Learning to read music cooperatively in a choral setting: A case study

Andrew Inzenga

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Learning to read music cooperatively in a choral setting: A case study

Abstract
Two volunteer cooperative teams of ninth grade girls were studied for six months to discover whether and how they learned to read music. The two teams represented novice students and students who had received private instruction. Study teams represented the population of the freshman Girls Chorus. Teams met regularly during daily chorus rehearsals, with only occasional help from the director. These meetings were analyzed through video tape recordings to observe if students employed traditional teaching and learning strategies to assist each other in learning. It was determined that team members regularly use certain teaching and learning strategies to assist in the cooperative constructing of their knowledge. Chorus members demonstrated significant gains (P = .05) in their ability to read music using the Iowa Tests of Music Literacy LEVEL 1. It was concluded that this cooperative learning method is an effective alternative for teaching chorus students to read music.

Keywords
Education, Curriculum and Instruction, Education, Music, Psychology, Cognitive

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LEARNING TO READ MUSIC COOPERATIVELY
IN A CHORAL SETTING:
A CASE STUDY

BY

ANDREW INZENGA
B. S., Music Education University of New Hampshire, 1976
M. S., Music Education, University of New Hampshire, 1992

DISSERTATION

Submitted to the University of New Hampshire
in Partial Fulfillment of
the Requirements for the Degree of

Doctor of Philosophy
in
Education

September, 1999
This dissertation has been examined and approved.

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June 18, 1999  
Date
DEDICATION

This document is dedicated to

Tommy, Buddy, Miss Bailey
Eric, Robbie, and Paul

In sharing your musical insights, you have enriched my life!
ACKNOWLEDGMENTS

I would like to acknowledge the following people whose support and encouragement greatly assisted in the completion of this project: To my family--Sue, Alex and Jay--who, in supporting me, have sacrificed so much; To Thomas Meehan who supported my efforts and allowed me great flexibility in my professional commitments; To Thomas Quigley who allowed me to study his choral program; To Sandy Samaha who drew the student figures in Appendix 1; To my colleagues at Exeter Area Junior High School who offered continuous support. To Ann Diller and the members of the Doctoral Research Seminar who offered constructive criticism and provided a sanctuary to discuss ideas and vent steam.

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ABSTRACT

LEARNING TO READ MUSIC COOPERATIVELY IN A CHORAL SETTING:
A CASE STUDY

by

Andrew Inzenga
University of New Hampshire, September, 1999

Two volunteer cooperative teams of ninth grade girls were studied for six months to discover whether and how they learned to read music. The two teams represented novice students and students who had received private instruction. Study teams represented the population of the freshman Girls Chorus. Teams met regularly during daily chorus rehearsals, with only occasional help from the director. These meetings were analyzed through video tape recordings to observe if students employed traditional teaching and learning strategies to assist each other in learning. It was determined that team members regularly use certain teaching and learning strategies to assist in the cooperative constructing of their knowledge. Chorus members demonstrated significant gains ($P = .05$) in their ability to read music using the Iowa Tests of Music Literacy LEVEL 1. It was concluded that this cooperative learning method is an effective alternative for teaching chorus students to read music.

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CHAPTER ONE

PURPOSE OF THE STUDY

Introduction

In traditional choral music education, the primary responsibility of the teacher/conductor is to teach while preparing the chorus for the next performance. This pedagogical model has been supported in numerous music education textbooks (Neiding & Jennings, 1967; Green, 1969; Garretson, 1970; Decker & Herford, 1973; Mark, 1986; Mark, & Gary, 1992). During their preparation, students are taught elements of choral performance such as vocal technique, listening skills, as well as elementary music theory including the ability to read music. In traditional music education, the teacher/conductor primarily functions to disseminate information (Collins, 1993).

Much of the sequence and structure found in today's choral rehearsals are drawn from the European conservatory master teacher class in which the conductor analyzed the ensemble's performance, identified problems, and suggested remedies (Tait, 1992; Collins, 1993). According to Mark & Gary (1992), during the 1960's the Music Education National Conference (MENC), published relevant material supporting this manner of choral music education. Therefore the teacher/conductor as the central classroom figure and disseminator of a music education is fundamental in modern music education theory and practice during the past thirty years.
Current Music Education Philosophy

Recent articles have reflected a change in the philosophy and methodology of music education. Atterbury (1992), calls for research in alternative music education curricula, while Tait (1992), suggests that music educators need to make effective use of small groups which encourage pupil participation. However, Goliger (1995), notes that in spite of the growth of cooperative learning methods in recent years, little documentation of its use has been reported in music academic journals. Also, according to Cox (1989), there is a need for research in all methods of choral educational styles, including cooperative learning. Based upon these sources, there exists a need for an informative study of a choral music curriculum that involves cooperative education as a major component.

Objectives of Choral Education

Any thorough choral music education curriculum includes teaching and improving music reading among its objectives. This study examined whether and how cooperative learning improved students' ability to read and sing music at sight (sight-sing music). The process of sight-singing involves reading, comprehending, and correctly singing music notation. In this complex cognitive process a singer must simultaneously consider both pitch, and rhythm in order to be successful. Proficient sight singing ability is important in the development of students' musicianship. Therefore, investigating the best ways to educate chorus students in sight singing is important to choral music education.
Purpose of the Study

The purpose of this study was to increase understanding of how students learn to read music in cooperative teams, and to assess that learning. This was accomplished by seeking answers to the following ten key questions:

QUESTION 1) How do members of the student teams learn to read music?

QUESTION 2) Do the team members regularly use any specific teaching strategies and learning strategies to assist each other in their construction of knowledge? If so, which ones?

QUESTION 3) What kind of measurable improvement in music reading resulted from the cooperative approach?

QUESTION 4) Is there any evidence that the students are transferring this knowledge to the full chorus rehearsal?

QUESTION 5) How do team members work on exercises in music concepts such as rhythm and harmony?

QUESTION 6) How do students in these teams feel about learning this way?

QUESTION 7) What attitudes towards choral music singing do students develop in teams?

QUESTION 8) How does the director feel about cooperative learning?

