

Course Management and Activity Design

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My Basic Premises

- Active learning is good
- Active learning exercises supplement the lecture, not replace it
- Use active learning activities to discover and build on student's existing conceptual model
- Get students participating more to enhance learning and make connections in the classroom

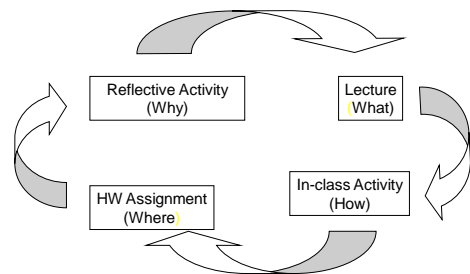
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Student Learning Objectives

- Increased self-confidence
- Sharing ideas
- Discussing course material
- Asking questions
- Making connections
- Relying on and supporting each other
- Enjoying the subject

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Active Learning Classroom Management Model



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Every Main Concept

- Lecture (What)– basic information
- In-class activity (How)– immediate practice
- HW (Where) – harder application (putting the pieces together)
- Reflection (Why) – active learning activity (critical thinking & deepen knowledge)

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Model Features

- Should do each phase at least once for each instruction block
- Covers multiple modes of learning
– From basic understanding to conceptual knowledge

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Classroom Management

- Critical to success of the activities
- Time management is also critical
- General guidelines...

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Five Guidelines

- 1) No student is called upon until they have shared their answer
- 2) Anyone can be called upon at any time
- 3) Clear step-by-step instructions
- 4) Walk around to ensure that everyone is on task and understands the task
- 5) Use activities after students have some experience with the topic

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Activities Design Pattern

- Use the same group of activities
 - Breeds familiarity
 - Lessens lost class time
- All shown activities are highly adaptable
 - Stand alone with no dependencies
 - New activities become easier to create
 - Easily adapted in anyone's class

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Getting Started

- Start with "low-risk" activities
- Reject activities that are uncomfortable
- Slowly build your toolbox and confidence
- Don't give up
- Some things will work, some won't

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Activities - Low to High Risk

- Icebreakers
- Minute Papers
- Think-Pair-Share
- Cooperative Learning – Round Robin
- Cooperative Learning – One Answer

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Designing Activities

- Define your objective
- Choose type of activity
- Create the activity
- Tell students what to do
- Explain why you are doing it
- Display the steps to the class
- Get student feedback
- Modify the exercise for next time

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Activities Review & Examples

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Think Pair Share

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Think-Pair-Share - Lecture

- Lecture activity
- Series of prepared questions
- All leading to increasingly difficult questions
- Find point of misunderstanding or lead into next topic
- This becomes the teaching moment

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Think-Pair-Share – Example

What is Think-Pair Share?

When would you use Think-Pair Share?

How does Think-Pair-Share benefit students?

How does Think-Pair-Share benefit faculty?

How does Think-Pair-Share increase learning?

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Think-Pair-Share Variation

- Answer the following questions for each program
 - Will the code compile?
 - If not, explain what is wrong
 - If it compiles, what is the output?
 - How do you fix the code?
- Hold up green sheet it compiles
- Hold up red sheet it fails

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Mathematics

- Give an example of a linear equation
- What is common among all the right answers?
- What does it mean to solve a linear equation?
- How do you check to see if your solution is correct?

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Mathematics

- **Topic** - Binary Numbers
- **Problems**
 - don't understand number systems
 - Can't count in binary
- **Questions**
 - Why does 8 (decimal) convert to 1000 (binary)?
 - Etc.

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Topic – Remote Sensing

- **Problem** – time consuming and unfamiliar
- **Lecture** – basics of remote sensing
- **Questions**
 - What is remote sensing
 - How does remote sensing work?
 - What is remote sensing used for?
- Spin bottle to pick group leaders
- Inclass activity/lab to apply remote sensing

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Cooperative Learning

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One Answer - Advice

- Ask questions that require thought
- Concentrate on conceptual knowledge
- Do after students have some exposure with the topic

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Two Variations

- Same question for all students
 - Use when you feel that understanding a specific concept is critical
- Different questions for each group
 - Use when several pieces/constructs are related to each other

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One Answer - Example

- Series of Questions concerning OOP
 - What is the purpose of attributes?
 - Why are attributes defined as private?
 - What is the purpose of constructors?
 - Why are accessors important?
- Each group explains a different OOP component
- Get to see students' conceptual model
- Teaching starts where model breaks down

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Round Robin

- Used for a process that requires several steps
- Especially effective when it is difficult to remember all the steps
- Students generate the steps
- Entire class assesses the answers

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Two Programming Examples

- List the required steps to create a computer program
- List the steps required to create a GUI application

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Photosynthesis

- Each group lists all steps
- Get one answer from each group
- Write steps in no particular order
- Continue until no more steps
- Learning Opportunity – Review results
 - Get suggestions from groups
 - wrong order, wrong step, missing steps

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Health

- Topic – Patient Assessment
- One Answer
 - What is the rationale for a patient physical exam?
- Round Robin
 - What are the components of a physical exam?

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Biology

- **Concept:** Chemical Pathways
- **Difficulty:** similar names, diff to remember
- **Activity**
 - Split into groups, each person has a role
 - Reactant, enzyme, product, cofactor...
 - Deliver a dialog that describes of steps
 - The funnier the story, the better

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Statistics

- **Difficult Topic:** Probability
- **Problems:** Dry, lack of Experience
- **Question:** probability of doubles in dice
- **Activity:**
 - Each group tosses dice and records results
 - Each group varies in result
 - Combined results gets closer to theory
 - Importance of sample size on theory

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This Session's Activity

- Individually,
 - Write down a concept that is difficult or complex
 - Write down why you think it is hard to learn
- One-by-one, tell your group your idea
- As a group,
 - Choose the one you like the best
 - Choose the type of activity
 - Create the activity
- One of you will share your activity to the class

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My Highest Praise

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