ABSTRACT

THE EFFECT OF FORMAL GROUP SKILL INSTRUCTION AND ROLE DEVELOPMENT ON ACHIEVEMENT OF HIGH SCHOOL STUDENTS TAUGHT WITH COOPERATIVE LEARNING STRATEGIES

By

Lorraine Berak Kaminski

The researcher's purpose in this study was to analyze the effect of teaching group social skills and group roles on the achievement level of high school students who were working in a cooperative learning structure.

Students selected for inclusion in the study all attended the same large nonmetropolitan high school. Most were eleventh graders enrolled in one of four class sections of first-year chemistry or one of four class sections of economics. Matching experimental and control groups were established for each subject, using previous grade point averages or previous test scores.

Two sections of each subject made up the experimental group, and a matching two sections made up the control group. The only difference between the experimental and control groups was the special training the students in the experimental group received on group social skills and group roles. Cooperative learning strategies were used in teaching the subject-matter content for all students.

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Four hypotheses were formulated, each centering on the premise that the students receiving special training would benefit through higher achievement on a test at the end of the unit. Mean scores were compared using analysis of variance.

No statistically significant differences were found between the experimental groups, which were taught group social skills and group roles, and the control groups, which did not receive any special training.

This dissertation is dedicated to my daughter, Kristy, for her understanding and faith throughout the past five years. With effort and love we have proven you can accomplish your dreams.

To my husband, John, who had to become both parents many times during the past five years. Thank you.

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CHAPTER I

STATEMENT OF THE PROBLEM

Introduction

Near the end of the nineteenth century, educators and researchers began to study the effects of using cooperation as a strategy for teaching and learning. The work of Francis Parker in 1875 proved that cooperative procedures were beneficial to the students. Unfortunately, twentieth-century educators and researchers stressed methods of interpersonal competition and eliminated many of the cooperative strategies, which started the sort-and-select process. This process of producing and encouraging the best students produced a classroom environment that selectively used competition and individualism to promote an environment that did not allow cooperation between students. Students needed to be educated to fit the jobs that the industrial revolution was creating. Therefore, it made perfect sense to teach students competition. After all, not every person needed to think. Workers were needed on the assembly line who would do their own work and not bother the person next to them. This methodology stayed with education through most of the twentieth century.

The 1970s and 1980s witnessed some dramatic changes in education. Prominent among these changes was the shift from

individualized instruction (Rothrock, 1982) and an emphasis on competition, to an emphasis on cooperation. This demand for cooperative skills was brought about, in part, because of the changing nature of the work place where graduates will be employed and become contributing members of society. The United States is no longer an agricultural or industrial society; this is the age of information. To survive and prosper in this information age, workers must be trained who can problem solve, discuss, and network. To meet this challenge, many educators are using cooperative learning to increase student achievement as well as collaborative skills. The cooperative learning structure has as a component the effective use of group social skills and the ability of group participants to recognize the role they are experiencing in the process.

Identification of the Problem

David Johnson and Roger Johnson, professors of education at the University of Minnesota, reviewed 122 studies conducted from 1924 to 1981 that considered achievement or performance data in competitive, cooperative, and/or individualistic classrooms. They found that 65 of the studies demonstrated that cooperation promoted higher achievement than did competition, 8 showed the reverse, and 36 showed no statistically significant difference. Johnson and Johnson found that, among studies comparing the effects of cooperation and independent work, cooperation promoted higher achievement in 108 studies, whereas the reverse was true in 6 investigations, with 42

revealing no difference. The superiority of the effects of cooperation held true for all age levels and content areas.

Cooperative learning is not new. Dewey (1902) advocated cooperative learning as a preferred method of teaching and learning. He proposed that a child's intellectual development would unfold if appropriate conditions surround the child. If group skills are valued, the child should be immersed in a group project. However, although many educators promote group skills, very little instruction is actually done that focuses on students learning the needed group skills and on the appropriate roles to perform while working as a group member.

In this study, the writer focused on the effects of teaching the group skills and group roles needed to use cooperative teaming effectively in the classroom.

Importance of the Study

This study is important for the following four reasons. First, a review of studies on cooperative learning indicated that little emphasis has been placed on the teaching of group skills and group roles. Many proponents of cooperative learning have indicated the necessity to use effective group skills and group roles (Johnson & Johnson, 1983). However, students are not born with the knowledge of how to be an effective group member. Therefore, they need to be taught the skills necessary to accomplish the group task and the roles necessary to be productive group members.

Second, these group skills are vital to maintaining a society whose members will collectively be able to problem solve and communicate in a rapidly changing environment. Students can learn to give clear, complete messages and to listen to feedback from peers. By sharing resources and working with each other toward a common goal, students learn to trust the individual as well as the group process. Therein lies a third reason for the importance of this study--the capability of a single individual to cope with the amount of new information that is being uncovered daily. Technology has made more information more available more quickly than in any other period in American history. Recent projections have indicated that the amount of available information is doubling every 1.5 years. Members of future generations will need to trust and depend on others for vital information. Through cooperative learning they can become more skilled at justifying and sharing the information they possess. They will also learn how to listen effectively and gain information from other individuals.

Finally, when students are able to interact successfully with their peers and are accepted as fellow students, their feelings about themselves improve, as does their performance (Ames & Ames, 1976).

Generalizability

The findings of this study have an influence beyond the limits of the study itself. First, because the students involved in the study were from regular classrooms, it can be concluded that the

findings will hold true for a large proportion of normal high school students and may be implemented successfully in most classrooms. Second, if the teaching of social skills proves advantageous for normal high school students, it might prove to be appropriate for any population of learners. Finally, the concept of teaching group skills and group roles is applicable in all content areas of education and training where the transmission of knowledge is a desired outcome.

Hypotheses

The researcher's primary purpose in this study was to examine the effects on students' achievement of working in a cooperative learning situation and being taught appropriate group skills and group roles. Specifically, the writer attempted to determine whether the teaching of group skills and group roles promotes higher achievement.

The following hypotheses, stated in the null form, were tested in this study:

Hypothesis 1: There will be no significant difference between the mean scores of students in the economics classes who received social skill and group role training and the mean scores of economics students who did not receive such training.

Hypothesis 2: There will be no significant difference between the mean scores of students in the chemistry classes who received social skill and group role training and the mean scores of chemistry students who did not receive such training.

Hypothesis 3: There will be no significant difference between the mean scores of the combined group of economics and chemistry students who received social skill and group role training and the mean scores of the combined group of economics and chemistry students who did not receive such training.

Hypothesis 4: There will be *no* significant difference between the total mean scores of female students who received social skill and group role training and the total mean scores of male students who received such training.

Purposes of the Study

Current researchers have pointed out the benefits of cooperative learning in all content areas and at all grade levels. While the teaching of group skills and group roles has been strongly suggested, very little evidence has shown that teaching these specific skills enhances or promotes greater achievement. The time consumed teaching these skills might be put to more effective use if they are not essential ingredients of the cooperative learning program.

In this study the researcher gathered and analyzed data from eight groups of high school students to discover the effects of directly teaching group roles and group skills. The eight groups were:

1. Students enrolled in four sections of a required economics class.

2. Students enrolled in four sections of an elective chemistry class.

Data were gathered from the eight classes at the same high school. All students' achievement was assessed by the same criterion-referenced teacher test for each subject area.

Definition of Important Terms

Competitive classroom structure. The teacher structures lessons so that students work against each other to achieve a goal that only one or a few students can attain. Students are graded on a curve, which motivates them to work faster and more accurately than their peers (Johnson & Johnson, 1987). This fosters a negative interdependence among students' goal achievements, and students perceive that they can obtain their goals if and only if the other students in the class fail to obtain their goals (Deutsch, 1962).

Cooperative learning. Cooperative learning strategies require that the teacher assign students to heterogeneous groups. Groups are then assigned various tasks, and students within the groups work cooperatively to learn the material.

Face-to-face interaction. Interaction patterns and verbal exchanges that take place among students in carefully structured cooperative learning groups. Oral summarizing, giving and receiving explanations, and elaborating are important types of verbal interchanges.

Group processing. Giving students the time and procedures to analyze how well their groups are functioning and how well they are using the necessary group skills.

Group roles. The functions assumed by individuals within the group; a representation of a certain characteristic.

Group social skills. Social skills needed to collaborate effectively with each other. Skills proposed are communication,

leadership, trust, decision making, consensus, and conflict management.

Individualistic classroom structure. The teacher structures lessons so that students work by themselves to accomplish learning goals unrelated to other students. Students seek an outcome that is personally beneficial and ignore as irrelevant the goal achievement of other students (Johnson & Johnson, 1987).

Levels of cooperative skills:

Forming. Skills directed toward organizing the group and establishing minimum norms for appropriate behavior.

Functioning. Skills directed toward managing the group's efforts to complete their tasks and maintain effective working relationships among members.

Formulating. The set of skills necessary to provide the mental processes needed to build deeper understanding of the material being studied, to stimulate the use of higher-level thinking, and to assure mastery and long-term retention of the material.

Fermenting. Fermenting requires the skills needed to stimulate reconceptualization of the material being studied, cognitive conflict, the search for more information, and the communication of the rationale behind one's conclusions.

Processing. The ability to discuss, describe, and reflect on the use of the group skills used and the roles played in order to improve the group's performance.

Positive interdependence. Designing a lesson so that students need each other in order to complete the group's task. Positive

interdependence is created by establishing mutual goals, having joint rewards, and sharing materials and information.

Review of Related Literature

The review of related literature includes three major areas. The first area centers on the concerns about school and the need to look at alternative methods of instruction to the "frontal teaching approach"--teacher instructing the whole class at one time--or assigning individual worksheets to individual students. The next area concerns cooperative learning and cooperative learning strategies. The final area focuses on the relationship between positive group interaction and academic achievement at the secondary level. This research includes the works of Slavin, Deutsch, Levin, Goodlad, Johnson and Johnson, Dewey, Kagan, Parker, Nevin, Mesch, Okebukola, Stanford, Roy, Webb, Kenderski, Glasser, Schmuck, Sharon, Holubec, and Nesbitt.

Cooperative learning is not a new approach. In the last three decades of the nineteenth century, Colonel Francis Parker captured the essence of true cooperation in his classroom. When Parker was superintendent of public schools in Quincy, Massachusetts, from 1875 to 1880, more than 30,000 visitors a year came to examine his use of cooperative learning procedures (Campbell, 1965). In the 1930s, John Dewey advanced the use of cooperative learning. In the 1940s, Morton Deutsch developed a theory that provided situations for cooperation and competition that has been the underpinning for

ensuing studies on cooperative learning. The renowned work of Johnson and Johnson is rooted in Deutsch's research.

Since the early 1970s, numerous studies have been conducted on cooperative learning techniques in elementary and secondary schools. These studies have focused on cooperative learning and its positive effect on improved social relations among races, ethnic groups, and high and low achievers, as well as increased productivity in problem solving and academic achievement. Most of the research has been conducted at the elementary level (Newmann & Thompson, 1987). Because secondary schools differ from elementary schools and because the behavior of high school students may differ from that of elementary students, it is important to note within the research literature those studies that have focused specifically on the secondary level.

In an investigation conducted at the National Center on Effective Secondary Schools (Newmann & Thompson, 1987), 27 studies were located that focused on grades 7 through 12. The studies met the following criteria: an experimental treatment that involved cooperative tasks and a group product or group reward structure, the use of a control or comparison group, a sample of at least 20 students, a duration of at least two seeks, and individual testing of student achievement. Most of the studies occurred in grade seven; the most successful studies happened at the eighth and ninth grade levels. The researchers pointed out a glaring need for more review, particularly in grades 10 through 12.

Newmann and Thompson also stated that future researchers should pay more attention to the interactive effects of method, level of thought, student background characteristics and status within a group, group roles, and the importance of teaching group social skills. In the present study, the focus was on group roles and the teaching of group social skills.

Summary and Overview

"Cooperation is basic to all human interaction and provides the context for competition and individualization; cooperation is the forest; competition and individualization are but trees" (Johnson & Johnson, 1975). For many years, educational institutions have permitted and even encouraged classroom goal structures to be competitive and individualistic. During the last 20 to 30 years, the pendulum has begun to swing back to include cooperative goal structures as well as competitive and individualistic structures. Many researchers have proved the effectiveness of using cooperation in the classroom. Results have generally shown higher achievement, improved relationships, and a better attitude toward school.

Many of the studies have been conducted at the elementary level. There is a concern that secondary students might not profit as much from cooperation in learning activities because these students have already seen that they can get further ahead by being competitive and by attaining their own individual goals. This researcher postulated that cooperative learning is as effective in secondary schools as in elementary schools. Perhaps even more

important than its effectiveness is its necessity, particularly for the future of the United States. Students are not born knowing how to cooperate and how to be effective group members. They need to be taught the values, habits, knowledge, attitudes, and skills necessary to fill their adult roles and to live rewarding lives in an information age that will require adaptation and the ability to problem solve and work together.

This dissertation is divided into five chapters. Chapter I consisted of an introduction, a description of the problem and importance of the study, the hypotheses and purposes of the study, and definitions of key terms.

In Chapter II, selected literature is reviewed. The focus is on cooperative, individualistic, and competitive learning methods of instruction, and the effects of these methods on academic achievement.

Chapter III contains a discussion of the study design, the population and sample, instrumentation, procedures, and methods used in analyzing the data.

The findings of the study are presented in Chapter IV.

Chapter V includes a summary of the study, conclusions, and recommendations for further research.

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

Since the early 1970s there has been a growing body of research literature on the use and effect of cooperative learning techniques in schools, with the predominant research occurring at the elementary level. Because secondary schools and students differ notably from elementary students and programs, it is imperative to take a special look at cooperative learning research done at the secondary level. Adolescent behavior and motivation may differ dramatically from that of elementary students and may, therefore, accentuate or decrease the effect of cooperative learning. The structure of education at the secondary level is no longer a debatable issue; education is at the threshold of a new era. Sizer (1984) stated that the basic structure of high schools has not changed in nearly a century, and, as a result, most secondary schools no longer serve their purpose well.

The writer's goal in this chapter is to build an argument to show the relevance of all the components needed for the implementation of successful cooperative learning. The review of literature is presented under the following headings: Need for Change, Cooperative Learning, Cooperative Learning Techniques, the

Effect of Cooperative Learning on Achievement, and the Need for Further Research.

