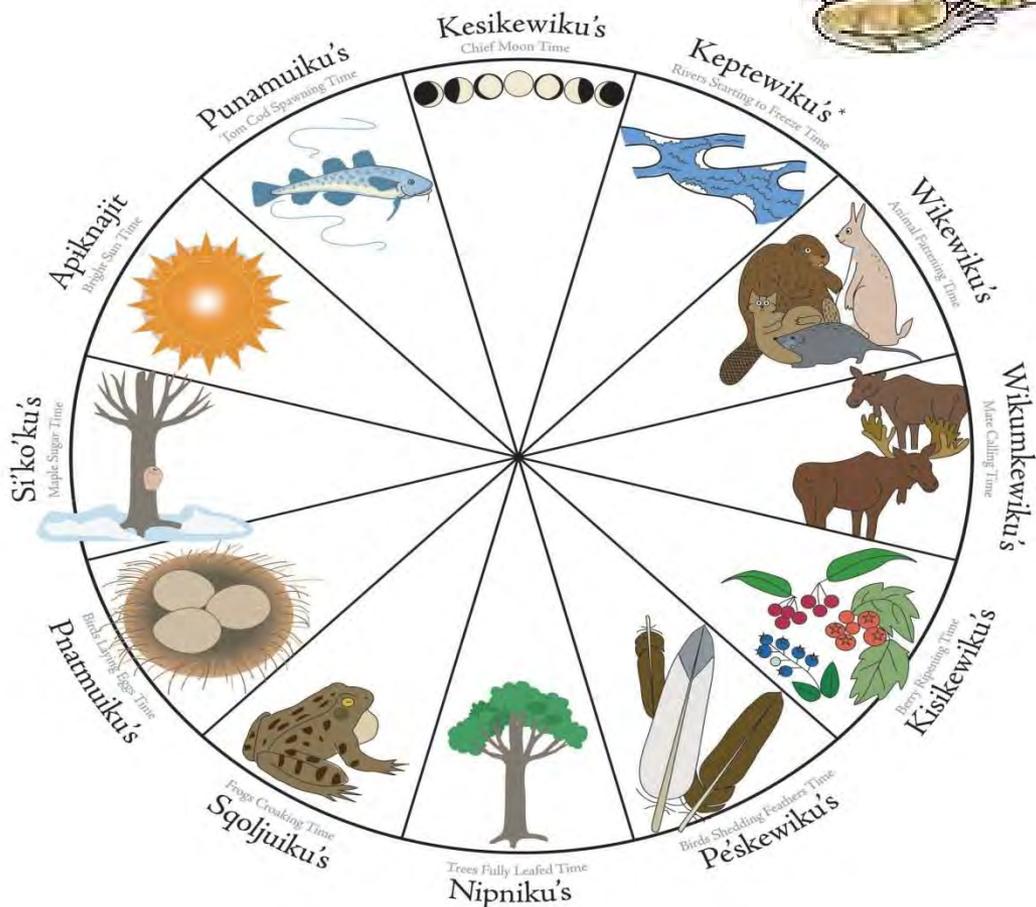
**June**

... in honour of  
"Juno", the  
Roman Queen  
of the Gods



# Indigenous Knowledge into Science

# biology



## ECOSYSTEM HEALTH CONSCIOUSNESS

### Difference, Pattern, Variation

TOQWA'TUKI KIJITAQNN • INTEGRATIVE SCIENCE

### Frogs of Unama'ki

|                                      |  |   |
|--------------------------------------|--|---|
| <p><b>Mink Frog</b></p>              |  | <p><b>Mink Frog - <i>Rana septentrionalis</i></b><br/>Mink Frog is green with many dark markings and is 4 - 7 cm long. It gets his common name from his mucky colors; he smells like a mink. Mink Frog uses special like pieces of wood being trapped together... "TAC TAC". While other frogs live on both land and water, Mink Frog spends most of his life in the water. He prefers permanent bodies of water like ponds and lakes. Female Mink Frog lays 2000 to 4000 eggs in a round jelly mass. The jelly mass is attached to an underwater plant stem or submerged log. Mink Frog eats dragonflies, damselflies, water beetles, aphids, minnows, leeches, snails, mollusks, and spiders.</p>   |
| <p><b>Green Frog</b></p>             |  | <p><b>Green Frog - <i>Rana clamitans</i></b><br/>Green Frog is green with grey or brown markings on its back and legs and has a light belly marked with dark streaks. Male Green Frog has a bright yellow throat and is 6 - 10 cm long. Green Frog uses mostly like a stone being struck together (click, click) for a sound, while other frogs use water... "LUSKUS". Green Frog prefers to be close to water, and spends a lot of its life at the edge of rivers, ponds, lakes, or streams. Female Green Frog lays 1000 to 4000 eggs in a long jelly mass that floats on the surface of the water like a raft. Green Frog eats beetles, flies, caddisflies, grasshoppers, spiders, snails, slugs, waterbugs, damselflies and snails, and sometimes other small frogs.</p>   |
| <p><b>Pickerel Frog</b></p>          |  | <p><b>Pickerel Frog - <i>Rana palustris</i></b><br/>Pickerel Frog is light brown with many dark blotches on his back and legs. He is 4 - 7 cm long. Pickerel Frog sings sounds like something rattling on the tin, the sound of someone slowly padding open a crate door... "AUBIP-ARKBIP". Pickerel Frog lives in the shores of ponds or lakes, or on the banks of streams, often using some permanent bodies of water or flooding areas. However, he will also live in moist fields, bogs, or swamp woods. Female Pickerel Frog lays her eggs in a round jelly mass attached to a plant or rock below the surface of the water. She can lay as many as 800 to 1800 eggs at a time. Pickerel Frog eats beetles, ants, spiders, caddisflies, cow bugs, water, snails, tree toads, and many small water creatures.</p> |
