Proposal for an International Conference

**Who’s Afraid of Group Learning and Evaluation? Advantages in the Science Laboratory**

Ayala Raviv and Esther Aflalo

**Summary**

Despite the inherent potential of group evaluation, there has been very little research into the characteristics of laboratory lessons and there are few empirical reports examining the use of this technique in science laboratories. Our empirical comparison between collective and individual laboratory reports prepared by post-elementary students highlighted the advantages of group learning and evaluation. Our study included 67 female students who undertook four laboratory experiments. Some of the participants worked individually while others worked in groups. We analyzed 133 experiment reports and found that the average grades for the collective reports were higher, and these reports contained more ways to solve problems. The students’ attitudes showed a statistically significant preference for group learning and evaluation. These findings raise challenging questions regarding the implementation of group evaluation in university laboratory courses.

**Alternative Evaluation**

The prevailing opinion among researchers is that while traditional evaluation based on examinations is effective primarily in measuring achievements and capabilities, alternative evaluation seeks to be more effective in promoting the students’ ongoing development. Traditional evaluation is undertaken by the teacher without connection to teaching, whereas alternative evaluation may also be implemented through processes, is undertaken with the learners’ cooperation, and is integrated in teaching (Johnson & Johnson, 1999). Collective evaluation is a form of alternative evaluation that plays an important role in cooperative learning processes.

**Cooperative Learning and Group Evaluation**

Cooperative learning refers to active learning characterized by small groups; it is undertaken and directed by all the members of the group. This learning allows each student to initiate and express themselves and their capabilities. Studies indicate the clear advantages of this approach both for the individual learner and in terms of group achievements. Benefits identified include enhanced academic achievements. An increase has also been observed in individual and group commitment and responsibility among the students (Hsiung, 2012; Lou, Abrami, & d’Apollonia, 2001).

Group evaluation refers to the evaluation of students’ abilities and capabilities in a group engaged in cooperative learning. Although group learning and evaluation are considered a significant success story, their implementation still appears to be limited, even in science laboratory classes, in which students conventionally learn in pairs or groups. Many science teachers remain unconvinced of the effectiveness of group evaluation in the laboratory, for various reasons, including the complex challenge of evaluating the individual’s ability within a group (Clyde, 1998).

In the current study, each student undertook two experiments individually and two in a group, relating to the subject of “volume and volume measuring skills.” Thus each participant experienced both forms of learning and evaluation. A comparative analysis was undertaken of 133 collective and individual experiment reports, and we also examined the learners’ thoughts about each of the forms of learning and evaluation by means of a closed questionnaire.

**Findings**

The average grades for the collective reports were superior to those for the individual reports; the difference was statistically significant. Content analysis found that the cooperative reports included longer texts, more detailed and precise descriptions of the findings and conclusions, and a greater number of ways to solve problems. The findings from the attitude questionnaire revealed a strong and statistically significant preference for group learning and evaluation over individual learning and evaluation in the laboratory.

**Discussion and Recommendations**

The findings show that it is desirable to enhance the implementation of group learning and evaluation in laboratory lessons. Although the study was conducted on post-elementary students, academic students also seem to benefit from group learning and evaluation, as for example in Aydin’s study (2011), which found that this learning is statistically significantly more effective in advancing academic knowledge and developing a positive attitude to laboratory learning among university students.

We recommend planning and developing models for group learning and evaluation in laboratory courses and other courses; providing guidance for academic faculty; and encouraging them to integrate these methods gradually. It is important to address the strong dominance of individual learning and evaluation in universities, resistance to change, and the challenges posed by group learning and evaluation.

**Bibliography**

Aydin, S. (2011). Effect of cooperative learning and traditional methods on students' achievements and identifications of laboratory equipments in science-technology laboratory course. Educational Research and Reviews, 6 (9), 636-644.

Clyde F. H. (1998). Why isn't cooperative learning used to teach science? Bioscience, 48 (7), 553-559.

Hsiung, C.M. (2012).The effectiveness of cooperative learning. Journal of Engineering Education, 101(1), 119-137.

Johnson, D. W., & Johnson, R. T. 1999. Cooperative Learning and Assessment. In D. Kluge, S. McGuire, D. Johnson, & R. Johnson (Eds.), JALT applied materials: Cooperative learning (pp. 164-178). Tokyo: Japan Association for Language Teaching.

 http://files.eric.ed.gov/fulltext/ED437852.pdf

 Lou, Y., Abrami, P. C., & d'Apollonia, S. (2001). Small group and individual learning with technology: A meta-analysis. Review of Educational Research, 71 (3), 449-521.