Need for Change

As a society, America has passed through the agricultural era and the industrial revolution and has entered the information age. Unfortunately, education has not kept up with the changes, and many students are being prepared for jobs that no longer exist and are not acquiring the academic and social skills needed to be successful in today's world (Toffler, 1974). Schools for the twenty-first century and beyond need radical reform in structure and curriculum design to meet the demands of communication, problem solving, ability to cope with change, and higher-level thinking ability. The world today and in the future does not require people to stand on an assembly line and do whatever they are told. Instead, it demands workers who can solve problems, work with technology, and inform each other of strategies and innovations.

Slavin (1981) proposed that human beings have been successful as a species because they are able to apply their intelligence to cooperating with others to accomplish group goals. No matter where one looks in society, one sees evidence of cooperative groups--families, neighborhoods, work groups, political parties, and teams. Each of these groups, whether consciously or unconsciously, needs and depends on each other to accomplish a common goal.

If schools are to prepare students to assume adult roles, it would seem logical that they would teach cooperation. Yet

cooperation and group dynamics are *skills* that are often ignored or, even worse, discouraged, particularly at the secondary level. Goodlad (1984) found, in his observation of more than 1,000 classrooms, that students in a class were predominantly lumped together as one mass and that they essentially worked and achieved alone. One has only to look at some of the national reports on student achievement to realize that this has not been an effective way to prepare youths for the adult world.

In a national report issued in 1983, entitled A Nation at Risk: The Imperative for Educational Reform, three salient issues are discussed. The prominent issue is that the nation is at risk because competitors throughout the world are overtaking America's once unchallenged lead in commerce, industry, science, and technological innovation. Although a variety of factors might be responsible for this change, one cannot dispute the role education plays in this arena. Many researchers have verified that within the past decade the mathematics and science achievement scores of American students have been failing when compared to those of students in other countries (Stevenson, 1983; Walberg, 1984). Part of the reason for this failure is that, in many classrooms, students do not have to think or reason; they just have to get the right answer.

As Goodlad (1984) studied 525 high school classrooms, he found that teachers spent 70% of the instruction time talking. They outtalked the entire class of students by a ratio of three to one. It has long been known that the person who does the most thinking and

processing is the one who can put new information into his/her own words and then share with someone else. Therefore, the person doing the talking is usually doing most of the thinking and processing. Goodlad's research points out the need for students to do more of the processing. Goodlad further noted that barely 5% of the instructional time was designed so that students felt an accountability to respond; less than 1% of the time were they required to provide an open response involving reasoning or expressing an opinion. One can understand why mathematics and science scores on achievement tests are deteriorating as students are not held accountable for thinking at higher levels, but most often are encouraged to sit and listen and reiterate the teacher's words. Many teachers encourage short-term memorization of basic facts and discourage higher-level thinking and problem-solving skills, which are needed in the transfer of information.

Glasser (1987) pointed out that teachers cannot raise students' scores on achievement tests. Teachers can only teach in a way that makes students want to learn. When students learn, they will do well on the test. Cooperative learning encourages teachers to allow the students to do the thinking and learning.

A second issue from the report A Nation at Risk deals with not having higher expectations for all students. It has been said that educators today are accepting mediocrity, not excellence. Employers are complaining that many graduates today do not have the skills needed to be a successful employee. Many states are trying to

address this concern by requiring that students pass an employability-skills test before a diploma is issued. While basic skills are certainly a part of this test, there is also an emphasis on social skills, responsibility, and the ability to get along with other people.

Hodgkinson's (1988) demographic research pointed to an aging white population, increasing minorities, and poverty among the young. Families with a working father, a housewife mother, and two school-age children now comprise only 7% of the population. Hodgkinson also pointed out that in the 1920s there were about 14 million immigrants, mainly from Europe. In the 1980s, there were more than 14 million immigrants, 80% of them from South America and Asia. Some of these immigrants have no formal education. It is difficult for a teacher to have high expectations when he/she has difficulty communicating with all the diverse children in the classroom.

Goodlad and Oaks (1988) stated that there are no quick-fix answers, but if the American public and policy makers hope to retain the notion of a common school, much about the schools themselves must be changed. The authors believed that the typical classroom pattern of children of the same age engaged in competitive, whole-group instruction needs to be changed to students clustered in small groups, exchanging ideas and helping each other learn.

The third issue from A Nation at Risk was the message that American schools must and can do better. The research, resources, and desire to do better exist throughout the nation. It will take

educators committed to applying the research and restructuring current practices to make the change. When new paradigms replace old ones, a great deal of risk is involved. Combs perhaps stated it best when he wrote, "Sometimes you can sell more papers by shouting louder on the same corner, but sometimes it's better to find another corner." Old assumptions for educational reform have governed the strategies for the past several years, with discouraging results. It may be time to change some of the old paradigms. In the present study, the writer examined one instructional technique that has produced positive results. A recent meta-analysis by Johnson, Maruyama, Johnson, Nelson, and Skon (1981) revealed that instruction that focused on cooperation and collaboration resulted in significant gains in students' achievement, self-esteem, and social development.

Cooperative Learning

In the 1950s, Deutsch (1962) formulated a theory of how students can interact with each other as they learn. He described three structures that can be used in a classroom: cooperative, competitive, and individualistic. In an individualistic classroom structure, there is no relationship between individuals' goal attainments (Wood, 1987). Many teachers today frequently operate under this method. They discourage students from sharing ideas and working with each other to solve a problem. In fact, Staub (1971) found that American children often believe that helping a person in trouble is cheating and inappropriate. In individualistic learning,

what students do is accomplished independently of others. Students seek goals that are of personal value only and take little interest in the accomplishments or failures of their peers (D. Johnson et al., 1976). Ames and Ames (1978) believed that children learning under an individualistic structure perceive learning to be a form of competition and that competition may even be with the self.

In a competitive classroom, individuals can achieve their goals only when others are not achieving their goals (Johnson & Johnson, 1975). This kind of an atmosphere forces students to work in direct opposition to one another. Grading is often done on a curve, and students, particularly at the secondary level, learn that they can be winners only if others fail. Many times this causes a perplexing problem for adolescents as they do not want to be held in poor regard by their peers. Coleman (1959) found that this grading structure tended to promote mediocre results. The group tends to hold down the efforts and achievement of those who excel, so the effort group members must expend to maintain their rank in the class is reduced. This causes peer pressure, which may lead to a situation in which students become apathetic, fail, or eventually drop out (Green & Riley, 1963).

In a cooperative classroom there is positive interdependence among students' goal attainments; students perceive that they can reach their learning goals if and only if the other students in the learning group reach their goals (Deutsch, 1962; Johnson & Johnson, 1975). In a cooperative classroom, students actually process the

material with each other. They discuss the information together, try to help one another understand the information, and encourage each other to work hard.

There are a number of differences between putting students together in groups to accomplish a task and actually structuring cooperative learning groups. The most salient differences are discussed in the following paragraphs (Johnson & Johnson, 1975; Johnson, Johnson, Holubec, & Roy, 1984).

Cooperative learning groups have goals that are structured so that students need to be concerned about the performance of every member on their team, as well as their own performance. Students must sense that they are positively interdependent with other members of their group. This is achieved by setting mutual goals; dividing labor; apportioning resources, materials, or information provided to the group; assigning different roles for group members to maintain; and giving joint rewards.

In traditional grouping patterns, students often are not held accountable for their individual work or for contributing to the rest of the group. Often, students who do very little and those who monopolize the group receive the same reward. In cooperative learning, there is a clear individual accountability, in which students' mastery of the assigned material is assessed individually, while receiving feedback throughout the assignment as an individual, as a group member, and as a total group. In this way, group members can see whom they need to help or encourage. For the group to be

successful, all group members are accountable for individual mastery of the material.

In cooperative learning groups, the students are heterogeneous in terms of ability. In addition, ethnicity, gender, and other personal characteristics should be taken into consideration so that there is a mix of each in a group.

In cooperative learning groups, social skills and roles are directly taught, practiced, and then implemented. All members share responsibility for performing leadership actions in the group. In addition, cooperative learning requires that all students appropriately use interpersonal and small-group skills. In the past, students were often put into groups and told to cooperate, without being taught the necessary skills. Students need to be taught the needed collaborative skills and be motivated to use them. When American students have been placed in experimental game situations in which valued rewards can be obtained only through cooperation, they have not fared well. In studies conducted with American students from second grade through college, nonadaptive competitiveness instead of cooperation has been observed (Edney & Harper, 1978; Kagan & Madsen, 1971, 1972; Madsen & Shapiro, 1970). Students' failure to adopt cooperative behaviors when needed can be related to the absence of cooperative skills being taught and learned by the students throughout their schooling.

A final difference between cooperative learning and just putting students together in groups to work is the role that the teacher plays. The teacher observes the groups, analyzes the

problems they have working together, and gives feedback to each group as to their effectiveness. In addition, the teacher structures procedures and time for students to process how effectively they are working together. It is in this processing that the students internalize the critical attributes of cooperative learning and plan how to use their collaborative skills more effectively.

Cooperative Learning Techniques

Since the early 1920s there has been considerable research on cooperation, but research on specific cooperative learning methods dates back only to the 1970s. At about that time, four groups of researchers began to evaluate classroom applications of the principles of cooperative learning. The initial groups consisted of Slavin, DeVries, Edwards, and other researchers at Johns Hopkins University; Aronson and his colleagues at the University of California at Santa Cruz; David Johnson and Roger Johnson at the University of Minnesota; and a group of researchers at the University of Tel Aviv in Israel. Each group developed and evaluated practical cooperative learning methods. Although cooperative learning techniques were developed initially for college and adult education, most of the research occurred at the elementary level (Slavin, 1982).

As cooperative learning strategies became more prevalent in schools during the 1970s and 1980s, so did the research literature. The body of literature at the secondary level, however, has remained

sparse. Five major techniques that have been investigated in grades 7 through 12 are summarized and discussed in this review. Each technique involves a traditional classroom of one teacher and a group of students, organized into heterogeneous ability groups of four to five students working together to accomplish a learning task. In addition, each technique emphasizes the need for teaching social skills. By integrating a variety of these techniques in middle-level and high school classes, teachers can capitalize on the social needs of this age group.

Strong peer affiliation is instrumental in helping adolescents mature socially, emotionally, and cognitively (Georgiady, Heald, & Romano, 1973). In a study conducted in London, it was found that the social organization of the school, not the buildings or resources, had the major influence on secondary students' attitudes and behavior (Rutter, 1979). This researcher proposes that the most effective schools communicate an ethos of caring in an atmosphere that encourages and values both individual thinking and mutual cooperation.

The need to teach group skills and group roles both inside and outside the classroom is a universal one. Ouchi (1981) said in his description of the Japanese corporate structure, "everything important in life happens as a result of teamwork or collective effort" (p. 42).

The techniques that foster the skills needed to accomplish effective teamwork include students within teams helping one another

to understand the material presented and recognition of teams that show high individual growth (Student Teams-Achievement Divisions); students helping one another learn material, and earning points by competing against other students of equal ability (Teams-Games-Tournament); small groups working together in which each group takes a different task or project (Group Investigation); small groups working together that create a group project without competition between groups (Learning Together); and students specializing in specific information on a topic, working with members of other teams to understand the specific area, and then returning to their teams to teach their topic to their group members (Jigsaw).

The organization of the learning tasks, the ways in which achievement is monitored, and the types of rewards given for individual and group performance vary with each technique. All are based on social-psychological research and theory originating at the beginning of the twentieth century. The descriptions below focus on each of the above-mentioned techniques most prevalent in secondary settings.

Student Team-Achievement Divisions (STAD) have been used in almost every content area. STAD is most appropriately used when teaching well-defined objectives with single right answers (Slavin, 1987).

The salient concept behind STAD is to motivate students to encourage and help each other master skills presented by the teacher. If students want their team to earn team rewards, they must help their teammates learn the material and improve their base

score. It becomes the responsibility of each member to assist the others to ensure that all have mastered the assigned task and, therefore, each team member can score higher on the final quiz.

Although students study together, quizzes and tests are taken and scored individually. Each person must know the material. This individual accountability motivates all team members to do a good job studying with each other because the team's success depends on mastery of the required information or skills by individual members. Team scores are then based on students' improvement over their own past records, thereby allowing for all students to contribute to the team effort. The team with the most improved scores can be rewarded extrinsically if so desired by the teacher. Many teachers recognize winning teams by articles placed in the school paper or by giving special privileges to the team members.

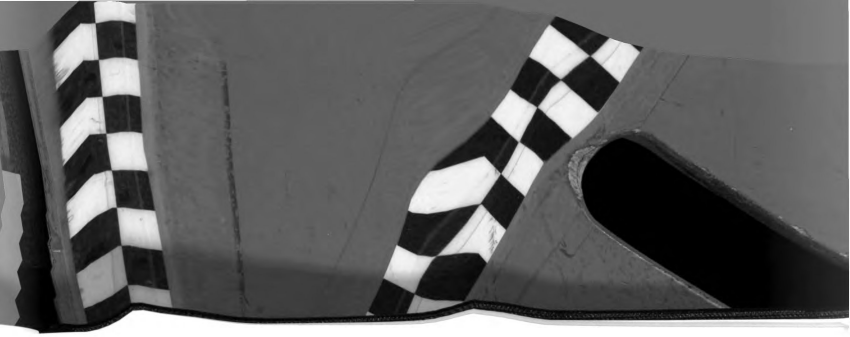
Teams-Games-Tournament (TGT), originally developed by David DeVries and Keith Edwards of Johns Hopkins University, functions in a manner similar to Student Teams-Achievement Division (DeVries & Slavin, 1978). Team-Games-Tournament focuses on reward interdependence, as students combine cooperative activities in their heterogeneous teams with appropriate competition against students who are of similar ability, as indicated by past performance, from different teams. The initial lesson presentation and practice format are identical to the STAD technique. But instead of taking individual quizzes, students compete with classmates of similar achievement from other teams. This equal competition makes it possible for

students of all levels to contribute maximum points to their teams if they do their best. Once again, while teammates can help one another prepare for the games by studying and working together, they cannot help them during the competition, thus ensuring individual accountability.

