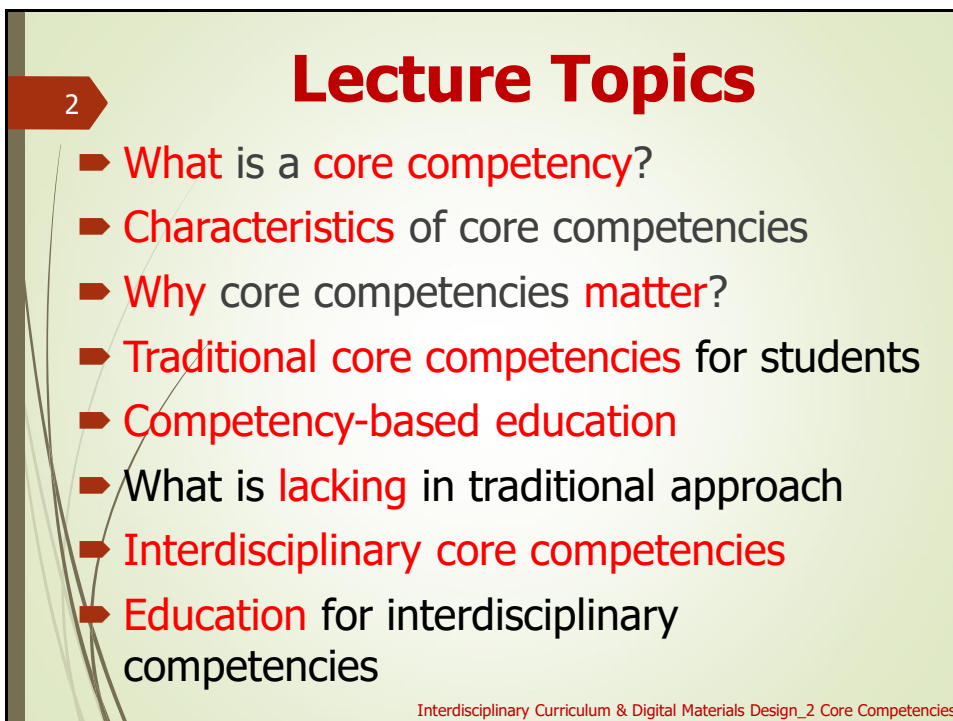




TCSL-70130
Lecture 02:
Interdisciplinary Core
Competencies
跨領域核心能力

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 **core competency**?
- **Characteristics** of core competencies
- **Why** core competencies **matter**?
- **Traditional core competencies** for students
- **Competency-based education**
- What is **lacking** in traditional approach
- **Interdisciplinary core competencies**
- **Education** for interdisciplinary competencies

Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies

3

Competency Definition

- There is no general agreed upon definition.
- The idea is well recognized.

- **Organization for Economic Cooperation and Development**

(**OECD**): a **competency** is more than just knowledge and skills. It involves the **ability** to **meet complex demands** by **drawing on** and **mobilizing psychosocial resources** (including skills and attitudes) in particular.

Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies

4

Competency Definition

- **UK Training Agency** (1989): "Standards development should be based on the notion of **competence** which is defined as the **ability** to **perform** the activities within **an occupation**. Competence is a wide concept which embodies the ability to **transfer skills** and **knowledge** to **new situations** within the occupational area. It encompasses **organisation** and **planning** of work, **innovation** and **coping with non-routine** activities. It includes those qualities of **personal effectiveness** that are required in the **workplace** to deal with co-workers, managers and customers."

Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies

5

Competency Definition

- **HETAC (2006):** "The unique characteristic of competence is the **effective and creative demonstration and deployment of knowledge and skill** in human situations. ... Competence refers to the process of **governing the application of knowledge to** a set of **tasks** and is typically **acquired by practice and reflection**. Some aspects of performance in situations may depend on **innate characteristics of an individual**. In as much as such performance is not learned it cannot be recognised as learning. Competence also encompasses the extent to which the learner can **acknowledge his/her limitations** and **plan** to transcend these through **further learning**."

Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies

6

Competency Definition

- **Crick (2008):** "A competence is best described as a complex **combination of knowledge, skills, understanding, values, attitudes and desire** which lead to **effective, embodied human action** in the world, in a **particular domain**. Competence is therefore distinguished from skill which is defined as the ability to perform complex acts with ease, precision and adaptability".

Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies

7

Competency Definition

- Duong (2016): "Competence is a **flexible conjunction** and **application** of knowledge, skills, attitudes, values, beliefs, motivations, interests, needs... to **implement tasks** or **deal with complex real-world problems** to **achieve good results**".

