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CHANGE: A Brief Introduction to Cooperative Learning

Introduction

Active learning is a category of pedagogies established as being extremely effective in engaging and maintaining student interest, thereby leading to better student performance and retention of subject matter. The responsibility for learning is focused on the learner. Many active learning strategies involve some form of group work. *Group work* covers all kinds of multiple-person active instructional activities along formal – informal and structured – unstructured spectra, thereby parsing out as “cooperative” and “collaborative” learning activities. In this issue of *CHANGE*, we provide a review of cooperative learning, a pedagogy that has been proven to be a good fit with the preferred learning and working styles of millennials in general and students from underrepresented populations in science, technology, engineering, and mathematics (STEM), including females, in particular. (Williams, *et al.*, 2007)

Overview of the Research

Cooperative learning is one of the main active learning pedagogies, along with collaborative learning and learning communities. Arendale (2005, p. 4) pictures the relationship among the three pedagogies as shown in Figure 1. It is well documented that students retain more knowledge when actively engaged in the learning process, and cooperative learning is often cited as an extremely effective instructional strategy. (see, for example, Felder and Brent, 2005; Heywood, 2005; Smith, 1993; Smith, *et al.*, 2005; and Watson, 1995)

Cooperative learning is more than students working together in teams. According to Johnson, Johnson, and Smith (1991), the five essential elements of cooperative learning are:

- clear positive interdependence between students
- face to face interaction
- individual accountability
- emphasis on interpersonal and small-group skill

- processes must be in place for group review to improve effectiveness

In other words, cooperative learning is a structured process in which team members work towards accomplishing a common goal, stressing positive interdependence, individual accountability, and group accountability. *Positive interdependence* is a state in which all members must cooperate to accomplish the goal; under the accountability rules, each member is individually and collectively responsible for the group’s work product. (Smith, 1993; Smith, *et al.*, 2005) Cooperative learning differs from collaborative learning in that the former “requires carefully structured individual accountability.” (Smith, *et al.*, 2005; p. 88)

Smith (1993, p. 198) notes the following benefits of students who are “cooperatively taught”: “longer information retention, better performance on exams, higher grades, stronger critical thinking and problem-solving skills, more positive attitudes toward the subject and greater motivation to learn it, better interpersonal and communication skills, higher self esteem, and if groups are truly heterogeneous, improved race and gender relations.”

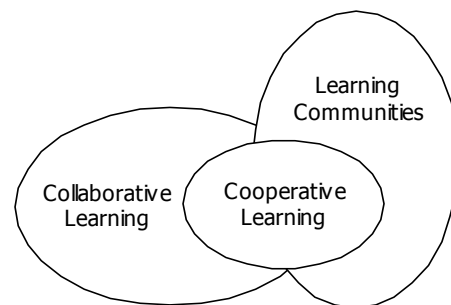


Figure 1. Relationship Among Collaborative Learning, Cooperative Learning, and Learning Communities (Arendale, 2005; p. 4)

One domain in which the effect of cooperative learning has been well researched is computer science. Students participating in one pedagogical instantiation, [pair programming](#), report higher levels of confidence in their abilities than students who strategized and coded on their own. (see, for example, Chase and Okie, 2000;



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McDowell, et al., 2003; and Williams, 2006) The use of pair programming is also effective in countering senses of isolation and alienation experienced by many students in computer science courses, especially introductory ones. (Williams, 2006)

Recommendations

Based on the research, recommendations for *CHANGE* include the following:

- **The use of cooperative learning activities should be encouraged in all classes**

Active learning strategies can be appropriately implemented in all instructional formats, from small seminars to large lectures; see, for example, Astrachan, *et al.* (2002) and Olds, McKenna, and Pazos (2007). Creating an instructional climate in which female students don't feel isolated and marginalized is important in their retention/persistence to graduation, especially in disciplines such as computer science, in which the number of female undergraduates declaring and persisting to graduation is declining. (Gibbons, 2008)

- **For maximum impact, faculty with any type of instructional duties should be provided with regular opportunities to gain or refresh competencies in delivering cooperative learning activities**

The concept of "inservice" is firmly established in elementary and secondary education. Postsecondary educators deserve the same opportunity to learn how to use female-friendly instructional practices such as cooperative learning effectively and efficiently.

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CHANGE - Change and Awareness Necessary for Global Engineering

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