| <p><b>Eastern American Toad</b></p>  |  | <p><b>Eastern American Toad - <i>Bufa americana</i></b><br/>Toad is a plump creature with warty skin and rough, warty skin. He is usually brown, with dark brown or black markings. Toad has a light belly with dark spots that become more distinct at night. Toad can grow to be 3 - 11 cm long. Toad lives in many different places, for example, in the woods, near streams, in fields, or near roads. Toad is very hardy! He can survive in a long, high winter season... "WAGG". Female Toad produces temporary ponds for breeding. She lays 4000 to 8000 eggs in a round water mass on the bottom of a pond or puddle. Toad eats many kinds of insects like caddisflies, crickets, snails, bugs, ants, slugs, earthworms, and onychophora.</p>   |
| <p><b>Northern Spring Peeper</b></p> |  | <p><b>Northern Spring Peeper - <i>Pseudis crepitans</i></b><br/>Spring Peeper is our smallest frog; he grows to 2 - 4 cm long. We know him for his loud croak that we hear in Spring Peeper among his night. His song sounds like a high "PEEP". Spring Peeper lives in the woods near ponds, marshes or swamps. It is not only one frog and can change the color of his skin to blend in with his surroundings. Female Spring Peeper lays 400 to 7500 eggs in a mass in an underwater plant or rock. Spring Peepers, like other frogs, often shed their skin and then eat it; however, most of the time he can digest the spiders, snails, tree toads, leafhoppers, ants, snails, worms, and caddisflies.</p>  |
| <p><b>Northern Leopard Frog</b></p>  |  | <p><b>Northern Leopard Frog - <i>Rana pipiens</i></b><br/>Leopard Frog is a slim, green frog 7 - 9 cm long. He has warty skin, and he has an oval shaped body with large green or brown spots that make his skin dark to match his surroundings. Leopard Frog sings sounds like a low rumbling sound followed by a throaty croak... "GAAH HAAU". Leopard Frog lives in fields, meadows, green-edge woods, swamps, and grassy wetlands. Female Leopard Frog lays 2000 to 4000 eggs in a diamond-shaped jelly mass. She prefers to lay her eggs in shallow water on the edge of lakes, ponds, or slow-moving streams. Leopard Frog eats beetles, aphids, snails, slugs, worms, and sometimes leeches.</p>   |
| <p><b>Wood Frog</b></p>              |  | <p><b>Wood Frog - <i>Rana sylvatica</i></b><br/>Wood Frog is a small frog 6 cm long, with a dark oval across his face. Wood Frog sings sounds like the quick click of a stick. "GWAK". Wood Frog lives mostly on land in wooded places (hence his name). Wood Frog prefers temporary ponds for breeding, for example, log piles, ditches filled with water, or swampy areas. Female Wood Frog lays 500 to 1200 eggs in a round jelly mass. Wood Frog eats spiders, snails and slugs, earthworms, caddisflies, beetles and other bugs.</p>   |

