Chapter 4
A Computer-Assisted Approach to Conducting Cooperative Learning Process

Pei-Jin Tsai
National Chiao Tung University, Taiwan

Gwo-Jen Hwang
National University of Tainan, Taiwan

Judy C.R. Tseng
Chung-Hua University in Hsinchu, Taiwan

Gwo-Haur Hwang
Ling Tung University, Taiwan

ABSTRACT

Cooperative learning has been proven to be helpful in enhancing the learning performance of students. The goal of a cooperative learning group is to maximize all members’ learning, which is accomplished via promoting each other’s success, through assisting, sharing, mentoring, explaining, and encouragement. To achieve the goal of cooperative learning, it is very important to organize well-structured cooperative learning groups, in which all group members have the ability to help each other during the learning process. In this article, a concept-based approach is proposed to organize cooperative learning groups, such that, for a given course each concept is precisely understood by at least one of the students in each group. An experiment on a computer science course has been conducted in order to evaluate the efficacy of this new approach. From the experimental results, we conclude that the novel approach is helpful in enhancing student learning efficacy.
INTRODUCTION

In past decades, cooperative learning researchers have shown that positive peer relationships are an essential element of success during the learning process, and isolation and alienation will possibly lead to failure (Tinto, 1993). Hundreds of relevant studies have been conducted to compare the effectiveness of cooperative, competitive, and individualistic efforts by a wide variety of researchers in different decades using many different methods (Smith, 1995; Keyser, 2000; Ramsay et al., 2000; Rachel & Irit, 2002; Veenman et al., 2002). Results have shown cooperation among students typically results in higher achievement and greater productivity, more caring, supportive, and committed relationships, and greater psychological health, social competence, and self-esteem (Johnson et al., 1991; Veenman et al., 2002).

Even though many researchers have proposed a variety of cooperation learning methods, and have defined various constraints on achieving the expected results, there are however, many complex human factors that cannot be fully controlled during the cooperative learning process, including the construction of cooperative learning groups and the designed activities for the promoting of constructive cooperation, which all are known to be difficult without proper aid.

In this article, we shall propose a computer-assisted approach to organizing cooperative learning groups based on complementary concepts to maximize students’ learning performance. In the approach, for a given course, each concept is well learned and completely understood by at least one of the students in each group. That is, in each cooperative learning group, the students will have an enhanced capability of learning all of the concepts, if they know how to learn from each other, via proper designed learning activities.

To evaluate the performance of the proposed approach, an experiment has been conducted on a computer course entitled, “Management Information System”. One hundred and four students were separated into a control group and an experimental group. In the control group, the cooperative learning groups were organized by averaging the pre-test scores of each group; in the experimental group, the concept-based grouping method was applied; dividing the students into cooperative learning groups based on their well-learned and poorly-learned concepts. From the experimental results, it can be seen that the cooperative learning groups constructed by the concept-based grouping method are able to achieve significantly better performance, and hence, we conclude that the new approach is helpful in enhancing student learning efficacy.

RELEVANT RESEARCH

In human societies, it can be seen that the more one learns from other people’s experiences, the higher the possibility of success. People often take advice, interact, consult with each other and observe others to learn from their activities and experiences; that is, people cooperate to learn (Ahmadabadi & Asadpour, 1980). “Cooperation” in this context means working together to accomplish common goals. Within the realm of cooperative activities, individuals seek outcomes that are beneficial to all members of the group. Cooperative learning is the instructional use of small groups so that students work together in order to maximize the learning efficacy of all group members (Johnson et al., 1991; Johnson & Johnson, 1999; Huber, 2003). Well-organized cooperative learning involves people working in teams to accomplish a common goal, under conditions in which all members must cooperate in the completion of a task, whereupon each individual and member is accountable for the absolute outcome (Smith, 1995).

In a cooperative learning group, students are assigned to work together with the awareness that success fundamentally depends upon the efforts of all group members. The group goal
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