Group Investigation was developed by Shlomo Sharan (1976) at the University of Tel Aviv. This technique is a general classroom organization plan in which students work in small groups using higher-level thinking skills such as inquiry, synthesis, and inferences as they cooperatively plan a group project. In this method, students form their own two- to six-member teams. Students choose a subtopic from a unit being studied, and the group further breaks down their subtopics into individual tasks, then performs the activities needed to prepare group reports. Each group makes a presentation or display to share its findings with the entire class.

David Johnson and Roger Johnson (1975) at the University of Minnesota developed the Learning Together model of cooperative learning. The methods they researched involve students working together in four- or five-member heterogeneous groups on assignment sheets. Each group hands in a single sheet and receives praise and rewards based on the group product. Students can be given an individual test to promote individual accountability to show mastery of the material.

Jigsaw was originally developed by Elliot Aronson (1978) and his colleagues. Students are assigned to five- or six-member teams. The academic material being studied is broken down into five or six



specific sections. Each team member becomes responsible for learning one of the sections. Next, members of different teams who are studying the same sections meet in "expert groups" to discuss their sections. Then the students return to their teams and take turns teaching their teammates about their sections. Because the only way students can learn about other sections is to listen carefully to their teammates, they are motivated to show interest in one another's work.

In a variation called Jigsaw II, all students are first given common information (Slavin, 1980). Then student "experts" teach more specific information to the group. Finally, students take tests individually, and team scores are published and recognition can be given to outstanding teams or to individual students who have made significant contributions to the team effort.

All of the techniques encourage students to help one another to learn, and all aim to promote both achievement and improved social relations, but there are significant differences in methods that reflect differences in theoretical perspective and educational philosophy. For example, STAD and TGT place more emphasis on individual testing of specific identified academic material and on individual and group competition to improve scores. In comparison, Learning Together and Jigsaw place more emphasis on internal student interest and desire to cooperate and on teacher reinforcement of the group skills that produced positive results. Group Investigation is

the most open-ended form and encourages students to foster and direct their own learning.

Many studies have emphasized student improvement in several arenas, including student achievement, cross-ethnic relations, social skill development, group process, and self-esteem (Kagan, 1983). Divergences among the methods may contribute to varying outcomes. However, the differences may be attributed to the emphasis placed on individual achievement and accountability versus group productivity and social understanding. STAD and TGT emphasize ways in which students' competitive motivation can be positively focused to compete with one's own previous achievement and with other peers at a similar level. Occurring simultaneously is the motivation one derives from and contributes to a group effort, which itself is driven by the excitement of group competition (Newmann, 1987). The final reward is individual achievement, along with improved social relations among students who have learned to work together as a team.

An opposing point of view is often found in the research literature that advocates cooperative learning largely as a way to diminish negative forms of individualistic and competitive behavior. Instead, cooperative learning should enhance skills in cooperative behavior, pride in group productivity, and students' ability to get along with members from diverse social backgrounds (Lazarowitz, 1985). Implementing this philosophy in today's competitive secondary schools requires, for most students and teachers, a commitment to turn away from past practices toward a more

cooperative way of life. Therefore, successful implementation of the method will require acquisition of not only the technique being used, but also training in new skills of social interaction and group roles.

These basic differences have been the subject of many research studies. Johnson and Johnson (1975, 1985) focused many of their studies on the distinctions among cooperative, competitive, and individualistic goal structures. Slavin (1983) supported a cooperative task structure that demands cooperation to complete a given task, a cooperative reward structure in which individuals are rewarded for group accomplishments, and individual accountability.

There has been very little research at the secondary level that has focused on the importance of teaching the required social skills and group roles. Within the past decade, due to an increased interest in cooperative learning as a technique, more research literature has become available. The majority of the research has centered on the development of games and simulations to facilitate integration, desegregation, and providing equal opportunity for all students (Sharan, 1980). The results of the research on cooperative learning have indicated potential for increased learning efficiency over the more traditional methods (Johnson & Johnson, 1980; Sharan, 1980; Walberg, 1984).

The Effect of Cooperative Learning on Achievement

A review of the research on the effect of cooperative learning on academic achievement in grades 7 through 12 produced 27 reports

of valid studies, involving 37 comparisons of cooperative versus control methods. This researcher considered studies to be valid when they involved an experimental treatment that included cooperative tasks and a group product or group reward structure, the use of a control or comparison group, a sample size of at least 20 students, a span of time that was at least 10 school days in length, and individual testing of student achievement.

These studies that were found involving grades 10 through 12 are summarized in Table 2.1. Table 2.2 includes background information on the four studies for grades 10 through 12. Most of the studies used classes that were already established and randomly assigned students to the various treatments. To control for teacher effects, the researchers randomly assigned teachers to methods or required teachers to use more than one method. The majority of the studies were conducted in grade 7, but studies in grades 8 and 9 have had the highest success rate. Grades 10 through 12 have had the least amount of research and the lowest rate of success. Science is the area that has been studied most frequently, but the success rates of mathematics and English have been the highest. The technique of STAD offers the most comparative studies and has shown the most successful results.

The lack of research at the higher secondary levels makes it difficult to form a sound judgment about cooperative learning techniques at this level. There are a number of reasons for the lack of research at higher secondary levels. It may be that many

Table 2.1.--Grade 10-12 cooperative learning studies.

Authors	Subject	N	Length	Technique Used	Effect
DeVries, Edwards, & Wells (1974)	Amer. History	191	12 weeks	Team-Games-Tournament	+
Johnson & Johnson (1984)	Mathematics	31	3 weeks	Learning Together	+
Lazarowitz, Baird, Hertz-Lazarowitz, & Jenkins (1985)					
Experiment 1	Biology	113	6 weeks	Jigsaw*	0
Experiment 2	Geology	83	3 weeks	Jigsaw*	0
Experiment 3	Genetics	69	2 weeks	Jigsaw*	-
Sherman & Zimmerman (1986) (Grade 10 only)	Biology	46	7 weeks	Group Investigation	0

Key: + = An effect favoring the experimental treatment (cooperative learning) at the .05 level of significance.

- = A difference favoring the control group.

0 = No difference.

*Modified version used. Students used an inquiry approach covering a wide range of material. They worked almost independently, and this was the only form of instruction.

Table 2.2.--Background information.

Study	Student Information	Teacher Training	Location
DeVries, Edwards, & Wells (1974)	7% minority	6 hours plus occasional follow-up	Suburban South
Johnson & Johnson (1984)	Diverse, metropolitan, 6 handicapped	60 hours	Midwest
Lazarowitz, Baird, Hertz-Lazarowitz, & Jenkins (1985)	Exp. 1: Low motivation, mainstreamed	None	Rural West
	Exp. 2: Low motivation	None	Rural West
	Exp. 3: Heterogeneous	None	Rural West
Sherman & Zimmerman (1986) (Grade 10 only)	White, middle-class, above average	No information	Rural Midwest

secondary teachers do not believe that students aged 15 to 18 are motivated by the rewards offered by cooperative learning. Many high school classes, as mentioned earlier, are not designed for cooperation, but rather are designed for competitiveness or individualism. As competition for grades and ranking increases, many students may value individual achievement over group cooperation. It may be that teachers at this level assume that students already have the necessary skills, expertise, and knowledge to work cooperatively. High school teachers who feel pressure to "cover" the curriculum think they cannot expend additional time teaching students how to be effective team members and to cooperate in the learning process. In addition, many teachers may believe they do not have the time to devote to additional training and practice, particularly with a technique that has not yet been proven to be advantageous. Davis (1985) reported resistance to cooperative learning techniques by high school teachers, and Sharan et al. (1984) reported resistance by junior high teachers.

As with any new technique, one might expect failure along with success. Changing paradigms requires great commitment, fortitude, and the ability to look at failures as a way of learning what could be successful. It would be unfortunate if secondary school teachers rejected what has been a successful method at other levels on the basis of such limited research. Upon close examination of the four studies in Table 2.1, it can be seen that three used Jigsaw, which has had many unsatisfactory results at the lower grade levels as well. The other study, according to the authors (Sherman &

Zimmerman, 1986), failed mainly because the experiment was conducted in the final weeks of the school year. Students had established their friends, study methods, and class norms and thereby resisted change in their rooms. In addition, there is no evidence that the teachers were assisted with special training in any of these studies.

It is important to remember that the pattern of results for all 27 reports showed that 25 of the comparisons favored a cooperative learning method at the .05 level of significance. In addition, some researchers have found benefits in affective behavior, cross-racial and ethnic friendships, and attitudes toward learning (Cohen, 1986; Johnson et al., 1984; Slavin, 1986).

The Need for Further Research

Current cooperative learning techniques differ in various ways, and these variations influence group processes and academic measures. The positive effects of cooperative learning methods on a variety of student outcomes have not been found for every method or in every study (Slavin, 1982). Therefore, there is a need to analyze the effects of specific elements within the cooperative learning structure.

Past researchers have treated cooperative learning techniques almost as an inclusive set of techniques. To date, there has not been much empirical research on the numerous variables that compose the salient elements of cooperative learning. For example, one of the important elements is face-to-face interaction; if it is a

critical element, one should task analyze what skills are necessary to carry out the task of face-to-face interaction and proceed to teach it to the students. As Johnson et al. (1984) pointed out, "there is no magic in positive interdependence in and of itself. It is the interaction patterns and verbal interchange among students promoted by the positive interdependence that affect education outcomes." Having documented the positive effect cooperative learning can have on student outcomes, researchers must now aim for better comprehension of the methods that achieve their outcomes.

At the secondary level, it is critical that future researchers pay attention to the interactive effects of method, level of thought, the social skills necessary to be successful, student roles, and student status within the group. As noted earlier, American educators need to develop alternative strategies and techniques to equip students to face the changing world. Cooperative learning, implemented effectively, may be part of what is needed to restructure and prepare tomorrow's leaders.

Summary

This chapter focused on cooperative learning. The evidence suggests that cooperative learning can have a positive effect on academic achievement. In addition, there have been positive benefits to affective aims of education, cross-racial and ethnic friendships, and positive attitudes toward learning. It is also evident from the scarcity of practical, valid classroom studies at the tenth- to twelfth-grade level that more research is needed to

provide a practical framework that will encourage wider implementation at that level.

CHAPTER III

DESIGN OF THE STUDY

Introduction

This chapter contains a description of the population from which the sample was procured, the procedures for data collection, and the method of data analysis. In addition, the researcher addresses the ethical considerations of the study, states the testable hypotheses, and describes the statistical procedure that was used to analyze the data. This study was designed to examine the effects on the achievement of students who have worked in a cooperative learning structure and have been taught appropriate group skills and group roles.

The steps involved in the design of the study began with the selection of a sample population of high school students who could participate. This was followed by selecting the specific high school and classes in that high school. Next was the selection of the teachers in that school who would be willing to plan their classes for cooperative learning and receive appropriate training. The specific subjects and sections were selected, the cooperative learning methods chosen, the social skills and groups roles identified, and the experimental time period established. The

measure of student achievement was determined to be a teacher-made unit test.

Population and Sample

The population was purposely taken from a large high school in Grand Traverse County. This community is located in the northwest portion of the lower peninsula of Michigan.

Grand Traverse County is one of the fastest growing areas in the Midwest. It is a diverse community, best known for its scenic beauty and quality of life. These factors contribute to making this city one of the leading tourist destinations in the Midwest. Obviously, an area like this attracts people, both those who wish to visit and those who wish to relocate. Tourism, therefore, is one of the largest industries. With tourism come new jobs, but many are in the minimum-wage category.

The quality of life and environmentally desirable living conditions attracted many people to relocate even when jobs, especially well-paid ones, were not available. This caused an abundance of workers. When there is a large labor supply, wages are frequently depressed.

The area also attracted a much larger number of retirees and senior citizens than might be typical, due to a number of factors mentioned above. Although this population does not affect the labor market, it does have an influence on the need for greater services, especially those related to older citizens. The area has a unique number of health service and legal professionals. There are more

than twice the number of physicians and lawyers per capita than one finds in a typical Michigan community.

A number of the above-mentioned factors contribute to a picture of affluence. Although the community has its share of persons of independent means, it is well balanced with persons who have a moderate income. This is evidenced by a nearly 20% eligibility among K-12 students for school lunch subsidy programs. The welfare case load is typical of the population of the state. The Chapter I federally funded school program in the district serves well over half of the schools. This community is a balanced one, with typical divisions of lower-, middle-, and upper-class families.

The desirable living conditions contribute to relatively high property values. This is especially true of property built on the hundreds of miles of shoreline of both Lake Michigan and high-quality inland lakes. The area contains perhaps the largest collection of second or vacation homes owned by Michigan residents. With current Michigan school finances hinged on property values, the school district enjoys a rather sound financial base. The community also has a strong positive reputation regarding support of school millage levies.

This community is served by a single high school, which contains grades 10, 11, and 12. The current school population is approximately 2,200 students, with anticipation of significant growth in the next few years. In fact, there has been considerable planning for the establishment of a second high school in the community. This is one of the largest high schools in Michigan.

Included in the high school population is a relatively small non-Caucasian population, made up primarily of Native Americans. These students typically comprise 1% to 2% of the school population.

The school offers a comprehensive instructional program, concentrating on preparation for additional studies after high school. Nearly two-thirds of the students move in that direction following graduation.

The large enrollment, along with the community support and positive educational philosophy, allows the high school to offer a strong academic program as well as a successful co-curricular program. The school can offer the fourth or fifth year of foreign language training, always having sufficient enrollment to make it cost efficient. The music and athletic programs enjoy one of the best reputations among all schools in the state.

The school program is diverse, providing an effective computer education curriculum as well as a strong business and vocational education program. To serve those students who find it hard to succeed in a traditional setting, there are two alternative school programs that enjoy a good reputation.

The sample population for this study came entirely from the students in this high school in Grand Traverse County. It can be assumed that, given the diverse nature of the community as described above, the students in the high school represent a typical nonmetropolitan-area high school population. It can further be assumed that a random sample of students from this high school at

any grade level would be typical of students in any nonmetropolitan-area high school.

