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Computer-assisted cooperative learning

Terence C. Barschow
University of Northern Iowa

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Computer-assisted cooperative learning

Abstract

Collaborative and cooperative effort is recognized as vital to almost every kind of relationship from family to workplace. It improves communication and creates a school/work culture that fosters mutual assistance among members. Industry has increasingly turned to the "work team" method of grouping workers. A similar process is gaining ground in American schools. Cooperative small group learning is being viewed as an important alternative to whole class instruction and having individuals work alone (Adams, Carlson, & Hamm, 1990).

Computer-Assisted Cooperative Learning

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Terence C. Barschow

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This Review of the Literature by: Terence C. Barschow

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Sharon E. Smaldino

Director of Research Paper

July 2, 1991
Date Approved

Sharon E. Smaldino

Graduate Faculty Adviser

July 2, 1991
Date Approved

R. Muffoletto

Graduate Faculty Reader

July 1, 1991
Date Approved

Peggy Ishler

Head, Department of Curriculum
and Instruction

July 3, 1991
Date Approved

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Chapter One

Introduction

Cooperative Learning

Collaborative and cooperative effort is recognized as vital to almost every kind of relationship from family to workplace. It improves communication and creates a school/work culture that fosters mutual assistance among members. Industry has increasingly turned to the "work team" method of grouping workers. A similar process is gaining ground in American schools. Cooperative small group learning is being viewed as an important alternative to whole class instruction and having individuals work alone (Adams, Carlson, & Hamm, 1990).

This concern for cooperative grouping or "teams in the everyday work-world is changing the factory model of top-down organization into one reflecting new concerns for collective responsibility. Therefore education's long held models of "teacher talk", textbook memorization, tracking, and moving pupils in large groups from room to room will not prepare students for this changed work world (Levin & Tractman, 1988).

This type of change will not be easy to implement into the educational system. The public has many expectations concerning what the schools should accomplish. Also, the students have many needs to be addressed.

The schools are expected to provide a wide range of services to the student, many of which are contradictory. They are expected to socialize all children, yet nourish each child's creativity. Also, schools should teach the best that past history offers but insure that each child possesses marketable skills. They should demand obedience to authority, but encourage individual children to think about and question the world around them, and at the same time cultivate cooperation while preparing children to be competitive (Cuban, 1986).

The students have certain expectations when it comes to school, among these is the need for recognition. Young people thrive on personal attention. Cooperative grouping allows students to receive more attention than can be provided in the typical large class environment.

Students of all abilities significantly benefit from cooperative learning techniques. Outstanding students help others in a tutoring capacity and pupils with less information can motivate students that have more. Self worth rises in cooperative groups and students of all abilities grow through the interaction that takes place in the group (Kraft, 1985).

Technologically Assisted Instruction

To help cope with the many demands placed on the educational system, the schools have looked to ways of meeting these needs. Among the array of possibilities technology has often seemed a promising choice. This is particularly true when the classroom teacher looks to address the needs of thirty or so individual students. Technology has been looked on as a means of providing an instrument that would meet these individual needs.

Sidney Pressey of Ohio State University was an early educator who recognized the need for efficiency in the classroom. In the 1920's he introduced machines that would allow students to work independently. At first these machines were used only for drill and practice and testing, but later Pressey

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realized that with certain modifications they could also be used for instruction (Niemiec & Walberg, 1989).

Pressey had been influenced by E.L. Thorndike, especially Thorndike's conditions of maximized learning. These conditions focused on : 1) the law of effect, recurrence of response is governed by consequence of effect; 2) law of recency, the most recent response is most likely to govern the recurrence; and 3) the law of exercise, responses are strengthened through repetition (Niemiec & Walberg, 1989).

The work of Pressey was slowed by the onset of the depression and World War II. Sporadic efforts to revive this educational technology, that could efficiently meet individual student needs, came to the forefront during the 1950's due to the efforts of B.F. Skinner and his teaching machines. Skinner felt that too much emphasis was placed on punishment in the typical classroom setting. His machines were designed to provide the student with instant rewards and thereby alter the student's behavior. Quick and adequate reinforcement on an individual basis is

beyond the capability of the average classroom teacher. Such a task seems to be an ideal task of teaching machines (Niemiec & Walberg, 1989).