QUESTION 9) What strengths and weaknesses to cooperative learning are apparent compared to students taught in a traditional choral rehearsal?
QUESTION 10) Does the cooperative learning approach have any other noticeable effects on student performance in chorus?

To adequately explore these questions it was necessary to refer to three areas of inquiry: first, the current research in cooperative learning and its application to a chorus rehearsal; second, the current recommendations of strategic learning research; and finally, methodology for analysis of cooperative learning.

**Cooperative Learning**

Cooperative learning is defined as students working together to accomplish shared learning goals, and to maximize their own and their groupmates' achievements (Johnson & Johnson, 1989, p. 276.) Participants not only help one another, but also prevent or obstruct destructive actions to the group. This differs from a competitive situation in which students may resist helping each other, and even work to prevent or obstruct a student competitor's efforts (1989). According to the constructivist theory of information processing, knowledge is constructed by the learner. And the construction of knowledge is enhanced through dialectic social interaction as found in cooperative teams (Day, Ch. 7 in Pressley & Levin, 1983). (See Chapter Two.)

**Strategic Learning**

For chorus students to have a rich learning experience, they must develop their musicianship including the ability to read music. Music reading is a fundamental skill for musicians and necessary for the acquisition
of more advanced music concepts and skills. Tait (1992) suggests that acquiring more advanced musical concepts calls for using teaching strategies as well as greater involvement of students into the educational enterprise. His suggestion is supported in this area by the work of educational researchers such as Michael Pressley (Pressley, Almassi, Schudler, Bergman, Hite, Eldinary, & Brown, 1994) and David Perkins (Perkins & Salomon, 1989). Their strategic learning research has documented improved student understanding in academic disciplines with the inclusion of teaching and learning strategies in the curriculum (Pressley et al., 1994). Their work focused on such strategies as elaboration, posing questions, summarization and scaffolding. Costanza and Russell (1992) found that certain teaching strategies are a regular part of traditional music education, with modeling, imagery, and question answering being the strategies most commonly observed.

This study examined whether students used specific teaching and learning strategies during cooperative team sessions to learn to read music, and whether these strategies were successful in assisting team members in developing their music reading skills.

Study Setting

Subjects for this study were drawn from a rural, area high school in Northern New England. The four-year high school has a population of approximately 2,500 students from four affiliated towns. The success of the schools' choral program is well documented as it has received numerous awards for excellence including commendations for music reading ability.
The students at the school elect to become involved in the choral program. However, there is a school fine arts requirement for graduation and some students use chorus to fulfill this requirement. The high school offers four choruses which involve approximately 10% of the total school enrollment. The subjects were drawn from the Girls Chorus which consists of 45 ninth graders who met for 48 minutes each day (a typical high school chorus schedule). Students spend approximately ten minutes of chorus rehearsal learning in cooperative teams. The cooperative teams are not teacher directed but construct knowledge as a unit.

The Process

This study examined how, and to what extent, student teams learn to read music in cooperative teams. Two teams, representing two different ability levels, agreed to be studied for six months. Students displaying a range of ability levels is common to most beginning choruses. However, the intent was not to compare the learning of these two teams, but to account for cooperative learning as described above.

Problems of the Study

This choral curriculum is unique. The author knows of no other choruses that incorporate cooperative learning in this manner. Due to strict guidelines for gaining access to students, regular meetings with team members to discuss findings were not possible. Although limited access was granted as the study progressed. In an effort to control for subjective data interpretations, some quantitative measurements were included. Students
music reading achievement was compared to the student norms for similar age and experience found in the Iowa Tests of Music Literacy - LEVEL 1. Finally, teacher analysis plus periodic team interviews were also used to corroborate findings.
CHAPTER TWO

REVIEW OF THE RELATED LITERATURE

Cooperative Learning

The History of Cooperative Learning

In 1948 Kurt Lewin stated that the essence of a group is the interdependence among its members and results in the group being a "dynamic whole" (Johnson & Johnson, 1989, p. 7). For cooperation to exist among people, then the persons involved must influence each other. Thus a cooperative experience can be understood as one person in a group causing changes in others. Furthermore, that any change in any member or subgroup results in changes in the state of any other member or subgroup. For interdependence to exist, the persons involved must influence each other, or that a change in one person's perception will affect the perception of others.

Deutsch's (1949) theory of social interdependence provides a foundation for much of the current research on cooperative learning. Deutsch described a socially interdependent person as someone for whom success depends on others obtaining their goal. In contrast, in competitive situations success is obtainable if others fail to attain their goal (Deutsch 1962; Johnson & Johnson, 1989, 1994). According to Deutsch cooperative situations and competitive situations specifically affect people as follows:
(1) Within a cooperative situation individuals make up for the ineffective actions of others.

(2) Within cooperative situations effective actions by other members are understood as positive, while in competitive situations the success of others often comes at an individual's expense.

(3) Within a cooperative situation collaborators are easily induced to help a participant and will work to prevent or obstruct a participant's failure. However, in a competitive situation, competitors rarely give assistance and even work to prevent or obstruct the effective actions (Johnson & Johnson, 1989).

In sum, according to Deutsch a greater number of people achieve more in cooperative situations than in competitive situations. Johnson and Johnson (1994) define cooperation as working together in small groups to accomplish shared goals so that individuals maximize their own achievement. Thus, individuals not only seek results that benefit themselves, but also ones that are beneficial to all other group members. Johnson and Johnson (1994) replicated Deutsch's research (1962) demonstrating that persons in cooperative situations reach their goals only if the other group members did. Accordingly, Johnson and Johnson (1989) suggest that cooperative learning goals are attained when individuals discuss, assist and encourage each other in their work (1989).
Research on Cooperative Learning in Education

There has been substantial research supporting the inclusion of cooperative learning into educational settings. Research has shown that as a result of working in cooperative groups, students' academic achievement increases (Sharan & Shacher, 1988; Sherman & Thomas, 1986; Slavin & Oickle, 1981), relationships among students improve (Slavin, 1994; Johnson & Johnson, 1989; Slavin, Leavy, & Madden, 1984), students' attitude towards school improves (Humphreys, Johnson & Johnson, 1982; Slavin & Karweit, 1981), and students' self-esteem is strengthened (Slavin, Leavy & Madden, 1984; Lazarowitz, Baird, Boulden, & Hert-Lazarowitz, 1982; Johnson, Johnson & Scott, 1978). Although widely studied, there is no consensus on a single best method of cooperative learning and no single spokesperson for the field has emerged (Davidson, 1985). However a consistent observation of researchers is that group goals which include individual accountability measures are essential for individual achievement (Stevens & Slavin, 1995; Slavin, 1994; Johnson & Johnson, 1989; Newmann & Thompson, 1987; Davidson, 1985).