Because of the nature of training and innovative instructional methodology that were required in this study, it was necessary to seek volunteers from the faculty at the high school. For example, the instructors needed to be competent in cooperative learning strategies or willing to take the time for this training. Further, it was necessary to use some class time for instruction in group roles and group social skills rather than traditional content. To select teachers who met these criteria, the initial contact was made with the high school principal. He agreed to seek clearance from school district officials for the study, to make staff aware of the study, and to identify interested staff members.

It was desirable to include different kinds of classes in the study to broaden the base of students involved. The researcher decided to use two teachers. The first taught four sections of economics, a required course for eleventh graders. The second teacher taught an elective course, consisting of five sections of second-semester chemistry. The economics classes were set up on a random basis by a computer scheduling program. This means that each section was heterogeneous in nature, typical of the school population. The chemistry class sections were formed by the computer on a random basis from those students who elected that course. The population typically includes 60% of the students enrolled in the high school. Generally, these are the better students with higher grade point averages, most of whom are going on

to post-high-school educational experiences. Because of the random-selection process, each chemistry section is essentially comparable to other sections. However, they are neither representative of the total student body nor totally heterogeneous in nature because most of the time lower-achieving students do not elect to take the course.

The inclusion of both a required course and an elective upper-level class was purposely done to determine which students would profit more from the cooperative learning technique prescribed in the study.

Procedures

The procedures of this study included training the teachers, setting up experimental and control groups, instructing students in social skills and group roles, preparing the content unit of instruction using cooperative learning instructional strategies, and collecting and analyzing the data.

Training the Teachers

The two teachers who volunteered to participate in the study had several years of experience with these subjects at this age level. Both were male and held tenure status. The principal considered both to be effective teachers. Over the past several years, the two teachers had attended workshops involving various components of professional-development programs. Both had participated in a 30-hour Instructional Theory Into Practice (ITIP)

workshop. Both were familiar with the concept of cooperative learning but had had very little formal training in such strategies. Their willingness to participate was evidence of their own interest in learning how to use cooperative learning in the classroom.

The training of the teachers was done by the researcher, who had had more than 100 hours of official cooperative learning training, much of it with the Johnson and Johnson team. The researcher had also presented more than 20 multi-day cooperative learning workshops for teachers and administrators in Michigan.

The teachers preferred one-to-one training, nearly all of which took place before the start of the school day. A small part of the training was scheduled during the teachers' preparation period. The initial training began with a presentation of the concept of cooperation and the advantages of teamwork. Next was a presentation of the differences between traditional small-group teaching and cooperative learning group work. Following this training, the teachers began to develop the instructional activities designed to teach students group social skills and group roles. This consisted of giving the teachers the activities, games, and simulation exercises that they would use with students to provide experiences in group work.

The teachers learned three kinds of cooperative teaming, concentrating on a method called Student Teams-Achievement Divisions (STAD). The next part of the training followed through on how to set up heterogeneous groups within each section. Daily lesson plans

were then developed, which included the social skill activities and the content instruction.

Setting Up Experimental and Control Groups

The study required the identification of class sections that were collectively equivalent in predicted achievement in that particular subject. This study took place near the beginning of the second semester. Two different methods were used to establish equivalence. This was necessary because economics is a one-semester course and chemistry is a full-year course.

All of the chemistry students had taken first-semester chemistry, but the class sections were reshuffled for the second semester. To establish equivalence, the first-semester chemistry cumulative test scores, translated into percentages, were calculated for each student. Next, a class average was calculated for each section, which established a grand mean for each of the four chemistry sections as follows:

Chemistry -1	82.41
Chemistry -2	79.79
Chemistry -4	79.27
Chemistry -5	83.40

Periods 1 and 2 were identified as the experimental groups, and periods 4 and 5 were identified as the control groups. The grand mean of the experimental group set up this way was only .24% different from that of the control group.

In economics it was necessary to use the students' previous semester overall grade point averages to determine group equivalence. Very few of the students had taken previous economics

courses. The grade point average for each student in each section was calculated, and again a grand mean was established. The mean grade point average for each of the economics class sections was as follows:

Economics -1	2.9
Economics -3	2.7
Economics -5	3.2
Economics -6	3.2

Periods 1 and 5 were identified as the control group, and periods 3 and 6 were identified as the experimental group. The difference in grade point averages between the experimental and control groups was .1, which provided equivalence for this study.

The experimental instruction for the students took place in approximately a five-week period near the beginning of the second semester. An instructional unit was planned for each of the two subject areas that would require approximately three weeks of class time for students to master the material. All content instruction used cooperative learning strategies, specifically the form called Student Teams-Achievement Divisions (STAD). STAD involves the following five steps:

1. Establishing heterogeneous groups.
2. Directed teaching activity.
3. Group practice and review.
4. Group preparation for the test.
5. Individual testing.

Within each section, control and experimental, teachers were instructed to establish heterogeneous groups of four students each.

These groups were formed by teachers listing students in rank order of predicted achievement in this content area, then setting up groups containing a high achiever, a low achiever, and two middle achievers. Thus, each small group of four had essentially the same learning potential as any other group.

The difference between the treatment of the experimental group and the control group was the instruction provided in group social skills and group roles. The experimental sections in each subject spent portions of each class period for seven days participating in group activities designed to teach the various group skills and roles (see Appendix A for activities).

Instructing Students in Social Skills and Group Roles

The basic premise of the study was that students who have been taught how to function effectively in groups will learn more when working with cooperative teams in the content unit. Two types of group skills were taught to the experimental class sections. These were group roles and social skills. The control class sections received no instruction in either group roles or social skills.

Instruction in group skills took place over a seven-day period. Ten to 20 minutes of each class each day were used for this purpose. This instruction involved selecting a number of activities requiring students to work together in small groups of three to five people. Group make-up was changed each day so that students were required to work with many different peers over the course of the seven days.

This was purposely done so that students would learn to work with a variety of peers involving different ability levels, social groups, and degrees of friendship.

The group roles taught included leader, recorder, reader, time keeper, and summarizer. With each group activity, students played different roles. Everyone, for example, functioned as a group leader at least once, as well as performing each of the other roles. Before starting an activity, the teacher reviewed with the students what the function of the leader was, and the duties and functions of the other assigned roles. The teacher monitored the groups and provided feedback to students regarding their roles, assisting as needed.

The group social skills were also taught through the same series of activities. These identified skills are the specific skills needed to function effectively as a member of a small group. The group social skills taught for this study included listening, consensus decision making, encouraging, and active participation. The method again was to select a social skill, to review with the students what was involved in using that skill in a group, and then to observe the group members using that skill during the assigned activity. Through feedback from the teacher and discussions by the group members following each exercise, students learned to use the social skills to accomplish a given task.

Content Instruction

The unit of study in each class subject for each section, whether control or experimental, covered the same content areas; all students were expected to master the same objectives. All instruction was identical for each section of the course, regardless of which period of the day the class met.

The teachers used the method of cooperative learning called Student Teams-Achievement Divisions (STAD) with all of their classes; therefore, they followed the teaching procedures recommended for this strategy. The steps include presenting a directed teaching activity to the entire class and then providing students an opportunity to practice and process the information presented in small heterogeneous groups. This is the essence of the cooperative learning strategy. The students in each small group become interdependent, and each student in the group is equally accountable for the content regardless of ability level. Small-group members work together doing the review and the practice sheets, coaching each other in preparation for the unit test. The researcher's premise was that students from the experimental sections who received special instruction in group social skills and roles would function more effectively as a result of their training. To learn from each other and become better prepared for the test, students who listened to each other, shared their ideas, and encouraged each other could be expected to learn more and score better on the final test. Teachers formed the heterogeneous groups by using the method they had learned during the training period.

The content unit of study was designed to be approximately three weeks long. The teachers designed their daily directed teaching activity, as well as the practice activities for the students. The final test was designed by the teacher for the economics unit and was taken individually in both the control and experimental classes. The chemistry test was purchased from the publishing company and modified by the teacher. It was also administered individually.

Data Collection

The measure of student achievement selected for this study was a teacher-designed unit test in each of the two content areas. The economics teacher developed an exam that covered the material from the three-week-long instructional unit. The test included matching items, true-false, short-answer questions, and essay questions. It covered both divergent and convergent thinking. (See Appendix B for a copy of the test.)

The chemistry teacher used a test prepared by the publishing company of the textbook used in the course. The test covered the objectives from the three-week instructional unit. This exam contained 37 multiple-choice questions and dealt with recall of information provided by the teacher or accumulated from laboratory experiments. The teacher modifies the test from semester to semester by mixing and matching various forms of the test provided by the textbook publishing company. (A copy of the test is contained in Appendix B.)

In each case, whereas the students prepared for the exam in their cooperative learning groups, the exam was administered on an individual basis; each student was accountable for his/her own work. The exams were graded by the teacher, and the raw scores were calculated and recorded as percentage correct for each student. The mean exam scores for the experimental group for chemistry were compared with the mean scores from the control group for chemistry. The same procedure was followed for the experimental and control groups in the economics classes.

Ethical Consideration

Consideration was given to ensure that the study participants would be afforded treatment in accordance with the American Psychological Association's (1985) Ethical Principles in the Conduct of Research With Human Participants. Teachers involved in this study were volunteers. They were at minimal risk. There was no threat of physical or mental discomfort. Information provided by the students was confidential and anonymous. The test scores were listed in columns, with no individual student identification. The participants were informed that this study concerned the effect of instruction in social skills and group roles at the secondary level and that, although they were receiving additional training, it would not be reflected as part of a score for their report cards or permanent records.

Testable Hypotheses

The following hypotheses were addressed in this study:

Null Hypothesis 1: There will be no significant difference between the mean scores of students in the economics classes who received social skill and group role training and the mean scores of economics students who did not receive such training.

Symbolically: H_0: $X_1 = X_2$

Alternative Hypothesis 1: The mean scores of students in the economics classes who received social skill and group role training will differ significantly from the mean scores of economics students who did not receive such training.

Symbolically: H_1: $X_1 \neq X_2$

Legend: X_1: Classes of economics students who received training

X_2: Classes of economics students who did not receive training

Null Hypothesis 2: There will be no significant difference between the mean scores of students in the chemistry classes who received social skill and group role training and the mean scores of chemistry students who did not receive such training.

Symbolically: H_0: $Y_1 = Y_2$

Alternative Hypothesis 2: The mean scores of students in the chemistry classes who received social skill and group role training will differ significantly from the mean scores of chemistry students who did not receive such training.

Symbolically: H_1: $Y_1 \neq Y_2$

Legend: Y_1: Classes of chemistry students who received training

Y_2: Classes of economics students who did not receive training

Null Hypothesis 3: There will be no significant difference between the mean scores of the combined group of economics and chemistry students who received social skill and group role training and the mean scores of the combined group of economics and chemistry students who did not receive such training.

Symbolically: H_0: $XY_1 = XY_2$

Alternative Hypothesis 3: The mean scores of the combined group of economics and chemistry students who received social skill and group role training will differ significantly from the mean scores of the combined group of economics and chemistry students who did not receive such training.

Symbolically: H_1: $XY_1 \neq XY_2$

Legend: XY_1: Combined group of economics and chemistry students who received training

XY_2: Combined group of economics and chemistry students who did not receive training

Null Hypothesis 4: There will be no significant difference between the total mean scores of female students who received social skill and group role training and the total mean scores of male students who received such training.

Symbolically: H_0: $X_F = X_M$

Alternative Hypothesis 4: The total mean scores of female students who received social skill and group role training will differ significantly from the total mean scores of male students who did not receive such training.

Symbolically: H_1: $X_F \neq X_M$

Legend: X_F: Females who received training

X_M: Males who received training

Analysis of Data

All hypotheses were analyzed using analysis of variance. The intention was to determine whether there were statistically significant differences between the treatment means. The .05 alpha level was used as the criterion for statistical significance.

Three assumptions need to be made in using this test statistic. First, the population must have a normal distribution. Second, the population must have homogeneity of variance. Third, the observations must be independent. All assumptions were met in this study. Because the population of students came from a common pool of students, it can be argued that the students came from a population that had a normal distribution and homogeneity of variance. The students were in different classes and were chosen randomly, so independence of observation was satisfied.

Summary

The design of the study and the procedures followed in conducting the research were explained in this chapter. The researcher examined the effects on academic achievement of high school students who received instruction, practiced and processed information in a cooperative learning environment, and received social skill and group role training, as compared to students who did not have social skill and group role training. The results of the data analyses are presented in Chapter IV.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

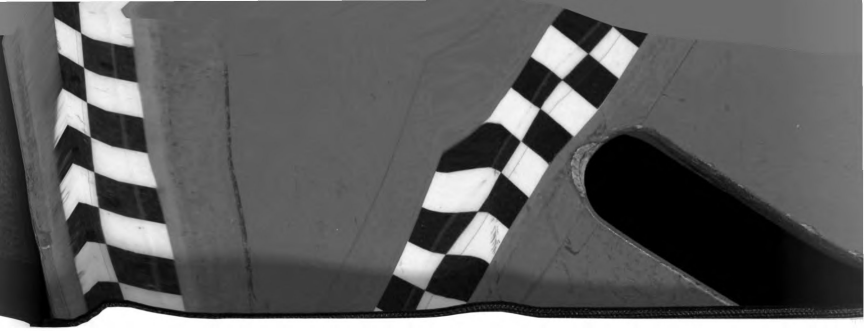
Introduction

This chapter contains an explanation of the data analyses in accordance with the research design outlined in Chapter III. A brief explanation of the statistical techniques that were used is followed by the findings for each hypothesis test and a related interpretation. First, the characteristics of the sample are discussed.

Characteristics of the Sample

The researcher examined the effects on academic achievement of students who worked in a cooperative learning structure and were given special training in effective group social skills and group roles. One hundred ninety-nine students were randomly selected from the same high school, of whom 100 received training in effective group skills and group roles.

All students were placed in heterogeneous groups. After students went through a directed teaching activity, they were expected to complete an assignment in their prearranged groups. In addition, they were expected to support and help each group member understand the material and study for the final unit test, which was designed by the teacher. Each student received an individual score



that was not related in any way to the scores of the other team members.

A summary of each hypothesis test and pertinent findings is presented in the following pages. Each hypothesis is restated, followed by the results for that hypothesis.

Hypothesis 1

> There will be no significant difference between the mean scores of students in the economics classes who received social skill and group role training and the mean scores of economics students who did not receive such training.