The instruction envisioned by B.F. Skinner and many others now seems to be in reach with the growing use of the classroom computer. The computer provides the possibility of moving beyond the linear program of top-down learning into a more open style of dealing with the world in which the student is living; a setting involving cooperation, technology, and education.

Where in the schools are students most often found working together for the purpose of gaining both individual and group goals? Some areas that come to mind are band, chorus, drama, athletics, newspaper, and yearbook. Each of these situations requires students to work together as learning teams, not only for personal gain, but also for the benefit of others.

In looking for a better school, Glaser stated the following:

At any rate, the idea of having students function as a group to produce some results have been carefully studied, and it works.

It brings into the classroom the same approach that schools use so successfully in extracurricular activities (Gough, 1987 p.659).

In many classrooms the student is told directly or indirectly to work alone, don't visit, and don't help. This approach ignores the basic human need for personal importance and can create a feeling of isolation in the learning process.

A few people in life produce their best work completely on their own. But most people feel more complete and confident as members of a team. Students in a team begin to realize that they can interact, contribute, cooperate, and have fun as part of a team and at the same time reach a goal or grade (Gough, 1987).

As team members, students can produce a book, solve a math problem, or research a topic in social studies. This is the way they will work, on the most part, after they leave school. This teamwork approach is already in place outside the classroom. The only place that teams seem to be missing is in the

classroom, where competition too often reigns (Gough, 1987).

Computer Assisted Interaction

In addition to the recent interest in the effects of teamed or cooperative learning, the meteoric rise of the computer as a classroom tool has opened many new educational possibilities. In the past the most common use of the computer in the classroom has placed the computer and student in a situation of isolation from the rest of the class (Vockell, 1989).

When it comes to using the computer, student-student interaction is often discouraged and students work individually at the computer (Johnson & Johnson, 1986). This approach to computer use is partly a result of reliance on computer programs designed for individual drill and practice and this practice can often serve to isolate the student from his or her peers (Johnson, Johnson & Stanne, 1986). There is no evidence that this is the best scenario. To the contrary, there seem to be more instances where small group use of the computer is preferred over solitary use (Vockell, 1989).

From this it would seem that the growing interest in computers could be combined with the concept of learning teams to produce an instructional structure that would enhance learning. This type of grouping is called computer-assisted cooperative learning groups (Johnson & Johnson, 1987).

There are at least three ways that computers can be combined with learning groups. They are:

1. Individualistic --- each student takes his/her turn at the computer without concern for the group effort.
2. Competitive --- each student works toward completing the group task, but is concerned with being the best in the group.
3. Cooperative --- students work to complete the task together with all team members sharing equally in the rewards of reaching the goal (Johnson & Johnson, 1986).

Competition in the classroom is given when students are primarily concerned with being the best. Cooperative learning teams may channel this competition into a more productive process.

Cooperative groupings may not remove all of the competition from the classroom, but this kind of grouping can place competition in perspective. Cooperative teams rely on each member contributing to the success of the team. Cooperative learning advocates have found that both high and low ability learners profit from cooperative grouping. (Slavin, 1984). Students must not only master the task at hand themselves, but help other team members to also master it (Lehr, 1984). Individual competition can be intimidating and those that favor it are usually those who feel they can win. Team competition often removes this intimidation factor and is fairer. If one team often wins, its team members can be redistributed. Fair competition can be fun and educational (Gough, 1987).

Purpose

There is a need to investigate the impact that the combination of the computer and cooperative learning groups have on student interaction and competition in the classroom. This paper will examine the relationship between computer-assisted cooperative groups and the development of social skills in and out

of the group situation. It will also explore how this type of grouping can impact on the negative aspects of classroom competition.

Chapter Two

Review of Related Literature

This chapter includes a review of the literature examining the advantages of computer-assisted cooperative grouping compared to the computer-assisted competitive and individualistic grouping of students. Specifically the following areas will be examined: grouping and computers, social skill development, and competition in the classroom.

