

TCSL-70130 Lecture 03: Interdisciplinary Learning & Course Design

跨領域學習與課程設計

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2


Lecture Topics

- What is a interdisciplinary learning(IL)?
- Characteristics of IL
- Benefits of IL
- Relationships of IL and curriculum
- Interdisciplinary curriculum design
- Interdisciplinary course design
- Interdisciplinary assessment
- Interdisciplinary teaching framework

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3 What is Interdisciplinary Learning (IL)

► **Interdisciplinary Learning:** A **knowledge view** and **curriculum approach** that **consciously** applies **methodology** and **language** from **more than one discipline** to examine a central theme, topic, issue, problem, or work. — Heidi Hayes Jacobs



“Interdisciplinary: a knowledge view and curriculum approach that consciously applies methodology and language from more than one discipline to examine a central theme, topic, issue, problem, or work.”

—Heidi Hayes Jacobs
INTERDISCIPLINARY CURRICULUM:
DESIGN AND IMPLEMENTATION (1989)

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4 Two Types of IL

► Learning **planned** to develop **awareness** and **understanding** of the **connections** and **differences** across **subject areas** and **disciplines**.

- This can be through the knowledge and skill content, the ways of working, thinking and arguing or the particular perspective of a subject or discipline.

► Using learning from **different subjects** and **disciplines** to **explore** a **theme** or an **issue**, meet a **challenge**, solve a **problem** or complete a final **project**.

- This can be achieved by providing a context what is real and relevant, to the learners, the school and its community.

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5

Characteristics of IL

- Use and integration of methods and analytical frameworks from more than one academic discipline.
- Make use of disciplinary approaches to examine topics, but pushes beyond by taking insights from a variety of relevant disciplines, synthesizing their contribution to understanding.
- Integrate these ideas into a more complete, and hopefully coherent, framework of analysis.

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6

Example: Coronavirus (COVID-19) Impacts and Responses

- Coronavirus(COVID-19) Pandemic is a good example of IL topic and approach
- The problem can be discussed from different perspectives:
 - Clinical features
 - Epidemiology and pathophysiology
 - Economy (local and world)
 - Politics
 - Humanity

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Purposes of Interdisciplinary Learning

7

- ▶ Enable teachers and learners to **make connections across learning** through exploring **clear** and **relevant links** across the curriculum.
- ▶ Support the **use** and **application** of **what has been** taught and learned in **new** and **different** ways.
- ▶ Provide opportunities for **deepening learning**.

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Why Teach with Interdisciplinary Approach

8

- ▶ (Kavaloski 1979, Newell 1990, Field et al. 1994, Vess 2009) have identified a number of distinct educational benefits of IL:
 - ▶ **Recognize bias**
 - ▶ **Think critically**
 - ▶ **Tolerate ambiguity**
 - ▶ **Acknowledge and appreciate ethical concerns**
 - ▶ **Promote significant learning**
- ▶ Let's examine each one of them.

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9

Uncover Preconceptions or Recognize Bias

- ▶ Help students **overcome** a **tendency** to **maintain preconceived notions**.
 - ▶ helping students **identifying insights from a range of disciplines** that contribute to an understanding of the issue
 - ▶ helping students **develop the ability to integrate concepts and ideas** from these disciplines into a broader conceptual framework of analysis
- ▶ Students position themselves to learn facts **more readily** and are **more open to adopting** a range of methodologies that promote understanding

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10

Advance Critical Thinking and Cognitive Development

- ▶ IL helps students **acquire perspective-taking techniques** (Baloche, Hynes, and Berger 1996) - the capacity to understand multiple viewpoints on a given topic.
- ▶ **Develop structural knowledge** - both *declarative knowledge* (factual information) and *procedural knowledge* (process-based information).
- ▶ **Integrate conflicting insights** from alternative disciplines.

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11

Tolerate or Embrace Ambiguity

- Help students understand **why conflicts commonly arise** over; the **causes** and **consequences** of an issue and, the **ideal way** for **policy** to **address** the issue of concern.
- IL advances the notion that **ambiguity** results from **alternative perspectives** on issues that are **advanced by different disciplines** rather than a **shortcoming** of a particular discipline.