Effective cooperative learning methods that improve student achievement are based upon the assumption that it is beneficial when students share ideas, explain their reasoning, and provide assistance to each other as they work together (Meloth, 1990; Meloth & Deering, 1994; Pressley, Wood, Woloshyn, Martin, King, & Menke, 1992). Thus, students involved in cooperative learning situations work together to achieve mutual goals and
that students involved in long-term mutual interests, work toward maximizing their joint outcomes (Johnson & Johnson, 1994; Slavin, 1995).

Slavin (1987) also recommends studying cooperative teams in long term projects (such as the music curriculum that is the subject of this study). Slavin (1994) concluded that for cooperative learning to have an effect on achievement it must be long term, and it must have both group goals and individual accountability.

Cooperative learning group goals which include individual accountability measures are essential for individual achievement (Stevens & Slavin, 1995; Johnson & Johnson, 1989; Newmann & Thompson, 1987; Davidson, 1985). Furthermore, cooperative learning programs that incorporate individual accountability increase student achievement more than those that do not (Slavin, 1994). Combining group goals with individual accountability motivates students to help the rest of their group learn and reduces the potential for individual students to rely upon the others to accomplish the team goals (Slavin, 1994; Stevens, & Slavin, 1995; Johnson & Johnson, 1989). Therefore, the inclusion of individual accountability is a key component for successful cooperative learning experiences, and the lack of individual accountability in cooperative groups is one of the major reasons why students in cooperative learning experiences sometimes fail.

Bak (1992), concurred that cooperative learning should include individual accountability. Bak's meta analysis evaluated the effect of cooperative learning on individual students' achievement in seventy three
studies. Bak found in over 60% of the studies that achievement scores of individuals in cooperative groups that included individual accountability exceeded individuals from control groups that did not include individual accountability.

To summarize, successful attainment of the group goals in educational settings should include individual accountability, and successful learning of individuals produces positive group interdependence.

Specific Cooperative Learning Methods

As Slavin (1995) observes there are several models of cooperative learning. Listed next are the five most common forms:

(1) STAD: Student Teams - Achievement Divisions.
(2) TGT: Teams - Games - Tournaments.
(3) TAI: Team - Assisted Individualization or Team Accelerated Instruction.
(4) Jigsaw - II
(5) CIRC: Cooperative Integrated Reading and Composition

STAD consists of five major components - class presentations, teams, quizzes, individual improvement scores, and team recognition. In STAD study materials are introduced during a full class presentation and four-member, heterogeneously mixed student teams respond to the specific topic or objective of the presentation. The most important feature of STAD is that students are working for their team. Team members provide peer support,
and develop respect for each other. Though the team’s success is paramount, there is individual accountability.

TGT follows the same teacher presentation and team composition as STAD. However, instead of quizzes and tests, TGT uses competitions between groups in which individuals represent their teams and compete against other team representatives, thus maintaining individual accountability as well as generating team scores.

TAI is concerned with adapting instruction to individual student differences. TAI was originally designed for use in upper elementary mathematics classes and uses heterogeneous grouping combined with individual accountability.

In Jigsaw II individual team members become experts on one aspect of the team assignment. Similar experts from every team meet to discuss their topic. This is an attempt to clarify the concept for each “expert” who then explains the topic to the other team members.

In CIRC student teams consist of paired students. Student dyads construct knowledge and are examined only after their partner determines they are ready. CIRC is primarily a comprehensive reading program for upper elementary and middle school grades.

Effectiveness of Cooperative Learning Methods

Adams (1995) investigated the effectiveness of incorporating STAD with mildly handicapped students and normal learners in an inclusive
classroom. Findings suggested that students in classes that used STAD did better academically than students in the control groups.

Spuler (1993) compared two cooperative learning methods, STAD and TGT, for their relative effectiveness in mathematics achievement K-12. In general, students who used STAD models showed higher gains in achievement than did students who used TGT. However, in studies of thirteen weeks or longer, the teams using the TGT learning model achieved higher gains than those who used the STAD learning model.

Zetty (1992) studied the effects of STAD and Jigsaw learning methods on achievement, anxiety, and classroom environment preferences (whole class, cooperative groups, or individual learning) in two college microcomputer application classes. Both of the cooperative methods showed significantly higher gains than other methods, with the Jigsaw group scoring significantly higher than the STAD group. However, Zetty also found that members of cooperative learning groups preferred whole class or individualized instruction over cooperative group instruction. Interestingly the instructor's preference changed from lecture/demonstration style to cooperative learning.

Adams (1995), Spuler (1993), and Zetty (1992), suggest that it is important to implement cooperative learning models long term to be effective. Although much of the research has compared specific models, a common element, individual achievement, has emerged as being important across all models. All of the models produced higher results in individual
achievement than did the traditional teacher/lecture format. These results have been observed in studies of cooperative learning in high school academics (Marshall, 1995; Wellman & Hickling, 1994) and community college English classes (Orlando, 1992). Their findings also suggest that cooperative learning is a useful way to teach new and abstract concepts.

**Music and Cooperative Learning**

Music learning is both abstract and social, and offers opportunities for cooperative learning. Leonhard and Hause (1959) noted the need for self directed groups to participate, choose repertoire, and to interpret music. Tait and Haack (1984) recommended a view of music education that fully develops human beings who “think carefully, feel deeply, share generously, and thus act more humanly” (p. XI).

