

El Sílabo del Curso: La Planificación de Cursos con Enfoque de Enseñanza Centrada en el Estudiante (The Course Syllabus: Planning Student-Centered Courses)

Día 5: El Aprendizaje Activo y Experiencial (Day 5: Active and Experiential Learning)

Universidad Católica de la Santísima Concepción



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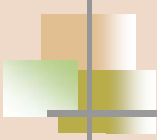
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Objetivos

- Reconocer la importancia de enfocarse en un curso en las actividades de los estudiantes
- Seleccionar y usar una variedad de métodos para comprometer a los estudiantes con su propio aprendizaje
- Alinear métodos de enseñanza y aprendizaje con los resultados de aprendizaje esperados en el curso



Review

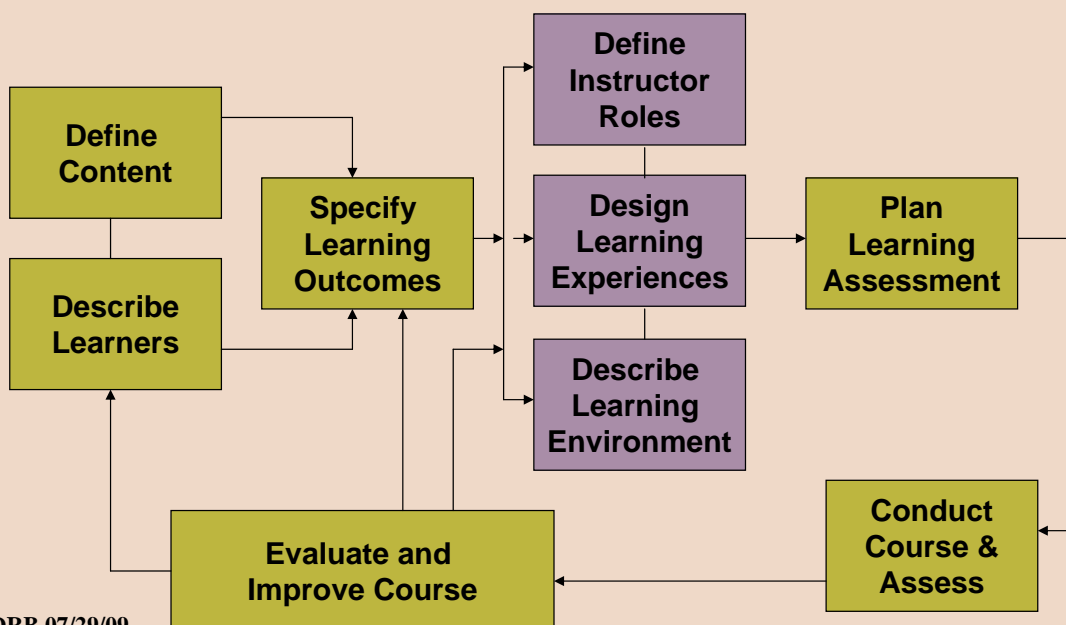
What did you learn yesterday?

- What did you learn *about* (concepts)?
- What did you learn *how to do* (skills, procedures)?
- What do you now have more *confidence* about, or have changed your *opinion* about (attitudes)?

Without looking at your notes, write three or four things you learned yesterday.



Course Planning Model



Defining Instructor Roles

	T1 Authority, Expert	T2 Salesperson, Motivator	T3 Facilitator	T4 Delegator
S4 Self-Directed Learner	Severe Mismatch	Mismatch	Near Match	Match
S3 Involved Learner	Mismatch	Near Match	Match	Near Match
S2 Interested Learner	Near Match	Match	Near Match	Mismatch
S1 Dependent Learner	Match	Near Match	Mismatch	Severe Mismatch

Adapted from Grow, 1991

Designing Learning Experiences



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- What are the activities in which students will engage?
- What tasks are students expected to accomplish?
- What projects will students be working on?

