Teaching TAs to Lead Cooperative Group Work

Jeff Klukas
April 21, 2010
DISCUSSION #1

- What previous experiences have you had with group work?
  - Have they been positive or negative?
  - What made them that way?
- Why might group work be a useful teaching tool?
The Workshop Story
The literature promotes cooperative group work as a form of active learning that provides clear benefits for students.

Blindly introducing group work to a discussion section does not guarantee success.

Students can be resistant to change.

TAs need background and practical advice to facilitate group work effectively.
A Look at the Literature

- **Active learning**
  - Shift responsibility of learning to learners

- **Cooperative group learning**
  - Positive interdependence
  - Face-to-face interaction
  - Requires communication
  - Ideas on group work and necessary conditions for success discussed by Felder & Brent (2001) and Oakley et al. (2004)
Demands on the TA

- A successful instructor has *content knowledge*
  - TAs are generally well-prepared in their discipline
- A successful group work facilitator understands the *social dynamics* of the classroom
  - They must guide the groups toward successful norms
  - TAs do not necessarily have training here
Workshop Development

- Teaching Assistantship
- Physics Teaching Forum (EL)
- Teaching-as-Research Internship
- Teaching w/ Technology
- Diversity in the College Classroom
- Instructional Materials Development
- Group Learning Workshop
Workshop Design
Eventual goal is increased undergraduate student learning

- We are one extra step removed from the students, which makes measuring this difficult
- We limit the scope of the study by assuming that knowledge of the literature and modeling of successful group work will translate into gains in the classroom

Focus on how participants can change

- We want to improve their attitudes toward group work
- We want to improve their impressions of their own abilities
- We want to model successful group work
Learning Goals

- Learning goals for participants
  - Introduce them to the education literature
  - Motivate them to use active learning techniques
  - Increase their confidence in being able to facilitate effective group work
  - Equip them with some practical skills to be able to run a group work session successfully

- Assessment aims to measure gains in each learning goal, along with practical feedback about the workshop
Workshop Overview

- **Surveys**
  - To allow assessment and self-reflection

- **Activities**
  - Each section of the workshop is grounded in an activity accompanied by explanation and discussion

- **Discussions**
  - Each section of the workshop includes small-group discussions to model the cooperative group work approach
Workshop Outline

- **Survey**: pre-session
- Presentation of learning objectives
- **Discussion**: previous experiences with groups
- **Activity**: memory exercise
- A look at the literature on group work
- **Activity & discussion**: video of a group work session
  - Focused on observing behaviors of a facilitator
- **Activity & discussion**: role-playing activity
  - Focused on overcoming obstacles to effective group work
- **Survey**: post-session
Pre-Workshop Survey

Please rate your agreement with the following statements by circling the closest response from the following scale:

SD = Strongly Disagree    D = Disagree    N = Neutral    A = Agree    SA = Strongly Agree

<table>
<thead>
<tr>
<th>Statement</th>
<th>Rating</th>
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</thead>
<tbody>
<tr>
<td>Cooperative group work could be useful in my teaching.</td>
<td>SD D N A SA</td>
</tr>
<tr>
<td>I am interested in using cooperative group work in my teaching.</td>
<td>SD D N A SA</td>
</tr>
<tr>
<td>I feel confident in my ability to run a discussion section focused on group work.</td>
<td>SD D N A SA</td>
</tr>
<tr>
<td>I am familiar with techniques for facilitating cooperative group work.</td>
<td>SD D N A SA</td>
</tr>
<tr>
<td>I am familiar with the science education literature.</td>
<td>SD D N A SA</td>
</tr>
<tr>
<td>Any comments to clarify your responses:</td>
<td></td>
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LEARNING OBJECTIVES

- Introduce you to the education literature
- Motivate you to use active learning techniques
- Increase your confidence to try group work
- Equip you with some practical skills to be able to run a group work session successfully
What previous experiences have you had with group work? Have they been positive or negative? What made them that way?

Why might group work be a useful teaching tool?
Last Fernday, George and Tony were in Donlon peppering gloopy saples and cleaming, burly greps. Suddenly, a ditty strezzle boofed into George’s grep. Tony blaired, “Oh George, that ditty strezzle is boofing your grep!”
1. When were George and Tony in Donlon?
2. What did the ditty strezzle do to George’s grep?
3. What kind of saples did George and Tony pepper?
4. What was Tony’s reaction?
5. What do you imagine happened next?
6. Based on the incidents in this story, do you think George and Tony will want to return to Donlon? Why or why not?
Fig. 2. Scatter plot of number of practiced traditional problems \( (n) \) vs number of correct responses to the conceptual questions \( (N) \).

Eunsook Kim and Sung-Jae Pak (Seoul National University), “Students do not overcome conceptual difficulties after solving 1000 traditional problems,” American Journal of Physics 70, no. 7 (July 2002).
DIVERSITY IN GROUP PROBLEM SOLVING

- Psychology research shows increased creativity in group problem solving in the presence of a minority viewpoint (Nemeth).
- Cooperative groups raise test scores for all students, but gains are disproportionately high for the lowest-scoring students.
- The learning environment determines which students have access to the learning.
Group Work in the Field

THE VIDEO
HTTP://WWW.YOUTUBE.COM/WATCH?v=D5DNQGNNFXC
DISCUSSION #2

- Share your observations from the video
- What points made in the video resonate with you? Are there any that you disagree with?
- What concerns do you have about fostering an environment that encourages productive work?
GROUP PROBLEM

- Find x using only elementary geometry
- No law of sines/cosines!

