Cooperative Learning

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Reasons for considering Cooperative Learning

- Active learning is usually more effective than passive learning
- Teacher becomes a facilitator, rather than lecturer
- Teaching and learning occurs within the group, leading to better understanding
- Small-group activities develop higher-order thinking

More Reasons...

- Student learns additional skills such as teamwork, responsibility as a group member, articulation of ideas, and social skills
- Participation in an academic group provides support, which leads to student retention and success

Common Worries

- Students are less productive, standards are lower
- Less material is covered
- Teacher loses control of the class
- Learning is misguided, students want to learn from authority
- Difficult to evaluate individual students
- Time factor (reorganizing)

Lower standards?

- Research shows that students in group learning situations always learn at least as much as those taught individually (Davidson 1990)
- In addition to grading and individual motivators, peer/team commitment becomes a third motivator
- Teacher must be involved to make sure the group is directed

Less Material Covered?

- Teaching versus learning
- Less material, but learned more in depth
- Careful planning can cover more material than lecture-based methods by encouraging out-of-class learning

Losing Control?

- Many students drift off during traditional lecture-based courses
- When working in groups, they are focused on the course content
- Supervised participation encourages students to make progress on the material

Misguided learning?

- Instructor must have confidence in the group learning ethic
- Students consistently rate well-structured group courses as their favorites
- Many additional personal skills besides course material are learned

Evaluation?

- Group activities in general cannot be graded individually
- Individual accountability is key to maintaining a functional group work ethic
- Group activities should be structured so that participation leads to better evaluation

Time factor?

- Structure is vital, and can take time to plan
- At first, group activities can be basic and progress to being more central to the course

Challenges for the Teacher

- Focus moves from teacher to students
- Must develop observation skills to be able to guide and evaluate members of the groups
- Structure of the activities is crucial to framing the progress and subsequent guidance and evaluation

3. Four Patterns in Deep Learning

- Motivational Context
- Learner Activity
- Interaction with others
- Structured Knowledge Base

(Rhem 1995)

Motivational Context

- If the student thinks they need to learn something, they will be more motivated to do so
- Motivation comes from ownership of the material

Learner Activity

- Active participation goes hand in hand with deep learning
- Activities must connect well with the concepts they are meant to teach

Interaction with others

- Group work brings an additional perspective to the learning process
- Other group members can have helpful viewpoints on the material

Structured Knowledge Base

- Engaging prior knowledge students have is necessary
- Integrating material with previous experience will allow students to want to move forward

4. Team Considerations

- Size
- Formation
- Roles within
- Classroom Behavior
- Team Building

Team Size

- Recommended size is four
- Small enough to prevent hiding members
- Large enough to keep group functional if a member is unavailable
- Also easily splits into pairs for easy divvying up of material

Team Formation

- Student selected teams – more homogeneous, less successful (Fiechtner & Davis 1985)
- Teacher selected teams – random, or criteria-based
- Combination – Students indicate preferences, teacher decides groups

Random vs. Criteria

- Random Groups – easy to form, usually heterogeneous, but ‘random’
- Criteria-based – Students indicate interests, background, experience; teacher matches students that complement each other

Rotating Group Roles

- Facilitator – Keeps group on track, divides the work, moderates discussion
- Recorder – Keeps track of records, group materials, assigned activities
- Reporter – Gives oral report of the group activities as necessary
- Timekeeper – Makes sure deadlines are met

Classroom Norms

- Encourage cooperative rather than competitive behavior
- Questions should be fully discussed within the group before approaching the instructor
- Use of team-building exercises

5. Structuring

- Structure is crucial to keeping group work focused and on task
- Five beginning structures:
  - Think-Pair-Share (Lyman 1981)
  - Roundtable
  - Value Line
  - Corners
  - Three-Step Interview

Think-Pair-Share

- Start with probing question
- Allow enough time to **think** (>1 min)
  - This think time is crucial (Rowe 1974, 1978)
- Student **pair** to discuss their thoughts on the question
  - Now 50% of the class is active
- Lastly, students **share** their results
  - Responses are more forthcoming and better than the typical ask-answer

Roundtable

- Students in the team go around, speaking their responses to the posed question as they add them to a paper for the group
- As the paper circulates, the teams record ideas quickly (brainstorming)
- Final review distills the good ideas and then they are presented

Value Line / Corners / Three-Step Interview

- Mostly used for opinion types of questions (should X do Y?)
- A way of organizing groups so that the members have differing opinions

