Integrative Science academic program

DRAFT DOCUMENT #2 (of 5):
reinvigoration – new courses required:
"Science in Community" (SciC)
• VISION, LEARNING OUTCOMES, REFERENCES •

FIVE DRAFT DOCUMENTS

1. work required – overview
2. new courses required – "Science in Community" (SciC)
3. relationships – looking to AFN's document on supporting students transitioning to PSE, CCL-AbLKC's *First Nations Holistic Lifelong Learning Model*, and APCFNC/AAEDIRP Elders Project's Recommendations on *Honouring Traditional Knowledge*
4. relationships – what is Integrative Science ... what is science?
5. relationships – transdisciplinarity

www.integrativescience.ca

NOTE about this document:

- Prepared in Winter 2014, this document along with others sought to convey understandings pertaining to *Integrative Science as a concentration with innovative MSIT science courses* within the *Bachelor of Science Community Studies (BScCS)* four year degree at Cape Breton University. They were prepared by Cheryl Bartlett to aid anticipated group discussions about potentially reinvigorating the Integrative Science concentration and the BScCS degree, given that both had become non-functional around 2010. The documents were not used and reinvigoration of Integrative Science and the BScCS did not occur.
- Collectively, the documents provide an overview of: (1) the work and resources that would have been required in order to proceed towards an envisioned reinvigoration of Integrative Science, and (2) the overall nature and evolving relationships for Integrative Science from its original vision and configuration as an academic program in the late 1990s guided by Two-Eyed Seeing through to its relationships with national developments in the 2000s and early 2010s. The period 1999 to the mid-2000s saw remarkable success for Integrative Science, including numerous students enrolled in the MSIT courses created for Integrative Science; several students graduate with a BScCS – Integrative Science degree; eleven students earn NSERC-USRAs and some students receive other scholarships; many students engaged in community workshops, summer research projects, and elementary school science outreach; and the Integrative Science program itself receive a national award of recognition from the Canadian Council on Learning.

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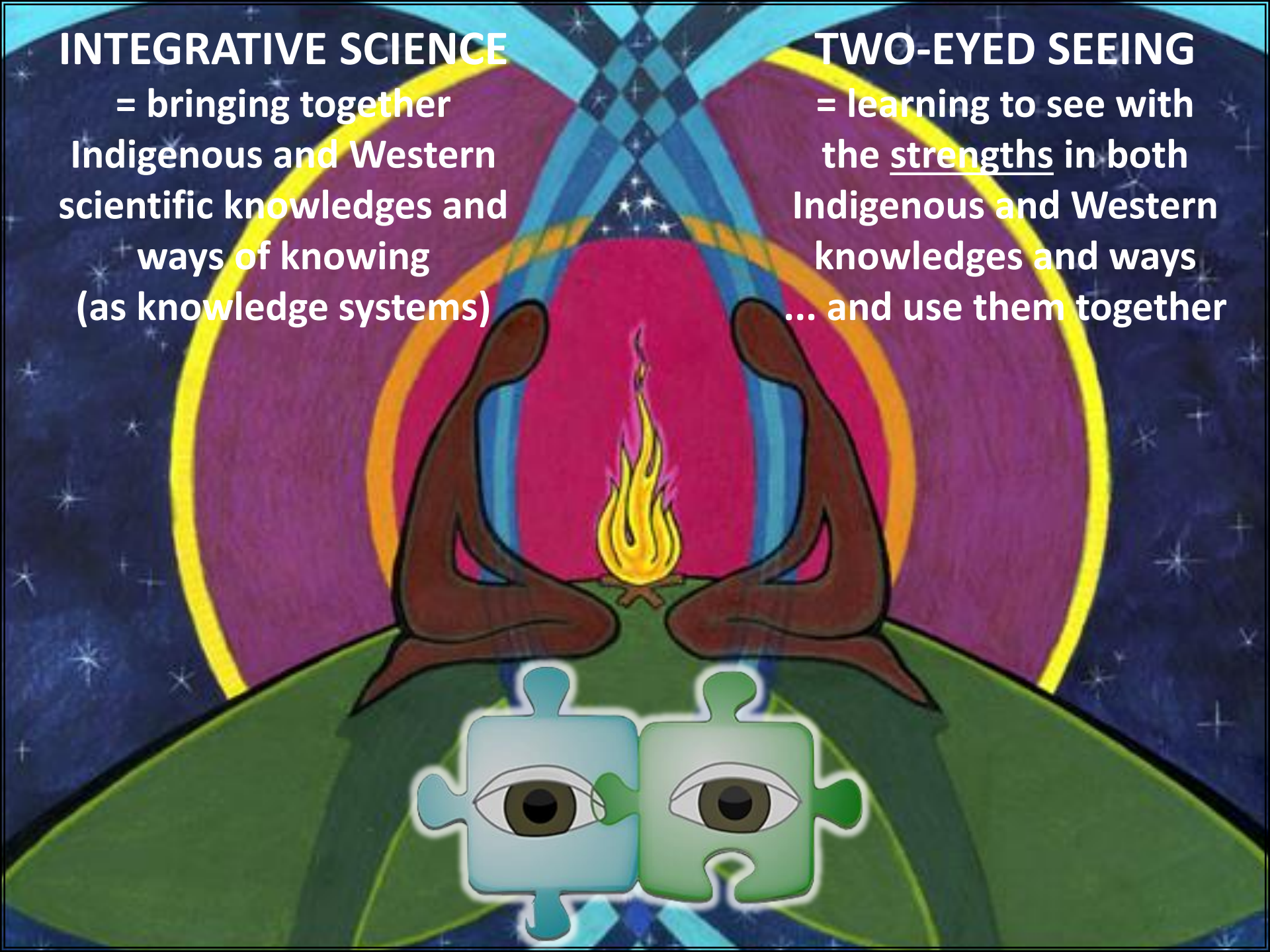
INTEGRATIVE SCIENCE

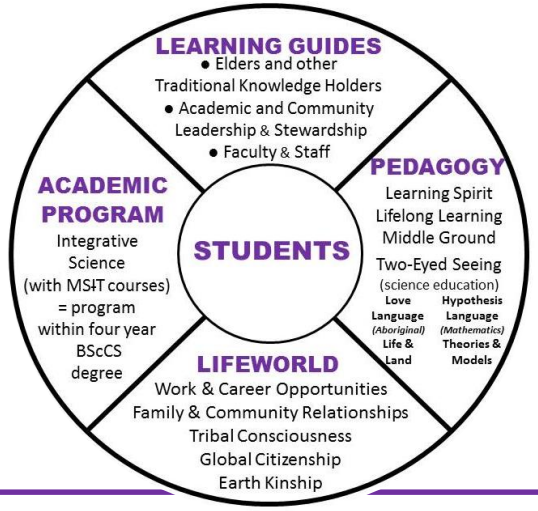
= bringing together Indigenous and Western scientific knowledges and ways of knowing (as knowledge systems)

TWO-EYED SEEING

= learning to see with the strengths in both Indigenous and Western knowledges and ways ... and use them together

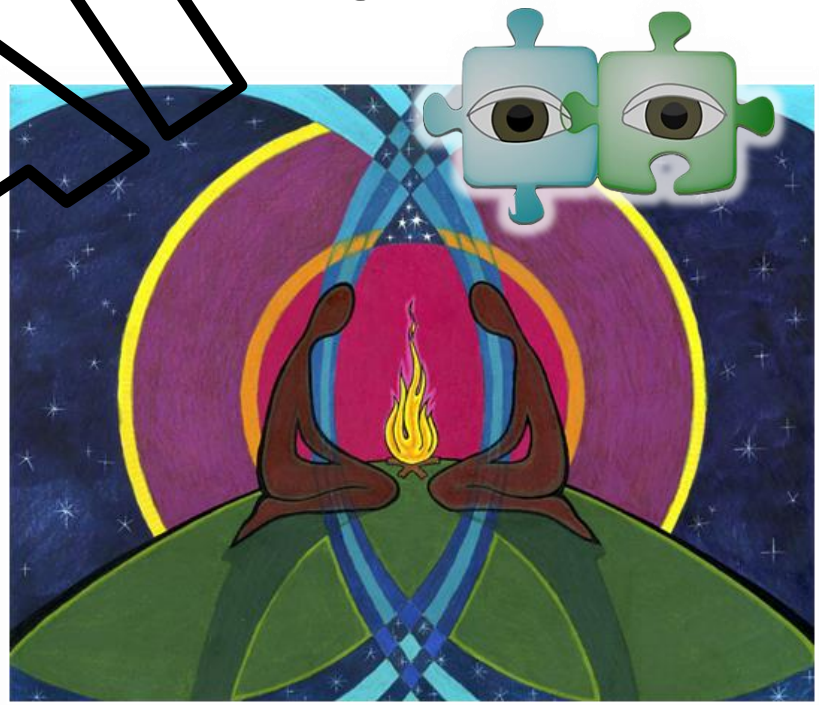


a document to share "information, resources, positioning, and congruencies" towards better and broader understandings of Integrative Science and Two-Eyed Seeing



A series of documents has been created to help justify and contextualize efforts and approaches towards revitalizing the Integrative Science academic program, including CBU's Bachelor of Science Community Studies (BScCS) degree which houses Integrative Science.

The documents in the series rely heavily on the use of images, congruent with the request that Integrative Science encourage learning in a visual way, a request made by Mi'kmaq community members when the academic program was conceived in the mid-1990s. The ability to read images and ponder a visual landscape – i.e. to sense patterns, changes, and resonances, and begin to interpret them – is both an Aboriginal traditional skill and a modern science skill … i.e., an Integrative Science skill. Oral communication – a second skill and one particularly emphasized in Aboriginal traditional ways – can then facilitate the creation of shared meaning. As such, it becomes a desirable, although not absolutely essential, travelling companion for visual learning and visual thinking.