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12

Appreciate Ethical Dimensions of Concerns

- Help students understand that there are **ethical dimensions** to most issues of concern.
- Ethical considerations entail **moral concerns** which means accounting for perceptions of **right** vs. **wrong**, **good** vs. **bad**, and the provision of **justice**.
- **Policy considerations** are likely to include discussion and valuation of **ethical factors**.

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13

Promote Significant Learning

- **Significant Learning** (Fink, 2003) takes place when meaningful and lasting classroom experiences occur.

A TAXONOMY OF SIGNIFICANT LEARNING

Category	Sub-category	Components
Learning How to Learn	Learning How to Learn	Becoming a better student Inquiring about a subject Self-directing learners
Foundational Knowledge	Foundational Knowledge	Understanding and remembering: Information Ideas
Application	Application	Skills Thinking: Critical, creative, & practical thinking Managing projects
Integration	Integration	Connecting: Ideas People Realms of life
Human Dimension	Human Dimension	Learning about: Oneself Others
Caring	Caring	Developing new Feelings Interests Values

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14

Promote Understanding

- Students **bring multiple forms of intelligence** to the **learning process**.
- Students are **heterogeneous** in their **learning styles**.
- Drawing on a broad array of frameworks and methodologies will **enhance student engagement**, and thus **learning**.
- **IL opens academic conversations** to ideas from a range of disciplines so **all** students should be able to **relate** and **contribute** to the dialogue.

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15

Benefits of Interdisciplinary Learning

Benefits of Interdisciplinary Learning

- Increased Cognitive Gains**: Represented by a brain icon with colorful nodes.
- Authentic, Real Life Learning**: Represented by a person holding a globe.
- Increased Critical Thinking and Problem Solving Skills**: Represented by a head profile with gears and numbers.
- Highly Engaging**: Represented by a colorful tree-like structure.
- Highlights Learner Strengths**: Represented by a person with a thumbs up and thought bubbles.
- Student-Centric**: Represented by a rocket being launched by hands.
- Opens Doors for students to Develop Interest in a Variety of Content Areas**: Represented by a thumbs up icon.

Jackie Gerstein
User-Generated Education

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16

Curriculum Design Models

Curriculum Integration Intensity Continuum

None				High
<p>Discipline-Based</p> <p>Content is presented in separate blocks of time without a deliberate attempt to show the relationships among the disciplines³</p>	<p>Parallel Disciplines</p> <p>Content of the different disciplines are sequenced in certain ways with the hope that students will discover implicit linkages³</p>	<p>Multidisciplinary</p> <p>Related disciplines are presented together in a unit or course structure to study a theme or issue and show the complementarity of the disciplines³</p>	<p>Interdisciplinary</p> <p>Units or courses of study from the various disciplines are deliberately presented together in ways to explicitly show the interconnectedness of the disciplines³</p>	<p>Transdisciplinary</p> <p>Subject areas are presented in a totally integrated fashion.² Students use a shared conceptual framework, drawing together discipline-specific theories, concepts and approaches to address a common problem.¹</p>

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17 **Discipline-Based Design Model**

- ▶ Traditional design model.
- ▶ Each subject is **designed and taught independently**.
- ▶ All learning takes place **within** the discipline itself.

Discipline-Based Design Model

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18 **Parallel Disciplines Design Model**

- ▶ Content of the different disciplines is **sequenced in certain ways** with the hope that students will discover the implicit linkages.

Parallel Disciplines Design Model

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19

Multidisciplinary Design Model

- **Related disciplines** are presented together in a unit or course structure to study a theme or issue.
- Show the **complementarity** of the disciplines.