Active and Experiential Learning

ACTIVE LEARNING

Engages students directly in thinking and problem solving activities

Emphasis is on engaging students in manipulating, applying, analyzing, and evaluating ideas

Examples:

Pair-and-Share
Group discussions
Debates
Concept questions

EXPERIENTIAL LEARNING

Active learning in which students take on roles that simulate professional engineering practice

Examples:

Design-implement experiences
Problem-based learning
Simulations
Case studies

Rationale for Active Learning: Constructivism

- What is learned is a function of the goals, content, context, and activity of the learner
- Students build their own internal frameworks of knowledge upon which they “attach” new ideas
- Cognitive conflict is the stimulus for learning



Rationale for Active Learning: Metacognition

- Knowing about knowing affects learning
- Students are encouraged to think critically and monitor their understanding
- Students reflect not only on *what* they know, but on *how* they know it



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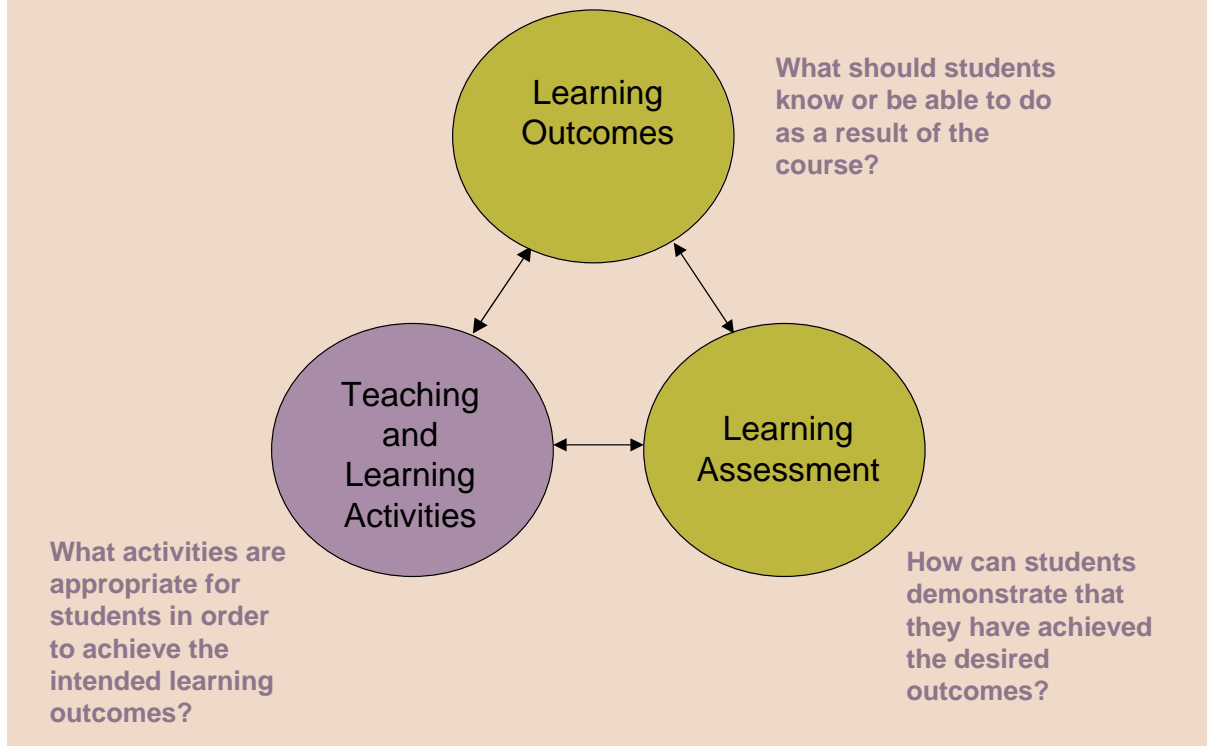
Rationale for Active Learning: Social Negotiation

- Social and cultural factors affect learning
- Knowledge evolves through social negotiation and evaluation of the viability of individual understandings
- Collaboration promotes project-based learning