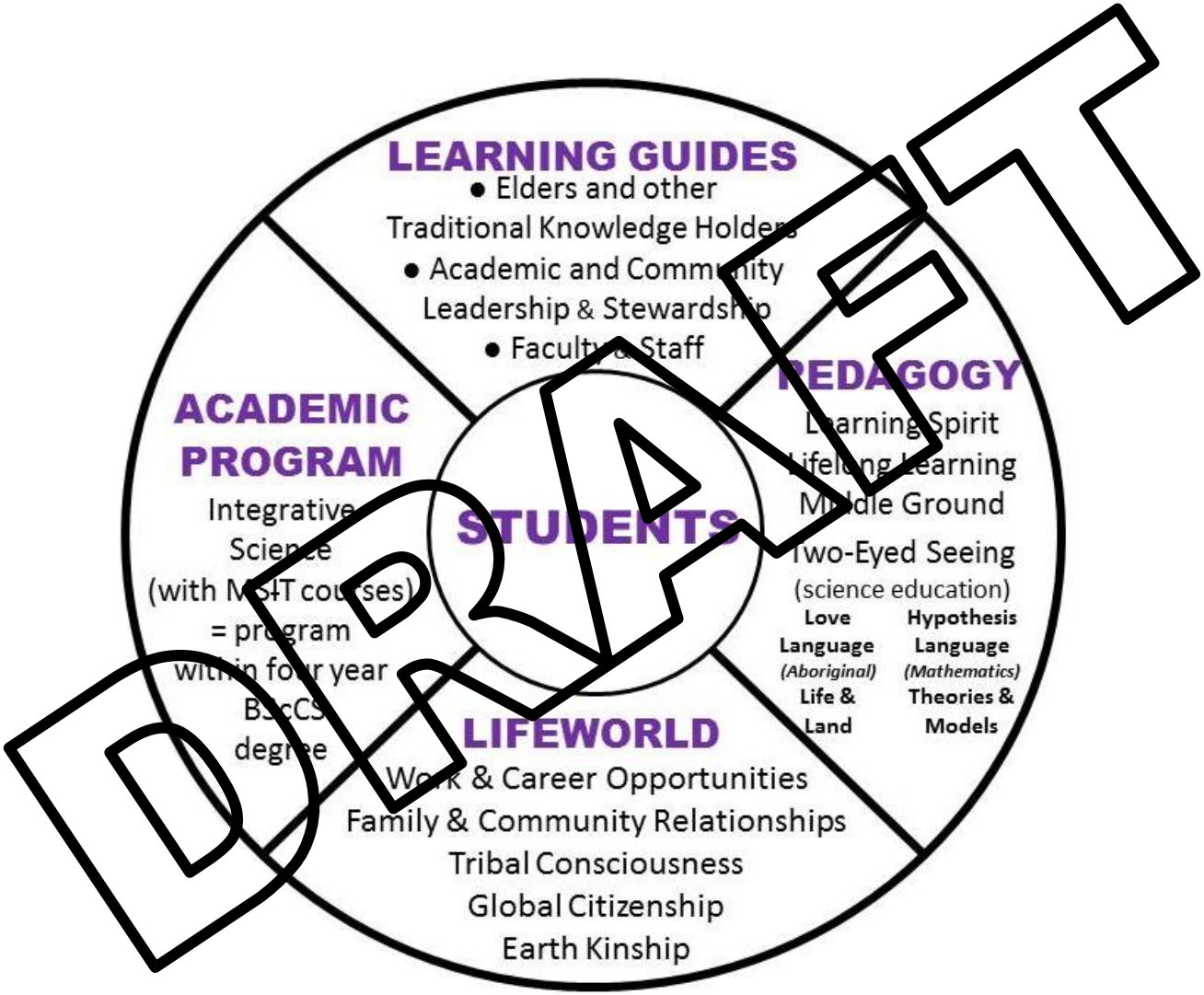


SUMMARY: This document ***"new Science in Community (SciC) courses required"*** provides information that can be mobilized to address some of the requirements within CBU's institutional processes for proposing and approving new courses. The new courses (labelled "SciC") are to provide Two-Eyed Seeing, inquiry-based, experiential learning opportunities for students who will, in the main, work together to create shared understandings pertinent to FN community interests within science and science-related issues and needs. This appeal to learning by way of a process that is creative, collaborative, collective, and community relevant positions intentions for the courses firmly within Aboriginal understandings about nourishing the Learning Spirit within a lifelong learning journey. The document begins with "community": a reminder of Elder Gwen Bear's teachings about community, a reminder of community within CCL's FN Holistic Lifelong Learning Model, a key extract from AFN's 2012 report "Supporting First Nations Learners Transitioning to Post-Secondary" which emphasizes the importance of educational work tied to community, and a synoptic look at AFN's 2007 model for wholistic policy and planning wherein bonding and bridging within and among FN communities are emphasized along with community linkages to formal institutions. A reminder is then provided of transdisciplinary approaches as the means by which the Western (mainstream) science community (particularly in Europe) has given itself permission to engage with values and knowledges of other communities including those considered non-academic or non-scientific (although, re latter, see document "U?-what is science?"). Transdisciplinarity is, therefore, a major dimension in the new SciC courses. Plus, it has considerable resonance with Integrative Science guided by Two-Eyed Seeing (see document "relationships with transdisciplinarity"); consequently, the co-learning essentials developed for Two Eyed Seeing (with respect to epistemologies, knowledge objectives, methodologies, and ontologies) are featured. The positioning of SciC courses in the structure of CBU's BScCS four year degree is diagrammed. Two SciC courses are intended to be available at every level in the 4 year degree. However, since a particular offering (or section) may have a mix of students from different year levels, it will **not** be necessary to create eight new courses. More information about the design for the new SciC courses is outlined, including reference to the separate document entitled "Learning Outcomes Framework". Emphasis is placed on partnership desirability with the Mi'kmaq Economic Benefits Office and relationship renewal with other community organizations with whom Integrative Science had previously interacted or is/should now. Attention is drawn to skills gaps recently identified by ECO Canada, with the possibility that the SciC courses address them. The document indicates that the next step in the creation of new SciC courses is the drafting of formal course proposals, congruent with CBU process. Attention is drawn to the fact that SciC courses have potential beyond Integrative Science, beyond CBU's BScCS degree, and beyond CBU, and that diverse delivery formats can and should be considered. Enlarged versions of the document's "learning outcomes framework" for the new courses are found at the end, along with numerous references.

NEW COURSES

SciC (Science in Community)

Bachelor of Science Community Studies degree

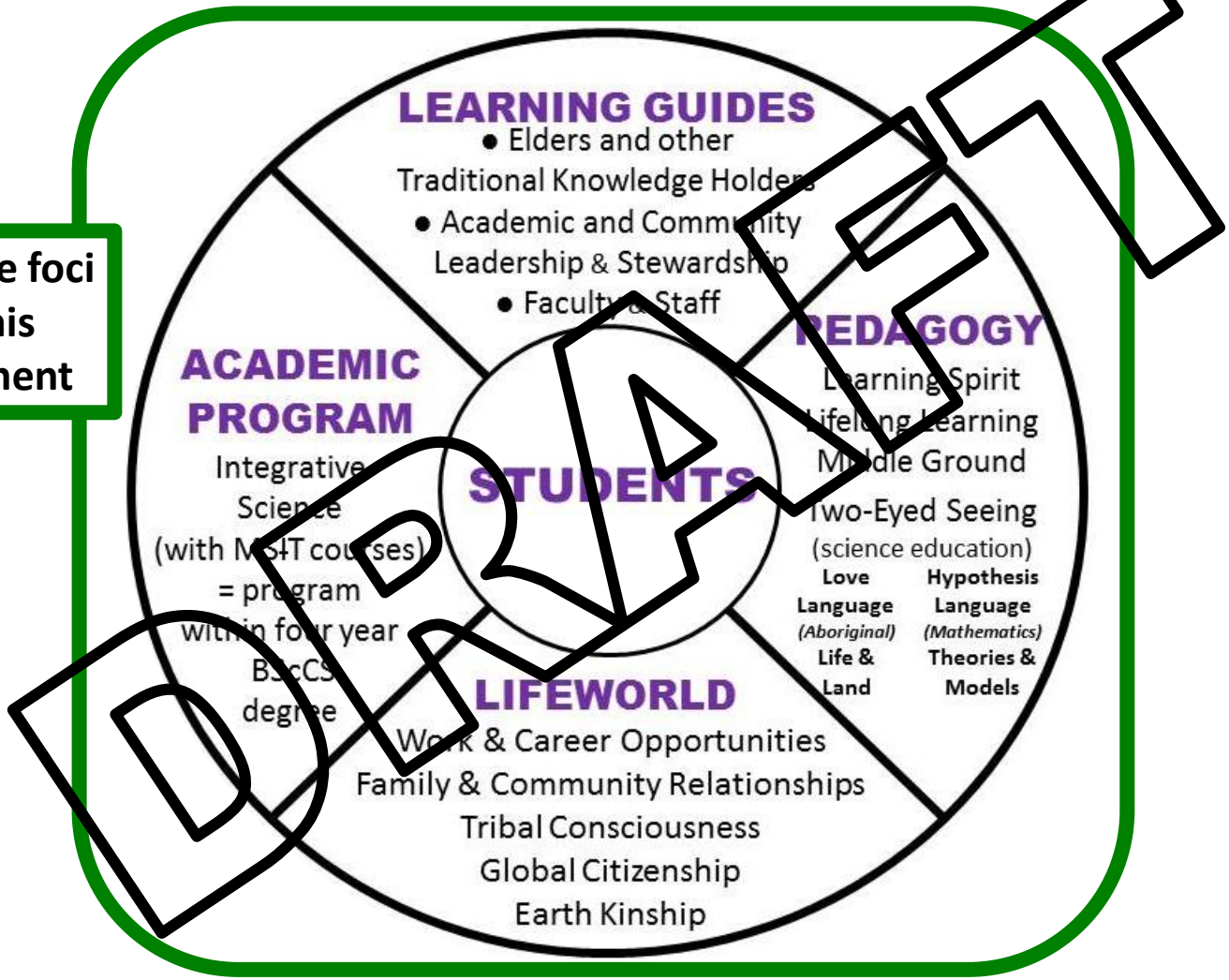


NEW COURSES

SciC (Science in Community)

Bachelor of Science Community Studies degree

multiple foci in this document



NEW COURSES

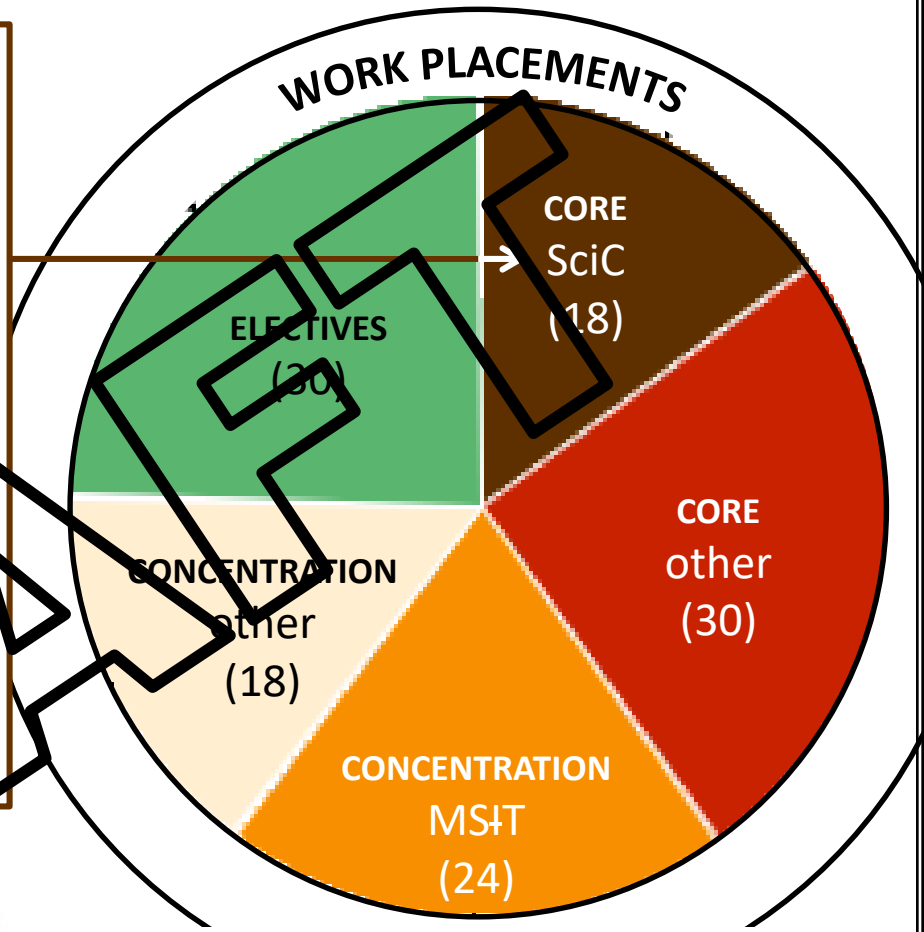
SciC (Science in Community)

"Explore in the CORE"

science or science-related needs or issues in community via inquiry-based, experiential learning courses

= SciC

wherein pedagogy is also Integrative Science plus Transdisciplinary (TD) … guided by Two Eyed Seeing



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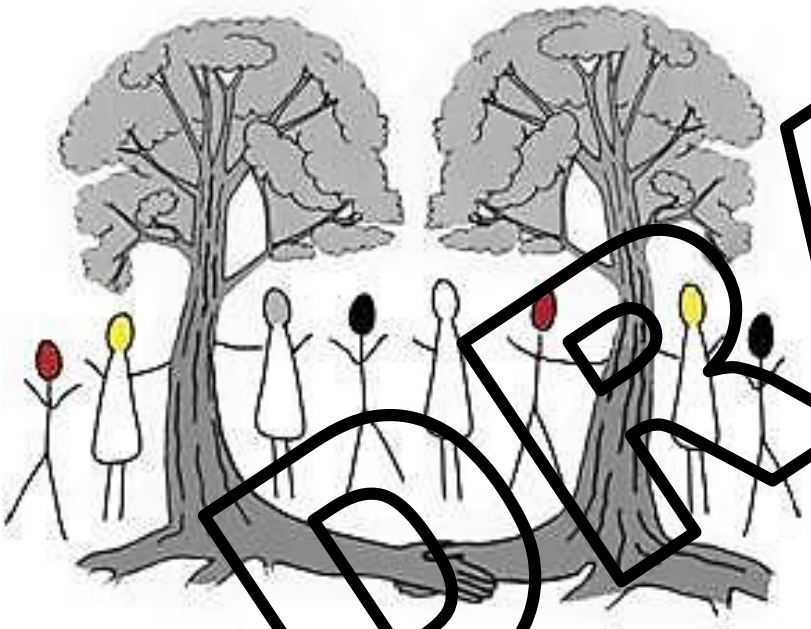
BScCS DEGREE STRUCTURE

number in parenthesis
= credits within 120 total credit degree

NEW COURSES

SciC (Science in Community)

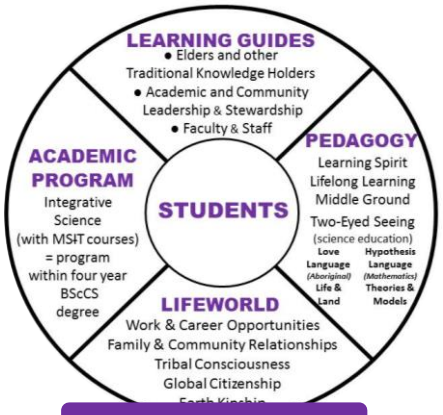
The new SciC courses will be key in rebuilding the core of the BScCS degree, as they will enable the vision for "science learning with and for community" as per the degree submission to, and approval by, CBU Academic Council and MPHEC in 1997 and 1999, respectively (plus in 1999 and 2001 for Integrative Science).



* numerous references available, e.g. Anuik. J. 2013. Nourishing the Learning Spirit: Coming To Know and Validating Knowledge: Foundational Insights on *Indian Control of Indian Education* in Canada. *In:* J. Reyhner, J, Martin, L. Lockard & W.S. Gilbert. (Eds.). *Honoring Our Children: Culturally Appropriate Approaches for Teaching Indigenous Students* (pp. 77-92). Flagstaff, AZ: Northern Arizona University.

