IMPLEMENTATION OF A FIRST YEAR BIOLOGY LEARNING GROUP PILOT STUDY

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PURPOSE
To facilitate first year biology students’ conceptual understanding, we conducted a pilot study to investigate the effects of learning groups (LGs) in Biology 112, an introductory majors biology course.

Why Learning Groups?
Our primary goals were to improve students’ ability to problem solve and perform better on exams. In addition, guided small group discussions can:
• make large classes small
• engage students in course material
• engage students in biological “world”
• facilitate learning from peers.

METHODS
The Course
BIOL 112 Unicellular Life: The principles of cellular and molecular biology using mainly bacterial examples.

• Offered twice during winter session – September and January.
• 3 sections offered per term; each with ~250 students and 3 hrs of lecture per week.
• Taught by 3 course instructors in a large lecture theatre.
• All students completed pre & post-term biology attitudinal survey.

LG Structure
Weekly learning group sessions where students worked in a small group on problems related to the lecture material:
• 50 minutes, once per week, for 6 weeks of 13 week term.
• Problems were designed to reflect the open-ended nature of biological principles and aligned with course problem sets.
• Each LG facilitated by a teaching assistant or departmental lecturer.

LG Students
43% of BIOL 112 students volunteered of which 30% were randomly chosen for a LG.

• Student population in any one LG was independent of lecture section.
• Participation in the LG was completely voluntary and required a commitment to the entire process.
• As incentive, students were guaranteed 3% of a 10% grade component. Non-LG students completed other assignments as part of the 10% grade component.

• Assigned groups of 4 – 6 students met in a small classroom of ~35.
• Provided with a workbook in which to record all ideas, discussions, concepts and solutions; the completed workbook was submitted at the end of term.
• Completed an end-term student LG survey.

LG Process
The LG process was designed to promote discussions with peers and instructor (see Figure 1).

RESULTS

1. Biology Attitudinal Survey* “pre and post”
Pre & post attitudinal survey responses were compared. We found that:
• LG students have demonstrated an increased ability to make links between concepts at the end of the course (p<0.05). Note the shift towards agreement between pre and post surveys within LG students (see Figure 2a).
• LG students have continued to relate their personal experiences to what they learn in class (p<0.05) as opposed to non-LG students (p<0.02). Note the shift towards disagreement between pre and post surveys within non-LG students (see Figure 2b).
• LG students have become cognizant of their limitations in their ability to explain biology (p<0.05). Note the shift towards agreement between pre and post surveys within LG students (see Figure 2c).

2. End-of-Term Student LG Survey
Students reported that their experience with LGs were positive (see Figure 3). Results indicated:
• Very high agreement across LG sessions, students valued group work (see Figure 3a).
• Very high agreement across LG sessions (except LG 2) as discussions helped them understand BIOL 112 concepts (see Figure 3b).
• Students were active participants within their group (see Table 1, q.2).
• LG problems helped their understanding of the course material (see Table 1, q.4).
• Approximately 50% of LG students felt they were better able to solve problems on their own, and explain biological concepts to others (see Table 1, q.9).

3. Exam Performance
*LG students midterm marks and final exam marks were slightly higher than non-LG students (p<0.05, p<0.01 respectively; see Figure 4).

END OF STUDY

CONCLUSIONS
Did we achieve our project goals?
- Small vs large classes (Table 1, q.12)
- Engage in course material (Table 1, q.9, q.10)
- Engage in biological principles (Table 1, q.3, q.11)
- Learn from peers (Table 1, q.1, q.4, q.5, q.7)

In Summary
- Students in LGs demonstrated shifts in some areas in their attitudes towards biology.
- Students valued the learning groups.
- 1 of the 7 LGs had consistently negative feedback (>77% of comments) which may suggest further TA training.
- There were no statistically significant differences in their final course grade between LG and non-LG students.

Lessons Learned
Results of this pilot project informed instructors about the learning groups and thus enabled us to develop effective sessions starting in the fall of 2008.

Decrease size of each LG session
- Group session enrolment to 1:24, TA:student ratio (6 groups of 4 students).

Increase each LG session time
- LG students suggested to permit more time for group discussions. This is an issue due to scheduling - classes at UBC are usually 50 minutes.

More TA training
- Reduce variability among TAs.
- Improve TA-student interaction.

Make explicit links of LG problems to:
- Lecture material.
- Exam content.

ACKNOWLEDGEMENTS
Support was provided by University of British Columbia, Faculty of Science Dean’s Office, Carl Wieman Science Education Initiative for the site Science, Science Centre for Teaching and Learning, Dept. of Microbiology & Immunology.

Special Thanks to Instructors; Juljten Benbaas, Erin Gaynor, Tracy Kian, Kion, Lecturer; Jennifer Sibley and Teaching Assistants; Costanza Castagni, Gerry Green, Jacqueline Lai, Mei Mei Tian as well as Biology 112 students!