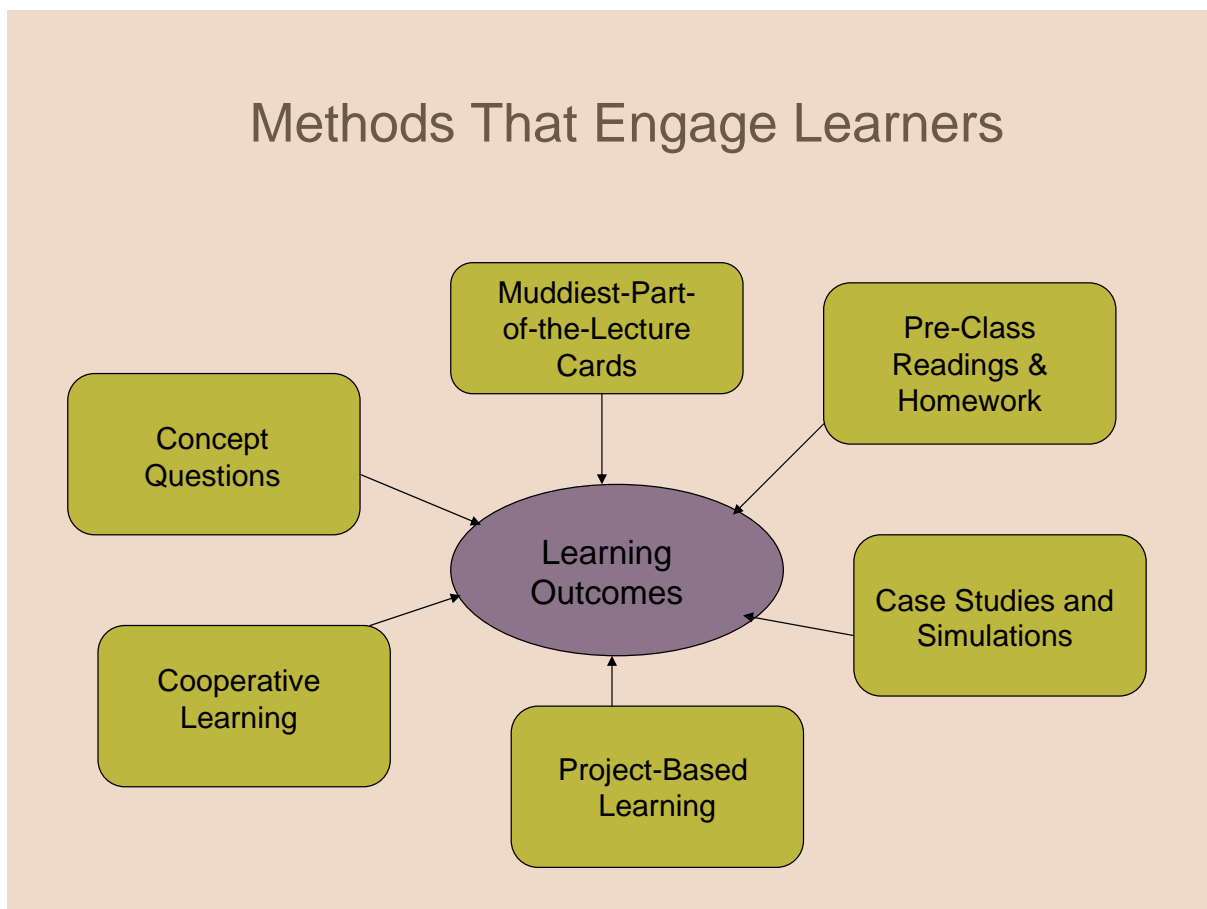


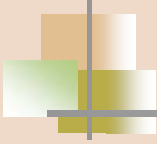
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Constructive Alignment



