

Engaging Undergraduates in RESEARCH and INQUIRY: A Scholarly Dialogue

Teamwork Development through Inquiry-based Learning in Laboratory Courses and Final-year Projects in Chemical and Biomolecular Engineering (CBME)

Course Instructor/Project Leader

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Members

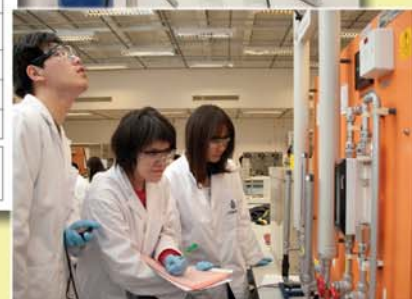
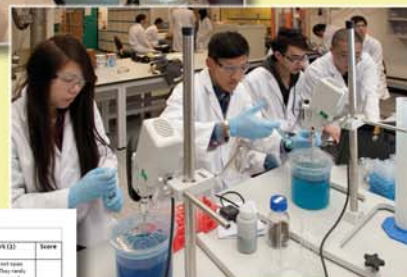
CBME faculty

Project/Course Objectives

The project objective is to develop students' teamwork skills systematically through explicit instruction, opportunities to practice, and formative feedback in two laboratory courses during their second year and on final-year projects during their third year in the Department of Chemical and Biomolecular Engineering.

Inquiry Based Learning Activities

- Teamwork training, with an emphasis on active listening and establishing trust, was provided in the first laboratory course and reinforced in the second laboratory course and final-year projects.
- Students were asked to reflect on their individual and team performances and carry out self and peer assessments periodically by using surveys and an assessment rubric.
- The evaluation results were shared with them and specific suggestions were made on areas that they could improve.



Team	Assessment Rubric for Teamwork			Score
Category/Criteria	Exemplary (3)	Competent (2)	Needs Work (1)	Score
Task	Team members are generally seen with one another. They do not show their conditions and emotions.	Team members are reasonably seen with one another. They occasionally show their conditions and emotions.	Team members are not seen with one another. They rarely show their conditions and emotions.	
Cooperation	Team members actively initiate, defend their and assist in resolving conflicts in their area. Team members are direct, frank and interesting.	Team members are willing to discuss different ideas and deal with conflicts reasonably. Team members are cooperative, frank and interesting.	Team members do not seem to have any ideas and are not willing to discuss different ideas. Team members are not cooperative.	
Commitment	Team members are very clear about the team's direction and purpose and actively committed to making the team's goals.	Team members are clear, particularly on the team's direction and purpose and partially committed to making the team's goals.	Team members have different ideas of what the team goals are and lack the commitment to make them.	
Accountability	Team members are clear about their own role and the role of other team members. Team members are highly motivated and work hard to achieve the team's goals.	Team members are reasonably clear about their own role and the role of other team members. Team members are motivated and work hard to achieve the team's goals.	Team members are not clear about their own role and the role of other team members. Team members are not motivated and do not work hard to achieve the team's goals.	
Results	Team members are highly motivated and work hard to achieve the team's goals.	Team members are reasonably motivated and work hard to achieve the team's goals.	Team members are not motivated and do not work hard to achieve the team's goals.	
Things that the team did well:		Things that the team needs to improve:		

How did you assess the effectiveness of students' learning?

Students' learning was assessed by:

- pre- and post-test of students' knowledge of teamwork skills;
- quantitative data derived from surveys on the performances of team members and the team as a whole;
- evaluation with an assessment rubric by self, peers, and faculty; and
- focus group interviews conducted by staff of the Center for Enhanced Learning & Teaching.

What were the major outcomes of this project/course? Do they match with your objectives?

Assessment data show that students' awareness towards teamwork skills has been enhanced.

Receiving timely feedback and having the opportunity to practice helped them build trust and deal with conflicts constructively.

Many students, however, viewed teamwork as a mere division of labor. There is a need to improve communication among team members and promote collaborative learning in future work.