Cooperative Grouping

Johnson and Johnson stated the following concerning the subject of cooperation:

Cooperation to a human is like water to a fish; it is so pervasive that it remains unnoticed. Cooperation is a non-conscious goal of interaction, socialization, and education. Within most situations no alternative to cooperation seems possible to humans. All competitive and individualistic efforts take place within a broader cooperative framework. Cooperation is the forest; competitive and individualistic efforts are but trees (Johnson & Johnson, 1987 p. 45).

Concepts of Cooperative Grouping

There are at least two conceptions of the idea of cooperative small group learning. One view sees children working in a classroom tutoring each other and rehearsing learning materials planned and provided by the teacher. The other view, exemplified in a study involving two hundred seventeen elementary students in grades two through six, looks at cooperative learning as task-orientated cooperation, communication and intellectual exchange with peers. Also, the pupils in a setting of this nature assume responsibility for planning and carrying out their own work, not just practicing what the teacher has provided (Ackerman, Hertz-Lazarowitz & Sharan, 1980).

It has been shown that this second view of cooperative grouping places responsibility for learning on the student, increases student achievement, and creates a positive attitude toward school and classmates. Learning becomes more fun. Students enjoy and care for each other and turn out high quality products (Smith, 1987).

Advantages

Learning in cooperative groups has been shown to have the following advantages over competitive and individualistic learning structures in many areas of learning:

1. positive interdependence vs no interdependence
2. individual accountability in cooperative groups vs no accountability to others in individualistic or competitive groups.
3. heterogeneous and shared leadership vs homogeneous and one appointed leader.
4. good working relationships maintained to complete the task vs only focusing on the task.
5. group processes the effective way they are working vs no processing (Johnson & Johnson, 1986).

To successfully implement and achieve these advantages, it is important when forming cooperative groups to impress on the group the idea that the group's success is directly related to each individual member's success. All must contribute to succeed and there needs to be an understanding that different members contribute in different ways. Also bear in mind that when groups are formed they do not have to

be forever and students may be in different groups for various topics and tasks (Lehr, 1984).

The teacher in a cooperative setting works as a facilitator. Not just the traditional dispenser of information, but also as a resource that is available to groups to give support and assistance if needed. Often the teacher is most needed as an encourager to progress. Teachers in this setting view themselves less as someone turning out a polished product, but rather as a facilitator to help students work to benefit themselves with the ultimate goal being self-motivation toward determining and accomplishing their own goals (Gough, 1987).

Computer Assisted Instruction

For various reasons, among them time, availability of equipment and structure of the classroom, the computer is often used as an add-on to large class instruction. Often the computer is part of the class instruction in the learning phase and then the students are sent off to work individually in a drill and practice setting (Vockell, 1989). This type of computer use tends to isolate the student.

The students work alone without contact with other students.

Lack of concern with the social impact of this use of the computer can lead to the development of the "closet computer queen or king" - the individual student with few social skills who goes to the corner, cubby, or down the hall to work on the computer in isolation rather than interact with his or her peers (Boyd, Douglas & Lebel, 1984).

Limitations

The limitations of this approach to computer use include:

1. the social isolation causes mood states (boredom, frustration, etc.) that interfere with learning.
2. the absence of opportunities to summarize orally.
3. the lack of social model to imitate or compare.
4. the lack of peer feedback which can hinder problem solving (Johnson & Johnson, 1986).

Grouping Dynamics

One way to reduce these drawbacks to the above setting is to form simple peer tutoring groups as a lead in to cooperative groupings. In non-computer

situations there has often been a problem with peer groups staying on task because of a lack of structuring skills on the part of individuals. This is a place where the computer can assist the peer group by supplying structuring and pedagogical capabilities that are lacking in the non-computer groupings (Vockell, 1989).

This use of computers and cooperative grouping is not just limited to peer groups of two. Groups of three, four, five, or six can be applied to a variety of tasks.