**Sqoljuiku's • Frog Croaking Time • "Moon Month" of May**

Many people traditionally named the different months (months) of the year based on significant natural patterns that they came to know within the ecosystems of their territory. Sqoljuiku recognizes the pattern of "frog croaking time" in spring when male frogs sing to attract female frogs in reproductive rituals. Different species of frogs make different sounds and much variation is heard within the voices and songs filling the air. The croaking is always near locations where female frogs can lay their eggs... areas where Mother Earth has fresh water such as ponds, ditches, swamps, and small lakes or streams. Frog eggs metamorphose (change) into tadpoles over 1 to 3 weeks, and tadpoles of most species change into frogs within 2 to 3 months.

Many other natural patterns occur during Sqoljuiku's, with some come out of the mud, tadpoles peek out from the stems, mayflowers and goldenrod bloom, baby eagles peek out from nests, and marsh grasses show new growth.

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Canada Research Chairs / Chaires de recherche en Canada

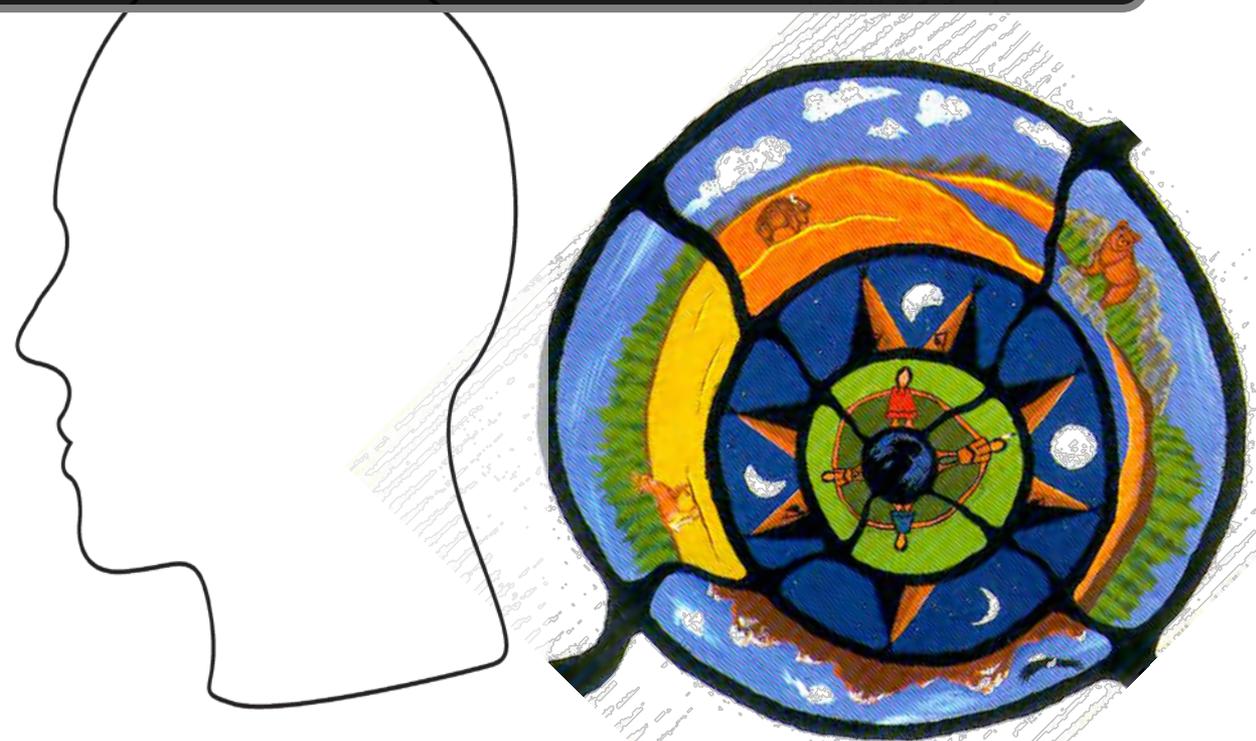
# PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