NEW COURSES

SciC (Science in Community)



WHY? multiple foci in this UC document

multiple foci to life within communities

politics

cognitive

culture

spiritual

physical

economics

emotional

social

multiple foci within a course intending to explore "Science in Community"

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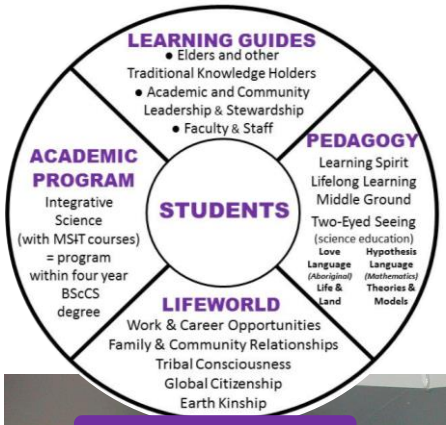
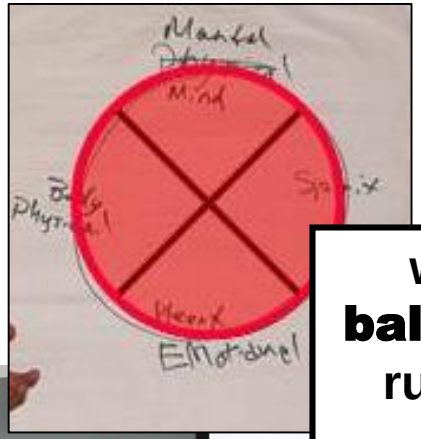
NEW COURSES

SciC (Science in Community)

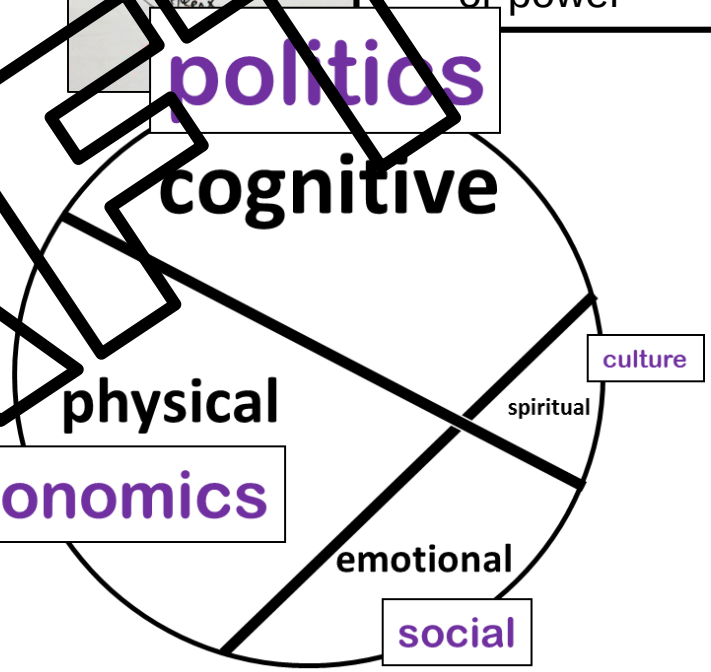




when **unbalanced:** runs on **greed** e.g. money or power

when **balanced:** runs on **life affirming energy**

community



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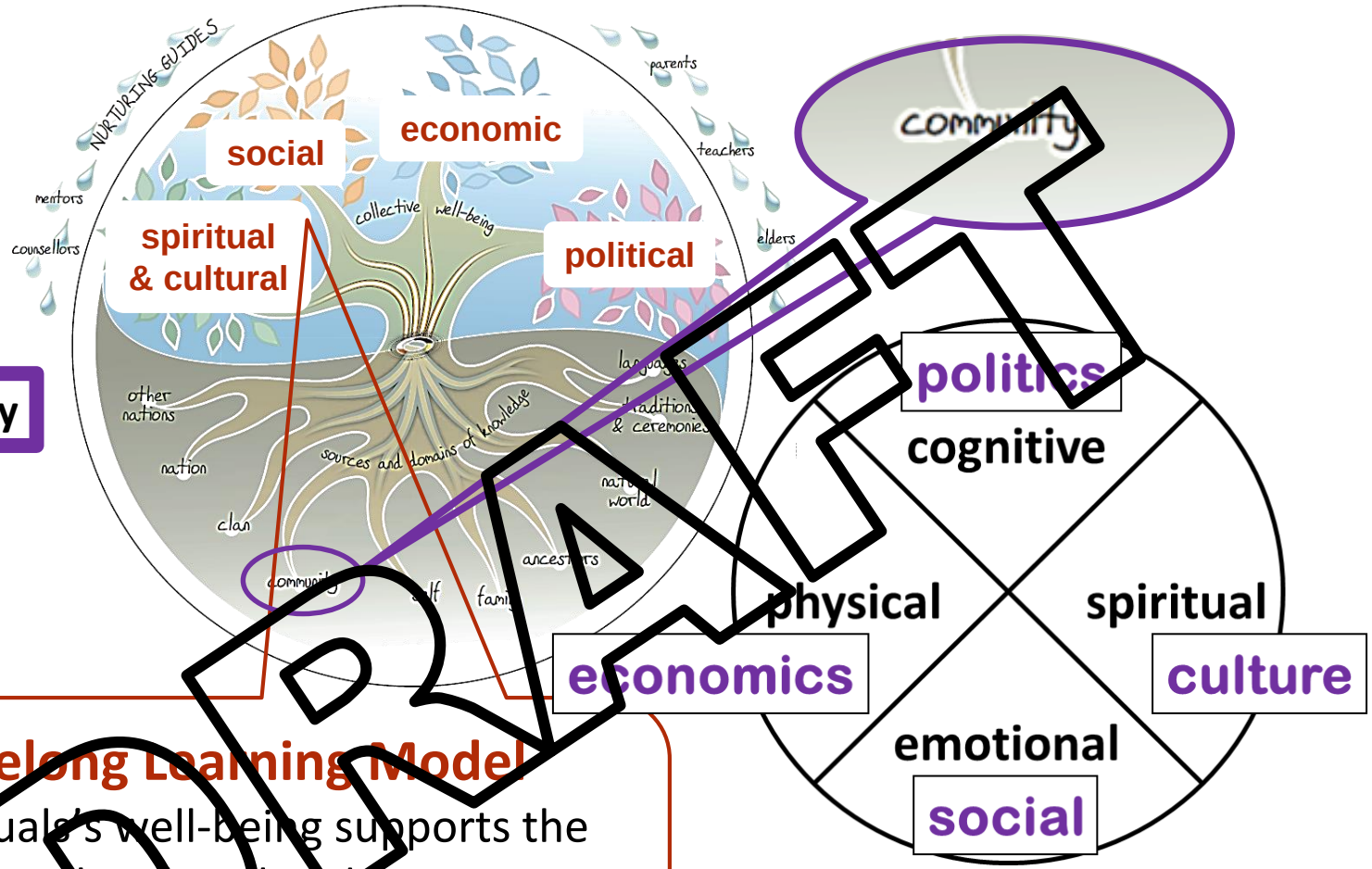
Ken Paul, ARCFNC Director of Fisheries (formerly DFO and Parks Canada) explaining Elder Gwen Bear's teachings about community

at 2004 CEPI – Integrative Science community workshop in Wagmatcook, NS

NEW COURSES

SciC (Science in Community)



community

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CCL Lifelong Learning Model

The individual's well-being supports the cultural, social, political and economic **"Collective Well-Being"**, represented by the **FOUR CLUSTERS OF LEAVES.**

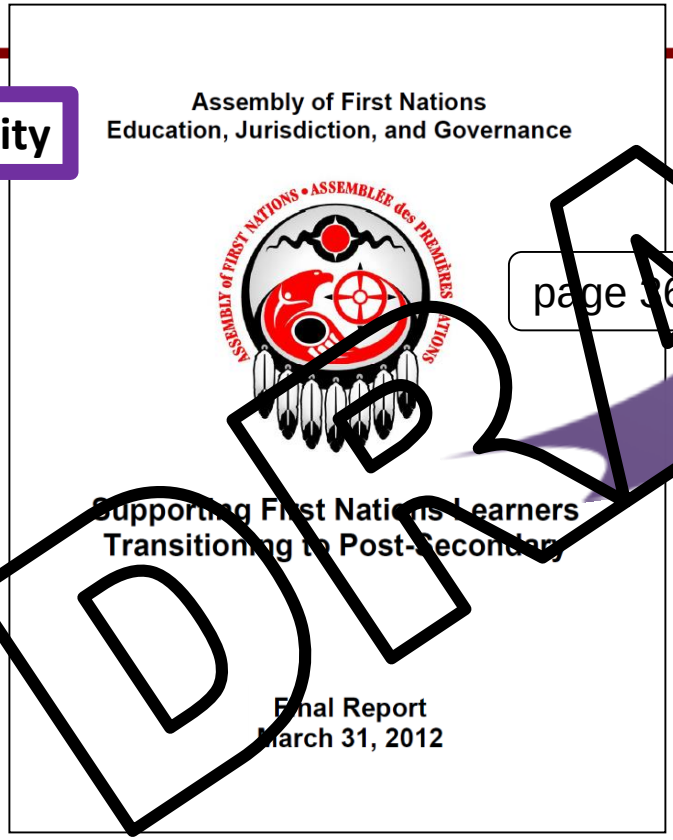
NEW COURSES

SciC (Science in Community)

"It is very important to think about our work as originating in the community because it is those kinds of processes that will take root and will effect long-term change for the overall social justice needs of our communities."

S. Brenda Small, Negahneewin College

community


Assembly of First Nations
Education, Jurisdiction, and Governance

page 36

Supporting First Nations Learners
Transitioning to Post-Secondary

Final Report
March 31, 2012

DRAFT

importance of embedding community dimensions throughout PSE programming and in support services for First Nations learners
(see document that examines AFN 2012 report)

http://www.afn.ca/uploads/files/education2/postsecondarytransitionsreport.pdf

NEW COURSES:
SciC (Science in Community)

> *"It is very important to think about our work as originating in the community because it is those kinds of processes that will take root and will effect long-term change for the overall social justice needs of our communities."*
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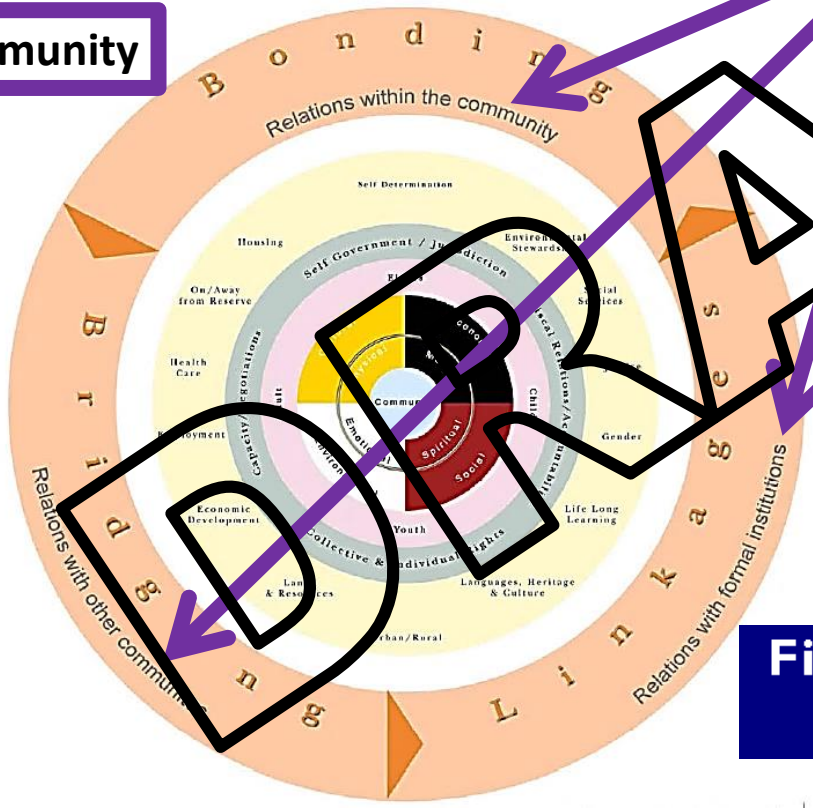


