# TCSL-70130 Lecture 03: Interdisciplinary Learning & Course Design

跨領域學習與課程設計

Shiow-yang Wu 吳秀陽

CSIE 資訊工程學系 NDHU 國立東華大學

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

# What is Interdisciplinary Learning (IL)

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)

Interdisciplinary Curriculum & Digital Materials Design\_3 Interdiciplinary Learning

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.

#### 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.

Interdisciplinary Curriculum & Digital Materials Design\_3 Interdiciplinary Learning

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

#### **Purposes of Interdisciplinary Learning**

- 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.

Interdisciplinary Curriculum & Digital Materials Design\_3 Interdiciplinary Learning

#### 8

## Why Teach with Interdisciplinary Approach

- (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.

# **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

Interdisciplinary Curriculum & Digital Materials Design\_3 Interdiciplinary Learning

10

# **Advance Critical Thinking and Congnitive Development**

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

### **Tolerate or Embrace Ambiguity**

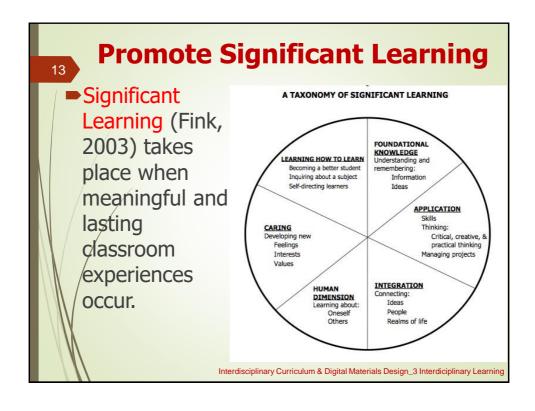
- Help students understand why conflicts commonly arise over; the causes and consequences of an issue and, the ideal way for policy to address the issue of concern.
- results from alternative perspectives on issues that are advanced by different disciplines rather than a shortcoming of a particular discipline.

Interdisciplinary Curriculum & Digital Materials Design\_3 Interdiciplinary Learning

#### 12

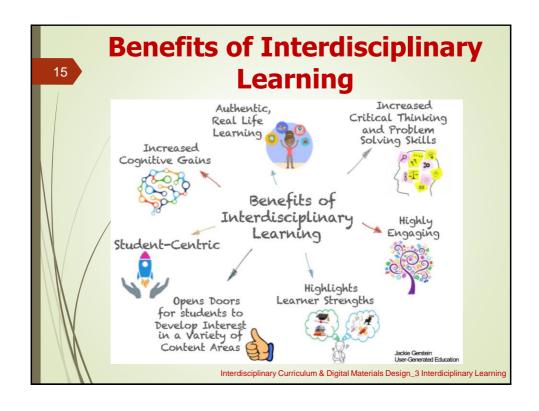
## **Appreciate Ethical Dimensions of Concerns**

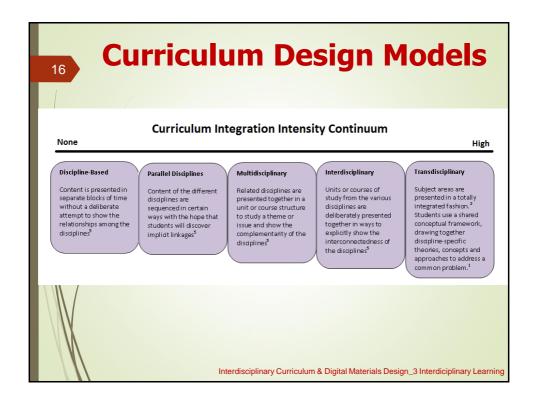
- Help students understand that there are ethical dimensions to most issues of concern.
- Ethical considerations entail moral concerns which means accounting for perceptions of right vs. wrong, good vs. bad, and the provision of justice.
- Policy considerations are likely to include discussion and valuation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