Although Sironen’s (1981) recommendations included that music teachers would be more successful if they help students realize their own learning goals by using small groups to teach musical concepts, Gollinger's (1995) study of a high school piano laboratory is the only published longitudinal study of cooperative learning in music education. His descriptive study investigated cooperative learning’s effect on interdependence versus competitive interaction in acquiring piano skills. Gollinger concluded that students who learned as members of cooperative student teams realized substantially higher end of term and final exam grades than students who did not participate in cooperative teams. The data also

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revealed better attendance and more positive classroom behavior among students in the cooperative groups.

Kaplan and Stauffer (1994) recommend including cooperative learning to teach high school chorus students to sight-read stepwise melodies. The authors cite an example of, but provide no data on, a cooperative learning lesson used in a Maryland high school.

**Critics of Cooperative Learning**

Critics share three major objections to cooperative learning:

1. Positive results found in studies may be due to the Hawthorn effect (Bossert, 1989). However, Stevens & Slavin (1995) dispute this claim, demonstrating that year-long studies of cooperative learning programs have been as successful as short-term studies in enhancing student achievement.

2. Group achievement does not necessarily mean individual achievement (Talmage, Pascarella & Ford, 1984; Solomon, Watson, Schaps, Battistich, & Solomon, 1990). (Perhaps the results of these studies actually support the need for individual student accountability in cooperative teams.)

3. Cooperative learning is more effective with greater teacher direction (Mucci, 1993; Taylor, 1994). Teacher direction could keep all students focused on their assignment.
Modern Cognitive Information Processing Theory

Modern cognitive information processing theory involves the process of thinking and learning. Careful examination of the ways students effectively construct cognitive processes have analyzed in relationship to improved student comprehension and achievement scores. Researchers have determined that including of teaching and learning strategies

Strategies - Related Instruction

Research into instruction which facilitates the use of learning strategies, is fundamental to the work of Michael Pressley and David Perkins. Strategies related instruction has typically been treated as a separate curriculum, or has been used to assist with the presentation of a curriculum (Pressley, McDaniel, Turnure, Wood, & Ahmad, 1987). Cognitive information processing including strategies-related instruction is compatible with cooperative learning situations (Pressley, Almassi, Schudler, Bergman, Hite, El-Dinary, & Brown, 1994).

Pressley et al. (1994) determined that students improved comprehension when taught how and when to use strategies as they read. They found that successful learning necessarily includes more explicit strategy instruction. They also found that students who effectively incorporated a few strategies into their learning were more successful than students who were taught a large number of strategies.
According to Flavell (1985), students who have been coached in how and when to use specific strategies have generated higher reading comprehension scores than students who did not.

Pressley, Heisel, McCormick, & Nakamura (1982) state that "if a student has developed his or her own strategy to use in a particular situation, then he or she will use it more efficiently than ones they are instructed to use" (p. 130). Though it might be argued that the strategies developed by an individual are not necessarily the best for a particular situation, Pressley et al. (1982) show that a student who develops such a strategy will use it efficiently.

Pressley, Wood, Woloshyn, Martin, King & Menke, (1992) suggested that learning increases when students use the strategy of elaborative interrogation to construct explanatory answers to questions about content to-be-learned. They found that approximately two thirds of the subjects tested using elaboration demonstrated significant achievement in comprehension over the control group (1992). Based upon the conclusions of Pressley et al. (1992; 1982) it appears that:

(1) Coaching of students in the use of strategies produces better results in comprehension.

(2) Students are capable of developing strategies to use in learning a specific topic.

The question that is raised here is will students functioning in cooperative teams devise new strategies or transfer previously learned strategies to learn?
Cooperative Learning and Strategies Instruction

According to Meloth & Deering, learning strategies instruction has positively effected metacognitive growth in cooperative learning environments (1994). Though Pressley et al. (1992) found that learners who attempt to explain how they constructed their new knowledge do so by relating it to prior knowledge, Gick and Holyoak (1980, 1983), Ross (1984), Markman (1977, 1979) and Langer, (1989) determined the opposite. Their studies suggest that people who process new materials do not tend to relate it to similar information encountered in the past unless prompted. This finding directly relates to the traditional chorus rehearsal in which a quick pace is recommended in order to keep a large number of singers focused (Neiding & Jennings, 1967; Green, 1969; Garretson, 1970; Decker & Herford, 1973; and Collins, 1993). Yet, this practice seems to be not as effective for student conceptual understanding. Research suggests that students need time to generate greater conceptual understanding which, is accomplished by activating prior knowledge, and elaborating on how they arrived at their answers (Pressley, Symons, McDaniel, Snyder & Turnure, 1988; Pressley, et al., 1987; Tobin, 1987). Students in cooperative teams needn't be concerned with class pace and classroom control issues and are able to concentrate on greater conceptual understanding.

Webb (1989, 1985) identifies two major areas in which cooperative teams increase conceptual understanding in students:
(1) In generating elaborate answers to questions from peers, students stimulate a variety of cognitive processes and produce more reflective responses.

(2) Achievement gains in cooperative learning depend upon the giving and receiving of elaborate explanations of concepts and skills.

Costanza and Russell (1992) found that the strategies of modeling, imagery, and question answering are the most common observed in traditional ensemble rehearsal. They also found that the strategies of prior knowledge activation and summarization of background knowledge are being incorporated but less frequently (1992).

The cited research suggests that learning strategies help students learn to read and comprehend textural material more thoroughly than students who do not use strategies. Also, that students who are given adequate time to explain their answers give more insightful responses.

**Strategy Instruction as It Relates to Thinking Frames**

If students understand a concept or a skill thoroughly enough so that its use becomes automatic, then it requires less mental energy to incorporate and they are free to devote more mental energy towards other activity (Perkins & Salomon, 1993; Pressley & Harris, 1990). Therefore a student using a specific concept that has become automatic (as a metacognitive function), is better able to use that concept as a tool to assist in learning another concept. Perkins (1986) describes this process as a thinking frame which is "larger than a strategy or a tactic." A thinking frame is used to organize thinking by
combining a learning strategy with metacognition (as to when or how to apply it) (1986). However, Pressley et al. consider when and how to apply a strategy as part of a thorough understanding the strategy (1994). Perkins (1986) and Pressley et al. (1994) support the position that students can discover a strategy (or process) and use it in acquiring new concepts.