ASSEMBLY of FIRST NATIONS • ASSEMBLÉE des PREMIÈRES NATIONS

MODEL

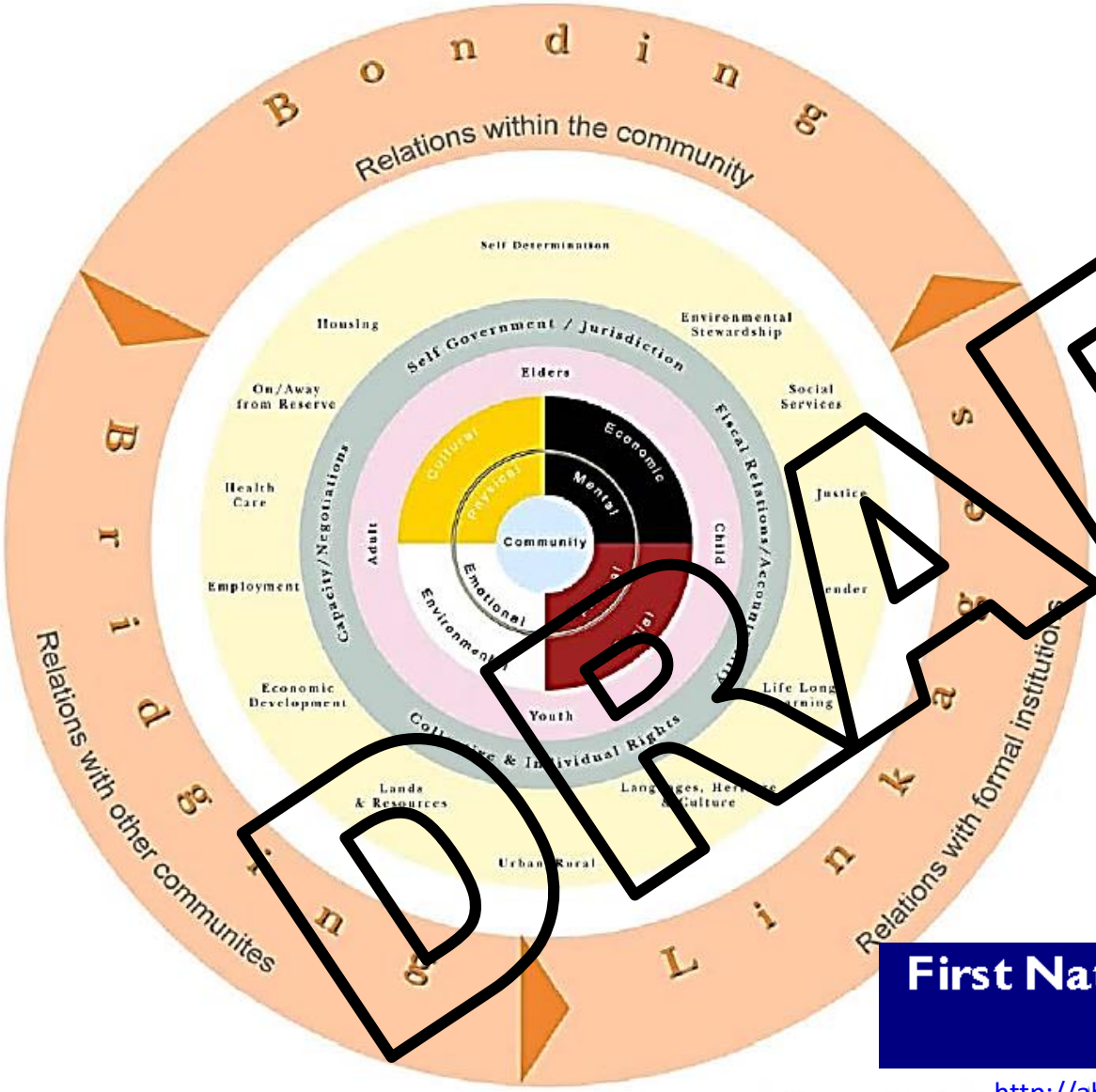
enlarged next page

First Nations Wholistic Policy and Planning Model

http://ahrnets.ca/files/2011/02/AFN_Paper_2007.pdf

NEW COURSES:

SciC (Science in Community)



First Nations Wholistic Policy and Planning Model

http://ahrnets.ca/files/2011/02/AFN_Paper_2007.pdf

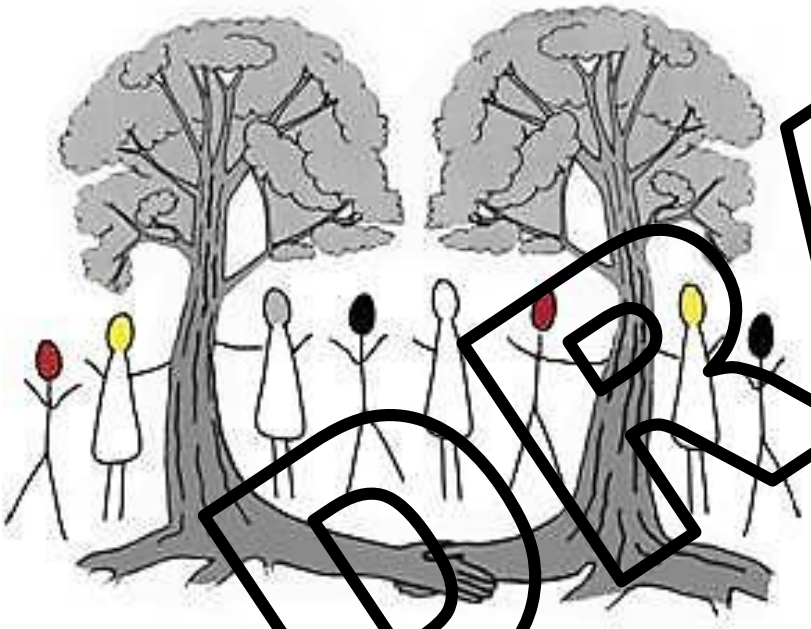
NEW COURSES:

SciC (Science in Community)

nourishing the Learning Spirit*

by way of an invitation to learn within new SciC courses that feature creative, collaborative, and collective processes

within community relevant issues and needs



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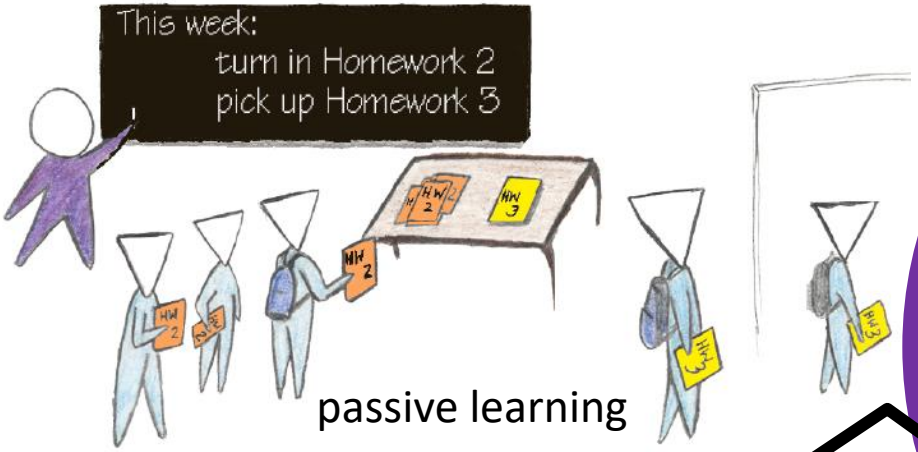
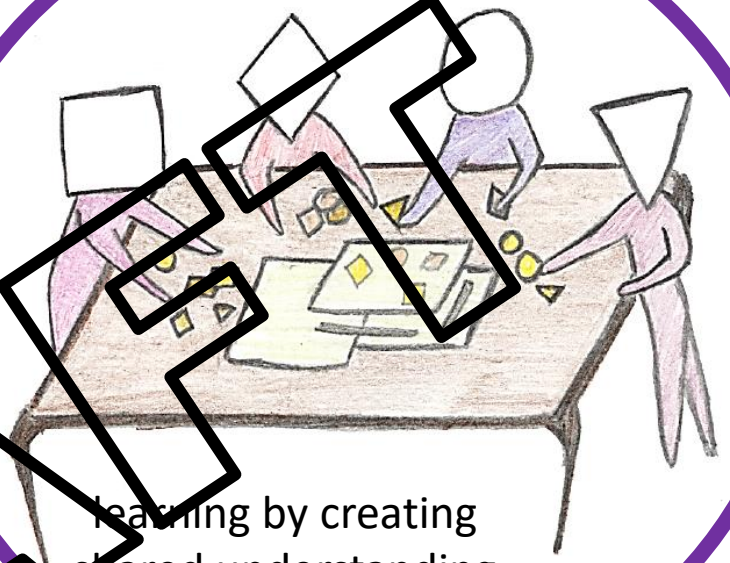
NEW COURSES:
SciC (Science in Community)

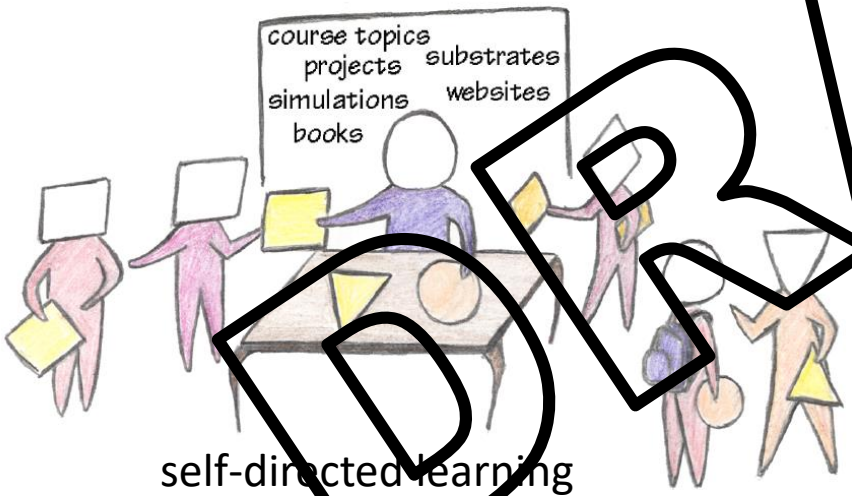


passive learning

emphasis



learning by creating
shared understanding



self-directed learning

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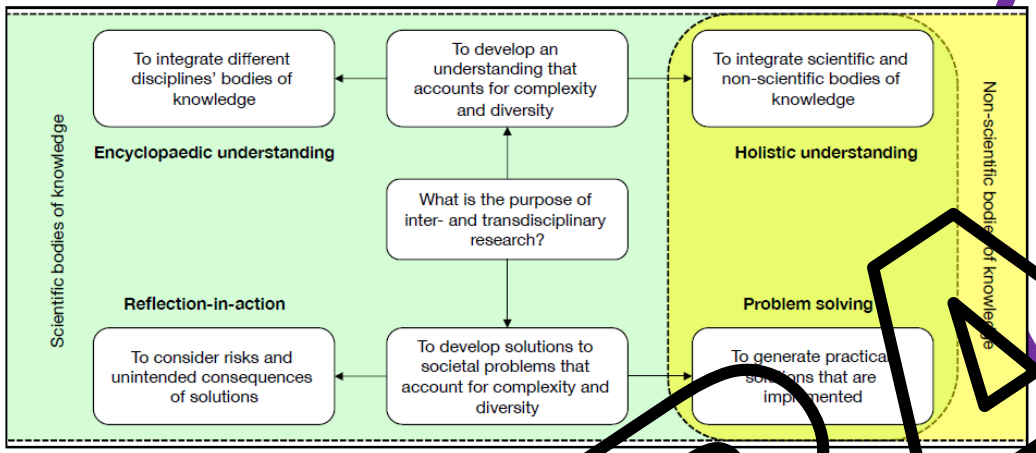
Formal Learning
*** three different approaches**

*** from: Fisher, G., 2000, Symmetry of Ignorance, Social Creativity, and Meta-Design**
http://l3d.cs.colorado.edu/~gerhard/papers/kbs2000.pdf

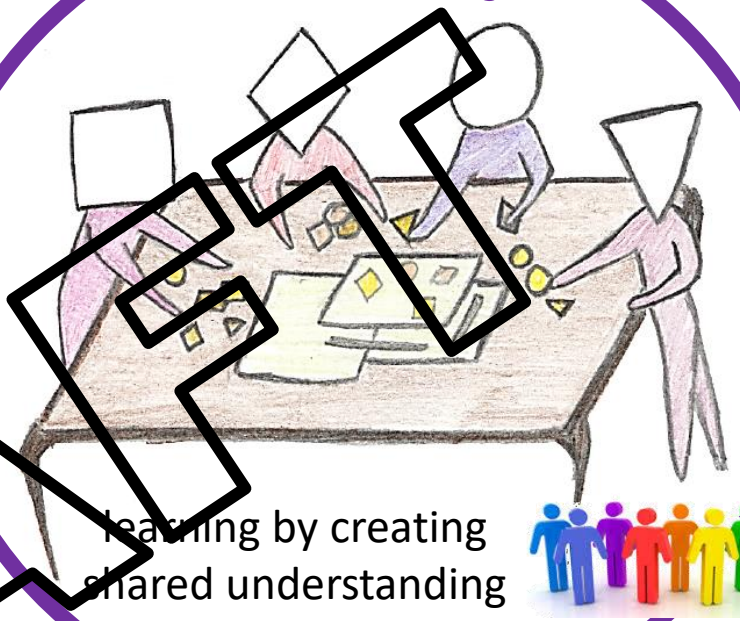
NEW COURSES:
SciC (Science in Community)

transdisciplinary (TD) approach



http://www.transdisciplinarity.ch/e/Transdisciplinarity/purpose

emphasis



learning by creating shared understanding

* The term **"transdisciplinary"** has evolved from its more literal meaning of transcending the traditional boundaries of university-based research to include the participation of extra-academic stakeholders.