6. Advanced Structures for Problem Solving

- Three advanced structures:
  - Structured Problem Solving
  - Discovery Learning (Davidson 1990)
  - Send-a-Problem (Kagan 1989)

Problem Solving

- Formulation of a problem often more critical than finding the solution
- Creativity versus machinery
- Using different approaches

Tasks to solve problems

1. Explore problem, create hypotheses
2. Identify known pertinent knowledge
3. Identify unknowns
4. Prioritize and allocate tasks to group members
5. Individual study of tasks
6. Share learned knowledge with group
7. Apply knowledge to problem
8. Assess and reflect on the solution and process

(Woods 1994)

Structured Problem Solving

- Teams work to solve problem
- Individuals in each group are assigned numbers
- At the end of the allotted time, instructor calls out a number, and that student presents results
- This ensures that everyone in the group knows and understands the solution, and can explain it

Discovery Method

- Give the students appropriate background readings, methods and/or data
- Prepare some questions which make the groups consider how to use the given information to answer
- Have students report on their findings
- Students need to discover the answers

Example from evolution course

- Give students a cranial cast, a few readings, tools associated with the species, maps
- Ask questions such as where the species lived, the name, the cranial capacity, the distinguishing features, the use of artifacts, etc.
- Students must learn to use the resources given to them, to find the answers

Send a problem

- Group 1 brainstorms answers o a posed problem. Answers put in envelope
- Second group does the same, without looking at envelope
- Third group looks at collected answers and selects best two options

Reporting Methods

- Stand up and share with the whole class
- Rotating one member from each group to present to another group
- Team Rotation, where groups present and critique to each other
- Poster gallery

7. Ideas for pairs

- Paired teaching, where groups break into pairs and work together on a problem
- Cooperative note-taking, where two students compare and correct each other's notes
- Peer editing, where one person describes an idea, the other takes notes. Both write and critique each other's papers

8. Other ideas

- Jigsaw – Members of different groups working on same aspect of the problem meet as a parallel group
- Essay confrontations – Students write essays, and then trade and respond to the essays
- Structured controversy – when the answers are not clear or black and white

9. More ideas

- Instructional Games
- Team learning – Students read material. In class they take a quiz alone, and then the same quiz with their team (consensus must be reached). Lastly, teacher announces answers and the students can challenge debate them

10. Technology

- Three main uses
- Repository – Stored information (published papers, videos, software)
- Public Forum – Collective knowledge base (user software, data, ideas)
- Private discourse – Two-way communication between individuals

Technology

- Serves to provide increased accessibility, increased student interaction, diversity of information

11. Assessment

- Group Grading – Can have problems if group has weak member(s) or is dysfunctional
- Remove individual accountability
- Need to incorporate assessment of member contributions

Assessment

- Individual assessment is difficult in the classroom
- Peer assessment is useful, but must be structured
- Self-assessment can also be used

Peer Assessment Ex.

- Has student attended meetings?
- Has student made an effort at assigned tasks?
- Does the student cooperate within the group effort?
- Does the student contribute or seek help within the group?
- (Rate from 1 to 5)

Classroom Assessment Techniques (CATs)

- This allows a systematic check of how well students are learning/progressing
- Use of CATs increases student interest, activity, participation, and cooperation
- A dynamic process that is structured and adapted through the course

Some Examples

- Background Knowledge Probe
- Group Instructional Feedback Technique
  - Used to get feedback on how teacher is helping/hindering group work

Some Examples

- Group Processing Form
  - Used to get feedback on how the group is functioning
  - Include questions such as:
    - How well did the group work together?
    - How many actively participated most of the time?
    - How many were fully prepared for work?
    - What changes to the group do you suggest?
    - Give example of something learned from the group

Some Examples

- Minute Paper
  - After group work, individual students answer short questions on the material and turn it in
- Focused listing
  - Has students identify key concept of the topic at hand
- Self-diagnostic Learning Logs
  - Directed journal of comments students record as they work on a particular aspect of the problem, including difficulties

12. Summary

- Group work promotes deep learning, cooperation and teamwork
- The group setting must be structured for it to be effective
- Teacher becomes more of a facilitator and observer rather than a lecturer or source of information

Summary

- Many techniques have been developed for having students work in structured activities; the teacher's job it to adapt them so they effective for the material being covered
- Evaluation can be a mix of graded assignments, oral presentations, posters, and self and peer evaluations; again, teacher must adapt them for specific application

Main Book Reference

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