Methods That Engage Learners

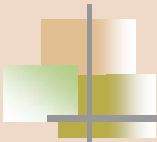




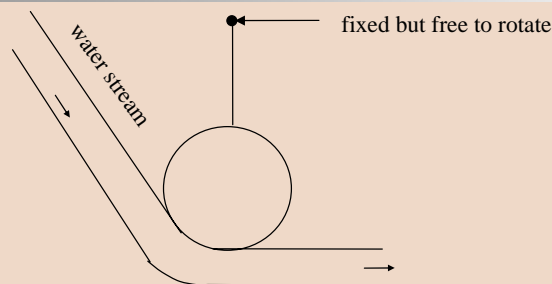
Concept Questions





- Focus on a single concept
- Are not solvable by relying solely on equations
- Reveal common difficulties with the concepts
- Have several plausible answers based on typical student misunderstandings

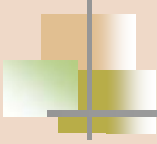


Sample Concept Question



Given the water behaves as shown above, which direction will the cylinder rotate when the stream first makes contact with the cylinder?

1. Clockwise 
2. Counter-clockwise 



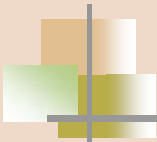
Sample Concept Question

To maximize **endurance**, an airplane must fly in a manner that

1. Minimizes drag
2. Maximizes drag
3. Maximizes the lift/drag ratio
4. Maximizes power available
5. Minimizes power required



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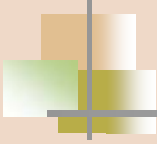
Sample Concept Question



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Which of the following words or phrases is an example of a **concept**?

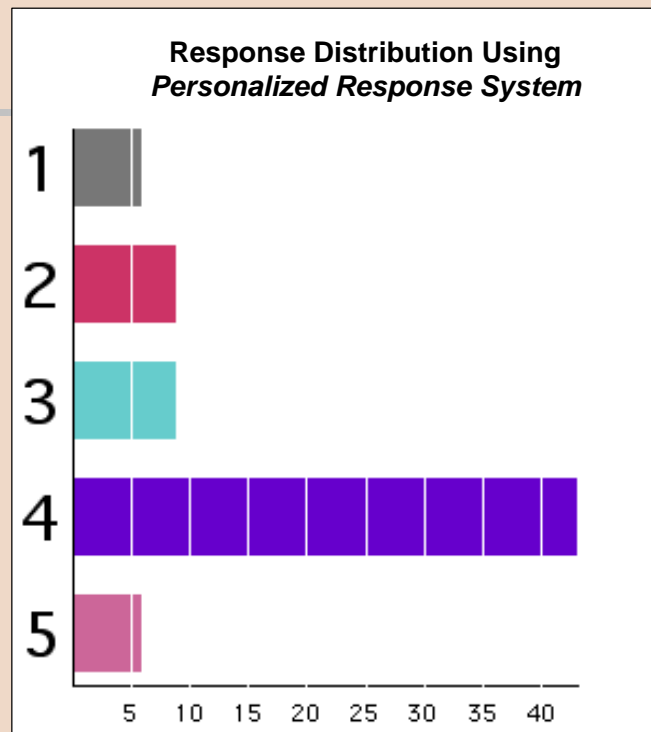
1. Ten degrees Celsius
2. Predicting an earthquake
3. Rotation of the earth
4. Constructing a flow chart
5. None of the above

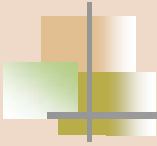


Using Concept Questions

- Pose a selected-response format question, e.g., multiple choice, true-or-false
- Ask students to indicate their answers, e.g., show-of-hands, color index cards, electronic response system
- If majority have the correct answer, give a brief explanation, then move on
- If majority have incorrect answers, clarify, e.g., have students discuss with partners, give detailed explanation
- Take another poll of students' answers