Perkins' (1986) research also suggests that when learners internalize a process (called automization) the demands on the working memory are drastically reduced. Automization therefore allows the learner to bring a broader range of knowledge into the thought process. This results in the learner being able to yield a more thoughtful response or solution to problem.

The cited research in cooperative learning suggests that students in cooperative teams work together to accomplish a goal. The cited research in strategic learning suggests that students may independently discover a process or a strategy that will assist them in learning a new concept. Therefore, whether team members use specific teaching and learning strategies to help teammates in learning to read music is important to this study.
CHAPTER THREE

METHODOLOGY

Data were collected using qualitative and quantitative methods to investigate how students in cooperative teams learn to read music. Subjects were from a rural area high school in Northern New England. The four year high school has a population of approximately 2,500 students from four towns. Approximately 45 freshman girls participate in the freshman Girls' Chorus which meets daily. Instruction included the completion of sequential worksheet assignments that were practiced in teams during class time. These cooperative sessions were the focus of this study.

Members of the chorus were tested in September for their music reading skills, and divided into two levels based upon their previous music education. Students self-selected teammates from their level resulting in two homogeneous levels of three person cooperative teams. The instructor recommended three potential study teams from both levels of music ability. From these six teams, two volunteer teams agreed to be observed over a six-month period during the 1997-1998 school year. One team (MKS—Margie, Karen and Sara) consisted of novice music students, and the other team (Las Chicas—the chicks—Amy, Beth and Carol) consisted of students with previous musical training. Each team was observed as it completed the assigned material over a six month period. All observations and student interviews...
were conducted during class time. Interviews with the teacher were conducted outside of class.

**Chorus Class**

Rehearsal time during Girls chorus was usually divided between cooperative team sessions and full ensemble rehearsal. Students began class vocalizing as part of the full ensemble for approximately ten minutes. Next, the instructor explained the cooperative teams' assignments, and the teams worked together for approximately ten to fifteen minutes. Finally, the teams would return to full ensemble and rehearse the choral repertoire understudy for the remainder of the class period (approximately thirty five to forty minutes).

**Qualitative Data Collection Procedures**

The study of chorus students in cooperative teams assisting each other in learning to read music is unique in the music education literature. Analyzing this complex phenomenon required an exploratory endeavor to observe what students learned as well as chronicling the patterns of how students learned.

**Naturalistic Observation in the Classroom Setting**

In reviewing the findings from multiple studies it was concluded that naturalistic observation was the most effective research method to evaluate this educational program. The decision was based upon the needs of the study and the schools restrictions in gaining access to the students. The following researchers have determined that naturalistic observation

It was determined that naturalistic inquiry has rarely been used to study areas of music education and never for this type of choral learning. However, it is well suited to understand how students engage in cooperative learning. Fraenkel and Wallen (1990), state that observational research in the natural setting can be used to obtain a more complete picture of what goes on in a particular cooperative student team. The nature of how team members learn is revealed through the ways people interact with each other in answering questions; in the meanings teams give to certain words and actions; in how people's attitudes are translated into actions; and in how students affect each other with gestures or comments. Thus, naturalistic observational research describes the process as well as its product.

Pellegrini (1996) described an important goal of naturalistic observation which is to provide the reader with a verbal picture of behaviors as they unfold. Naturalistic observation allows for close examination of various aspects of the curriculum such as curriculum materials and teacher strategies because it constructs a picture through close examination of the entire phenomena and is not centered upon a single event. And therefore has a higher likelihood of obtaining a truer picture of what transpired during the studied event, the cooperative team sessions (Pellegrini, 1996; Messick, 1983).
Pellegrini and Stanic (1993), found that observational methods can be useful in evaluating both children and programs as well as documenting the operation and the impact of the program under study. This is because naturalistic observational methods do not put subjects into anxiety-producing situations. Placing students into uncomfortable situations that might inhibit their learning was the major concern of the school administration as well.

Videotape Recording in Naturalistic Observation

Lofland and Lofland (1995) state that naturalistic research is foremost an emergent research method. Emergent research provides for the refining of data collection methods towards focusing on important phenomenon and broadening its lens to include unanticipated events. It is the emergent character of this research project that makes naturalistic observation desirable and the use of videotape to record teams a particularly appropriate method for data collection. Lofland and Lofland (1995) list the following four reasons to use a video camera to record a culture. A researcher may:

(1) Collect more of what is happening in a situation than a single person can.

(2) Solicit expert opinion on what is transpiring.

(3) Replay tapes for continued analysis and study

(4) Compare early, middle and late period video tape recordings to observe development in how the group functions as a single unit.

They recommend that if the setting is an especially significant or an interesting one, even a partial study of it will be better than none at all. As
the use of student teams in learning to read music is unique in the literature it is therefore worthy of study. Even though the school administration initially granted only limited access study students in order to corroborate data collected.

Teams were studied for a six month period. The teams studied were alternately videotaped in the music office at the teacher's suggestion in order to obtain high quality audio recordings. This data collection procedure differed from the usual class practice in which cooperative student teams worked in separate areas of the rehearsal room. However using videotape to record all observational data represent an established paradigm for data collection found in Lofland and Lofland (1995), and Dabbs (1982). Videotape recordings were made of every cooperative team class session and alternated on a daily basis between the two teams studied.

Analytic Procedures

Student conversation was transcribed verbatim at random intervals for thirty seconds during a ninety second episodes and similar to data collection procedure used by Dabbs (1982). These thirty second snapshots were analyzed to see if patterns of knowledge construction and examples of specific teaching and learning strategies became apparent. The observer was not only a silent witness to what transpired, but was also able to micro analyze what transpired in the sessions.

Learning and teaching strategy classifications were developed from Pressley, et al. (1994); Pressley, et al. (1992). The specific strategies watched for
included modeling, imagery, elaborative interrogation, prior knowledge activation, predictions and question generating, thinking aloud, clarification, summarization, and direct explanation and are summarized in the following table, Table 1.

All verbal interaction from the video tapes was transcribed or described (during the interludes) and numbered consecutively so the sequence was preserved.