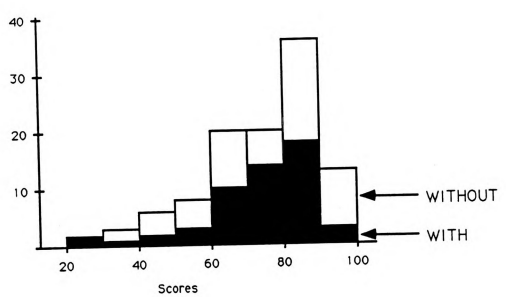
Hypothesis 1 was tested with analysis of variance. The test statistic $F = .58$ with $p = .4482$ was not below the .05 level and therefore did not show a statistically significant difference between the two means. This means there was no statistical evidence that students who received the additional training did significantly better or worse than students who did not receive the treatment. The data were not conclusive; therefore, judgment was reserved and the null hypothesis was retained. Table 4.1 shows the results of the analysis of variance for these data.

By examining the histogram below the table, it can be seen that the results obtained were asymmetrical in nature. Compared to a normal curve distribution, the scores were skewed to the higher end of the curve. More students received scores between 75 and 100 than between 20 and 75. The histogram shows how the students with and without the training performed on the final unit test. The columns are stacked on top of each other, and each column represents the total number of students in the group. Within each column the

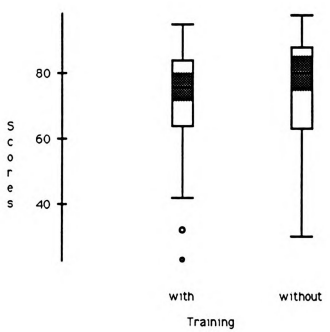
number of students who had the social skill and group role training and the number of students who did not have such training is represented. The stacked part of the histogram is not meant to be cumulative, but independent of the bottom portion of the column. The total column shows the total number of students in this particular group.

Table 4.1.--Results of the analysis of data for Hypothesis 1.

Source	df	Sum of Squares	Mean Square	F-Ratio	Prob.
Training	1	167.283	167.283	0.57956	.4482
Error	106	30595.600	288.638		
Total	107	30762.900			



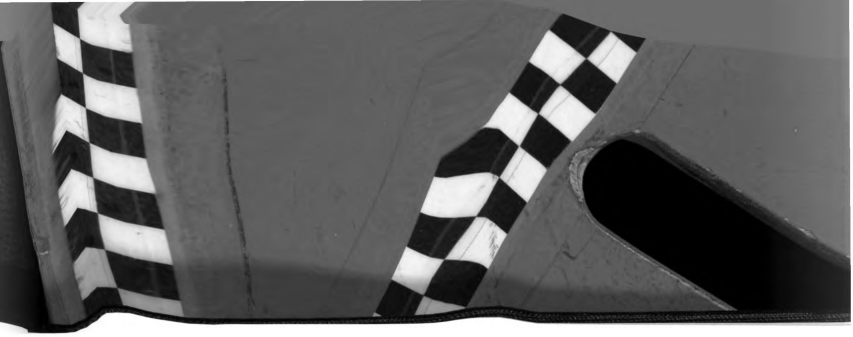
Looking at the box plot below, one can see the gray areas that would overlap if one box plot were put on top of the other. It is safe to say with some confidence that the medians in both groups were in the area indicated and did not show a significant difference.



Hypothesis 2

There will be no significant difference between the mean scores of students in the chemistry classes who received social skill and group role training and the mean scores of chemistry students who did not receive such training.

Hypothesis 2 was tested by analysis of variance. The test statistic $F = .27$ with $p = .60$ did not show any statistically significant difference between the mean scores of the two groups. If there was any evidence, it was not enough of a difference to

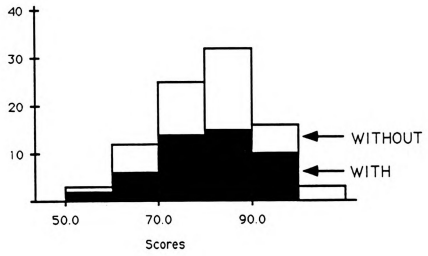


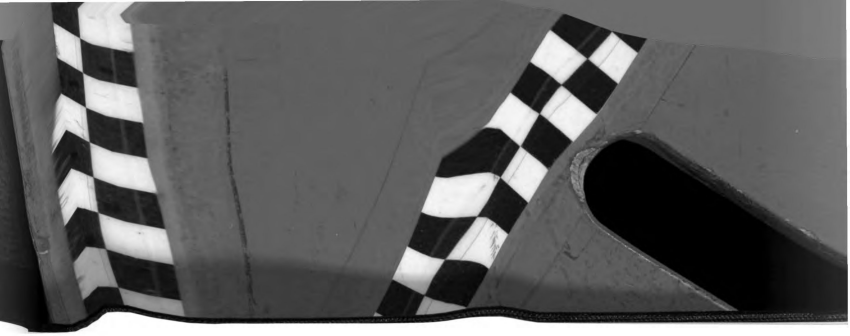
convince one that there really was a difference but rather just a random variation between the two means of the students in the different chemistry classes. Table 4.2 shows the results of the analysis of variance for Hypothesis 2. The null hypothesis was retained.

Table 4.2.--Results of the analysis of data for Hypothesis 2.

Source	df	Sum of Squares	Mean Square	F-Ratio	Prob.
Training	1	130.7865	30.7865	0.26504	.6080
Error	89	10338.1000	116.1590		
Total	90	10368.9000			

The histogram below shows a fairly normal distribution. While slightly asymmetrical, these results are not as pronounced as those for the economics students. The graph is skewed slightly to the higher end of the score range.





Each column in the histogram represents the total number of students who scored within that range on the final unit test. Each column also shows the number of students who received the social skill and group role training and the number who did not receive such training. The numbers in each column are fairly equal. However, by looking at the graph it is evident that students without the training had a wider disparity in scores. There was a greater distinction in scores for the students who did not receive the social skill and group role training.

Hypothesis 3

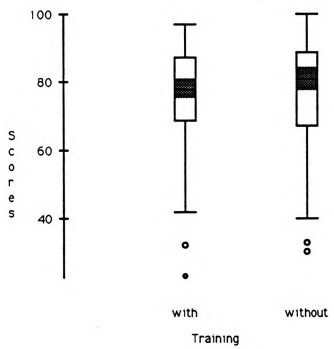
> There will be no significant difference between the mean scores of the combined group of economics and chemistry students who received social skill and group role training and the mean scores of the combined group of economics and chemistry students who did not receive such training.

Hypothesis 3 was tested with analysis of variance. The test statistic $F = .53$ with $p = .47$ showed no statistically significant evidence that training in group social skills had an effect on students' achievement on the unit test. Table 4.3 shows the results of the analysis of variance for the classes with and without training.

The box plot below the table shows that the median scores of the students who received the social skill and group role training and those who did not receive such training were not significantly different. One can be fairly sure that these scores are close to each other. Thus, the null hypothesis was retained.

Table 4.3.--Results of the analysis of data for Hypothesis 3.

Source	df	Sum of Squares	Mean Square	F-Ratio	Prob.
Training	1	114.9995	114.999	0.52851	.4690
Error	98	21323.9000	217.591		
Total	99	21438.9000			

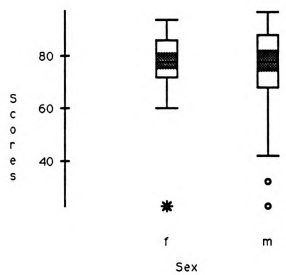


Hypothesis 4

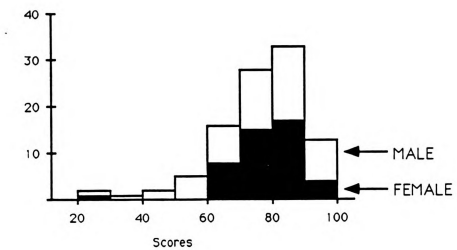
There will be no significant difference between the total mean scores of female students who received social skill and group role training and the total mean scores of male students who received such training.

Analysis of variance was used to test this hypothesis. With $F = .79$ and $p = .39$, there was no statistical evidence to show that gender made a difference in final achievement on this particular

test. The box plot below shows a mean score for females of 77.7 and a mean score for males of 76.073. The gray area shows a confidence factor of more than 95% assurance that the means were in the designated area.



The histogram below is asymmetrical. The curve for the male students is skewed to the lower end of the scores. The female students were less diverse and performed more similarly than differently on the test. There was not enough statistical data to reject the null hypothesis; therefore, it was retained.



Discussion

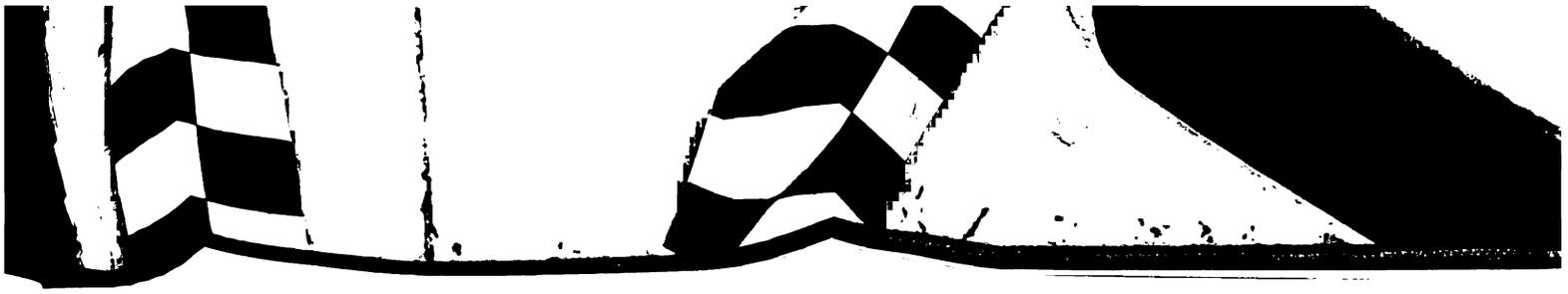
The basic premise of this study was that students who received special instruction in how to function effectively in a group would learn more when taught with cooperative learning strategies. To test this premise, half of the students involved in the study received special training in group skills at the beginning of the trial period, while the control group received no group skills training. Both the experimental and control groups were taught the same unit of instruction using the same cooperative learning strategy. All of the students involved in the study came from a normally distributed population. A Pearson product-moment correlation was completed that used the scores of all the students on their final test (see Appendix C). Looking at the results, it can reasonably be assumed that the students came from a population that was normally distributed.

It was hypothesized that when all students were given a test at the end of the unit, the experimental group with the social skills training would score higher than the control group who did not have the special training. In addition, three other factors were tested: gender, high- and low-achieving students, and different content areas.

To determine the significance of any differences that existed, it was necessary to formulate a null hypothesis for each of the four areas. The results described previously in this chapter showed no statistically significant difference between groups in any of the four areas. In other words, the null hypothesis was accepted in each case.

While no statistically significant difference in achievement gain was found between the experimental and control groups, neither was there statistical evidence of the experimental group's achievement level being lower than that of the control group.

There were other factors contributing to the data that influenced the results. In particular, the hypothesis in which the economics students were grouped with the chemistry students did not factor in the range of difficulty of the tests being used. The effects of group social skills and group role training might not be proven to be statistically significant on a test where the majority of the required thinking is convergent. On an essay or open-ended-question test, the students with special training might have had more of an advantage.

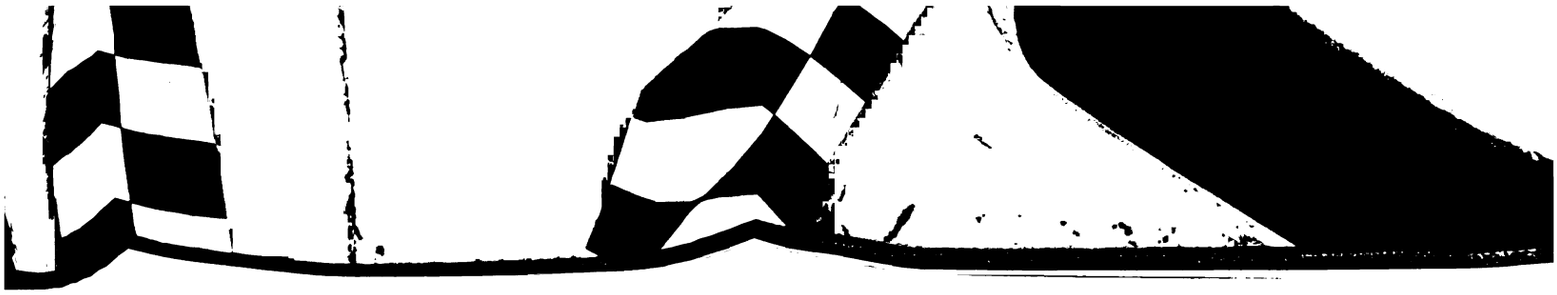


Judgment on all of the hypotheses should be deferred until further evidence is presented.

Summary

This chapter contained an analysis and report of the data collected in this study. Characteristics of the sample were discussed. Analysis of variance was used to determine whether all four hypotheses could be accepted or rejected. Histograms and box plots were used to present the information visually and to display students' median scores on the final unit test.

A summary of the study, discussion, implications for educators, and recommendations for future research are presented in Chapter V.



CHAPTER V

SUMMARY, CONCLUSIONS, RECOMMENDATIONS, AND SUGGESTIONS FOR FURTHER STUDY

Introduction

This chapter contains a brief summary of the purposes and procedures of the study, conclusions drawn from the data analysis, recommendations resulting from the project, and suggestions for further study.

Summary

The researcher's purpose in this study was to analyze the effect the teaching of group social skills and group roles had on the achievement level, as measured by scores on a unit test, of high school students who were working in a cooperative learning structure. The study was designed around the following premises:

1. Students who have been trained in group social skills and group roles will be able to transfer those skills effectively when placed in a cooperative learning situation in a content-related course, work more effectively in their groups, and perform better on a final test.

2. Regardless of the content area, students who are taught group social skills and group roles should receive higher scores on

an individual test than those students who have not received this special training.

3. Gender might make a difference, suggesting that either males or females would do better academically than the opposite gender when they receive specific group skill training.