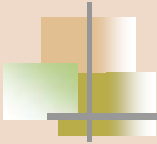
Electronic Response Systems





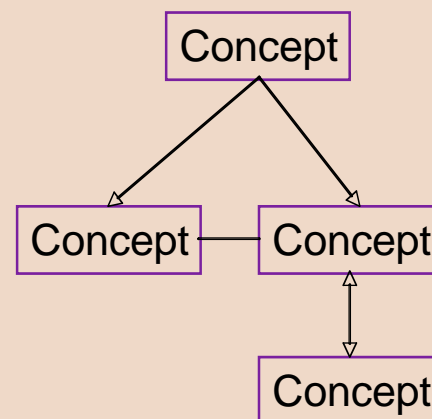
Benefits of Concept Questions

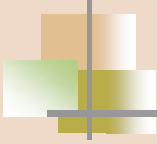
- Easily incorporated into lectures
- Obtain immediate feedback on the level of class understanding
- Extend concepts in new directions
- Give students practice in using terminology and concepts
- Confront common misconceptions
- Enhance teamwork and communication skills
- Improve class participation and motivation



Activity: Creating Concept Questions

- Select a few concepts from your concept map
- Write a **concept question** in a multiple-choice format for each concept
- Share your concept questions with a partner
- If time permits, use your concept questions with the whole group



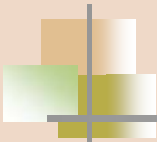


Elements of Cooperative Learning

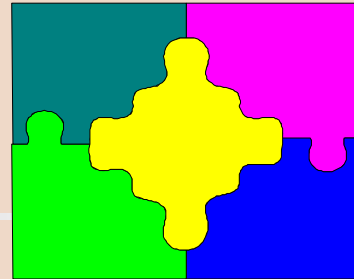


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- Positive interdependence
- Face-to-face interaction
- Individual and group accountability
- Interpersonal and small-group skills
- Group processing



Method: Jigsaw



- Divide the class into groups of three or four. These are students' **base** groups.
- Within each group, count out the number of concepts or processes to be learned.
- Students move to the group with all the same number, e.g., all the 1's together. These are the **expert** groups.
- In the expert group, students discuss the assigned concept. They decide how they will teach this concept to their base groups. They can use sketches and examples to clarify the concept.
- Students return to their base groups and teach their concept to the whole base group.
- When all groups have learned all the concepts, check for understanding.

Project-Based Learning

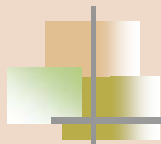
- Student-centered and self-directed
- Organized around real-world problems
- Focused on authentic skills
- Collaborative
- With faculty as facilitators



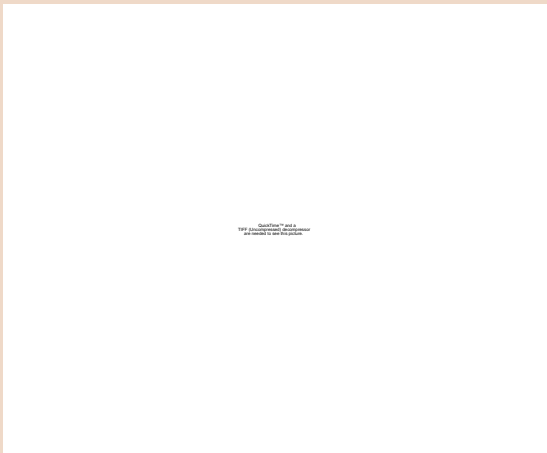
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Queen's University Belfast

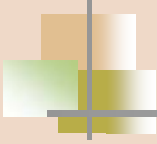


Designing Project-Based Learning



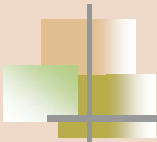
Louisiana Tech University

- What is the context of the PBL experience?
- What is the overall goal or purpose?
- Who is the target audience?
- Where does this experience fit in the curriculum or program?
- What is the project's level of complexity?