Multidisciplinary Design Model

Discipline
Goal

Discipline
Goal

Discipline
Goal

Theme

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20

Interdisciplinary Design Model

- Units or courses from various disciplines are **deliberately presented together** in ways to explicitly show the **interconnectedness** of the disciplines.
- Teachers may plan together and courses may be scheduled in blocks to show relatedness.
- **Discipline boundaries are transcended** and focus is on the **commonalities across disciplines**.

Interdisciplinary Design Model

Goal

Discipline Discipline Discipline

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21 **Transdisciplinary Design Model**

- Curriculum **transcends** the **disciplinary boundaries**.
- Disciplines are **embedded** "naturally" with the general curriculum where the transdisciplinary interconnections are made.
- **Integration** becomes the **purpose** of education, not simply a tool.
- Not only focuses on disciplinary and interdisciplinary skills but also on many **non-academic skills** as well, such as life skills and/or social/emotional skills.
- **Collaboration** forms the backbone of learning.
- Seeks to **present education** and the **disciplines** in a **holistic** way.

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22 **Transdisciplinary Design Model**

- **Student** is the **producer** of **knowledge** while the **teacher** is the **designer** of the **interactive learning environment**.

Transdisciplinary Design Model

Academic Skills

Discipline
Discipline
Discipline

Goal

Non-Academic Skills

Social Skills
Emotional Skills
Critical Thinking Skills
Cooperation Skills

Real-Life Problem (PBL)

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23

Interdisciplinary Teaching

- Effective IL classroom entails 6 key steps:
 1. Pre-Instructional Planning
 2. Introduce the Methodology to Students
 3. Take it to the Classroom
 4. Practice Interdisciplinary Thinking
 5. Provide Feedback
 6. Assessment
- Interdisciplinary teaching and learning occurs when disciplinary knowledge, concepts and skills are **consciously integrated** to solve a problem, create a solution, explain phenomena or generate further questions

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24

Interdisciplinary Assessment

- Assessment is a **key element** in the success of interdisciplinary teaching and learning.
- When conducting interdisciplinary assessment, must consider:
 - The **dimensions** of assessment
 - The **functions** of assessment
 - Assessment **design**
 - Assessment **practices**

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25

Dimensions of Assessment

- Rowntree(1987) proposed the **five** key **dimensions** of assessment:
 1. **Purposes** (**Why** assess?)
 2. Learning **goals** (**What** to assess?)
 3. Learning **activities** (**How** to assess?)
 4. **Interpreting** and **judging** learning (How to **evaluate**?)
 5. **Feedback** (How to **use** and **report** the **outcomes**?)

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26

Functions of Assessment

- **Definitional**: when it identifies for students that which is deemed important to learn.
- **Formative**: when the design shapes how students will go about their learning.
- **Summative**: when it functions to assure educational institutions and society through reporting of learning outcomes.
- These **three** functions are **pivotal** in the design of assessment.

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Assessment Tips

27

- **Targets** of assessment:
 - Disciplinary **grounding**
 - **Integration** of disciplines
 - Academic processing **skills**
 - **Holistic advancement** or **interdisciplinary purpose**
- Should focus on the **process of learning**, not just result.
- Can incorporate **formative feedback** and a **mix of assessment instruments** and **methodologies**.
- Should be **locally designed** or **elaborated** to cater for **particular classroom needs**.

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Teaching Framework

28

Interdisciplinary teaching framework
(Author: Veronica Boix Mansilla)

INTERDISCIPLINARY UNDERSTANDING
purposeful, disciplined, integrative

1. MULTIFACETED TOPICS
What topics are worth teaching in an interdisciplinary way?

2. DISCIPLINARY UNDERSTANDINGS
What disciplinary tools will students need?

3. INTEGRATIVE UNDERSTANDINGS
How will disciplines come together?

4. PERFORMANCES OF UNDERSTANDING
What will students do to learn?

5. TARGETED ASSESSMENT
How do we know students are understanding?

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29

Reading Assignment

- Find a **paper** on **interdisciplinary learning** and **education** with a **case study**.
- Confirm your paper with the instructor.
- Read the paper during the spring break.
- Discuss the case and findings of the paper with classmates and instructor on the first class after spring break.

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