Any drill and practice can easily be used with a group of two or three as with an individual. A simulation can be used with groups up to five or six as an information provider. They are often structured in such a way that one person cannot gather the information alone and others are needed to successfully complete the task. The computer can give feedback to the groups' actions (Johnson & Johnson, 1986).

The individualistic and cooperative structures can even be combined. Students work in pairs to develop composition ideas. Then they could

individually work at the computer writing their compositions. Finally they could work cooperatively once again to edit and discuss their work. This could be done at the computer or from copies printed from the computer (Johnson & Johnson, 1986).

These are but a few examples of computers and groups of students that have been combined successfully. These approaches remove the concern for computer isolation, but raise another classroom concern of student interaction.

Social Interaction

Computer-assisted cooperative learning combines the structure of the computer software with the social environment of cooperative learning. But for students to work well together it is important that certain social skills be developed in addition to working toward task completion.

As mentioned previously, the concept of cooperation can mean different things to different people. Because of this, students need to have it defined operationally. There are beginning behaviors such as "stay in your group", "use quiet voices", "take turns", and "use people's names" that can be

introduced as initial expectations (Johnson & Johnson, 1987).

Also one needs to keep in mind that students will not do well in developing social skills unless they believe that they are appropriate and useful. They need to understand the skill and have the opportunity to practice it. It is also important to try to give the students immediate feedback and have them use the skill frequently enough so that it is integrated into their natural behavior (Johnson & Johnson, 1987).

For cooperative groups to function properly and be effective in the classroom, time must be taken to explicitly teach social skills to be used in the cooperative process. This requires that time be spent in teaching cooperative behaviors that will enhance communication and increase the effectiveness of the learning process. In learning cooperative skills it is important to limit skill development to one or two skills at a time. This may interfere with task achievement (Bloom & Schunke, 1979).

Some initial skills for group members might include the following:

1. Developing personal responsibility for and an individual's work and behavior.
2. A willingness to assist any group member.
3. Seeking teaching advice only when all members of your team have the same question.

These three rules should be explained to and understood by all group members (Van de Walle, 1988).

Once these initial skills have been established, the students can move on to the development of other interactive skills. These may included having each member explain how to get the answer, encouraging all to participate, listening carefully to what other group members are saying, not changing your mind unless you are logically persuaded (majority rule does not promote learning), and criticizing ideas not people (Johnson & Johnson, 1987).

It is important to develop these interaction skills as this interaction through discussion of task and management statements in the cooperative setting provide greater conceptual understanding of the materials and greater retention of what has been

learned. In a study involving 71 upper elementary students randomly separated into cooperative, competitive and individualistic groupings it was observed that when students worked in cooperative, competitive and individualistic groups, even though there was more discussion in the cooperative group, the cooperative group completed daily work faster and more accurately. The student-student interaction was almost always learning orientated (Johnson, Johnson, Stanne, 1985).

Another study involving one hundred fifteen junior high students, where one-third of the students worked individually with the computer and the rest worked in cooperative computer-assisted groups, also showed greater social development with the cooperative groups. The students in the cooperative groups also exhibited a more positive attitude toward learning and tended to score higher than those who worked individually (Levita, Mevarech, & Stern, 1987).

Results of such studies as cited above and another one involving high and low ability eighth grade students by Hannafin and Hooper (1988), show substantial academic improvement of low ability

students in mixed ability treatment groups. At the same time, there is no significant reduction of the achievement of the high ability students. This research then seems to indicate that cooperative grouping poses little risk in terms of achievement, but offers much potential for gain in terms of social skill development and interaction.

Interaction at the Computer

There are at least three ways that groups of students may interact at the computer. The students may present information or elaborate on the task at hand. Management statements may be made informing others on procedure being used. Students may discuss unrelated issues to the task at hand (Johnson, Johnson, & Stanne, 1985).

Working together at the computer has been shown to increase social skills and improve peer relationships. This is not just a group of students working together. It is a group of students who have learned how to contribute their own ideas, encourage others to participate, express support for others, summarize, and coordinate efforts of all members of the group (Smith, 1987).