**Documentation of Teaching and Learning Strategies**

A panel of three professional educators were used to corroborate the strategies most often observed during cooperative team sessions. In preparation, the panel members read the chapter, "Transactional Instruction of Reading Comprehension Strategies" from Creating Powerful Thinking in Teachers and Students: Diverse Perspectives, by Michael Pressley, (McKeough & LuPart, 1994). The chapter described the previous nine strategies the panel was to chronicle. Copies of the nine strategies and definitions were passed out to panel members and every strategy was modeled and explained by the researcher.
Table 1

Strategies

(1) **Modeling** - An example for the students to emulate
    Verbal examples:
    - See how I hold my music when I sing it.
    - Do it like this. (The student sings the correct pattern)
    - No, this is the way it's supposed to go. (And demonstrates)
    - Try singing it the way Jill does.

(2) **Imagery** - The use of vivid or figurative language to represent objects, actions or ideas. (Berube et al., p.417)
    Verbal examples:
    - Make that note sound as loud as an explosion.
    - This part has to be as soft as singing a lullaby to a baby.

(3) **Elaborative interrogation** - Generating responses to "why" questions activates prior knowledge (Pressley, et al., 1992).
    Verbal example:
    - Why do you think that?

(4) **Prior knowledge activation** - Relating the concept to previous similar examples.
    Verbal examples:
    - This is just like in that piece we sang last week.
    - This part is the same as we sang on the first page.

(5) **Predictions and question generating** - Anticipating what will be next, or questioning the possible meanings of the new concept or example.
    Verbal examples:
    - Try thinking about how the next verse is going to sound.
    - Are we going to sing the same notes as we did in the first verse after the chorus?

(6) **Thinking aloud** - Asking the student to talk through the process and explain how he or she arrived at the answer.
    Verbal Examples:
    - Explain what do you do to sing a high note?
    - This kind of note is the same as this one.

(7) **Clarification** - To make a concept become clear for oneself or for others.
    Verbal examples:
    - Remember what we already talked about earlier, how the rhythm goes?
Table 1 (continued)

(8) Summarization - Periodically stopping to construct and articulate the principle points of the topic under study.
   Verbal Examples:
   Look, we’re supposed to do A, then B, then C.
   I think this whole thing simply means this .......
   Remember what we already talked about.

(9) Direct explanation - A complete description of the concept, process or problem.
   Verbal example:
   When the notes go up, make your voice go up. When they go down, make your voice go down.

The backgrounds of the volunteer panel is described as follows:

Observer A was a beginning accredited music educator.
Observer B was an experienced educator with over five years of teaching experience and no formal music training.
Observer C was an experienced educator with over ten years of teaching experience and with some formal music training.
Observer D was the study researcher also an accredited music educator with over twenty years experience.

The panel viewed representative examples team videotapes and chronicled the strategies observed. The panels observations were sought in order to corroborate the observations classified and patterns of behavior chronicled by the researcher.
Other Triangulation Procedures

After two months of group observations, periodic interviews began with the chorus students and their teacher. Students were interviewed and asked to comment on examples taken from the video tape recordings. The questions probed how teams functioned as a unit and how the students learned to read music. The objective of these interviews was to answer the specific questions which guided this study.

The teacher was asked to view and comment upon specific segments of the videotapes regarding how the teams functioned to achieve his intended goals. He was also asked specific study questions that pertained to him. These interviews offered a means to triangulating qualitative data collection.

Quantitative Data Collection Measurements

Quantitative data were collected to assess improvement in students' music reading ability. Two sources were used, the Iowa Tests of Musical Literacy - LEVEL 1 and student classwork including worksheet assignments.

Iowa Tests of Musical Literacy - LEVEL 1

The Iowa Tests of Musical Literacy, developed by Edwin Gordon in 1970 and revised in 1991, are standardized musical achievement tests. The tests are designed to evaluate a student's music achievement and subsequent development, as well as compare a student's relative standing in music achievement to national norms for students of similar age and experience (Gordon, 1991).
The tests are divided into six sequential levels of difficulty. After discussions with a representative from the publisher, it was decided that Test # 1 was appropriate to be used as the pre-test and the post-test for this study. Test # 1 includes both tonal concepts and rhythm concepts and takes 45 minutes per section to administer.

Test Procedure

Students listen to a prepared music tape and individually respond on a color coded worksheet. The tape gives directions with two examples per subtest. A taped voice asks the participants to either classify the patterns, or compare what they hear to the written example by checking the appropriate box on the worksheet. If a student does not understand a particular question, there is an “in doubt” box that may be marked. The “in doubt” option is designed to provide an individual student music profile which, according to its designer “increases the validity of the individual music test without significantly reducing its reliability” (Gordon, 1991, p. 8). Tests were hand scored using the supplied answer grid.

Gordon reports that the Iowa Tests of Musical Literacy demonstrate sufficient validity and reliability (Gordon, 1991; Gordon, 1994). The tests were designed to compliment his music program Jump Right In. The purpose of using these test scores was to provide quantitative measurements supporting music reading skill.

The Iowa Tests of Musical Literacy - LEVEL 1 were used in a pre-study and post-study test design which generated data regarding the students' ability
to listen, read and write tonal and rhythmic patterns. From these tests, composite scores were generated for both the tonal and rhythm sections, as well as a final composite score which included all subtests. The pre-test and the post-test each yielded a total of nine separate musical scores for the subjects: three tonal scores, three rhythmic scores and three composite scores. Next, each test will be described in greater detail.

**Tonal Concepts**

(1) **Audiation/Listening (T1)** - Tonal patterns in major and harmonic minor intervals are played for the student. The student classifies what is heard by selecting the appropriate box: M = major intervals; m = minor intervals; ? = do not know. (For a sample test sheet, see Appendix 3)

(2) **Audiation/Reading (T2)** - A student indicates whether the tonal patterns written on the test are: Y (yes) = the same as the patterns heard on the tape recording; N (no) = different from the patterns heard on the tape recording; ? (in doubt) = the subject is not sure whether the tonal patterns are the same as on the tape recording.

