Teamwork: Dealing Effectively With Group Projects

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The ALC helps facilitate teamwork
What do you see as the advantages & challenges of using team assignments in your teaching?

Discuss this at your table and write two advantages and two challenges on the board near your table.
Outline of today's presentation

1. Why use teamwork?
2. Designing an effective team assignment
3. Creating teams
4. Planning for team success
5. Assessing team and individual performance
Why use teamwork?

• Educational research has shown that students who work in teams learn better than students who work individually.

• Teamwork is a skill employers look for.
Design an effective team assignment
An effective team assignment requires:

- Distinct contributions from each member
- Group decisions
- A problem complex enough to benefit from multiple perspectives
Students Propose Genetic Solutions to Societal Problems

In the Foundations of Biology sequence for entering biological scientists, the University of Minnesota, inquiry-based learning is woven throughout the classroom and laboratory. During the first semester lecture and discussion, students work in teams on a Genomic Engineering Proposal in which they propose a gene-based solution to a societal problem of their own choosing. Instructors coach the teams throughout the semester on experimental design and execution, as well as data analysis, presentation strategies, team work, and research ethics. On the basis of outcomes from the nearly 1000 students who have taken the course over the past 6 years, the project has succeeded in engaging students in the intellectual work of biologists and the experience of what it means to conduct inquiry.

Our approach emphasizes both scientific teaching and an evidence-based approach to course design that applies principles of how people learn (1) and the importance of integrative biology courses (2). We also stress the higher-order skills in the curriculum: synthesis, evaluation, and creation (1). As in the University of Oregon’s "Workshop Biology" (3), we encourage student creativity by enabling teams to choose their own project topics. Our course design acknowledges the evidence that team-based learning delivers high learning gains and facilitates development of important life skills (4). This team-based class structure supports the growth of collaborative skills, including giving and receiving constructive feedback, and non-scientific organization, initiative, and communication. As instructors, we emphasize learning for teams and individuals.

The Genetic Engineering Proposal begins with each student in the team identifying a socially important issue for which genetic engineering could provide at least part of the solution, such as bioremediation of contaminated soil by enhanced plants or microbes, improved nutritional value in crops or livestock, or diagnosis and treatment of a disease. After literature searches, team discussions, and feedback from the faculty instructors, the team settles on a topic they will jointly pursue for the remainder of the semester (see the photo). The team must then use primary scientific literature, databases, and sometimes, interviews with expert researchers to create a compelling argument for the value of the proposed project, to develop an experimental protocol to achieve the end product, and to describe the broader implications of the project, including ethical issues. They must also complete a phylogenetic analysis of their gene of interest or the donor or recipient organisms to address potential methodological problems, environmental impacts, or logical fallacies.

Students do not carry out the proposed experiments, which would typically take years to accomplish. However, the proposal enables students to do the sophisticated intellectual work typical of biologists and explore how science relates to society. They innovate, collaborate, and communicate at a level that transforms their experience of introductory biology and their relationships with one another and with their instructors. They apply what they are learning to solve real-world problems that are important to them and thus experience the relevance of biology concepts. Moreover, the project is inherently integrative, bringing course topics together with information that students locate themselves. Expecting students to begin doing the intellectual work of a biologist inspires them and helps them understand early in their education what biology is.

Students have tackled a range of socially important issues (see supplementary materials (5)). Even though some projects...
Introductory Biology – Devise a genetic solution to a societal problem

• Teams of nine choose a societal problem of interest and use genetics to devise a possible solution to the problem
• Teams present their solution in a poster at a class poster session
Introductory Chemistry Team Project
Introductory Chemistry - Devise a chemical deicer
International Business Management Team Project
Interprofessional Health Care Team Project
Intraprofessional teams work on a case study

- Teams of 4-5 choose a country of interest and research cultural considerations for doing business in that country
- Teams present their findings in mock training sessions
Interprofessional teams work on a disease outbreak case study

- Receive a semester long disease outbreak case study
- Work initially in subject-matter-expert teams
- Work next in interprofessional teams
Think of a possible team assignment for one of your courses that addresses all of these elements:

• Requires distinct contributions from each member
• Requires group decisions
• Addresses a problem complex enough to benefit from multiple perspectives

Work on this individually
Create teams to maximize success
Assign teams to distribute resources
Assign teams to distribute resources
Assign teams to distribute “resources”
Options for configuring teams

• Student background or experience
• Random
• Topic choice
• Combination
Identify a skill or experience that would be a valuable asset for a team project in your class

Examples:

- Pharmacology class – biochemistry course
- Teaching class – teaching experience
- Introductory physics – calculus course
Help teams succeed
Motivate your students to work in teams
Provide students with in-class time to work
Provide instruction on teamwork skills
Provide instruction in the stages of group development.
Have students work on team process
Have students devise team policies

- How often should we meet?
- How important is it to show up on time?
- Will we have a single leader or share leadership?
- How will we make decisions? Majority rules? Consensus?
- How important is it to get our work finished on time?
CHEM 1065 Team Policy Agreement Guide

Step 1. Individually read the Tips for Team Success

Step 2. As a team discuss and answer the following questions.