4. While social skill teaching takes time from regular content instruction, the time lost is more than offset by the achievement gained through more effective participation by students in their cooperative learning groups.

Four hypotheses were formulated to determine whether the teaching of group social skills and group roles had an effect on the academic achievement of high school students. All of the hypotheses were tested using analysis of variance.

The population from which the sample was drawn comprised high school students from a nonmetropolitan area in the northwestern part of the lower peninsula of Michigan.

Findings Relative to the Hypotheses

The findings discussed in this section are based on the analysis of data presented in Chapter IV.

1. Null Hypothesis 1 was retained. The means from the final test of those economics students who received the social skill and group role training were not significantly different from the mean scores of the control group. The standard deviation of the students who received the training was 16.579, and the standard deviation of the students who did not receive the training was 17.384. As

evidenced by these scores, the scattering among the data was nearly the same for both groups of students. There was no statistically conclusive evidence that the training made a difference.

2. Null Hypothesis 2 was retained. Chemistry students who received the group social skills and group role training did not differ significantly from the control group in terms of the means of their final test scores. Although the students in the chemistry class scored higher overall than the economics students, the difference was not a result of the teaching of social skills and group roles. The very nature of the student who elects chemistry could account for the chemistry students' higher academic achievement on the final test. These students usually have a higher overall grade point average than students one might find in a required economics course.

3. Null Hypothesis 3 was retained. The combined mean scores of both chemistry and economics students on the final test for the experimental group were not significantly different from the combined mean scores of the control group. Providing social skills and group role training did not prove to be more beneficial to the students. On the other hand, providing the training in social skills and group roles was not detrimental to the students' academic achievement on the unit test. The data were inclusive; therefore, judgment about the effectiveness of the training should be reserved.

4. Null Hypothesis 4 was retained. There was no statistical evidence supporting the notion that females or males will perform

better upon being taught social skills or group roles in cooperative learning situations.

The four hypotheses all dealt with the effect on academic achievement of teaching social skills. In each of the four cases, the data revealed no significant difference between the experimental and control groups, thereby requiring retention of the null hypotheses.

Conclusions

Based on the findings of this study and the trends that other researchers are favoring, the following conclusions were drawn.

1. In general, students who received special instruction in group social skills and roles did not perform better on a unit test when all students were being taught with cooperative learning strategies. It appears that group skills training in itself had no bearing on actual learning of instructional content. It is possible there were other gains from the teaching of group social skills and roles, but higher achievement was not supported by the results of this research.

2. Students in a laboratory-oriented chemistry class gained no more or less than students in a discussion-oriented economics class when given special training in group skills and roles. Two very different subjects were purposely included in the study. Although more research is necessary to support a conclusion that any subject would yield the same results, it appears that subject content made no difference in this research.

3. The previous achievement level of students had no effect on whether they would profit from special group skills and role training. The economics classes were heterogeneous in nature, representing the entire spectrum of the student body, with equal numbers of lower- and higher-achieving students. The chemistry sections included primarily higher-achieving students because the chemistry class is suggested primarily for college-bound students. An examination of the scores on the unit test following the content instruction showed there was no significant difference between the experimental and control groups in economics as compared with chemistry. Thus, it was concluded that higher-achieving and lower-achieving students were affected similarly by the training in group skills and roles.

4. The gender of students was not a factor in achievement when both male and female students were provided special training in group social skills and roles. The male students in both subject areas in the study tended to perform no higher or lower than the female students on the end-of-unit achievement test as a result of having or not having special training in group skills and roles.

Discussion

Overall, the results of the study showed that special training in group social skills and roles was neither an advantage nor a disadvantage in student learning of content areas when students were taught with a cooperative learning strategy. It also appears that males and females, as well as higher- and lower-achieving students,

were affected equally by the training. Several variables, some of which could have been controlled in the study and others that could not be controlled, might have influenced the results. The variables included in this discussion are the role of the teacher, the nature of the students themselves, the amount of time allocated for the study and the time of year the study was conducted, the method of cooperative learning employed, and the gender of the students.

The role of the teacher. Few teachers are well trained in the dynamics of group behavior. Teachers need to have high levels of organizational and technical skills to use small groups effectively in the classroom. They need observation skills and diagnostic procedures so they know when to intervene and when to let the group work out a problem on their own. In addition, they need to have good evaluation tools and processes so they can model these skills for their students.

As supported by Goodlad's (1979, 1980) research, teachers traditionally spend approximately 70% of class time doing the talking. Although the teachers in this study were trained in the techniques of cooperative learning, it was not possible to monitor the presentation or teaching of group social skills and roles, or the class content. The possibility then exists that the teachers were not sophisticated or knowledgeable enough about the techniques to present them to the students in ways that would encourage the students to practice and use the skills effectively during the regular content lessons.

The teachers did not prepare any new materials or test items to cover their units of instruction. Although they were willing to experiment with the technique, they did not want to spend the time developing new lessons or activities that might better have fit the cooperative learning group work. As Davis (1985) suggested in his studies, many high school teachers feel pressured to cover the content and often do not vary their materials to match students' learning styles or different teaching strategies.

The students. Students who have gone through a typical school program have learned that competitiveness and individualism are frequently valued more than cooperation. As competition for grades and ranking increases, many students may value individual achievement over group cooperation. Although students were taught group social skills and roles and used them during the designated activities, they might have chosen not to implement the methods when involved in a cooperative group. As Kagan (1985) emphasized, cooperative methods provide students with role experiences that they have usually learned to restrict in traditional classrooms.

The students themselves must see the benefit of using these social skills and role diversity, in order to use them effectively for their own motivation and reward. This takes considerable understanding about group interaction and group dynamics on the students' part. The students in this study might not have had enough experience in effective groups to be able to understand the dialectical nature of group interdependence and individual achievement. Students at this level might have had a more vital

interest in receiving knowledge directly from the more knowledgeable teacher, rather than a peer (Newmann & Thompson, 1987). Webb (1985) showed that, in general, working and sharing in a small group does not have an effect on individual achievement in itself, but that the kind of help and discussion given and received makes a difference. Giving short answers and recalling facts do not have a major effect, but giving substantive explanations does have an effect. The students involved in this study were more inclined to be working on convergent activities and discussions during their content instruction. A look at the final test also supports a more convergent than divergent approach.

Time. There may be two factors to consider when dealing with the variable of time. One factor is the time spent on a particular research project; the other is the time of the year the research was conducted.

In a survey conducted at the National Center on Effective Secondary Schools (Newmann & Thompson, 1987), 27 studies were located that focused on grades 7 through 12. Of these 27 studies, only 6 (22%) occurred in grades 10 through 12. The duration of those six studies ranged from 2 to 12 weeks. The only study that showed a positive achievement result on a curriculum test was 12 weeks in length. The amount of time needed to integrate the social skills and group roles fully is probably more than two or three weeks.

Students at the high school level have usually formed peer support groups before the second half of the year. The chemistry students, although they were reshuffled at the marking period, may already have established a pattern of interaction that could not be reconciled in three weeks.

An interesting interaction that occurred with the content instructional time in this study was that time for direct instruction did not appear to make any statistical difference in the test scores at the end of the unit. Some might speculate that the students in the experimental group did not have as much time for content instruction because a portion of their class periods was spent on activities dealing with social skills and group roles. In reality, they had less content time than the control group as the final test was given on the same day to both groups. The results of the study show that, although a portion of every class period for approximately seven days was spent on group skill instruction for the experimental group, they did equally well on the final test when compared to the control group. This allows the speculation that students trained in group skills might use time more wisely and learn more per actual hour of instruction as a result of their training. This variable could be tested if the social skills instruction occurred before content instruction for either group.

Method of cooperative learning. Student Team-Achievement Divisions (STAD) is most appropriately used when teaching well-defined objectives with single right answers (Slavin, 1987). The most salient concept behind STAD is to motivate students to

encourage and help each other master skills presented by the teacher. The use of base scores is highly recommended because it builds individual as well as group accountability. When these two elements are not present, students' motivation to encourage their team members might be diminished. These components were not used in the present study. This factor might have affected the final outcome. Slavin (1983) asserted that the critical elements of success for cooperative learning techniques were a combination of group rewards and individual accountability.

Gender. Webb (1984) found that gender composition of the group affected the degree of group participation by males and females in discussions within the group. Whether males or females were in the majority, males were more effective in obtaining help. In high-achieving classes, males showed more meaningful interaction within their groups, but in low-achieving classes these gender-related differences did not occur (Webb & Kenderski, 1985).

In the present study, no statistically significant difference was found between the final test scores of male and female students who received training in group skills. The test results of chemistry and economics students were purposely combined so that there would not be a separation between high- and low-achieving students. Although there might have been some interaction within the small groups that supported Webb and Kenderski's findings, the mean average of scores on the final test did not prove conclusively

that males or females benefited from the teaching of group social skills and roles.

The need for group social skills and roles is universal, both inside and outside of the classroom. In his description of the Japanese corporate structure, Ouchi (1981) said that the focus of all important happenings was a result of teamwork or collective effort. This should be true for all students and workers, regardless of gender.

Recommendations

Based on the findings of this study and the conclusions reached as a result of the findings and the trends that are appearing in current research, the following recommendations are presented for consideration.

1. It is recommended that boards of education and administrators consider inservice training programs for practicing teachers and administrators in the area of cooperative learning. These programs should focus on a variety of cooperative learning techniques while considering the change in attitude and teaching style that will be required of participants in the training programs.

2. It is recommended that administrators encourage teachers at the secondary level to experiment with cooperative learning strategies. Cooperative learning has been proven to be a viable strategy at different levels, and teachers at the secondary level

need to experiment with the strategy to see what works for students at their level.

3. It is recommended that when teachers use cooperative learning they employ some type of group score. Some emphasis in most cooperative learning strategies is placed on a type of competition between the small groups. Team scores are calculated and winning teams are identified, followed by some sort of celebration. It is possible that when there is not intra-team competitiveness student motivation is diminished.

4. It is recommended that teachers who are using cooperative learning strategies develop materials appropriate for the use of the strategy. Traditional assignments that focus on convergent thinking are not always appropriate for meeting the criteria that would make the activity acceptable for a cooperative learning team.

5. It is recommended that teachers work with students on learning and using group skills. There needs to be sufficient practice time in developing the social skills so that the social skills can be transferred to any content area. The value of cooperation goes against many of the institutionalized values in the American culture. The competitiveness of many students, especially the more successful ones, tends to limit students' willingness to interact and share with their peers. There exists a considerable feeling in our culture and our societal norms that competition is part of the American way of life.

Suggestions for Further Study

1. It is recommended that additional data be collected on the effect of using a cooperative learning strategy on high school students' achievement.

2. It is recommended that future researchers concentrate more on the interactive effects of method, level of thought, nature and background of the students, and status within a group.

3. It is recommended that further research on cooperative learning at the high school level be carried out over a longer period of time and at different intervals.

4. It is recommended that future researchers look at which type of learner might benefit from using instruction based on cooperative learning techniques at the secondary level.

5. It is recommended that further research be done in which instruction in group social skills and roles is completed before experimental and control groups begin their content instruction.

6. It is recommended that further research be done using instruction in social skills and group roles with activities and materials that are consistent with the subject area content.

APPENDICES

APPENDIX A

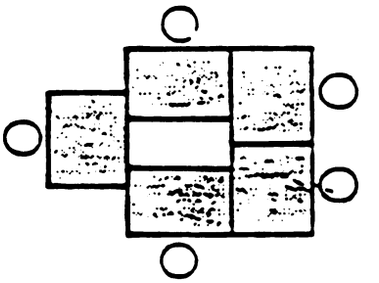
ACTIVITIES FOR SOCIAL SKILL TEACHING AND GROUP ROLE DEVELOPMENT

WORKING IN GROUPS

Suggestions

1. Arrange your desks in a star pattern so that no one is off to one side.

2. Clear your desks so that you have room to work.



Group Roles

1. **Leader:** The leader is the task manager; the leader moves things along and is responsible for making sure that all tasks are done and completed on time.

2. **Recorder:** The recorder takes notes; the recorder keeps a record of the group's progress, especially the ideas generated by the group members.

3. **Reporter:** The reporter reports the results of group work to the rest of the class; the reporter tries to "sell" the group's ideas to the class.

4. **Liaison:** The liaison person is the social leader and the "linking agent"; the liaison person makes sure that everyone participates and cooperates. The liaison person also meets with members of other groups as directed.

Rules

1. Everyone should try to cooperate. A group is very fragile (breakable). Everyone should try to participate in activities and refrain from being negative and critical.

2. Each time you are called upon to work in groups, you must fill each of the roles. You may rotate roles or have permanent roles. You may also rotate some roles while others remain permanent.

LIFE RAFT

Objective: To experience teamwork and individual and group commitment

High Risk States: Rebelliousness; Negative social attitudes; Low self-esteem

Group Size: Unlimited (but with only 10-15 students per group)

Time: 30 minutes

Materials: One 2' by 2' square made from brightly colored posterboard; blackboard and chalk or newsprint and marker

Procedure: Begin the exercise by asking the class to share ideas in answer to the question: "How do groups best work together to solve problems?" Write the ideas on the blackboard or newsprint so that class may refer to them later.

Clear an area and place the "life raft" of posterboard in the center of the area. Explain to students that they must climb aboard the raft and hold their position for at least 30 seconds. During this 30-second time period, no foot may touch the ground (though both feet of an individual may not be on the raft!). After this explanation, allow 10-15 students at a time a maximum of 3 minutes problem-solving time before attempting the activity!

Processing:

1. Describe what happened during this exercise (during the problem-solving and "climbing aboard" times!).

2. What kinds of leadership emerged during the entire process? How do you feel about your role in any of the leadership which emerged?

3. Did you feel like one person hanging on or did you feel like a member of a team working together? How did you contribute to any team effort which emerged?

4. What was the level of concentration within the group? What effect did the level of concentration have on your problem solving?

5. What have you learned about yourself as a member of a team? Are you satisfied with what you have learned about yourself, or is there anything that you are not satisfied with and that you would like to work on in another group situation?

Variations: Try this exercise nonverbally. Some groups concentrate more easily and make strong effort to complete the task when they have this additional "handicap."

ENERGY CIRCLE

Objective: To experience teamwork, individual and group commitment, and the value of communication among members of a group.