Levels Of Complexity

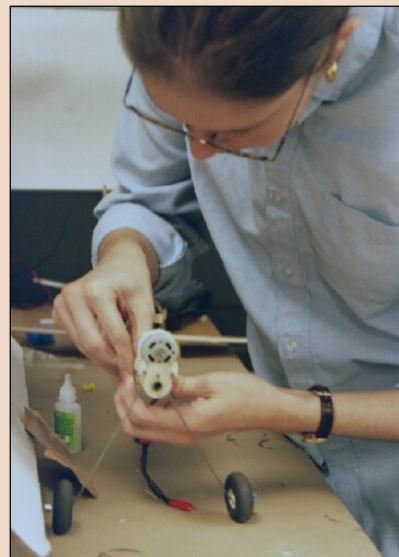
	Increasing Complexity →→→		
Activity	I-O	D-I-O	C-D-I-O
Structure	Structured		Unstructured
Solution	Known		Unknown
Team	Individual	Small Team	Large Team
Duration	Days	Weeks	Months



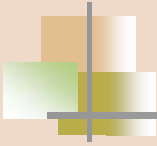
Level Of Complexity: Basic

Building a model airplane from a kit

Activity	I-O
Structure	Structured
Solution	Known
Team	Individual
Duration	Days



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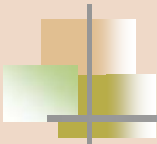
Level Of Complexity: Basic

Building a model rocket from soda straws

Activity	(D)-I-O
Structure	Structured
Solution	Known
Team	Small Team
Duration	Days



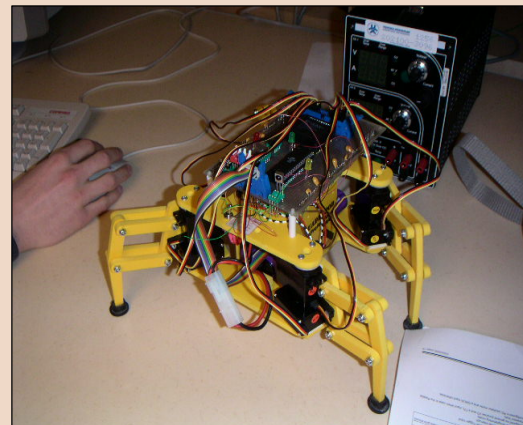
United States Naval Academy



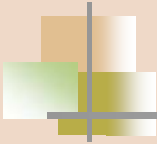
Level Of Complexity: Advanced

Building a robot

Activity	D-I-O
Structure	Structured
Solution	Unknown
Team	Small Team
Duration	Weeks/Months



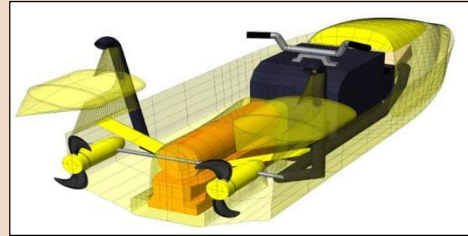
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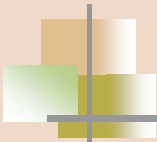
Level Of Complexity: Advanced

Sub-skimmer: underwater and overwater craft

Activity	C-D-I-O
Structure	Unstructured
Solution	Unknown
Team	Large Team
Duration	Months



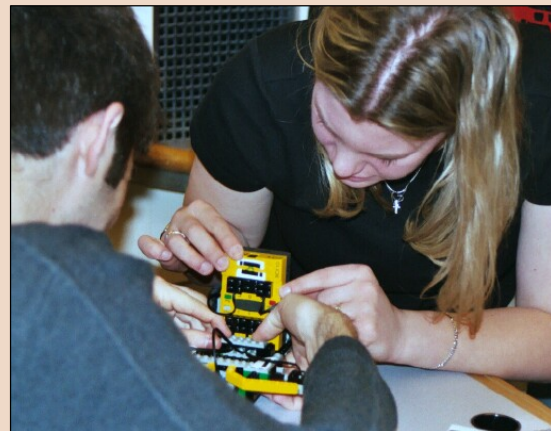
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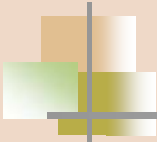
Exercise: Level Of Complexity

For the projects you have in your course, would you describe them as **basic** or **advanced**? Why?