(3) **Audiation/Writing (T3)** - A student completes a series of nine note notation patterns by choosing the correct response from two separate alternatives. From an alternative of eight different notes, the subject chooses the correct four notes to complete the pattern to sound the same as the example performed on the tape recording.
(4) Tonal Composite Score (TTC) - A standardized composite score of the three tonal tests.

Rhythm Concepts

(5) Audiation/Listening (R1) - Patterns in a duple or triple meter are played on the tape recording and subjects mark whether the pattern is as follows: D = duple meter; T = triple meter; ? = in doubt.

(6) Audiation/Reading (R2) - Subjects indicate whether the rhythm patterns written on the test are: Y (yes) = the same as the patterns heard on the tape recording; N (no) = different from the patterns heard on the tape recording; ? (in doubt) = the subject is not sure whether the rhythm patterns are the same as on the tape recording.

(7) Audiation/Writing (R3) - A subject completes the notation of rhythmic patterns by choosing appropriate note heads, flags, beams, ties and rests so that it is the same as that heard on the tape recording (Gordon, 1991, p.15). A subject completes the note value by choosing to color in the stem giving the note one value, or leaving it blank which gives the note a different value.

(8) Rhythm Composite Score (TRC) - A standardized composite score of the three rhythm tests.

Total Composite Score

(9) Composite Score (CTR) - A composite score of the tonal and rhythm composite scores.
The *Iowa Tests of Musical Literacy Level 1* were used to establish mean scores from the class as well as individual scores from the sample teams. Data gathered from these tests were used to answer the following question: What kind of measurable improvement in music reading resulted from the cooperative approach?

Finally, student gains were also evaluated by analyzing student class work. The data were used to support observations of how the study teams functioned on a specific assignment. Class work consisted of student written test grades and assigned solo tape recordings of exercises, which were used to establish a more complete understanding of the team's learning process. A further use of class work as part of the data collection procedures was that it demonstrated individuals long-term growth.
CHAPTER FOUR

RESULTS

This chapter will answer the following ten study questions:

QUESTION 1) How do members of the cooperative student teams learn to read music?

QUESTION 2) Do the cooperative team members regularly use any specific teaching strategies and learning strategies to assist each other in their construction of knowledge? If so, which ones?

QUESTION 3) What kind of measurable improvement in music reading resulted from the cooperative approach?

QUESTION 4) Is there any evidence that the students are transferring this knowledge to other choral situations?

QUESTION 5) How do selected teams work on exercises in music concepts such as rhythm and harmony?

QUESTION 6) How do students in these selected teams feel about learning this way?

QUESTION 7) What attitudes towards choral music singing do students develop in teams?

QUESTION 8) How does the director feel about cooperative learning?

QUESTION 9) What strengths and weaknesses to cooperative learning are apparent compared to students taught in a traditional choral rehearsal?
QUESTION 10) Does the cooperative learning approach have any other noticeable effects on student performance in chorus?

Answers to these questions are provided through analysis of (1) cooperative team dialogue transcripts; (2) quotations and summaries of interviews from study students; (3) the director; and (4) quantitative measurements.

Study Teams

Subjects' Previous Choral Music Education

Las Chicas

Team Las Chicas (the girls) included three students—Amy, Beth, and Carol—each received previous instrument lessons. Amy, a trumpet player, and Carol, a clarinetist, both began formal study in elementary school. Beth and Amy have privately studied piano. All three students sang in their junior high school choruses and describe their previous choral experiences as follows:

(1) The teacher passed out both lyric sheets and music.

(2) Students learned unison or separate vocal parts by rote.

(3) The music was learned by memorizing musical phrases in association with the text.

(4) The teacher introduced musical notation, rhythms and syllables.

However, students reported that they were unaware of any attempts to use this knowledge in order to build music reading skills in chorus.
Amy and Carol were concurrently playing in the junior high school band and believe the experience provided them a greater opportunity to learn to read music notation.

MKS

Team MKS—Margie, Karen, and Sara—were students with less previous music experience. Sara, who briefly studied piano, had more formal music education than the rest of the team. All three reported similar junior high school choral experiences as Las Chicas. It had not been necessary for students to learn to read music in junior high and elementary school. Student success depended upon recreating a programmed performance.

QUESTION 1) How do members of the cooperative student teams learn to read music?

Learning in Cooperative Teams

The consensus of both teams is that individual members brought musical strengths and weaknesses to the team learning process.

Las Chicas Interview Transcript 1/7/98

Carol - Well like, if you don't know how to (perform the musical example), the other person might. And they can help you learn how to read the music.

Beth - Each person in the group has a stronger point (rhythm, pitch matching etc.). Some people are better at knowing notes and then you can help each other out with whatever is strong for you.

Carol - Yeah.

Five-Step Learning Process

The cooperative teams of Las Chicas and MKS learned class assignments using a five-step sequential process. The process was introduced
by the teacher at the beginning of the year and was routinely observed in subsequent cooperative team session and consisted of the following five-steps:

(1) Students identify the correct solfege syllable.

(2) Students sing the individual pitches without rhythmic constraints (not paying attention to the rhythmic values of the notes in the phrase).

(3) Students chant the rhythm pattern using a hand patching procedure. (The procedure will be described during Step Three.)

(4) Students combine singing the solfege syllables with the rhythm.

(5) Students individually choose to either tape record a performance of the exercise or perform it for the teacher.

Although it soon became apparent that Las Chicas functioned more effectively as a team than MKS, both followed the five steps. These examples illustrate the dynamics of the group interactions as they work through the exercises.

STEP 1) Students identify the correct solfege syllable.

Students began the year by individually writing the correct solfege syllable for each pitch in the exercise. Next, they would check their results with each other. Most of the time work was checked after each measure and sometimes even after each note.

Las Chicas Interview Transcript 1/7/98

Beth - First, we would find “Do” and write out the solfege (underneath the notation). Then we would write out the rhythm on top, and the solfege notes on the bottom or whatever.
All - Yeah.
Carol - (continuing on) We write what each note value is.
(Value refers to the length or duration of the pitch, 1 beat, 1/2 beat, etc.)

This description of STEP 1 is supported by the following transcript from the beginning of the school year.