*“human  
health”*



Artist: Rod Restoule  
from: *Into the Daylight*;  
C. Morrisseau, 1998

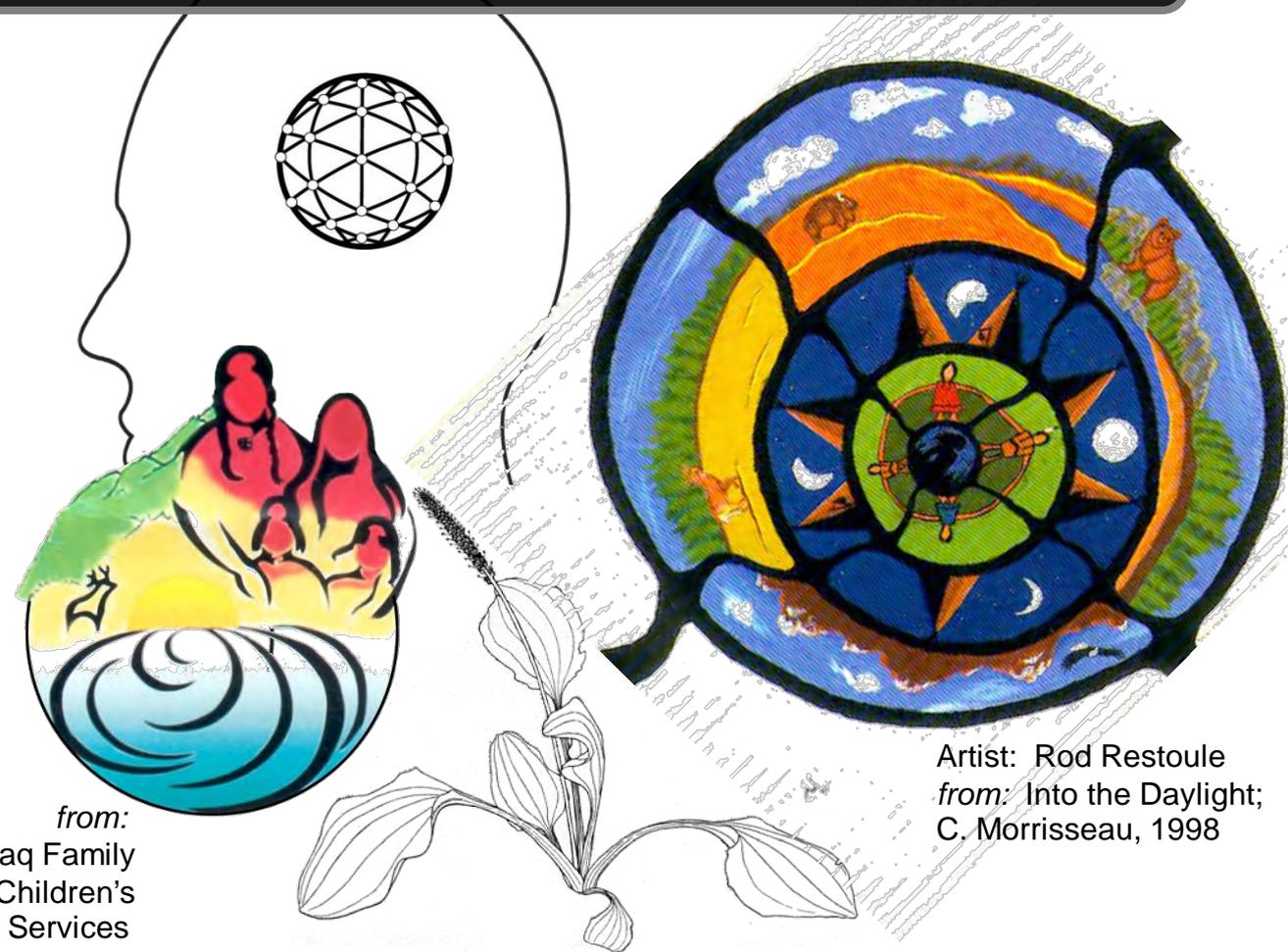
# PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