** page 1147 in Carew, A.L. and Wickson, F, 2010, The TD Wheel: a heuristic to shape, support, and evaluate transdisciplinary research, Futures 42: 1146-1155*

NEW COURSES:
SciC (Science in Community)

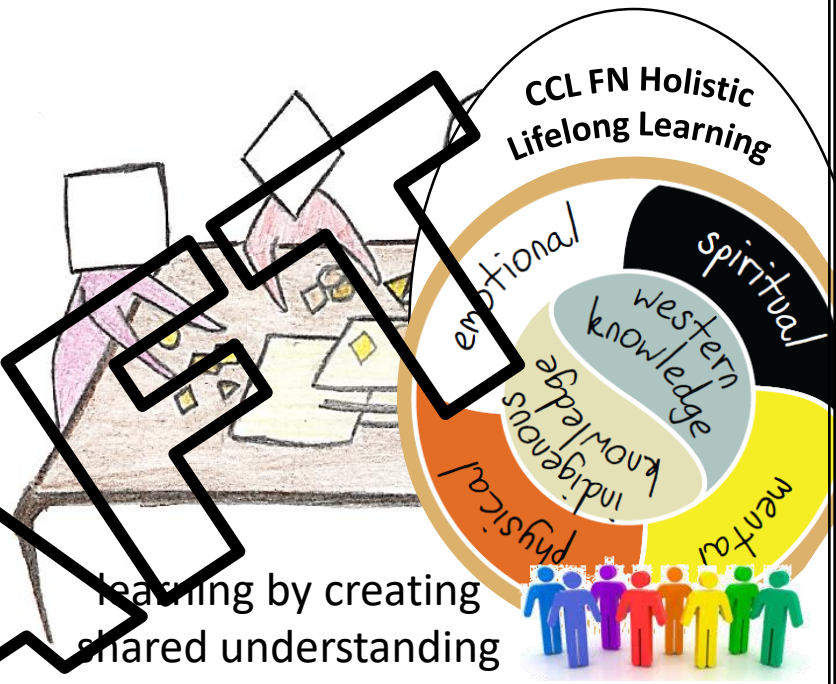
see UC document that explores

Transdisciplinary (TD) research principles

vis-à-vis

Integrative Science and Two-Eyed Seeing

(doc = "UC-TD-IntSci-TwoEyedSeeing")



learning by creating shared understanding

= community

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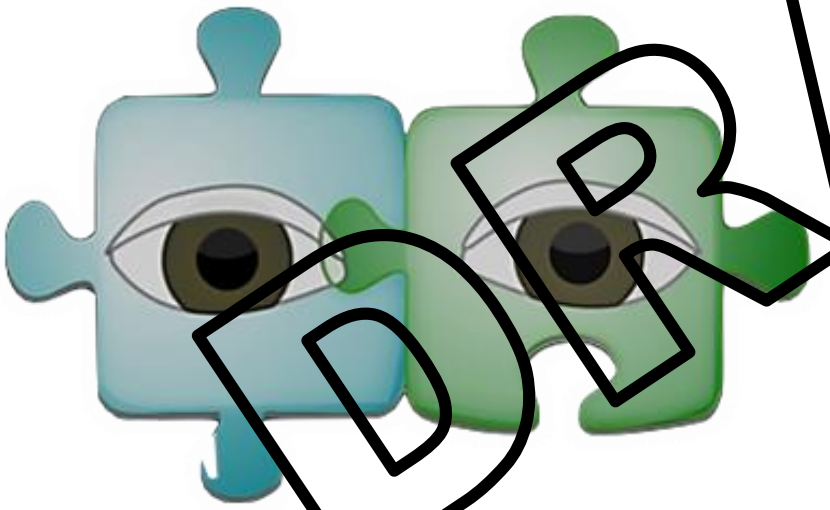
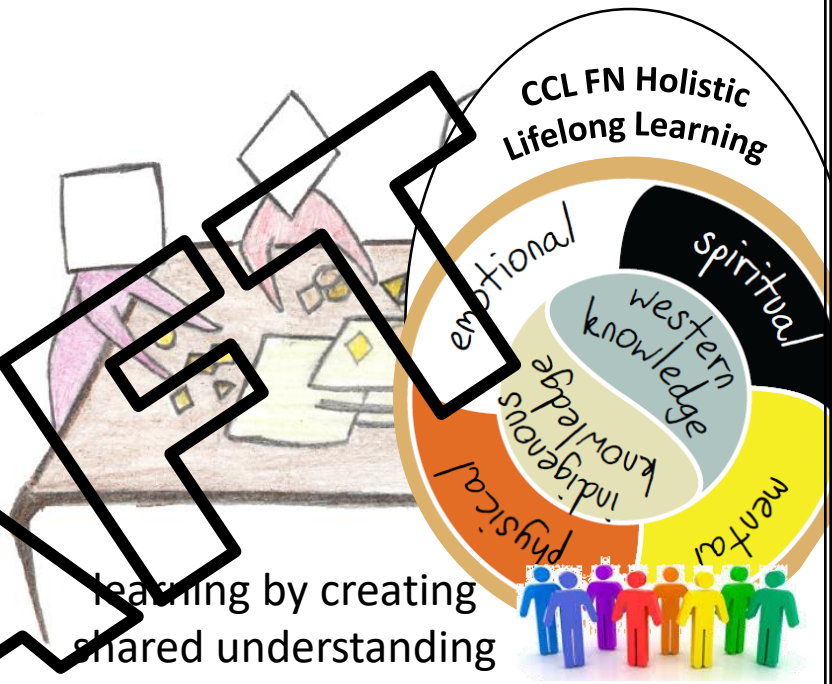
NEW COURSES:
SciC (Science in Community)

Two-Eyed Seeing
is a guiding principle

= learn to see with strengths in different perspectives and learn to use these together for the benefit of all

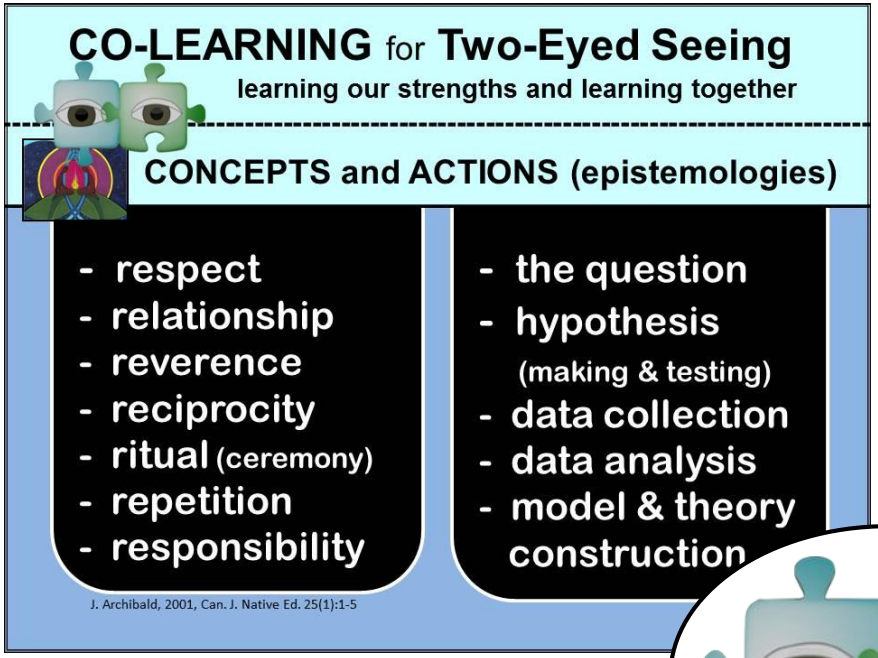


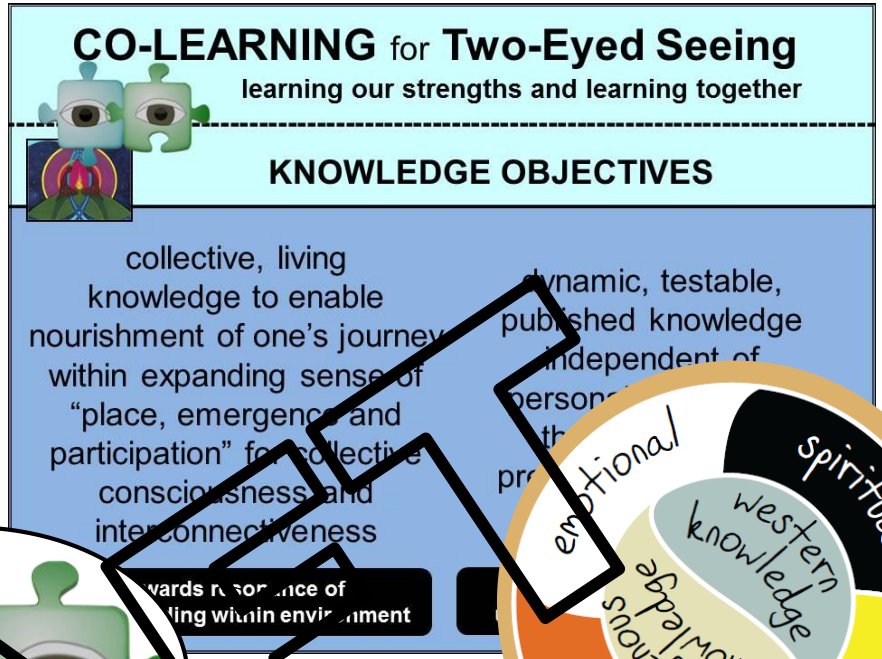


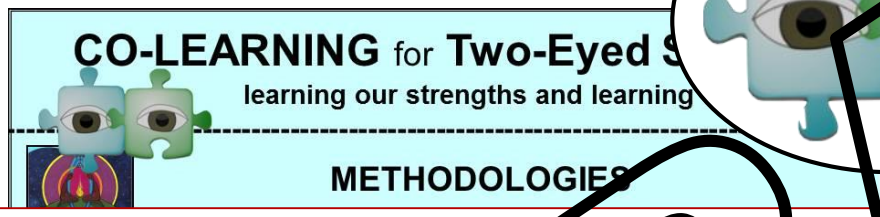
learning by creating shared understanding

= community

CO-LEARNING
with community
= “a must” for transdisciplinary work







While transcending discipline boundaries certainly remains an important activity of TD researchers, [others] have made reference to a range of related boundaries beyond discipline-based knowledge divides that TD researchers transcend. These include: affect/effect or fact/value; epistemological divides; and various systems conceptualization and boundary judgements.

from page 1147, in Carew, A.L. and Wickson, F, 2010, The TD Wheel: a heuristic to shape, support, and evaluate transdisciplinary research, Futures 42: 1146-1155)

CO-LEARNING for Two-Eyed Seeing

learning our strengths and learning together

CONCEPTS and ACTIONS (epistemologies)

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

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

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

CO-LEARNING for Two-Eyed Seeing

learning our strengths and learning together

KNOWLEDGE OBJECTIVES

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

dynamic, testable, published knowledge independent of personal experience that can enable prediction and control (and "progress")

towards resonance of ...ling within environment

towards construction of understanding of environment

CO-LEARNING for Two-Eyed S...

learning our strengths and learning

METHODOLOGIES

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

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

...EARNING for Two-Eyed Seeing

...learning our strengths and learning together

NATURAL WORLD (ontologies)

All my Relations

beings ...
interconnective and animate:
spirit + energy + matter

with
CONSTANT CHANGE
within balance and wholeness

parts & wholes

objects ...
comprised of parts and wholes characterized by systems and emergences:
energy + matter

with
EVOLUTION

SciC (Science in Community)

POTENTIAL TOPIC AREAS

enabling different exploration … list can be expanded

1) sustainable energy and environment

a. energy generation-storage-transmission
b. ecotourism
c. environmental assessment for TEK purposes
d. ecosystem stewardship, e.g. Bras d'Or Lakes Biosphere, CEPI

2) health

a. ecosystem health
b. human health
c. active transportation

3) climate change

4) sustainable resource co-management

a. fisheries, aquaculture, forestry

5) non-sustainable resource extraction

a. fracking, mining, oil sands

6) Integrative Science outreach

a. Gr 6-12: science fairs, summer camps
b. professional upgrading (various)