High Risk States: Rebelliousness; Negative social attitudes; Low self-esteem

Group Size: Unlimited

Time: 15-20 minutes

Materials: One 6" by 6" square per person. Make each square from brightly colored posterboard.

Procedure: Begin this exercise by posing to the group: "What kind of effort would this group have to make to get everyone moving at the same time?" "How do groups best work together to solve problems?" Discuss the questions and ask students to keep in mind this discussion throughout the remainder of the exercise.

Clear an area and place the squares in a circle, allowing about 18" between each square. Instruct students to make a circle and to place each foot on one-half of each square on either side of them. Explain to students that they must move completely around the circle as a group and end up at the position in which they started the exercise.

During the rotation, their feet may not touch the ground--only the squares.

After this explanation, allow students a maximum of 3 minutes problem-solving time before they attempt the activity.

Processing:

1. Why was this exercise called energy circle? What happened in this exercise (including the problem-solving time)?

2. Did the initial problem-solving enable you to work well as a group? What happened during the problem-solving that was helpful or unhelpful?

3. What leadership emerged during any portion of the exercise? How comfortable were you with this leadership? What was <u>your</u> place in the leadership, and how effective do you think your role was?

4. What might you do differently or the same if there were to be a "next time" for this exercise? Why?

<u>Comments</u>: This exercise works well with <u>all</u> ages.

COOPERATION GAME

Objectives:

1. To identify those behaviors which help and hinder effective teamwork.
2. To become more sensitive to the effects of my own behavior on a group's teamwork.

High Risk States: Rebelliousness; Negative social attitudes; Low self-esteem

Group Size: Unlimited

Time: One class period

Materials: A puzzle set for each team of five students: a set consists of five envelopes of puzzle pieces (see directions below); blackboard and chalk or newsprint and marker

Procedure: This exercise is a nonverbal activity focusing on the behaviors which help or hinder effective teamwork. Before beginning the exercise, it is helpful to discuss with your class the meanings of: 1) nonverbal communication and 2) cooperation, particularly in a group context.

Ask your class: "What are examples of how we may communicate without words?" List answers on the board; they may include, "Smiling; groaning; walking away; nodding my head." Explain that this period's activity will ask students to rely on nonverbal communication and that they will need to keep in mind the list of nonverbal signals.

Next, ask students, "What behaviors are necessary for cooperation to occur, especially when more than two people need to cooperate as a group?" Again, list answers on the board; they may include, "Everyone must understand the instructions; listening has to occur; everyone needs to remember that each person's ideas are important."

Divide the class into teams of five. If you have extra students, you may involve them as "watchers" or process observers of the task of the small groups.

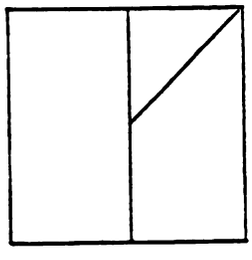
Distribute each set of five envelopes to each team: every person will then have an envelope of puzzle pieces. Explain that each team has the task of fitting the puzzle pieces, which are jumbled up throughout the five envelopes of a set, into five squares per team or one square per person on a team. Several individual combinations will be possible but only one total combination results in five squares per team.

Each correct square has three pieces. There is one combination of three pieces which prevents the formation of the five correct squares. This is a trick square! (Leader can check diagrams for correct formations and for trick square).

If a group forms the trick square and is therefore prevented from forming the five correct squares, the leader may want to point out the trick square. The group can then avoid that combination and continue with the object of the game. Or, leader can try one of the following options:

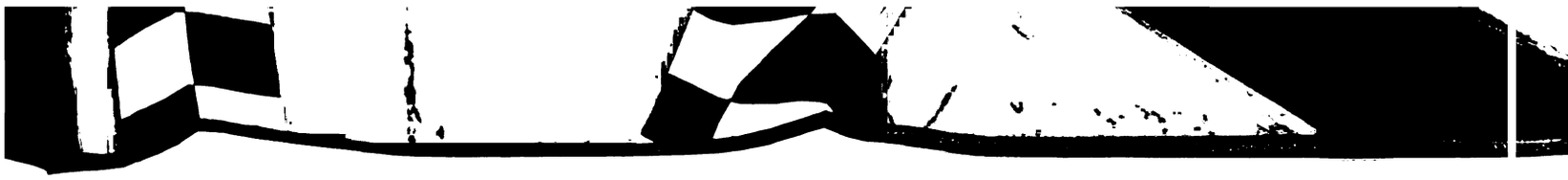
-Draw trick square on the board ahead of time
-Give each group the choice of being shown the trick square or figuring it out for itself.
-Intervene only if time and frustration level dictate.

Here is the trick square formation:



The solid rectangle can be on either side of the other two pieces in the trick square.

	LIKE	DISLIKE
VEGETABLE		
MOVIE		
VACATION SPOT		
ANIMAL		
MEAT		



THEY'LL NEVER TAKE US ALIVE!!

Ranking Sheet

In a recent survey Dun's Review lists the most perilous products or activities in the United States, based on annual death statistics. Below, in no particular order, are listed fifteen of these death-causing hazards. Your task is to rank them in order of dangerousness according to the number of deaths caused each year. Place by the number 1 the most dangerous, by the number 2 the next most dangerous, and so forth.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____

swimming
railroads
police work
home appliances
alcohol
nuclear power
smoking
motor vehicles
pesticides
handguns
bicycles
firefighting
mountain climbing
vaccinations
surgery

Taken from: Joining Together: Group Theory and Group Skills (2nd ed.). David W. Johnson and Frank P. Johnson. Englewood Cliffs, NJ: Prentice-Hall, 1982.

As he left to visit a sick relative, Mr. Richardson informed his daughter, "Tracey, do not leave the house and do not let anyone in while I am gone. I want you to stay here and keep an eye on the baby, who is sleeping. If you don't take care of this responsibility, you will be punished."

As time passed, Tracey grew restless. Soon, her friend Mary Anne knocked at the door. "Come on out and shoot baskets," pleaded Mary Anne. "No, I have to watch the baby until my dad gets back," said Tracey. "O.K.," said Mary Anne, "I'll just shoot a few hoops here in your driveway until then."

Presently, Robert and Randy showed up and joined Mary Anne. Tracey, who had a crush on Robert, watched from the front window. "Come on out," called Robert when he saw her. "I can't," said Tracey. "Sure you can. You just don't choose to," replied Robert. "She's chicken," said Mary Anne, "and afraid she might get in trouble." "Don't be such a wimp," chided Robert. "Besides," he confirmed, "I've got to leave in a few minutes. I want to see you."

Tracey checked the bedroom and found her baby sister still sleeping. Then she stepped out on the front steps to talk to Robert. "Here, shoot one," challenged Randy as he passed her the ball. Tracey bounced it twice and shot. Swish. "Great shot. Bet you can't do that again," he said. Another swish and Tracey was hooked.

Five minutes later, her mother pulled into the driveway. "Who's watching the baby?" asked her mother. "I am," said Tracey, hoping her mom wouldn't get too mad. "Please don't tell Dad," Tracey pleaded. "I made sure she was O.K."

Later that night, Tracey's mom and dad had a long talk. Tracey's dad decided on the punishment. Her mom agreed, and Tracey was grounded for the weekend.

RESPONSE SHEET

1. Which one person, in the opinion of your group, was most responsible for the grounding of Tracey? Who was least responsible? Check over the list below. Put a 1 by the person your group feels is most responsible. Put a 2 by the person your group feels is the next most responsible. Continue until everyone has a number, 1 through 6.

   ____ Robert

   ____ Father

   ____ Mother

   ____ Tracey

   ____ Mary Anne

   ____ Randy

   Give supporting rationale for your first two choices.

2. Write three possible appropriate titles for this story. Write a one-sentence rationale for the one your group feels is most appropriate.

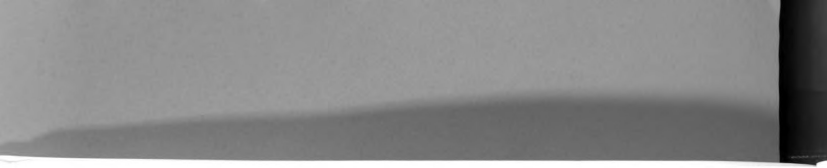
SIGNATURES OF GROUP MEMBERS
(I agree with these answers and
helped our group reach consensus.)

_____

_____

_____

_____



INFLUENTIAL PEOPLE--RANK ORDERING

Objective: To become more aware of the effects of our values and beliefs on individual and group decision-making

High Risk States: Rebelliousness; Low valuing of school; Poor teacher-student relationships; Low self-esteem

Group Size: Unlimited

Time: One class period

Materials: Lists of influential people (mimeographed for one per person); paper and pencils; blackboard and chalk or newsprint and marker

Procedure: Explain the objective of this activity and tell your students that there will actually be two steps in the process: 1) making individual choices and 2) joining with several other people and sharing those choices before making a common decision.

Distribute the lists of influential people to each member of the class. Instruct your students to rank order the 15 people in terms of how influential they have been in the course of history. Give 10 minutes for this step in the exercise.

Next, divide the class into groups of four to six people each. The groups will have 20 minutes to share their individual lists and to come to a consensus (agreement) on the three most influential and the three least influential.

Following is a sample list from which to choose the 15 people to be rank-ordered. Choose those names with which your students are familiar.

Picasso	C. S. Lewis	Ghandi
Michelangelo	Lewis Carroll	R. Nixon
St. Paul	Al Capone	Daniel Ellsburg
Gutenburg	John Dean	Martin Luther
Lee Harvey Oswald	Abraham Lincoln	Winston Churchill
Rosie Parks	Joan of Arc	Confucius
Karl Marx	Herbert Hoover	B. Franklin
St. Peter	Adolf Hitler	Copernicus
Shakespeare	C. Columbus	T. Edison

Queen Elizabeth I
Susan B. Anthony
Hemingway
Marie Antoinette
Johann S. Bach
Walt Disney
St. Francis
Socrates
Jesus Christ

Clara Barton
Marilyn Monroe
Moses
Bob Dylan
Gloria Steinem
Cleopatra
Oliver W. Holmes
Emily Dickinson

Mme. Curie
Harriet B. Stowe
Frederick Douglas
Sarah Bernhardt
Martin L. King
Margaret Mead
Buddha
Lenin

COMPREHENSIVE LEARNING

TASK: Make a cinquain poem.

A cinquain poem has 5 lines:

First line is a noun (Our topic is "school").
Second line contains 2 adjectives describing the noun.
Third line contains 3 verbs relating to the noun.
Fourth line is 4 words to express a feeling about the noun.
Fifth line is a 1-word synonym for the noun.

COLLABORATIVE SKILL: Praising, taking turns, encouraging others to participate.

ROLES: 1 timer, 1 recorder, 1 task master, 1 observer.
All members contribute ideas and all praise during group work.

TIME LIMIT: 10 minutes to compose the poem, 5 minutes to present it, 5 minutes to process.

PROCESSING:
A. Teacher comments
B. Observer's data on skills
C. What did we do well?
D. What can we improve next time?

FOLLOW-UP: All cinquain poems will be taped to the wall and examined during break.

NUMBER

A Sample Activity at the Intermediate Level--Palindromes

This activity involves looking for number patterns, both visually and numerically. It also provides practice in addition with regrouping.

Materials: Two worksheets for each student, crayons

Introducing

1. Present or review concepts that are needed. A palindrome is a number that reads the same frontward and backward, such as 44, or 252, or 8008. A number that is not a palindrome, such as 13, can be changed into a palindrome by adding in a certain way: You reverse the digits and add. Record how to do this on the board: Since it took one addition, 13 is a 1-step palindrome.

```
 13
+31
 44
```

Some numbers take more than one addition. Demonstrate with 68.

```
 68
+86
154
+451
 605
+506
1111
```

2. Pose a part of the problem or a similar but smaller problem. Have the students try this for the number 48. You do it on the board for them to check their work. When they've done this, have them record the results for 13, 68, and 48 on the Palindrome Recording Chart.

3. Present the problem to be solved. Each group is to investigate all the numbers in this way from 0 to 99. First they should decide how to divide up the work. They keep individual records on the chart as demonstrated. They also each record on the 0-99 chart, coloring in all the numbers that already are palindromes with one color, coloring in 1-step palindromes with another color, 2-steps with another color, and so on. They decide what colors to use as a group. Direct them to look for patterns on both charts. Also, tell them to beware of 98 and 89*, and not to tackle those unless they are ready for a serious bout of addition.

4. Discussion. Ask for questions.

---

*98 and 89 take 24 steps. The palindrome is 8,813,200,023,188.

Exploring

Problems generally do not arise during this exploration. It may take several class periods for all groups to finish their work.

Summarizing

Discuss the group processes. Ask groups: How did you divide up the work? Was your system a good one? Did you change your system during the activity? What do you think would be the best way for a group to do this activity?

Ask for patterns that emerged on charts. Record summary statements. Some groups notice, for example, that when the sum of the digits of a number is less than 10, the number is always a 1-step palindrome. Others notice that all resulting palindromes are multiples of 11. Have them look for other patterns such as these.

Ask how they categorized the one-digit numbers--as 1-step, already palindromes, or not at all. There is no right answer for this, but groups should be able to explain their theory.

NUMBER

* * * 0 - 99 CHART * * *

What colors are you using? Color in the small squares to show.

- ☐ already palindromes
- ☐ 1-step
- ☐ 2-step
- ☐ 3-step
- ☐ 4-step
- ☐
- ☐

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

NUMBER

* * * PALINDROME RECORDING CHART * * *

No. Steps	Palindrome		No. Steps	Palindrome		No. Steps	Palindrome	
10			40			70		
11			41			71		
12			42			72		
13			43			73		
14			44			74		
15			45			75		
16			46			76		
17			47			77		
18			48			78		
19			49			79		
20			50			80		
21			51			81		
22			52			82		
23			53			83		
24			54			84		
25			55			85		
26			56			86		
27			57			87		
28			58			88		
29			59			89		
30			60			90		
31			61			91		
32			62			92		
33			63			93		
34			64			94		
35			65			95		
36			66			96		
37			67			97		
38			68			98		
39			69			99		

Try looking for palindromic words. Mom and Dad are two examples. What others can you find? How about palindromic expressions:

TOO HOT TO HOOT
WAS IT A RAT I SAW?
NURSE, I SPY GYPSIES, RUN!