*“human health”*



from:  
Mi'kmaq Family  
& Children's  
Services

Artist: Rod Restoule  
from: Into the Daylight;  
C. Morrisseau, 1998

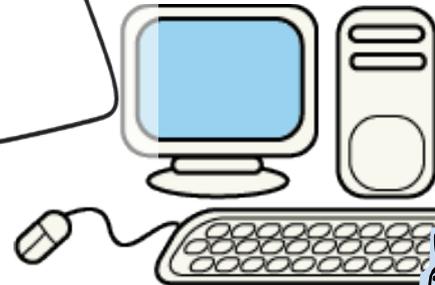
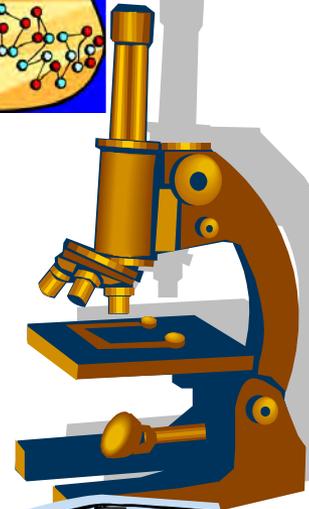
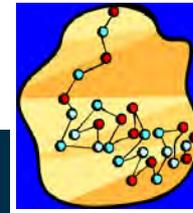
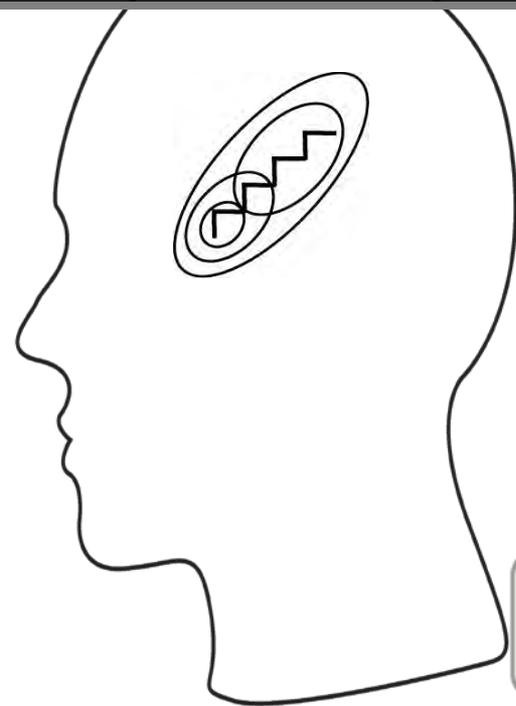
# PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

*“human health”*



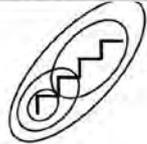
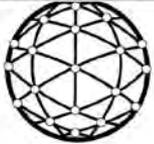
# Developing Traditional Curriculum

**Two-Eyed Seeing**  
our world is

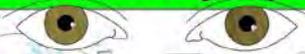


**interconnective**

**parts & wholes**



**Two-Eyed Seeing**  
our overall knowledge objectives



towards resonance  
of understanding  
within environment

towards construction  
of understanding  
of environment



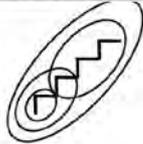
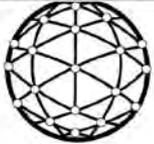
# Developing Traditional Curriculum