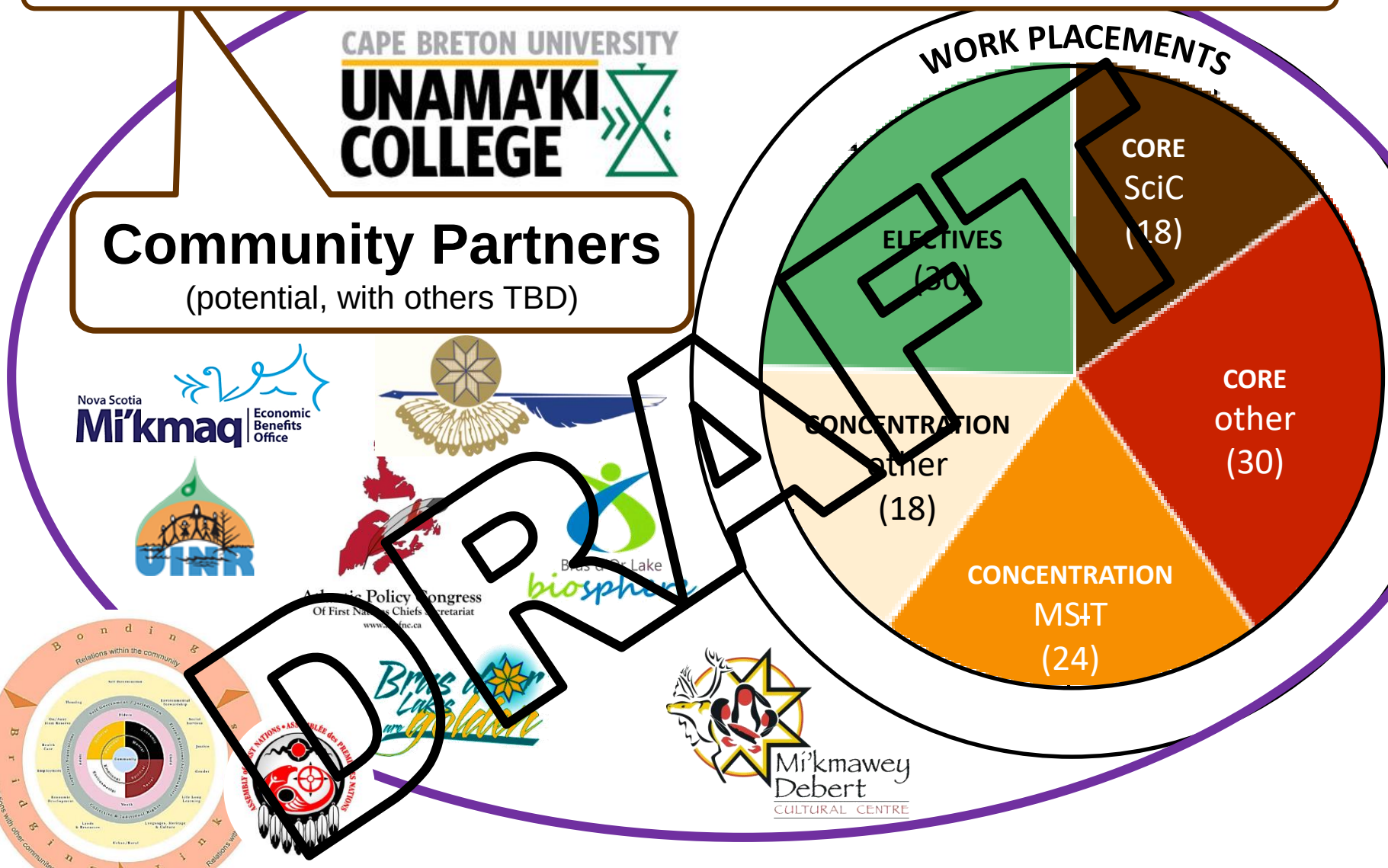
7) science entrepreneurship

SciC (Science in Community)

POTENTIAL TOPIC AREAS

CAPE BRETON UNIVERSITY
UNAMA'KI COLLEGE

Community Partners
(potential, with others TBD)



Nova Scotia Mi'kmaq Economic Benefits Office

UINR

Atlantic Policy Congress
Of First Nations Chiefs Secretariat

Bras d'Or Lake biosphere

Mi'kmawey Debert
CULTURAL CENTRE

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SciC (Science in Community)

design

- 4 course levels (1st – 4th year), each with 2 numbered courses
- topics (see potential topic list) to be taught at any level, with different learning outcomes by level (consult "Learning Outcomes Framework")
- particular topic can have a sub-focus
- instructors drawn from both CBU and community
- community partner to be identified for each topic
- entrepreneurship and business linkage embedded in every topic, every course
- a course section can have a mix of students from different year levels
- a student could repeat a topic twice (maximum)
- a BScCS student could do two courses (maximum) at Year 1 level and two courses (maximum) at Year 2 level
- a BScCS student must do at least one course at Year 3 level and at least one at Year 4 level
- Co-ordinator required

SciC (Science in Community)

"Learning Outcomes Framework"

SciC COURSES: LEARNING OUTCOMES FRAMEWORK - GENERAL -		
GENERAL 1 **(every level):** humans as storytellers; storytellers as creating community; story as knowledge; knowledge as story; knowledge mobilization; cultural humility	**TRANSDISCIPLINARY: SCIENCE IN-WITH-FOR COMMUNITY** • Two-Eyed Seeing as a guiding principle for collaboration of worldviews • different worldviews embed different philosophies: ontologies, epistemologies, axiologies, methodologies, language • middle ground as an educational approach • knowledge models (adopted and adapted from Elder Murdena Marshall) • transdisciplinary approaches for "science in-with-for community" • appropriate community-engagement protocols and processes • entrepreneurship and economic linkages with topic in community context • perspective as shaping story and perspective(s) within story • pattern recognition-transformation-abstraction within st • story within different sources: oral, online, peer-reviewed, published (academic, grey, other) • story communicated in different ways: oral, written, visual, performance	
	INDIGENOUS KNOWLEDGE	**WESTERN SCIENCE**
GENERAL 2 **(every level):** knowledge models and/or theories	• Seven Sacred Gifts of Life • FN Lifelong Learning Model • Mi'kmaq Creation Story	Staircase to Physical Matter in the Universe • Big Bang Theory
GENERAL 3 **(every level):** knowledge models and/or theories	• FN Wholistic Policy and Planning Model • Blackstock Breath of Life Theory	Evolutionary Theory (basics) • Ecological Theory (basics)
GENERAL 4 **(every level):** knowledge generation + transmission + gardening	• story within worldview framework • share and discuss story within context of models and theories related to course topic • story within Knowledge Circle and KT Kit (Hansen and Smylie) and Indigenous Storywork (Archibald)	• story within worldview framework • investigate and analyze specific story topic • disseminate information about story specifics and contexts

DRAFT

GENERAL

Two-Eyed Seeing

Story as Knowledge
Knowledge as Story

various knowledge models and theories

knowledge generation, transmission, gardening, translation

SciC (Science in Community)

"Learning Outcomes Framework"

1st SciC COURSES: LEARNING OUTCOMES FRAMEWORK

- YEAR 1 -

NOTE: A specific topic, congruent with science and science-related issues or needs in community as per a pre-determined course topics list (itself to be dynamic), is to be designated for each course delivery.

INDIGENOUS KNOWLEDGE	WESTERN SCIENCE
• overview: Indigenous Knowledge and Indigenous science • different types of Indigenous story • lived experience as personal story w relational network (interconnectivity relationship of me within family, cor (e.g. friends, sports teams, commun groups), and natural environment	
• presentation audience: classmates a • presentation content: demonstrate Seeing (see above Year 1, for Indiger • General 1-4: basic understandings a positioning, community context, and • other B: basics of holistic storywork and communication re topic, within	

2nd SciC COURSES: LEARNING OUTCOMES FRAMEWORK

- YEAR 2 -

NOTE: A specific topic, congruent with science and science-related issues or needs in community as per a pre-determined course topics list (itself to be dynamic), is to be designated for each course delivery.

INDIGENOUS KNOWLEDGE	WESTERN SCIENCE
• personal story within and into coll story: relationship of me within fa community, natural environment, collective knowledge; • understanding of holistic story an interconnectivity within comm political, cultural, social and spirit domains	
• presentation audience: classm • presentation content: demonstra (see above Year 2, for Indige • General 1-4: good understandi positioning, community context, a • other: online literature review fo other sources	

3rd SciC COURSES: LEARNING OUTCOMES FRAMEWORK

- YEAR 3 -

NOTE: A specific topic, congruent with science and science-related issues or needs in community as per a pre-determined course topics list (itself to be dynamic), is to be designated for each course delivery.

INDIGENOUS KNOWLEDGE	WESTERN SCIENCE
personal story into and within collecti knowledge and web of life (interconnectivity with natural environme perspective and differen own community (where live & work) presentation audience: classmates and, ic • presentation content: demonstrate explo Two-Eyed Seeing (see above Year 3, for In • General 1-4: intermediatae understandin topic positioning, community context, a other B: comprehensive (on-line plus libra of 10 academic papers and 10 other sourc	• objective information mobilized into new

4th SciC COURSES: LEARNING OUTCOMES FRAMEWORK

- YEAR 4 -

NOTE: A specific topic, congruent with science and science-related issues or needs in community as per a pre-determined course topics list (itself to be dynamic), is to be designated for each course delivery.

INDIGENOUS KNOWLEDGE	WESTERN SCIENCE
• personal experience and collective knowledge mobilized within holistic knowledge story framework and web of life (interconnectivity with natural environment): perspectives and differences among communities throughout nation and into international contexts	• objective information analyzed within reductionist or ecological knowledge story framework • concept mapping for local to international contexts
• presentation audience: classmates, own community members including Elders, academic community, other TBD • presentation content: demonstrate advanced understandings of topic using Two-Eyed Seeing (see above Year 4, for Indigenous and Western) and middle ground • General 1-4: advanced understandings and competencies for models and theories, plus same re topic positioning, community context, and entrepreneur/business linkages • other: comprehensive (on-line plus library) literature review for topic, to include annotated scan of 10 academic papers and 10 other sources	

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BY YEAR LEVELS

topics taught at any level, but with different learning outcomes by level

SciC (Science in Community)

positioned by year in 4 year BScCS degree

A particular offering (or section) can accommodate a mix of students from different year levels. Therefore, it will **not** be necessary to create eight totally different courses. Rather, it will be necessary to have eight different course numbers, along with different learning outcomes defined for each level.

1st

2nd

3rd

4th

TWO COURSES at each year level = eight different course numbers BUT NOT eight totally different courses

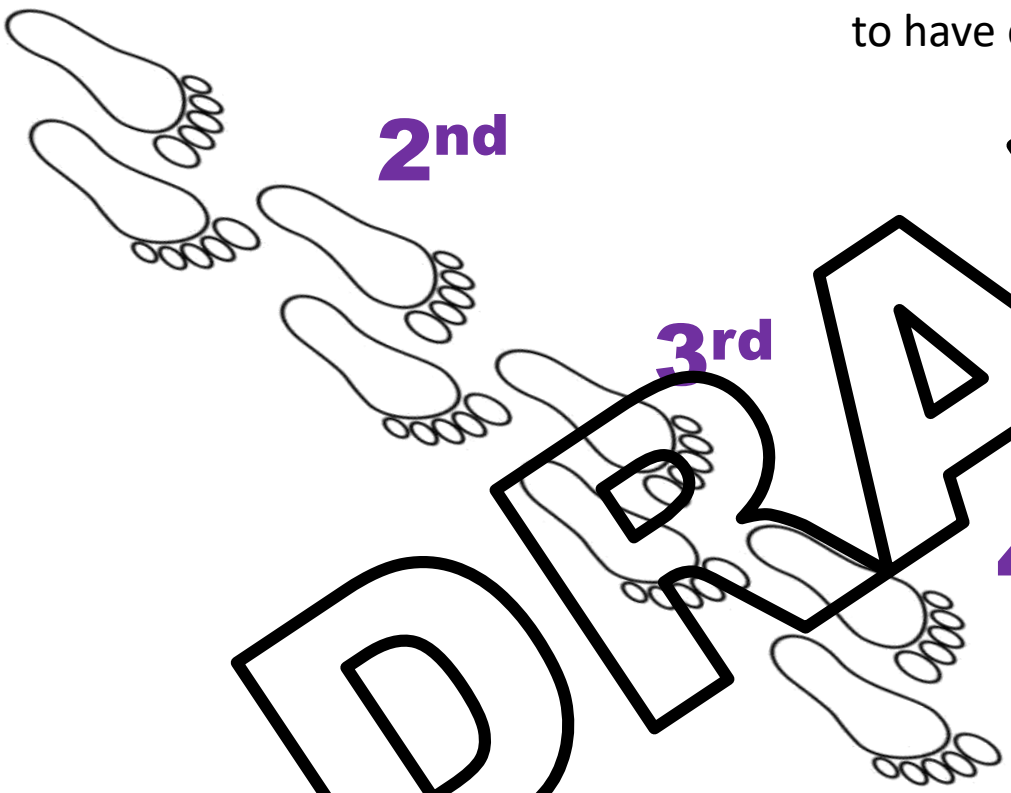
RECALL:

- 4 year levels (1st – 4th), each with two appropriately numbered courses
- a course section can have a mix of students from different year levels
- topics can be taught at any level, with different learning outcomes by level
- consult "Learning Outcomes Framework" document

SciC (Science in Community)

positioned by year in 4 year BScCS degree

A particular offering (or section) can accommodate a mix of students from different year levels. Therefore, it will **not** be necessary to create eight totally different courses. Rather, it will be necessary to have eight different course numbers, along with different learning outcomes defined for each level.