Read "The Robert Trebor Story." All the palindromes in that story came from Palindromes and Anagrams by Howard W. Bergerson (Dover Publications). Write a palindromic story if you're interested.

General Instructions for Role Players

You work for the telephone company and one of you is the foreman while the others are repairmen. The job of a repairman is to fix phones that are out of order, and it requires knowledge and diagnostic skills as well as muscular skills. Repairmen must climb telephone poles, work with small tools, and meet customers. The foreman of a crew is usually an ex-repairman; this happens to be true in this case. He has an office at the garage location but spends a good deal of time making the rounds, visiting the places where the men are working. Each repairman works alone and ordinarily does several jobs in a day. The foreman gives help and instructions as needed.

The repairmen drive to various locations in the city to do repair work. Each of them drives a small truck and takes pride in its appearance. The repairmen have possessive feelings about their trucks and like to keep them in good running order. Naturally, they like to have new trucks, because new trucks give them a feeling of pride.

Here are some facts about the repairmen and their trucks.

	Years With Company	Type of Truck Used
George	17	2-year-old Ford
Bill	11	5-year-old Dodge
John	10	4-year-old Ford
Charlie	5	3-year-old Ford
Hank	3	5-year-old Chevrolet

Most of the men do all their driving in the city, but John and Charlie cover the jobs in the suburbs.

In playing your part, accept the facts as given and assume the attitude supplied in your specific role. From this point on, let your feelings develop in accordance with the events that occur during the role play. When facts or events arise that are not covered by the roles, make up things that are consistent with the way it might be in a real-life situation.

Role instructions are taken from an article by N. R. F. Maier and L. F. Zerfoss, "MRP: A Technique for Training Large Groups of Supervisors and Its Potential Use in Social Research," Human Relations, 1952, 5, 180-181. Permission to reproduce the roles has been granted by the Plenum Publishing Company, London, England.

MONITORING COOPERATIVE GROUPING

Group:_____ Teacher's Name:_____
Activity:_____ Observer's Name:_____
Date:_____ Duration of Observation:_____

Observation Sheet

Names

Participating						
Helping: "Let me show you."						
Put-downs: "That's not right."						
Off task						
Questions: "I need help."						
Encouragement: "I really liked what you did."						

Summarizing

PROCESSING

Day 1: Positive feedback to group members by using a tally sheet identifying three of the desired behaviors. Students should each be given 30 seconds to respond to the information once it is shared.

Day 2: Ask a group processing question. Groups discuss and come up with consensus answer and share out loud when called upon. The three group questions: What actions did group members do that were helpful? I felt the best when _____. A skill our group needs to work on is _____.

Day 3: Focus on one member of the group at a time. Everyone is to share one positive thing that person did during the group work. A the end have the group summarize the one thing that went well and the skill that will need to be improved upon the next time.

Day 4: On an. index card the students write a comment for each person on their team that answers the following open-ended statements:

I appreciated it when you _____.

You really help the group when you _____.

The skill you used the best today was _____.

Day 5: Tally sheet and discussion of how much growth has/has not occurred over the week.

_____
(Name of Activity)

GROUP OBSERVATION SHEET

Names of Group Members

Collaborative Skill						

Reaction to Group Work

Today, as a group, we:	YES	NO
1. accomplished our goal	____	____
2. helped each other add or clear up ideas	____	____
3. felt good about working together	____	____

As a group member I:	MOSTLY	A LITTLE	NONE
acted as an (a)			
idea generator	____	____	____
encourager of others	____	____	____
clarifier of ideas	____	____	____
summarizer	____	____	____
record keeper	____	____	____

Something that I did to make the group more successful in doing its work:

Something that I did to make the group feel better about working together:

Something that I'll work on next time:

APPENDIX B

FINAL UNIT TESTS FOR CHEMISTRY AND ECONOMICS

Chemistry Test **LIQUIDS--SOLIDS--WATER**

DIRECTIONS: Write on the line at the right of each statement the letter preceding the word or expression that best completes the statement.

1. Liquids have all the following properties except (a) definite volume; (b) fluidity; (c) diffusion; (d) easy compressibility.

2. Substances that are liquids only at temperatures below room temperature are composed of (a) low-molecular-weight nonpolar molecules; (b) higher-molecular-weight nonpolar molecules; (c) low-molecular-weight polar molecules; (d) ions.

3. The escape of high-energy molecules from the surface of a liquid is called (a) diffusion; (b) boiling; (c) evaporation; (d) equilibrium.

4. In terms of the kinetic theory, what is the effect on a liquid-vapor equilibrium system if the temperature of the liquid is raised? (a) the average kinetic energy of the liquid molecules is decreased; (b) the rate of evaporation is decreased; (c) the concentration of vapor molecules above the liquid surface is decreased; (d) eventually, equilibrium is reestablished but at a higher vapor pressure.

5. A liquid-vapor system in equilibrium is kept at constant temperature while the volume of the system is increased. When equilibrium is restored (a) the concentration of vapor molecules has increased; (b) the vapor pressure is the same as the original vapor pressure; (c) the volume of the liquid has decreased markedly; (d) the number of liquid molecules has increased.

6. During boiling, the temperature of a liquid (a) remains constant; (b) increases; (c) decreases; (d) approaches the standard boiling point.

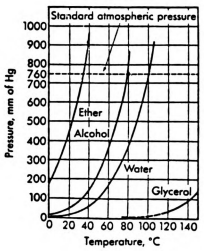
7. The precise definition of a vapor is (a) the gaseous phase of a substance that is a liquid at normal temperatures; (b) the gaseous phase of a substance that is a solid at normal temperatures; (c) a gas at a temperature below its critical temperature; (d) a gas that cannot be liquefied.

8. During the process of freezing, a liquid (a) loses kinetic energy; (b) loses potential energy; (c) gains potential energy; (d) gains kinetic energy.

9. When a substance changes from a solid to a vapor without passing through the liquid phase the process is known as (a) condensation; (b) evaporation; (c) sublimation; (d) vaporization.

10. Amorphous solids that may find applications because of their unusual nondirectional magnetic properties are (a) ordinary glasses; (b) paraffins; (c) forms of carbon; (d) metallic glasses.

11. The pattern of points that describes the arrangement of particles in a crystal structure is the (a) unit cell; (b) cube; (c) crystal lattice; (d) kind of symmetry.

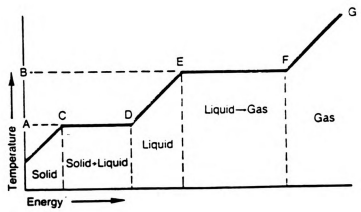


12. Increasing the temperature causes the equilibrium vapor pressure of liquids to (a) increase, (b) decrease, (c) remain the same, (d) double

13. The normal boiling point of alcohol is (a) 60°C, (b) 80°C, (c) 100°C, (d) 870°C

14. Water will boil at a temperature of 80°C when the pressure exerted on its surface is equal to (a) 200 mmHg, (b) 300 mmHg, (c) 380 mmHg, (d) 760 mmHg

15. When the pressure on the surface of ether equals 920 mm of Hg, its boiling point is (a) 39°C, (b) 20°C, (c) 60°C, (d) 105°C



USE THIS DIAGRAM FOR 16-20

Identify the point on the graph where each of the following occurs.

16. melting begins (a) A, (b) C, (c) E, (d) G

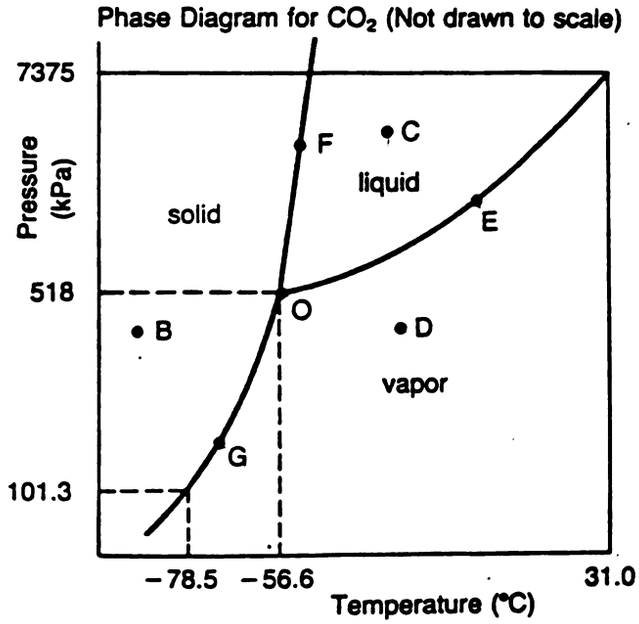
17. condensation begins (a) C, (b) D, (c) E, (d) F

18. freezing begins (a) C, (b) D, (C) E, (d) F

19. boiling begins (a) D, (b) E, (C) F, (d) G

20. As the substance goes from D to C, it gives off heat. (a) T (b) F

21. As the water temperature goes from 4°C to 0°C and freezes, does the volume (a) increase, (b) decrease, (c) stay the same



22. The triple point for CO_2 shown on the graph is
(a) G, (b) O, (c) D, (d) E

23. At which point would a boiling liquid be found?
(a) G, (b) F, (c) E, (d) D

24. At which point would sublimation occur?
(a) B, (b) C, (c) D, (d) G

25. The molar heat of vaporization of water is 9.7 kcal at 100°C. The heat of vaporization of one gram of water is (a) 9.7 cal; (b) 18 cal; (c) 100 cal; (d) 540 cal.

26. The structural formula for water is written as (a) H—O—H; (b) H—H—O; (c) H—O(H); (d) O(H)(H)

27. The strength of the covalent bonds between the oxygen and hydrogen atoms in water is evident in the fact that it does not decompose appreciably until its temperature reaches (a) 4°C, (b) 1500°C, (c) 373 K; (d) 2700°C.

28. Water has its maximum density at (a) 0°C, (b) 273 K, (c) 373 K; (d) 4°C.

29. Oceans, rivers, and lakes cover about what percentage of the surface of the earth? (a) 10; (b) 9; (C) 75; (d) 60.

30. Substances that take up water from the air and form solutions are said to be (a) subliming; (b) deliquescent; (c) amorphous; (d) in equilibrium.

31. A layer of alcohol is made to float on a layer of waer. After a while the alcohol and water are completely mixed. The result indicates the property of liquids called (1) evaporation; (2) noncompressibility; (3) diffusion; (4) indefinite volume.

32. Physical equilibrium is a dynamic state in which two opposing physical changes in the same system proceed at equal (1) volumes; (2) masses; (3) rates; (4) concentrations.

33. The equilibrium vapor pressures of liquids depend on (1) the temperature only; (2) the nature of the liquid only; (3) the temperature and volume of the liquid; (4) the temperature and nature of the liquid.

34. As water solidifies it (1) gives off heat and contracts; (2) gives off heat and expands; (3) takes in heat and contracts; (4) takes in heat and expands.

35. The smallest portion of the crystal lattice that exhibits the pattern of the lattice structure is the (1) molecule; (2) cube; (3) unit cell; (4) ion.

36. A hydrate is a crystallized substance that contains (1) an anhydride; (2) water of crystallization; (3) only hydrogen bonds; (4) a hydride.

37. The number of free surfaces of a solid is (1) one; (2) two; (3) none; (4) all.

ECONOMICS TEST: Chapter 7

I. MATCHING (2 points each)

____	1. trust	a.	hold common stock of other corporations
____	2. pool	b.	goal is to limit production
____	3. Clayton Act	c.	51% of common stock
____	4. external economy	d.	benefit of a natural monopoly
____	5. economies of scale	e.	common stockholders give voting rights
____	6. merit good	ab.	restricted interlocking directorates
____	7. holding company	ac.	main goal of anti-trust legislation
____	8. natural monopoly	ad.	social value more important than cost
____	9. controlling interest	ae.	benefits gained other than producer/consumer
____	10. competition	abc.	government sanctioned

II. TRUE AND FALSE (a for true; b for false) (2 points each)

____ 1. All monopolies are natural monopolies.
____ 2. Pools are illegal in the United States when they damage competition.
____ 3. General Motors is a natural monopoly regulated by the government.
____ 4. The Sherman Act forbids price discrimination.
____ 5. The Sherman Act set forth the "rule of reason."
____ 6. Pollution costs are external costs built into the cost of an automobile.
____ 7. It is illegal for an executive from the telephone business to sit on the public service commission that regulates it.
____ 8. Collective goods are provided usually with no cost recovery in mind.
____ 9. The airlines are a typical example of a collective good.
____ 10. The steel industry has external costs associated with it.

III. SHORT-ANSWER QUESTIONS (4 points each)

1. Identify an external cost and who pays for it.

2. What are the 2 main goals of deregulation?

3. Give 2 of the charges filed against ATT.

4. Name 2 provisions set down by the Clayton Act.

5. Give a benefit and a detriment that the phone company's natural monopoly provides.

IV. ESSAY QUESTIONS (Choose two of the following questions) (20 points each)

1. Explain what a pool is and how it functions. Then graphically show how a pooling arrangement could increase the price in a market. Be specific about the market and be sure to label all axes correctly.

2. Diagram a typical holding company and explain how the holding company gains control in a particular market. Be specific about the market and use dollar figures where applicable. Is this form of combination illegal? Why/why not?

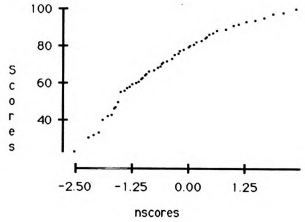
3. Which of the anti-trust laws includes the "rule of reason"? Explain why this rule is important and give supporting information for your answer.

4. Natural monopolies provide benefits called economies of scale. Using the ATT case as an example, explain these economies of scale and the charges filed against this natural monopoly. Which of the charges, in your opinion, was justified?

5. Environmental protection deals mainly with pollution. Explain what internalizing and externalizing this external cost could mean to both the price of a specific product, and/or the raising of taxes. Use a graph to explain your pricing explanation.

APPENDIX C

PEARSON PRODUCT-MOMENT CORRELATION



Pearson Product-Moment Correlation

	Scores	nscores
Scores	1.000	
nscores	0.963	1.000

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BIBLIOGRAPHY

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