Activity	
Structure	
Solution	
Team	
Duration	



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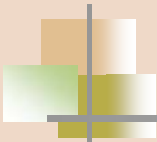


Teamwork

- How many teams will there be, and how will the teams be formed?
 - Instructor-formed teams vs. self-selection
 - Most current research supports instructor-formed teams
- What criteria will you use to form the teams?
 - Diverse ability levels, common time blocks
 - Gender, culture, language
 - Expertise in project tasks
- How will team leaders be chosen?
 - Appointed by instructor
 - Chosen by team
 - Self-nomination

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TIFF (Uncompressed) decompressor
are needed to see this picture.

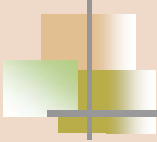
John Hopkins University



Communication

- What forms of communication will be included in the project?
 - Documentation
 - Drawings and graphics
 - Design analysis
 - Budget plan
- With whom will students be expected to communicate?





Describing Learning Environments

What kind of physical space and equipment are required or desirable?

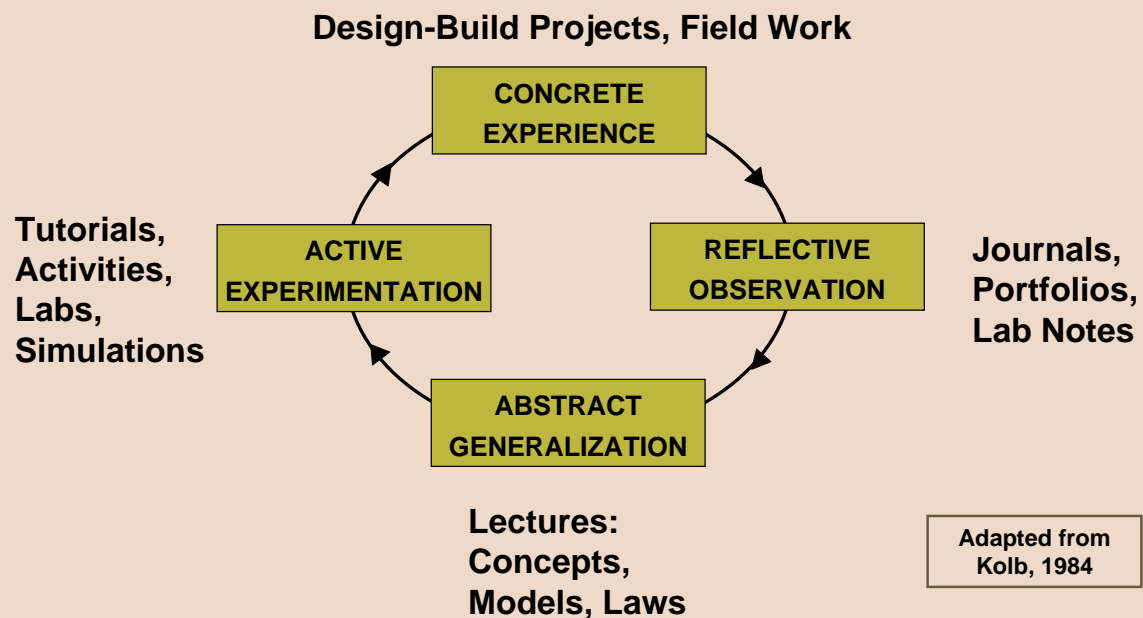
What specific resources or materials are required? Who supplies them?

What level of technical support is required?



Chalmers Tekniska Högskola

Using a Variety of Methods



Aligning Teaching Methods With Learning Outcomes

	Concept Questions	Muddy Cards	Cooperative Learning	Pre-Class Readings	Case Studies/ Simulations	Project-Based Learning
Conceptual Understanding						
Reasoning/ Problem Solving						
Skills/ Processes						
Creativity/ Synthesis						
Attitudes						

Muddiest-Part-of-the-Lecture

What is still “clear as mud” to you?

What methods for engaging students can you introduce or improve in your courses?