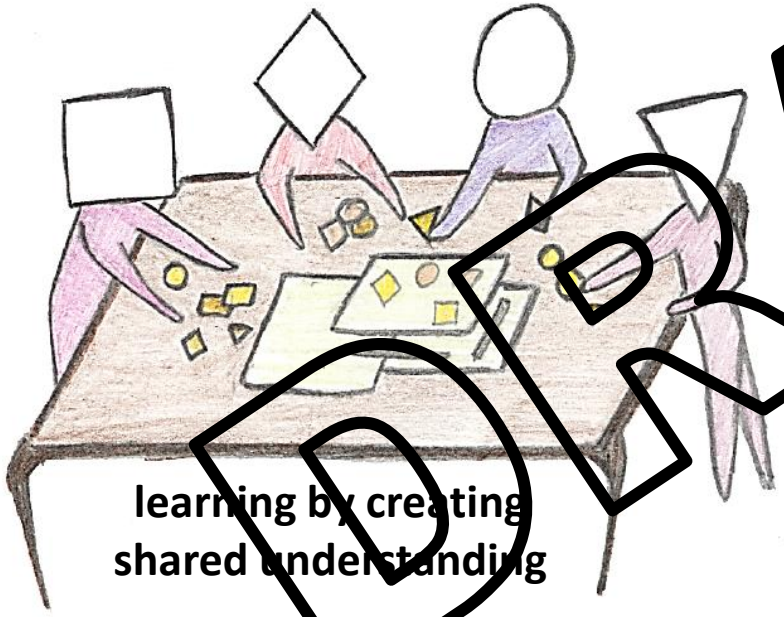
student to position the 18 credits of SciC courses (toes ⬮) according to interests, with maximum of two at each of 1st and 2nd year levels and at least one at 3rd year and one at 4th year levels

SciC: 6 courses (each 3 credits = 18 total) required in CORE of BScCS

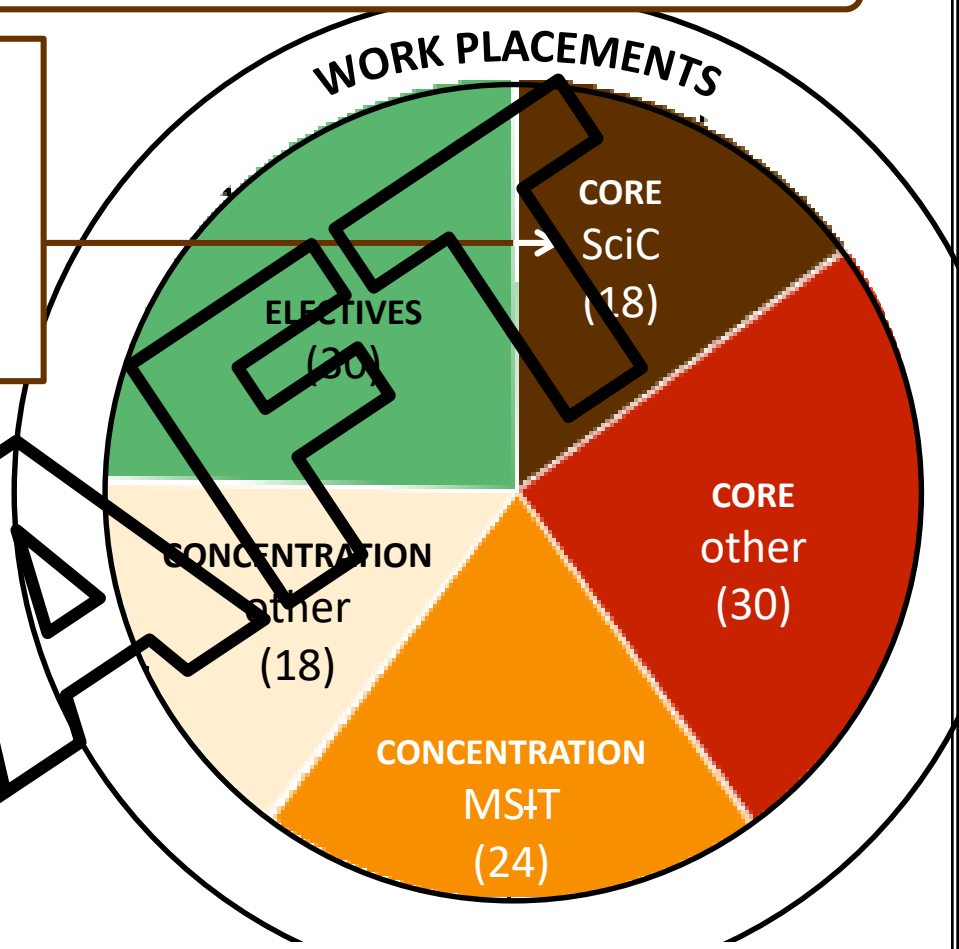
SciC (Science in Community)

positioned by structure for the 4 year BScCS degree

"EXPLORE in the CORE"
science or science-related
needs or issues in community
via inquiry-based,
experiential learning courses



learning by creating
shared understanding



BScCS DEGREE STRUCTURE

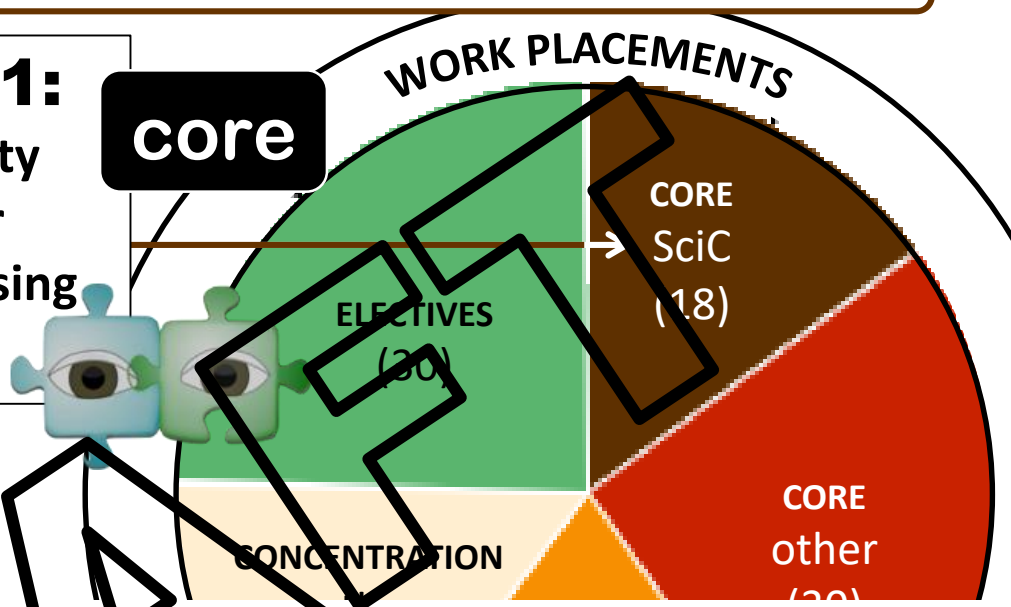
number in parenthesis
= credits within 120 total credit degree

SciC (Science in Community)

positioned by structure for the 4 year BScCS degree

DEGREE WORK NEED #1:

- **develop new "Science in Community (SciC)" courses for science inquiry for community-based issues or needs, using (18 credits required in core)**



learning by creating shared understanding

NEW: SciC courses, N = 4 levels (x 2/level), each 3 credits *(rebuild OLD 3 x 6 credit courses)*

→ guiding principle: ***Two-Eyed Seeing*** as per that of Mi'kmaq Elder Albert Marshall

→ approach: ***transdisciplinary methodologies + community engagement methodologies***

→ embedded additional: ***entrepreneurship and business linkage***

- "transdisciplinary" (TD) as such is becoming the "acceptable way" by which the natural sciences community is giving itself permission to engage with community knowledge and community knowledge holders
- "community engagement" with special focus on Indigenous community processes, protocols, and partners plus also accommodate understandings of other approaches
- entrepreneurship and business linkageS

SciC (Science in Community)

positioned by structure for the 4 year BScCS degree

DEGREE WORK NEED #1:

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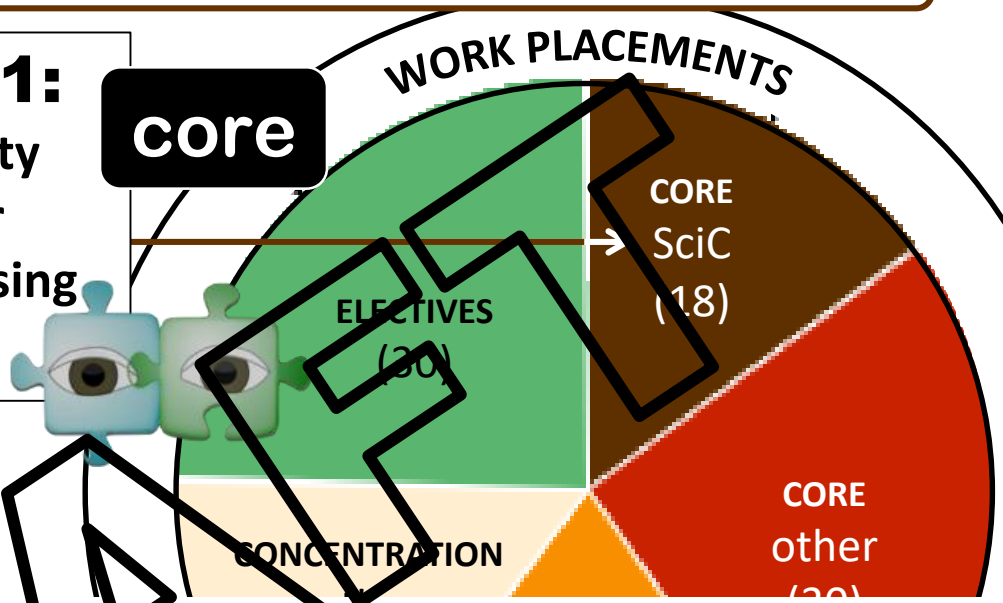

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According to ECO Canada's recent environmental study titled **Defining the Green Economy**, businesses have identified 3 green skill gaps that are needed in the environment industry:

1. Technological change
2. Knowledge of sustainable development
3. Interdisciplinary thinkers (Interdisciplinary ≈ Transdisciplinary)

ECO CANADA
Environmental Careers Organization

explanations on next pages

ECO CANADA
Environmental Careers Organization

http://www.eco.ca/community/blog/3-skills-green-businesses-need-now/43183/

by Stephanie Warthe | February 22, 2012

Guest Post: by Rhea Castillo

Several shifts are occurring in the skill and knowledge expectations for workers in the green economy. With the quick pace of technological advancements, the growth of the green economy has placed a heavier emphasis on technical competence, as green employees are required to work with increasingly complicated technological systems.

According to ECO Canada's recent environmental study titled **Defining the Green Economy**, businesses have identified 3 green skill gaps that are needed in the environment industry:

1

Technological Change

The lightening-speed evolution of technology requires people who can:

1) **Adapt** to new methods
2) **Apply** new methods to existing practices
3) **Understand** the relevance of certain technologies

learning by creating shared understanding

ECO CANADA
Environmental Careers Organization

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According to ECO Canada's recent environmental study titled **Defining the Green Economy**, businesses have identified 3 green skill gaps that are needed in the environment industry:

2

Knowledge of Sustainable Development

Knowledge of sustainable development and green practices is important. The lack of people with this background is blaringly apparent across all levels of business, and as such, may require further environmental training or education. Green businesses need people who think green and can lead a workforce's adoption of green practices. Carbon trading and environmental finance are areas businesses are particularly in the dark about.

learning by creating shared understanding

ECO CANADA
Environmental Careers Organization

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Interdisciplinary Thinkers ↔ note ≈ transdisciplinary

Big-picture thinkers who thoroughly grasp green issues and their importance across disciplines or departments are, and will continue to be, key players in the green economy.

As emphasized in **Defining the Green Economy**, "As the green economy continues to evolve, greater pressures will be placed on interdisciplinary cooperation, including a greater level of understanding of the relationships between business areas interacting with each other".

learning by creating shared understanding

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learning by creating shared understanding

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New Course Proposal
Cover Sheet

This sheet must be completed when submitting a proposal for a new course to Senate
the proponents wish to be considered by Academic Committee may be provided as a
of these terms, see the reverse side of this sheet.

Four-letter Code (for calendar use)	Course Title (e.g., Psychology 1XX: Introduction to Psychology) (The Course Number will be assigned by the Registrar)		
Cross-Listing	**Exclusions**	**Prerequisites/Required for…**	
Elective or Required (name degree/dip./cert.)	**For required courses only, list the specific requirements met (*)**	**Frequency of offerings/Priority level**	**Library holding update required?**
Lab, fieldwork, co-op, etc. required	**Instructor**	**Teaching Format**	**Financial Plans Complete?**
Calendar Description			

Required Prior Approvals:
Department Chair: _____
(signature, date) (vote results for/against/abstain)

Dean: _____
(signature indicates budget plans are in place)

*DDC: _____
The relevant Degree Diploma Certificate committee must approve courses that are required or can be used to satisfy a specific requirement.