**Two-Eyed Seeing**  
our world is

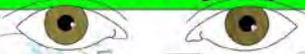


**interconnective**

**parts & wholes**

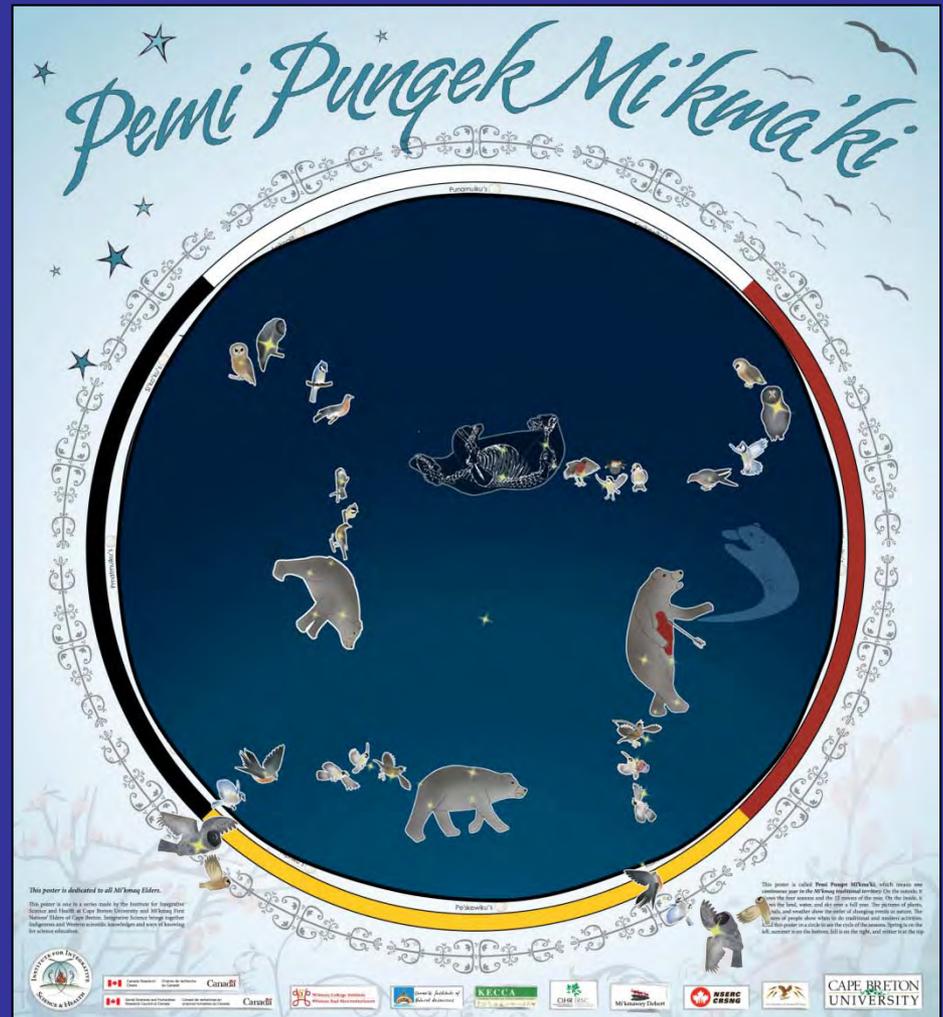


**Two-Eyed Seeing**  
our overall knowledge objectives



towards resonance  
of understanding  
within environment

towards construction  
of understanding  
of environment



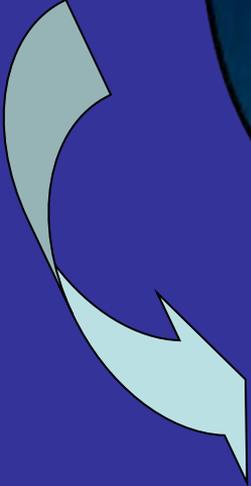
Winter

Spring

Autumn

Summer

Northern Horizon



# Pemi Punaek Mi'kma'ki

Winter

Autumn

Spring

Summer



This poster is dedicated to all the people of Cape Breton, Nova Scotia, who have made it their home. It is a tribute to the rich history, culture, and natural beauty of this region. The poster is a work of art that celebrates the four seasons of Cape Breton, Nova Scotia, and the many activities and traditions that are unique to this region.

This poster is called Pemi Punaek Mi'kma'ki, which means our common name in the Mi'kmaq traditional language. On the outside, it shows the four seasons and the 12 months of the year. On the inside, it shows the local, native, and city over a full year. The pictures of plants, animals, and weather show the order of changing events in nature. The pictures of people show what is in traditional and modern activities. Read this poster in a circle to see the cycle of the seasons. Spring is on the left, summer is on the bottom, fall is on the right, and winter is on the top.