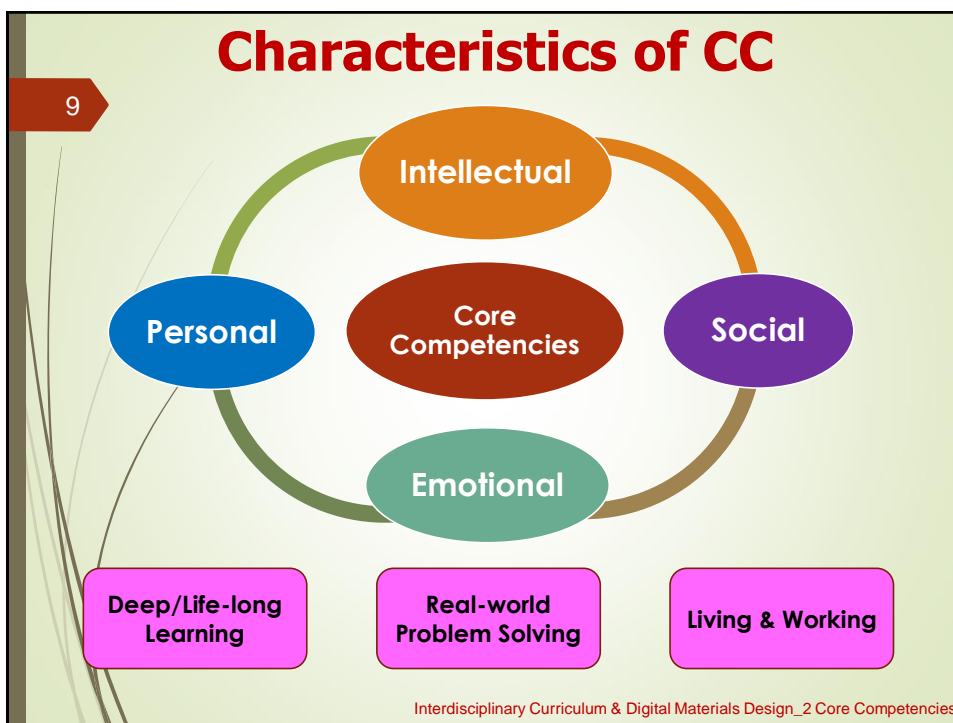
Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies

8

Competency Definition

- **British Columbia** (BC's New Curriculum): "Core competencies are sets of **intellectual, personal, and social and emotional proficiencies** that **all** students need to develop in order to engage in **deep learning** and **life-long learning**."
- **Alberta Education**: "Competencies are combinations of **attitudes, skills and knowledge** that students **develop** and **apply** for **successful learning, living and working**."

Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies



- ## Why CC Matter
- 10
- Traditional education focuses on **knowledge** and **skills**.
 - Typically results in **surface learning** and **short-term outcomes**.
 - School education has little to do with life after graduation.
 - **Competence based learning** or **education (CBE)** strive to overcome the deficiencies of traditional education and better equip students to face the challenges of real life and careers.
- Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies

11 Traditional Core Competencies

- Different institutions or even departments may have different (more specific) set of CC.
- Being too specific makes any set of CC no longer “core”.
- **Only a few values can be truly core** — so fundamental and deeply held that are applicable to **ALL** students!!
- Let us take a look at some interesting lists of CCs.

Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies

12 CC of Alberta Education

➤ **Alberta Education** promotes development of the following core competencies:

CRITICAL THINKING	COMMUNICATION
PROBLEM SOLVING	COLLABORATION
MANAGING INFORMATION	CULTURAL AND GLOBAL CITIZENSHIP
CREATIVITY AND INNOVATION	PERSONAL GROWTH AND WELL-BEING

Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies

13

The 6 CCs

➔ Many institutions adopt the C-T-PS 6 CCs.

CORE COMPETENCIES

COMMUNICATION

C

1. Share and develop ideas
2. Obtain, interpret, and present information
3. Work together to plan, carry out, and review tasks and activities
4. Describe/recall and reflect on experiences and what one can do

CREATIVE THINKING

T

1. Novelty and value
2. Generating ideas
3. Developing ideas

CRITICAL THINKING

T

1. Analyze and critique
2. Question and investigate
3. Develop and design

POSITIVE PERSONAL & CULTURAL IDENTITY

PS

1. Relationships and cultural contexts
2. Personal values and choice
3. Personal strengths and abilities

PERSONAL AWARENESS & RESPONSIBILITY

PS

1. Self-determination
2. Self-regulation
3. Well-being

SOCIAL RESPONSIBILITY

PS

1. Contributing to community and caring for the environment
2. Solving problems in peaceful ways
3. Valuing diversity
4. Building relationships

RICHMOND
UNIVERSITY
OUR FOCUS IS ON THE LEARNER

Interdisciplin

14

CC of InformED

➔ CC of **InformED** of **Open Colleges** at AU:

1. Learning How to Learn.
2. Gaining Empathy.
3. Creativity.
4. Foresight.
5. Digital Literacy/Programming.
6. Curating information.
7. Being able to navigate diverse perspectives.
8. Being entrepreneurial.
9. Being a group facilitator.
10. Staying up-to-date.

Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies

15

Some are Long and Specific

➔ The generic competences proposed in Tuning Project

1. Ability to work in an interdisciplinary team
2. Appreciation of diversity and multiculturality
3. Basic knowledge of the field of study
4. Basic knowledge of the field of the profession
5. Capacity for analysis and synthesis
6. Capacity for applying knowledge in practice
7. Capacity for generating new ideas (creativity)
8. Capacity to adapt to new situations
9. Capacity to learn
10. Critical and self-critical abilities
11. Decision making
12. Elementary computing skills (word processing, database, other utilities)
13. Ethical commitment
14. Interpersonal skills
15. Knowledge of a second language
16. Oral and written communication in your native language
17. Research skills

Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies

16

21st Century Skills

➔ A closely related concept

21ST CENTURY SKILLS
HOW TODAY'S STUDENTS CAN STAY COMPETITIVE IN A CHANGING JOB MARKET

Learning Skills

- Critical Thinking
- Creativity
- Collaboration
- Communication

Literacy Skills

- Information
- Media
- Technology

Life Skills

- Flexibility
- Leadership
- Initiative
- Productivity
- Social

Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies

Competency-Based Education

17

- Recognizing the importance of competencies, **competency-based education (CBE)** or **learning** has been gaining popularity in recent years.
- Simply put: Education is about what students **know** and are able to **do** (i.e. **gaining competencies**), not how long they stay in classroom (i.e. **earning credit hours**).
- **Progress** is measured by your ability to prove **mastery of competencies**.

Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies

CBE vs Traditional

18

➤ The learning model of CBE is quite diff

	Traditional time-based	Competency-based
Focus, structure and content	Content: knowledge, skills, attitudes Rotations	Outcomes demonstration of competence Relevant, paced learning opportunities
Goal	Knowledge acquisition	Knowledge application
Actors	Teacher to Learner	Teacher and Learner Relevant role models
Assessment	Evaluation form Norm-referenced Summative	Evaluation portfolio Criterion referenced Formative
Program completion	Fixed time	Variable time

Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies

CB Classrooms

19

➤ CBE naturally leads to different teaching

Traditional Classrooms	Competency-Based Classrooms
One grade is given per assignment. An assignment may be a quiz, a test, homework, project, or anything the student must complete.	One grade is given for each specific competency. Students may be assessed throughout the process but these formative assessments will not typically be considered in the final evaluation.
Assessments are based on a percentage system. Criteria for success may be unclear.	Standards are criterion or proficiency-based. Specific criteria and standards are made available to students ahead of time.
Traditional grades may rely on a mix of assessment, achievement, effort and behavior to determine the final grade and may include late penalties and extra credit.	Grades measure only achievement. Information about effort and behavior may be reported but it is not part of the competency assessment. There are no penalties or extra credit given.
Everything goes in the grade book regardless of purpose. Every assessment score is included in determining the final grade no matter when it was collected during the module. The final grade determines whether the student advances to the next level.	Students advance only upon mastery of the competency.

ncies

CC enough for the Future?

20

➤ Even with traditional core competencies, students may still encounter significant challenges confronting the future due to:

- Only possess knowledge/skills of a limited domain.
- Can only see things from a narrow perspective.
- Difficulty in capturing the essence of complex problems.
- Willing but have difficulty in working with others
- Disciplinary training limits creativity

Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies

21

Interdisciplinary CC

- ▶ Lattuca et al.(2012) proposed a list of interdisciplinary competencies for engineers:
 1. awareness of disciplinarity
 2. appreciation of disciplinary perspectives
 3. appreciation of non-disciplinary perspectives
 4. recognition of disciplinary limitations
 5. interdisciplinary evaluation
 6. ability to find common ground
 7. Reflexivity
 8. integrative skill

Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies

22

Interdisciplinary CC

- ▶ A generalized version of the CC proposed by IGERT program to NSF:
 1. Depth of knowledge in one discipline or field of study
 2. Ability to recognize the strengths and weaknesses of multiple disciplines
 3. Ability to apply the approaches and tools from multiple disciplines to address a problem
 4. Ability to work in a team with individuals trained in different disciplines
 5. Ability to communicate based in one discipline or field of study to others trained in different disciplines
 6. Ability to communicate about interdisciplinary ideas to both general audiences

Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies

A more specific collection

23

Ackerman (1989)	Flexible thinking Ability to generate analogies and metaphors Understanding of the strengths and limitations of disciplines
Ackerman & Perkins (1989)	Ability to assess value to knowledge gained Enhanced thinking and learning skills Improved higher-order cognitive skills Improved content retention Capacity for proactive and autonomous thinking skills Ability to devise connections between seemingly dissimilar contexts
Field, Lee, & Field (1994)	Ability to tolerate ambiguity or paradox Sensitivity to the ethical dimensions of issues Enlarged perspectives and horizons Ability to synthesize or integrate Enhanced creativity, original insights or unconventional thinking Enhanced critical thinking Capacity to perceive a balance between subjective and objective thinking Humility, sensitivity to bias, and empowerment Ability to demythologize experts

Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies

Education for Interdisciplinary Competencies

24

- To develop an interdisciplinary curriculum and/or course:
 1. Identify the set of **core competencies**
 2. Design the **course** and **activities** based on **CBE**
 3. Use competency-based methods to provide students with **personalized learning experience**
 4. Develop **competency-based assessment**
 5. Use **PBL** and/or **PjBL** for **learning by doing**

Interdisciplinary Curriculum & Digital Materials Design_2 Core Competencies