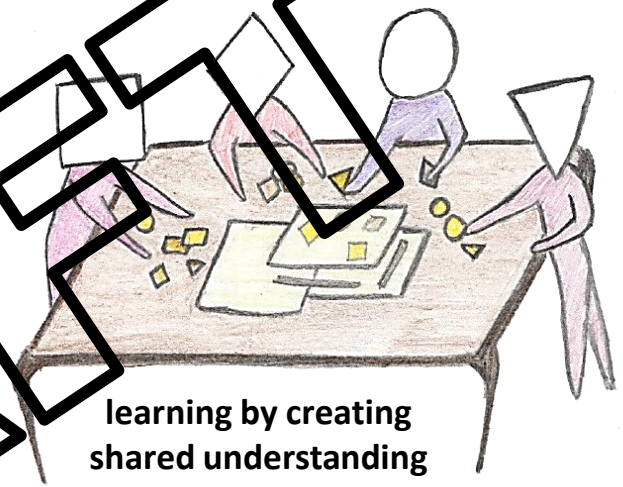
Required Attachments
- Schedule of topics or course outline - Course Objectives - Additional consultations
- Discuss the role of course in program(s), student constituencies, evidence of need, financial and human resources.

List appendices here:

Final Approvals:
Academic Committee approval (date): _____ Senate approval (date): _____

SciC: explore

science or science-related needs or issues in community via inquiry-based, experiential learning courses



learning by creating shared understanding

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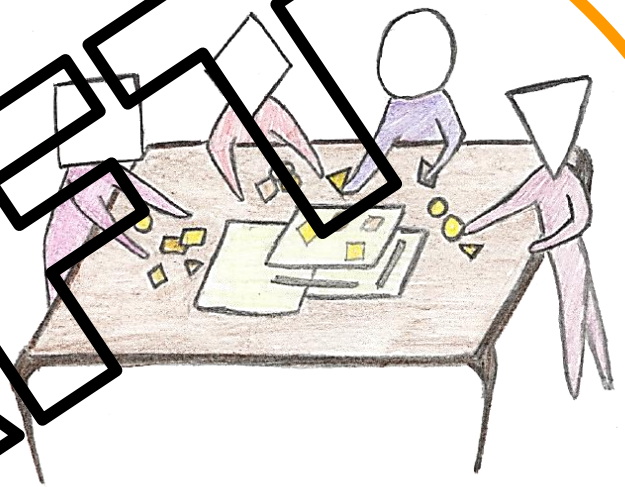
NEXT STEP REQUIRED FOR SUBMISSION OF PROPOSAL FOR NEW COURSE(S)

question of purpose

SciC (Science in Community)

MANY POSSIBILITIES

BScCS - Integrative Science
BScCS - other
BSc Biology
BSc Nursing
BA (in-community delivery)
all other CBU degrees
degrees of other universities
MSAP (Mi'kmaq Science Advantage Program)
Aboriginal Health Sciences Pathways



SciC (Science in Community)

Learning Outcomes Framework

DRAFT

proposed "LEARNING OUTCOMES FRAMEWORK" for
envisioned new SCIENCE IN COMMUNITY (SciC) COURSES

The "Learning Outcomes Framework" outlined here for the new SciC courses being envisioned is part of the overall work required to revitalize CBU's four year Bachelor of Science Community Studies (BScCS) degree, including the Integrative Science concentration.

SciC courses (each 3 credits, or ½ year courses) are compulsory in the core of the BScCS degree and 18 credits, in total, are required. Two courses are envisioned for each year level in the four year degree, or eight courses in total. However, given that a particular offering (course) is intended to accommodate a mix of students from different year levels, it will **not** be necessary to create eight totally different courses. Rather, it will be necessary to have eight different course numbers, along with different learning outcomes defined for each level. The Learning Outcomes Framework includes both general information and information by year, for the SciC courses.

The format by which a particular course offering can accommodate a mix of students from different year levels enables a learning environment in which more senior students will be able (and also expected) to help junior students. This "across the levels" can be viewed as somewhat akin to intergenerational learning, which is frequently encouraged (as Elder ↔ youth) within the literature for Aboriginal education.

Furthermore:

1) Each SciC course is intended as 6 contact hours/week (following standard time expectation for a CBU science course). Delivery format and means may vary, while abiding by these overall expectations.
2) SciC courses are Two-Eyed Seeing courses in which students interested in Integrative Science and/or natural science are provided with the opportunity to learn within an inquiry-based, experiential process that extends into, and includes, community.
3) "Transdisciplinary" (TD) *sensu* Concept B in Pohl (2011) and further explicated in Bergmann et al. (2012) is a term of choice used herein. TD approaches are the means by which the Western (mainstream) science community (albeit mainly in Europe) has given itself permission to engage with values and knowledges considered to be non-academic and non-scientific. The UC document "what is science?" should be consulted for other perspectives with respect to "non-scientific", however.

4) The Learning Outcomes Framework embeds the intent that students "learn to co-learn" in collective, collaborative, and creative ways to explore topics congruent with science and science-related issues and needs in communities.
5) Co-learning can be defined as "learning together + learning from each other + learning the common (within perspectives to worldviews) + learning the differences (within perspectives to worldviews)".
6) Co-learning for each course will, by design, also include the professor and, ideally, community members.
7) Course offerings will be at all four levels within the four year BScCS degree (or other), namely 1st - 4th, and such will be reflected in course numbers. Outcomes at higher levels are to be inclusive of outcomes at lower levels.
8) As previously indicated, any particular offering can accommodate a mix of students at different levels in which case students at higher levels will be expected to help those in lower levels.
9) Students will be expected to demonstrate understandings by way of expressive communication (oral and written, plus other) for diverse audiences.
10) With increasing course level, students will be expected to demonstrate increased competency of communication skills, increased depth and breadth of understanding of various knowledge models and theories and their applications, and increased understandings of the topics both in isolation and within community contexts.
11) A student in the BScCS, to satisfy the requirements of the degree core, may take a maximum of two courses at the 1st year level and a maximum of two at the 2nd year level, plus the same student must take at least one at the 3rd year level and at least one at the 4th year level.

SciC COURSES: LEARNING OUTCOMES FRAMEWORK

- GENERAL -

GENERAL 1 (every level): humans as storytellers; storytellers as creating community; story as knowledge; knowledge as story; knowledge mobilization; cultural humility	**TRANSDISCIPLINARY: SCIENCE IN-WITH-FOR COMMUNITY** • Two-Eyed Seeing as a guiding principle for collaboration of worldviews • different worldviews embed different philosophies: ontologies, epistemologies, axiologies, methodologies, language • middle ground as an educational approach • knowledge models (adopted and adapted from Elder Murdena Marshall) • transdisciplinary approaches for "science in-with-for community" • appropriate community-engagement protocols and processes • entrepreneurship and economic linkages with topic in community context • perspective as shaping story and perspective(s) within story • pattern recognition-transformation-abstraction within story • story within different sources: oral, online, peer reviewed, published (academic, grey, other) • story communicated in different ways: oral, written, visual, performance	
	INDIGENOUS KNOWLEDGE	**WESTERN SCIENCE**
GENERAL 2 (every level): knowledge models and/or theories	• Seven Sacred Gifts of Life • FN Lifelong Learning Model • Mi'kmaq Creation Story	• Staircase to Physical Matter in the Universe • Big Bang Theory
GENERAL 3 (every level): knowledge models and/or theories	• FN Wholistic Policy and Planning Model Blackstock Breath of Life Theory	• Evolutionary Theory (basics) • Ecological Theory (basics)
GENERAL 4 (every level): knowledge generation + transmission + gardening + translation	• story within worldview framework • share and discuss story within context of models and theories related to course topic • story within Knowledge Circle and KT Kit (Hanson and Smylie) and Indigenous Storywork (Archibald)	• story within worldview framework • investigate and analyze specific story topic • disseminate information about story specifics and contexts

SciC COURSES: LEARNING OUTCOMES FRAMEWORK

- YEAR 1 -

NOTE: A specific topic, congruent with science and science-related issues or needs in community as per a pre-determined course topics list (itself to be dynamic), is to be designated for each course delivery.

INDIGENOUS KNOWLEDGE	WESTERN SCIENCE
• overview: Indigenous Knowledge and Indigenous science • different types of Indigenous story • lived experience as personal story within relational network (interconnectivity): relationship of me within family, community (e.g. friends, sports teams, community groups), and natural environment	• overview: Western science • Western science as objective information presented in an exceedingly formal story format • objective ↔ subjective
• presentation audience: classmates and ideally own community members (including Elders) • presentation content: demonstrate basic understanding of topic positioning within Two-Eyed Seeing (see above Year 1, for Indigenous and Western) and middle ground • General 1-4: basic understandings and competencies for models and theories, plus same re topic positioning, community context, and entrepreneur/business linkages • other: basics of holistic storywork and of reductionistic storywork: gathering, framing, analysis, and communication re topic, within community context, and entrepreneur/business linkages	

SciC COURSES: LEARNING OUTCOMES FRAMEWORK

- YEAR 2 -

NOTE: A specific topic, congruent with science and science-related issues or needs in community as per a pre-determined course topics list (itself to be dynamic), is to be designated for each course delivery.

INDIGENOUS KNOWLEDGE	WESTERN SCIENCE
• personal story within and into collective story: relationship of me within family, community, natural environment, and collective knowledge; • understanding of holistic story and interconnectivity within community of political, cultural, social, and spiritual domains	• science story as objective, peer-reviewed, published, and publically available knowledge
• presentation audience: classmates and, ideally, own community members (including Elders) • presentation content: demonstrate exploratory understandings of topic using Two-Eyed Seeing (see above Year 2, for Indigenous and Western) and middle ground • General 1-4: good understandings and competencies for models and theories, plus same re topic positioning, community context, and entrepreneur/business linkages • other: on-line literature review for topic, to include annotated scan of 5 academic papers and 5 other sources	

SciC COURSES: LEARNING OUTCOMES FRAMEWORK

- YEAR 3 -

NOTE: A specific topic, congruent with science and science-related issues or needs in community as per a pre-determined course topics list (itself to be dynamic), is to be designated for each course delivery.

	INDIGENOUS KNOWLEDGE	WESTERN SCIENCE
	• personal story into and within collective knowledge story and web of life (interconnectivity with natural environment); perspective and difference within own community (where live or work)	• objective information mobilized into new knowledge story • concept mapping for local context
	• presentation audience: classmates and, ideally, own community members (including Elders) • presentation content: demonstrate exploratory and interconnective understandings of topic using Two-Eyed Seeing (see above Year 3, for Indigenous and Western) and middle ground • General 1-4: intermediate understandings and competencies for models and theories, plus same re topic positioning, community context, and entrepreneur/business linkages • other: comprehensive (on-line plus library) literature review for topic, to include annotated scan of 10 academic papers and 20 other sources	

SciC COURSES: LEARNING OUTCOMES FRAMEWORK

- YEAR 4 -

NOTE: A specific topic, congruent with science and science-related issues or needs in community as per a pre-determined course topics list (itself to be dynamic), is to be designated for each course delivery.

INDIGENOUS KNOWLEDGE	WESTERN SCIENCE
• personal experience and collective knowledge mobilized within holistic knowledge story framework and web of life (interconnectivity with natural environment): perspectives and differences among communities throughout nation and into international contexts	• objective information analyzed within reductionist or ecological knowledge story framework • concept mapping for local to international contexts
• presentation audience: classmates, own community members including Elders, academic community, other TBD • presentation content: demonstrate advanced understandings of topic using Two-Eyed Seeing (see above Year 4, for Indigenous and Western) and middle ground • General 1-4: advanced understandings and competencies for models and theories, plus same re topic positioning, community context, and entrepreneur/business linkages • other: comprehensive (on-line plus library) literature review for topic, to include annotated scan of 10 academic papers and 10 other sources	

SciC (Science in Community)

some specific references

(to support Learning Outcomes Framework)

SELECT REFERENCES and RESOURCES

for "LEARNING OUTCOMES FRAMEWORK" as proposed for new SCIENCE IN COMMUNITY (SciC) COURSES

(document prepared in Winter 2014)

A. Topic and Source: Integrative Science and Two-Eyed Seeing

- Integrative Science website: www.integrativescience.ca. Numerous articles and presentations (various authors) accessible under "Presentations and Articles" (for years up to and including 2012) and under "News" and/or "Archives" (for 2013 and subsequent years).

B. Source: Canadian Council on Learning (CCL) – Aboriginal Learning Knowledge Centre documents

- CCL. 2007. First Nations Holistic Lifelong Learning Model. http://www.ccl-cca.ca/ccl/Reports/RedefiningSuccessInAboriginalLearning/RedefiningSuccessModelsFirstNations.html
- CCL. 2007. Redefining How Success is Measured in First Nations, Inuit and Métis Learning. http://www.ccl-cca.ca/pdfs/RedefiningSuccess/Redefining_How_Success_Is_Measured_EN.pdf
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- CCL. 2009. Patricia Kovacs. Synthesis Report of the Aboriginal Learning Knowledge Centre's literature reviews: Responsive Educational Systems. http://en.copian.ca/library/research/ccl/responsive_edu_system/responsive_edu_system.pdf

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