PROVINCE

POST-SECONDARY

ORGANIZATIONS

YOU
Acknowledgements & Disclaimers
Holistic definition of innovation

The integration of different types

Orientations

Process

Skills

Potential gaps in NL

Opportunities for reform

Systems thinking

Takeaways
We can’t improve what we don’t define

Reduce emphasis on entrepreneurship and R&D as innovation – and PhDs as innovators

Co-opetition is needed between advocates of reform

Mandate, incentivize, and facilitate innovation education on all levels

Access & equity in innovation education – otherwise we get non-inclusive and misinnovation
INNOVATION
EDUCATION
Pop Quiz *(True/False)*

The following case studies are what we talk about when we talk about innovation.

**An inventor realizes that carbon glows when you run electricity through it.** They begin mass-producing carbon filament "bulbs" of light to sell it to a municipality to improve nighttime visibility and safety – but only succeed by developing an electricity distribution system, too.

**An owner of a cornerstore realizes that a popular new after-school program is starting, and they add new items to their deli and shift their cashier schedules so that they can check in two customers at the same time due to the increase in busy-ness.**

**A designer connects gaps in therapists' schedules with an online app that helps the therapist schedule on-demand time with clients through video calling.**

**A manager is having trouble keeping their team engaged in meetings, and discover a new mode of agenda-setting and collecting minutes through conversations with their friends (who work in another industry). Adapting the new meeting mode renews the productivity of their team.**

**Specialized facilitators re-frame their services as an events-based business model to deliver their creative approaches to strategy and community building to clients.**

**Political activists record a politician's commitment of bribery and turn it into a ringtone. The ringtone goes viral and the leader is ousted.**
Three inquiries:

Innovation education in NL

Research Question

How might we define innovation holistically, across many different perspectives and geographies?
Innovation

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International
Canada
Newfoundland & Labrador
Theorists
Other
Research Question

How might we define innovation holistically, across many different perspectives and geographies?

What is innovation?

The innovation process

Innovation orientations

Innovation skills and competencies
What is innovation?
What is innovation?
What is innovation?

An innovation is a change that creates new value or improves the delivery or capture of value.

Innovations exist in many forms, from product to social movement; at many scales, from new-to-you to new-to-the-world; and in many degrees, from radical to incremental. The success of one innovation often requires the success of others in parallel.

Innovation often results in new knowledge, relationships, and spin-off innovations.
Innovation Orientations

Technology & Science

Social & Sustainability

Commercial & Entrepreneurial
https://systemicdesign.kumu.io/the-innovation-process
Innovation is...

Fractal

Systemic

Indiscrete/Continuous
https://systemicdesign.kumu.io/innovation-skills-competencies-modelling
Lessons & Contributions

Abstract, generalizable definition of innovation useful across orientations

Overemphasis on entrepreneurship and technology in innovation strategies and policies

Overemphasis on aspects of the innovation environment and underemphasis in how we create and nurture innovators

Innovation orientations

Universal innovation process model
Three inquiries:

Innovation
Innovation education
Innovation education in NL

Research Question

What are the skills and competencies required to be an innovator? What are the learning constructs and outcomes we can design to help a learner achieve proficiency in these skill and competency domains?
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Methods

Instructional design & education literature

Concept mapping & design synthesis

kumu.io mapping
Contributions

Comprehensive model of innovation skills and competencies

Curricular outcomes for innovation education
Three inquiries:

Innovation

Innovation education

Innovation education in NL

Research Question

How does NL currently offer innovation education?

How might we provoke change in the Newfoundland and Labrador education system, in order to introduce more innovation education into the curricula?
Research Question

How does NL currently offer innovation education?

Methods

Process modelling

Curricula guides & prescribed learning outcomes

kumu.io mapping
Research Question

How does NL currently offer innovation education?

Sports and recreation
Elementary
Intermediate
Volunteerism
Hobbies

Work and career

Self-directed learning
Post-secondary

Extra- and co-curricular programs
Secondary
Primary
Lessons

Insufficient curricula for many of the innovation domains

Sources extrinsic to the education system must be examined
Research Question

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Centrality Analysis

**Accessibility**

Reach efficiency: how quickly change in a given element reaches the rest of the system.

Highly reach-efficient elements propagate change quickly throughout the system.

**Influence**

Eigenvector centrality: how well-connected an element is to other well-connected elements.

Highly influential elements deeply affect the rest of the system.

**Bottlenecks**

Betweenness centrality: how often an element is on the shortest path between two other elements.

High betweenness elements are bottlenecks or single-points of failure as change propagates.

**Torque**

Torque: an element’s reach efficiency weighted by its influence. In other words, leverage points.
https://systemicdesign.kumu.io/systemic-dynamics
Causal Loop Diagramming - Centrality Analysis

**Accessibility**
- Innovation learning from outside of the public education system
- Lack of emphasis on innovation skills and competencies
- Low price of oil

**Influence**
- Innovation education
- Innovation capacity
- Perceived innovation gap

**Bottlenecks**
- Innovation capacity
- Innovation education
- Recognition of innovation skill deficiency
- Perceived innovation gap
- Search for solutions to the innovation gap
Torque: an element’s reach efficiency weighted by its influence.

In other words, leverage points.

Causal Loop Diagramming - Centrality Analysis

Torque

- low price of oil
- other calls for reform
- accessible and practical models for innovation education
Lessons from system dynamics

Be wary of conflating innovation and other concepts (e.g., R&D)

“Injecting” change efforts in a couple of places could lead to exponential growth in innovation capacity

Raise awareness about the dynamics of resource dependency
Lessons from leverage points

Establish and disseminate an accessible, pragmatic model of innovation education

Unite calls for reform

Get a head start by offering extra- and co-curricular programs

Be mindful of public perception of innovation & innovation skills
Universal model of innovation

Semi-quantitative model of systemic change

Model of innovation education + curricula outcomes

Model of innovation education in NL

Systemic analysis of reform opportunities & barriers

Leverage points
Lessons

Reduce emphasis on entrepreneurship and R&D as innovation – and PhDs as innovators

We can’t improve what we don’t define

Co-opetition is needed between advocates of reform

Mandate, incentivize, and facilitate innovation education on all levels

Access & equity in innovation education – otherwise we get non-inclusive and misinnovation
Further research

Testing the innovation model

Testing the system model

Combining data science and systems thinking for systemic design