Competition

Cooperative computer-assisted learning also can defuse the competitive atmosphere so pervasive in the classroom. Because there can only be one "winner" in a competitive situation, the majority of students will experience failure. In the traditional classroom the students are ranked from "best" to "worst" and in most classrooms there is a stable pattern of achievement so that the same majority of students always lose and the same few always win. Losers in such a situation tend to view learning as boring, unfair, and not fun (Johnson & Johnson, 1987).

In the cooperative group setting competitively structured learning activities can provide a change of pace and release of energy. In a group setting competition involving drill review or a low-key test when all members of a group have mastered a task can focus on the fun part of competition (James, 1989).

Just as there is a need to develop skills for cooperation, there is a need to develop skills for competition. Some skills to develop are:

1. playing fair --- involves following the rules.
2. being a good winner and loser.

3. enjoying the competition, win or lose.
4. monitoring progress --- because in competitive games, winning is the goal, it is important to know where one stands in relation to the others.
5. not to overgeneralize the results --- winning does not make one more worthwhile and losing does not make one less worthwhile (Johnson & Johnson, 1987).

Another plus to the cooperative computer-assisted groupings is that the social and competitive skills developed in the cooperative group are carried over into situations outside of the group:

Classroom learning in small groups provides for the acquisition of social skills needed for sustaining cooperative interaction with peers. It also appears to create social norms supporting peer cooperation. These norms could develop because teachers help pupils acquire cooperative skills and help them behave cooperatively during the learning process without "preaching" to them to cooperate. Mutual assistance, fair

distribution of speaking privileges, collective decision making, and sharing responsibility for task performance became accepted and expected behavior patterns in the classroom, sanctioned by teachers and pupils alike (Hertz-Lazarowitz, Sharan, & Steinberg, 1980 p. 105).

Computer-assisted learning is better served in a cooperative goal structure than individual study arrangements. Also, when looking at cooperative, competitive and individualistic goal structures, the literature reviewed supports the conclusions of some researchers that cooperation should be the most frequently used of the three (Boyd, Douglas, & Lebel, 1985; Johnson & Johnson, 1987).

Computer-assisted cooperative learning groups offer considerable potential. Cooperative groups provide an important alternative to competitive and individualistic groupings but their effects require close examination in regards to social, affective, and academic aspects (Dalton, Hannafin, & Hooper, 1989).

Chapter Three

Conclusions

The purpose of this paper to investigate the literature describing the computer-assisted cooperative learning groups as opposed to competitive and individualistic learning groups. Specifically questions were asked concerning the advantages of the cooperative group and the effects of this type of grouping on social skill development and the reduction of competition.

In the review of the literature the cooperative setting was found to be advantageous over the competitive and individualistic setting since the emphasis is placed on the learner. The student has greater control in determining the goals and direction of the organization and direction of the task. The cooperative setting creates an environment more like what the student will encounter in the future.

With regard to social interaction, the cooperative group provides for natural exchange of information between students. In cooperative groups, where cooperative social skills have been carefully practiced and learned, there is created an atmosphere

where social interaction is done in a constructive and caring manner. Students in this type of group are willing to take risks and be both flexible in accepting new ideas and firm in supporting their own. Another advantage of the cooperative over the individualistic or competitive grouping is that the social skills developed in the group are carried over into activities outside of the group.

Competition is also placed in perspective in a cooperative situation. The students are allowed to view winning and losing as less stressful situations. Competition is viewed as fairer and a fun change of pace to the regular day. Again it is important to develop in the students a positive attitude by spending time instructing students in the development of competitive skills.

Using the computer with the cooperative group further enhances the benefits mentioned. The computer acts as an organizer for the students by providing a framework in which the students may be guided as they learn. It provides a structure to the learning environment and can serve as a tool for working with the task at hand.

In the review of literature, it is suggested that there is potential for great benefit in utilizing the computer-assisted cooperative learning group. This environment brings greater student responsibility to the classroom and can make the classroom a more natural model of the world outside. Students benefit not only in their academic achievement but also in developing social skills that will benefit them in many settings.

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