S. Kavanagh, L. Marshall,  
& M. Marshall, 2008

# Living knowledge shared by Elders helped bring an historical source to life:



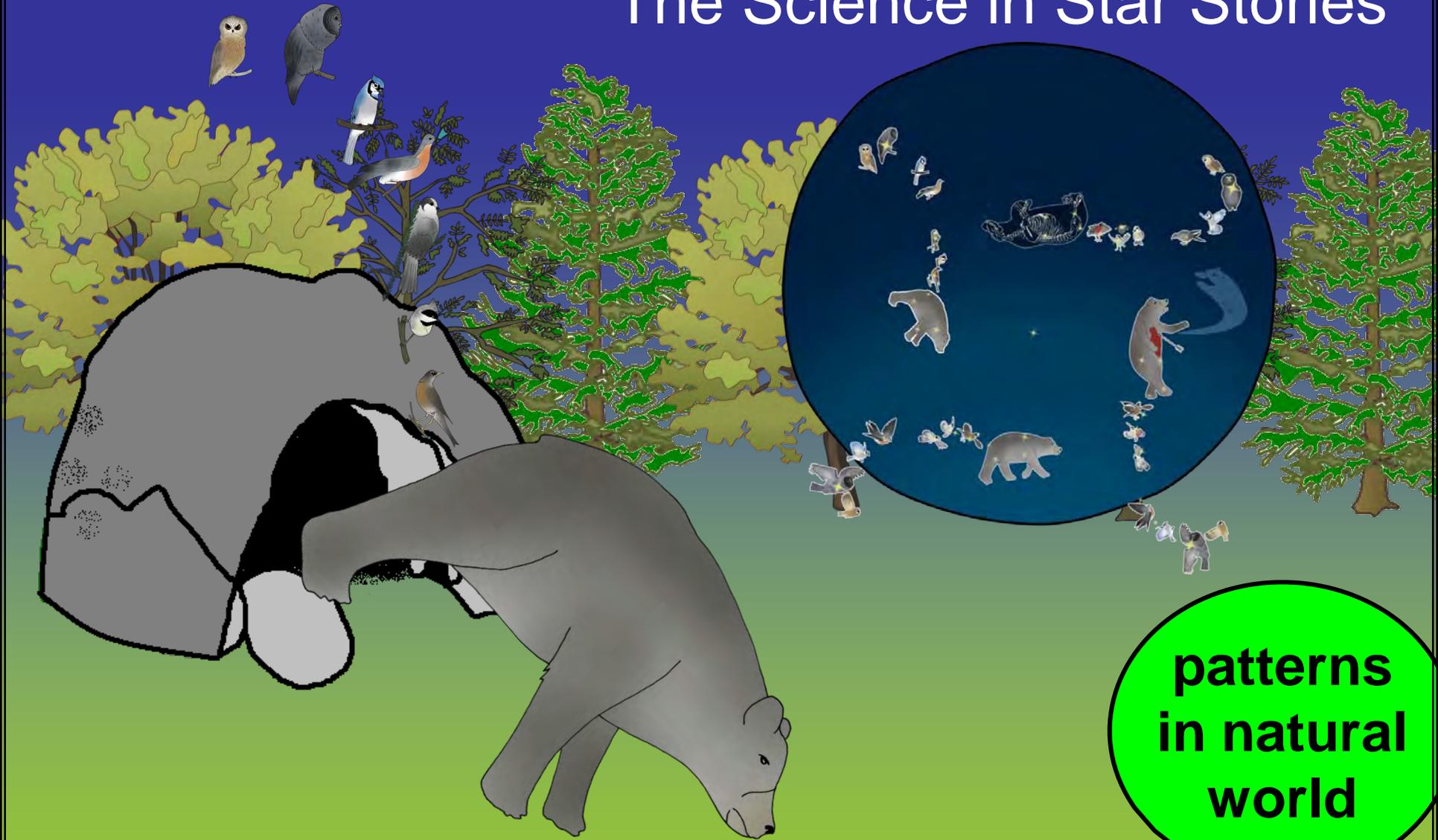
Murdena Marshall, Elder,  
Eskasoni First Nation  
Mi'kmaq Nation