Stolen from:

- http://thinkzone.wlonk.com/MathFun/Triangle.htm
DISCUSSION #3

- How could an outside voice (i.e. the TA) have helped your group work more smoothly together?
- What could a TA have done to prevent the situation from occurring?
End-of-Workshop Survey

In order to accurately evaluate what you have gained from the workshop, we want to revisit what you answered before the workshop. Do you feel like you overestimated or underestimated your knowledge coming in? You now have a chance to revise your pre-workshop answer and to indicate whether you feel more or less confident about group work as a result of the workshop.

SD = Strongly Disagree   D = Disagree   N = Neutral   A = Agree   SA = Strongly Agree

<table>
<thead>
<tr>
<th></th>
<th>Before the workshop</th>
<th>After the workshop</th>
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<tbody>
<tr>
<td>I feel confident in my ability</td>
<td>SD D N A SA</td>
<td>SD D N A SA</td>
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<td>to run a discussion section</td>
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<td>focused on group work.</td>
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<td>I am familiar with techniques</td>
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<td>for facilitating cooperative</td>
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<td>group work.</td>
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<td>I am familiar with the science</td>
<td>SD D N A SA</td>
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<td>education literature.</td>
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<td>Cooperative group work could be</td>
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<td>useful in my teaching.</td>
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<td>I am interested in using</td>
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<td>SD D N A SA</td>
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<td>cooperative group work in my</td>
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<td>teaching.</td>
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If your “Before the workshop” responses differ from what you said in the pre-workshop survey, why do you feel differently now?
Workshop Results
Survey Design

- 3 points in time, 4 sets of data
  - Immediately before the session
  - Immediately after the session
    - Includes a chance to revise pre-session answers
  - Six weeks later (electronic)
- Baseline questions
  - Correspond to the learning goals
  - Appear on each survey
- Evaluative questions & comments
Data shown reflects most recent implementation

- Spring 2008
- Teaching Improvement Program organized by the Engineering School at UW-Madison
- 23 participants, mostly grad students, from a variety of STEM disciplines

Follow-up

- Only 6 participants responded to the follow-up survey
- More on this later...
Cooperative group work could be useful in my teaching
I am interested in using cooperative group learning in my teaching

Survey Results
I feel confident in my ability to run a discussion section focused on group work.
Survey Results

I am familiar with techniques for facilitating cooperative group work

Number of Responses

<table>
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<th>Pre</th>
<th>Revised</th>
<th>Post</th>
<th>Follow-up</th>
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<tr>
<td>SD</td>
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<tr>
<td>SA</td>
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<td></td>
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</tr>
</tbody>
</table>
I am familiar with the science education literature

Survey Results

Number of Responses

Pre | Revised | Post | Follow-up
SD  | SD      | SD   | SD
D   | D       | D    | D
N   | N       | N    | N
A   | A       | A    | A
SA  | SA      | SA   | SA

SD  | SD      | SD   | SD
D   | D       | D    | D
N   | N       | N    | N
A   | A       | A    | A
SA  | SA      | SA   | SA
Problems with Follow-Up Data

- Low response rate (6 of 23) means low statistics
  - Sent out on Thursday afternoons (optimal time)
  - Sent out three weeks in a row
  - More incentives?

- Anonymity means I cannot match follow-up respondents to in-workshop respondents
  - Would allow us to plot change in response
  - Anonymity was chosen for simplicity, but should be reconsidered (requires an okay from IRB)
Workshop Results

- In follow-up, all respondents that had tried group work indicated that it was “some” or “a great deal” of help in their discussions.
- Both the discussion on previous experiences and the video were viewed as “useful” to “very useful.”
- Feelings were more neutral on the role-playing exercise, but time limited the amount of time available for discussion.
Workshop Results

- From comments:
  - Participants greatly value the small-group discussions
  - Participants have trouble integrating the information with the real-world discussion section
  - Students tend to have a lower opinion of group work than does the TA

- The comments and evaluative questions are very useful in revising the workshop
“This was an interesting and useful workshop. I would encourage you to take more of the TA training time next year. This is a more useful workshop than much of the other TA training.”
The Teaching-as-Research Process

- Literature
- Participant Comments
- Survey Feedback
- Cooperative Group Learning Workshop
Conclusions

- Developed and implemented a TA workshop focused on successful facilitation of cooperative group learning
- Measured significant gains in participants’ confidence and their familiarity with techniques and literature, at least in the short term
Unanswered Questions

- Does this workshop increase the likelihood of a participant incorporating group work into their teaching?
- Does the workshop have a lasting effect on participants’ attitudes toward group work?
- Does student learning from group work increase when facilitated by a TA trained in facilitating such activities?
Future Work

- Adopt identifier system to match follow-up results with in-session surveys
- Focus on ways to increase follow-up participation
- Increase sample size by integrating across sessions
  - Workshop has reached a stable state, so different sessions should be comparable
- Disseminate and collaborate
  - Should be applicable across campuses and STEM fields
Acknowledgements

Bob Mathieu, Steve Ackerman,
Don Gillian-Daniel, Michael Winokur