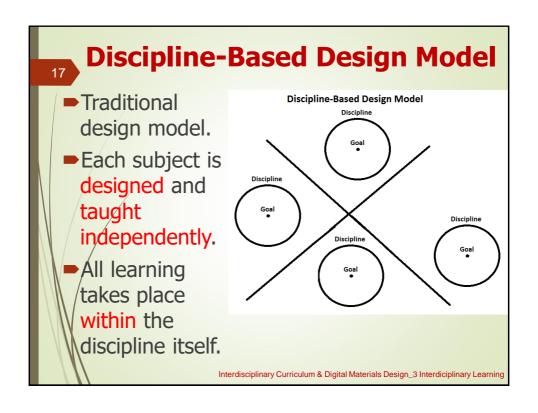


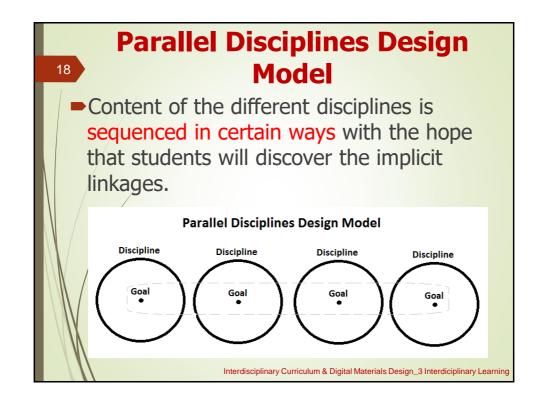
## **Promote Understanding**

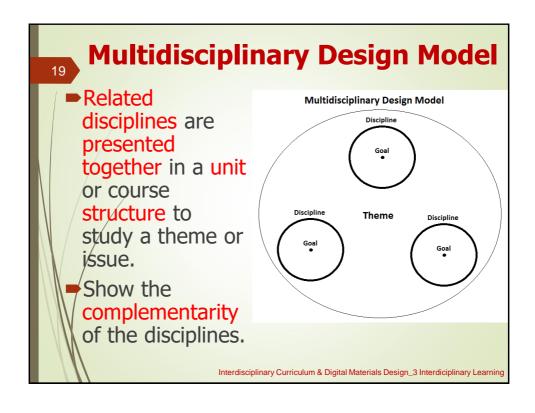
- Students bring multiple forms of intelligence to the learning process.
- Students are heterogeneous in their learning styles.
- Drawing on a broad array of frameworks and methodologies will enhance student engagement, and thus learning.
- IL opens academic conversations to ideas from a range of disciplines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

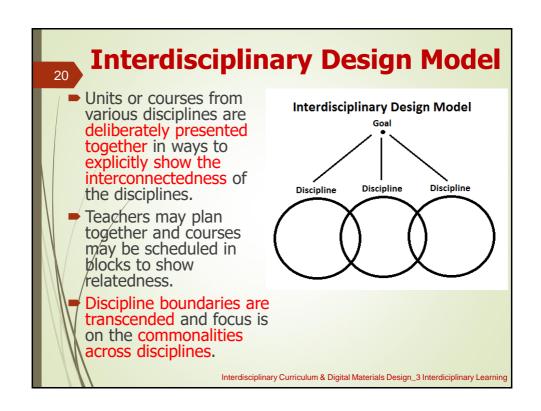












### **Transdisciplinary Design Model**

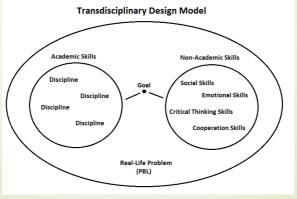
- Curriculum transcends the disciplinary boundaries.
- Disciplines are embedded "naturally" with the general curriculum where the transdisciplinary interconnections are made.
- Integration becomes the purpose of education, not simply a tool.
- Not only focuses on disciplinary and interdisciplinary skills 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.

Interdisciplinary Curriculum & Digital Materials Design\_3 Interdiciplinary Learning

22

### **Transdisciplinary Design Model**

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



### **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
- The transfer of the transfer o

Interdisciplinary Curriculum & Digital Materials Design\_3 Interdiciplinary Learning

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

#### **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?)

Interdisciplinary Curriculum & Digital Materials Design\_3 Interdiciplinary Learning

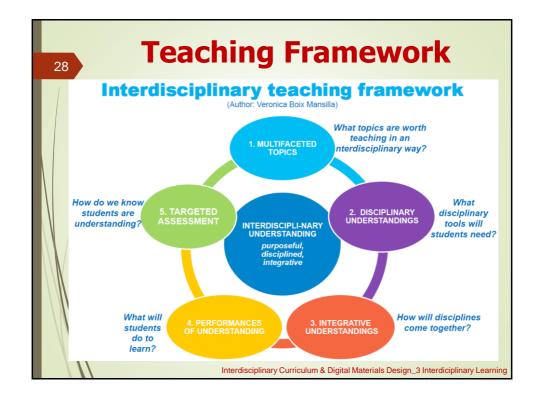
26

#### **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.

## **Assessment Tips**

- 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.



### **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.