Lillian Marshall, Elder,  
Potlotek First Nation  
Mi'kmaq Nation

# Muin and Seven Bird Hunters

The Science in Star Stories



**patterns  
in natural  
world**



GERALD GLOADE

Patterns  
in Stars

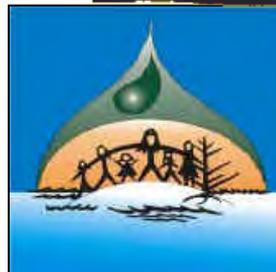
“Reflections”

artist Gerald Gloade  
Millbrook First Nation

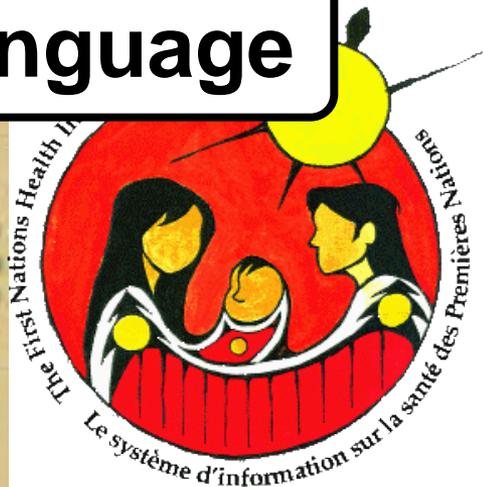
Patterns  
on Earth

stories of our interactions with and within nature

# Science



Life  
Love  
Land  
Language



logos from: Aboriginal organizations, various sources

patterns  
in natural  
world

patterns  
in natural  
world

Indigenous

Western

“bringing our sciences together”

Science



Life  
Love  
Land

Science

|    |    |    |    |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| H  |    |    |    |     |     |     |     |     |     |    |    |    |    |    |    |    | He |    |    |    |    |    |    |    |    |    |
| Li | Be |    |    |     |     |     |     |     |     |    |    | B  | C  | N  | O  | F  | Ne |    |    |    |    |    |    |    |    |    |
| Na | Mg |    |    |     |     |     |     |     |     |    |    | Al | Si | P  | S  | Cl | Ar |    |    |    |    |    |    |    |    |    |
| K  | Ca | Sc | Ti | V   | Cr  | Mn  | Fe  | Co  | Ni  | Cu | Zn | Ga | Ge | As | Se | Br | Kr |    |    |    |    |    |    |    |    |    |
| Rb | Sr | Y  | Zr | Nb  | Mo  | Tc  | Ru  | Rh  | Pd  | Ag | Cd | In | Sn | Sb | Te | I  | Xe |    |    |    |    |    |    |    |    |    |
| Cs | Ba |    |    | Hf  | Ta  | W   | Re  | Os  | Ir  | Pt | Au | Hg | Tl | Pb | Bi | Po | At | Rn |    |    |    |    |    |    |    |    |
| Fr | Ra |    |    | Unq | Unp | Unh | Uns | Uno | Uue |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|    |    | La | Ce | Pr  | Nd  | Pm  | Sm  |     |     |    |    |    |    |    |    |    |    | Eu | Gd | Tb | Dy | Ho | Er | Tm | Yb | Lu |
|    |    | Ac | Th | Pa  | U   | Np  | Pu  |     |     |    |    |    |    |    |    |    |    | Am | Cm | Bk | Cf | Es | Fm | Md | No | Lr |

Periodic Table of the Elements

stories of our interactions with and within nature

Canada Research Chairs / Chaires de recherche du Canada

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Social Sciences and Humanities Research Council of Canada

Conseil de recherches en sciences humaines du Canada



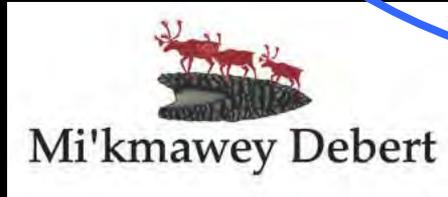
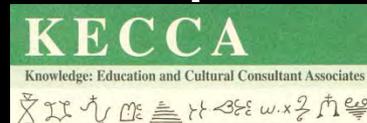
CAPE BRETON UNIVERSITY



Wela'ioq / Thank you



Mi'kmaq Elders



Eskasoni Detachment Royal Canadian Mounted Police / Gendarmerie royale du Canada