Team lab work policy questions

1. How important is it to show up for every lab? Arrive on time? Stay for the whole lab? Let the rest of the team know if you will be absent or late?
2. How important is it for every team member to participate in every lab?
3. How important is it for each team member to arrive prepared? (i.e. completed all of the reading and prework ahead of time).
4. How will we manage and rotate roles?
5. How should we make decisions? All must agree? The majority must agree? One person makes the decisions?
6. How will we deal with inevitable conflict? Avoid talking about it? Try to persuade others? Discuss it as a team?
    Focus on trying to identify and solve the problem?
7. Should we end each lab with assigned action items to complete before the next lab?

Step 3. Fill out the form below and have each member print their name. Your name indicates that you agree with all of the decisions made by the group.

Step 4. Turn this in to your TA

Team name ________________________________

1. Briefly describe your team policy for showing up, being prepared, and participating in each lab

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2. List who will take on each role (Team Leader, Communicator, Record Keeper, Waste Manager/Mediator) below. These roles can be rotated during the semester.

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Team process document example
Provide groups with a team experience to help inform their team process discussion.
Use a reading jigsaw to help teams synthesize information from multiple sources.
Expert group members go back to original teams to teach their teammates.
Assess both team and individual performance
Ideal team assessment includes:

• Concrete & meaningful feedback
• Individual and group feedback/assessment
• Peer assessment
Ensure concrete & meaningful feedback
Interprofessional teams work on a disease outbreak case study

<table>
<thead>
<tr>
<th>Project attribute</th>
<th>Activity that addresses it</th>
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<tbody>
<tr>
<td>Concrete feedback</td>
<td>Project divided into stages with grades and feedback at each stage</td>
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<tr>
<td>Individual &amp; group accountability</td>
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<tr>
<td>Peer assessment</td>
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## Business Management

Create and deliver training for conducting international business

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## Schedule of project subtasks

<table>
<thead>
<tr>
<th>Week</th>
<th>What’s due</th>
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<tbody>
<tr>
<td>4</td>
<td>Choose the country your team will focus on</td>
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<tr>
<td>6</td>
<td>List of 12 websites describing your country</td>
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<tr>
<td>8</td>
<td>Interview of person with experience of the culture of your country</td>
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<tr>
<td>10</td>
<td>Draft of your presentation &amp; peer review of presentation drafts</td>
</tr>
<tr>
<td>12</td>
<td>Revised draft of presentation to instructor</td>
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<tr>
<td>14</td>
<td>Student presentations</td>
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## Schedule of case study project subtasks

<table>
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<tr>
<td>4</td>
<td>Self-reflection and personal growth goals</td>
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<tr>
<td>5</td>
<td>Team evaluation of SME teams – visual map</td>
</tr>
<tr>
<td>6</td>
<td>Report of team process in interprofessional teams</td>
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<tr>
<td>10</td>
<td>Press conference presentation</td>
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<tr>
<td>11</td>
<td>Presentation draft to instructor</td>
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<tr>
<td>12 - 14</td>
<td>Student presentations</td>
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<tr>
<td>14</td>
<td>Final self-reflection paper</td>
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Assess individual and group components
Introductory Chemistry - Devise a chemical deicer

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<tbody>
<tr>
<td>Concrete feedback</td>
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<tr>
<td>Individual &amp; group accountability</td>
<td>• Group lab report</td>
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<td></td>
<td>• Individual quiz grades</td>
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<td>Peer assessment</td>
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Include peer assessment in grading
**Introductory Biology – Devise a genetic solution to a societal problem**

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<td>Peer assessment</td>
<td>% of project grade determined by peers</td>
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Please rate each of your team members, as well as yourself.

**1. Does this team member come to class well prepared, ready to contribute to discussions and team work?**

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<th>Almost always</th>
<th>Frequently</th>
<th>Rarely</th>
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<td>Student 1</td>
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<td>and so on, through Student 9</td>
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**2. Did this group member respectfully listen to the suggestions of others?**

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Today's date __________________ Team __________________

**Team Accountability Documentation**

This sheet is due in your team folder every Friday immediately after the end of class. It becomes part of your team's Intellectual Property notebook, which is part of the total 300 project points. Each team member needs to state explicitly what he/she contributed to the work of the team during the week (e.g., Who found relevant references, drafted a section of the project proposal, gave feedback on a draft, interviewed an expert on the project topic or researched a project element and explained it to the rest of the team. Once all team members have filled in their contributions you need to pass the sheet around your team so all can verify the claims made by others.

<table>
<thead>
<tr>
<th>Name</th>
<th>What I contributed to the team work this week</th>
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Return to your team assignment for your course. Brainstorm how you will assess:

- The entire team
- Each individual on the team

Work on this individually
Reflect on how the project went and make changes if needed.
Summary

1. Tell students why you are having them work in teams
2. Design an effective team assignment
3. Create teams to distribute important resources
4. Have students talk about how their team will work together
5. Assess team and individual performance
What questions do you still have about using teamwork in your teaching?
Resources

• Cooperative Learning: Best Practices
  Center for Research on Teaching and Learning
  University of Michigan
  http://www.crlt.umich.edu/publinks/clgt_bestpractices#forming

• teamwork.umn.edu – a website created by the Center for Teaching and Learning to support students during their teamwork projects

• Turning Student Groups into Effective Teams, Barbara Oakley, Richard M. Fleder, Rebecca Brent, Imad Elhajj, Journal of Student Centered Learning, 2 (1) 2004

• Team-Based Learning – Larry K. Michaelsen, Arletta Bauman Knight, L. Dee Fink