Notes from the Life Sciences Carl Wieman Science Education Initiative

Vol. 2 No. 2 **March 16, 2009**

The Invention Groups

Jared Taylor has been working with members of Microbiology and Immunology and Biology 112 students to compare two group-oriented activities in tutorials: Invention Groups and Learning Groups. Invention Group activities present students with a challenging problem (not necessarily a biological problem) based on fundamentals principles or concepts related to lecture material that students have not yet covered, but will encounter within a week or so. The students invent a solution to the problem based on their own knowledge and experiences. In the process they explore the principles and concepts of the problem. In Learning Groups students work on a biological problem (equally challenging to the Inventions) that is more obviously related to lecture material. This setting is similar to a worked problem tutorial, with the students working in groups. In both settings students write out their solutions and ideas on flip-chart paper and present them to the class.

As part of the assessment of these two activities, students are surveyed about their experiences. Here we report some responses from last term. Many responses were similar between the two groups. However when the responses to the open-ended question "What were the top three benefits of participating in the learning/invention groups?" were coded (by general topic) and compared some differences became apparent.. The data are shown in the table below. Students in the Invention Groups more frequently indicated that their problem solving and thinking skills had improved. In addition they more frequently mentioned making knowledge connections and applying their knowledge. Interestingly, Learning Group students more frequently indicated that the activities helped them learn and study the Biology 112 material.

What were the top three benefits of participating in the Invention or Learning group?

	Communication and teamwork	Problem solving and thinking	Social	Bonus marks	Learning and studying Biol 112	Application and knowledge connections	Exam prep	Engagement and enjoyment
% of total comments for Learning Groups (N = 466)	17.3	**9.4**	14.1	7.0	**38.4**	**6.4**	4.4	4.9
% of total comments for Invention Groups (N = 221)	15.4	**16.7**	14.9	7.7	**25.3**	**14.9**	4.1	7.7

Continued overleaf

The data in the table suggest that Invention Group exercises foster thinking and problem solving, that is they may "teach students to think". The project is continuing this term. We have expanded participation in Invention Groups and we are developing and implementing more direct measures of students' problem solving abilities to investigate their abilities.

Is spicing up the lecture worthwhile?

There was a lively debate in CWSEI STLF meetings sparked by a paper by Mayer *et al.* [Mayer, R.E., Griffith, E., Jurkowitz, I.T.N. and Rothman, D. *J. Exper. Psychol: Applied.* 14(4) 329-339. 2008. "Increased interestingness of extraneous details in a multimedia science presentation leads to decreased learning".

The authors used two parallel sets of materials for biology problems (1: how a cold virus infects humans or 2: digestion) that differed in whether they included high-interest details (e.g. relating to sex or death) or low interest details (e.g. relating to health tips). In the abstract the authors conclude "In both experiments as the interestingness of details was increase, student understanding decreased (as measured by transfer). The results are consistent with a cognitive theory of multimedia learning, in which highly interesting details sap processing capacity away from deeper cognitive processing of the core material during learning". The lesson might be that since the novice learner treats the material presented as equally important, highly interesting, but peripheral, details take up needed learning capacity and the results can be negative.

Would you like more information about teaching and/or technology in a workshop setting?

CWSEI is scheduling a year-end event for April 29. Planning is just starting for what to include. One idea is open workshops or demonstrations on selected topics. If there is something you would like to see or participate in, let us know and we'll pass it along

We're around.

If you're interested in talking to us about your course(s), or teaching /learning, feel free to contact anyone of your LS-CWSEI team: Jared Taylor <jtaylor@zoology.ubc.ca, Harald Yurk <yurk@zoology.ubc.ca>, Gulnur Birol <birol@science.ubc.ca>, George Spiegelman <spie@interchange.ubc.ca>. You might also check out the CWSEI website for information and resources about teaching/learning: http://www.cwsei.ubc.ca.