Las Chicas Transcript 9/24/97

Amy - Let's write in the notes; that will probably be easier.
Carol - Yeah.
All Students (write in and chant the solfege note names out of rhythm while consistently checking each others results) - “Sol, La, Fa Me, Re, Me, Re, Do, Fa, Re, Fa, Do, La, Ti, Do, Fa.”

Team MKS had more difficulty with the early assignments as demonstrated in a session on October 9.

MKS Transcript 10/9/97

Karen - (pointing to her music) - Did you say that that one right there is always “Do”?
Sara - No, cause see now ( mumbling something indiscernible).
Karen - (shakes her head in frustration) - I thought I could get it, yesterday, cause I was like, cause I felt, ah...... (she shakes her head again).
Margie - (her eyes focused on the workbook) - The next one's “Re.”
Sara - It goes, “Do, Re, Me, Fa, Sol, Sol, Fa, Me, Fa, Me, Fa, Me,...

As the year progressed and students gained expertise, they would complete more of the exercise before checking each other's work, as demonstrated in the Las Chicas transcript from November 10.

Las Chicas Transcript 11/10/97

Beth - (patching) - OK. 1,2, begin.
All - “Do, Do, Re, Ti, Do”, (They make a mistake).
Beth - Wait a minute. OK, it goes “Do, Re, Ti, Do, Do, Do.”
Carol - What?
Beth - (turning and showing Carol her paper) - Cause that is the same as that (she points), right?
Carol - No....
Beth - (interrupting and realizing her mistake) - Yeah right, sorry I screwed up.

Eventually, as students became more familiar with reading and classifying the notation into solfege syllables, they no longer needed to write in every solfege syllable.

Las Chicas Transcript 11/10/97

Beth (patching) - OK. 1, 2, begin.
All - "Do, Do, Re, Ti, Do", (they make mistake)
Beth - Wait a minute. OK, it goes "Do, Re, Ti, Do, Do, Do."
Carol - What?
Beth - (turning and showing Carol her paper) - Cause that is the same as that (she points), right?
Carol - No....
Beth (interrupting) - Yea right, sorry I screwed up.

As these students sight singing ability developed, their ability to read and comprehend written notation as solfege syllables became more automatic. Thus, their ability to think musically also grew.

Previously it was described that learners can only hold a few pieces of information in their short-term or working memory at a time. As a new skill becomes automatic or part of a person's cognitive repertoire, it no longer requires much deliberate attention to be used. Then, the demand on the working memory is drastically reduced which allows the learner to include additional information in the thought process. This meant that as study team members learned they were able to concentrate greater attention to other musical components such as the text, phrasing, and blending with the other sections.
STEP 2) Students sing the individual pitches without rhythmic constraints.

MKS Transcript 11/12/97

Margie - Let's do Example 1 (she immediately starts to sing out of rhythm and is joined by the others) “Do.” ..... 
All - “Mi, Sol, Mi, Do, Do, Do, Re, Mi, Re, Do, Ti, Ti, Do.” 
Karen - I think we did that wrong, but..... 
Margie - I don't think so.

Though MKS members practice the part, they didn't analyze and evaluate their performance. Aware that something is wrong, they were unable to analyze the musical problem (incorrectly singing the solfege intervals). Through repetition tuning improved and the MKS members began to conceptualize how the intervals should sound.

Study students demonstrated that they were beginning to understand and internalize the relationship between the solfege pitches which eventually enhance each member’s ability to sing a musical phrase in tune.

STEP 3) Students chant the rhythm pattern using a hand patching procedure.

(For a diagram see Appendix 1)

A description of the hand patching procedure.

Students sit holding their left hand across their body, forming a right angle forward from the shoulder through the fore-arm, while keeping the wrist parallel to the floor at shoulder height. The back of the right hand rests underneath the palm of the left hand. Next, the right hand is moved downward in tempo tapping the thigh of the right leg. After tapping the thigh, the hand returns to the first position under the palm of the left hand. The complete event lasts one full beat (quarter note in 4/4 time), with the
initial downward motion lasting 1/2 beat (eighth note in 4/4 time), and the returning upward motion lasting an equal 1/2 beat.

The patching procedure allowed students to maintain a consistent pulse and minimize the tendency for members to accelerate or slow down the tempo during the chant. Patching also forced individual members to keep steady time with the rest of the team, therefore prohibiting an individual member from merely imitating the performance of other members. This is an important distinction and a primary reason for team success.

As the students chant the length of each note, it is articulated using the syllable “Dah...” or “Dot...” for long notes and “Da” for short ones. By combining these syllables with the patching, an accurate representation of the rhythm pattern of the exercise is determined by the team members. When students became familiar with the rhythm, they would steadily increasing in numbers of measures until the exercise was mastered.

Usually, a leader would begin by establishing a tempo. The leader would count out a full measure in tempo - for example, “1 & 2 & 3 & 4 &.” Beginning with the first measure, the team would begin to chant together. Though the role of leader would frequently rotate in Team MKS, in Team Las Chicas it usually fell to Beth.

During the sessions early in the school year, students would decide on the rhythmic value for each note and isolate how each measure should sound:
Las Chicas Transcript 9/26/97

Amy - The little dot at the end means you go 2, 3 - dah dah dah. (Amy is modeling the rhythm including a dotted half note. On beats 2 and 3 her right hand taps her thigh kinesthetically reinforcing each beats of the measure allowing students to see, hear and feel the rhythmic pattern.)
Carol - Oh yeah, Dah dot, oh yeah (imitating the patch procedure)
Beth - Oh yeah (attempting the same rhythmic figure).
Amy - Dot Dah Dot (using the patch)
Carol - (physically doing the exact same thing in sync with Amy. Beth is mirroring just a little behind.)
Amy and Carol, who have learned the exercise, now model its performance for Beth, still unsure.

The first three steps assisted students in conceptualizing the way the exercise was supposed to sound by isolating the separate components of pitch and rhythm. If there was confusion about any part of the exercise, students could isolate the problem and work on the specific problem. Next, the students combined these components into a performance of the exercise.

STEP 4) Students combine singing the solfege syllables with the rhythm.

MKS Transcript 11/12/97

Margie - All right, let's do example #2. I think I got that one, (referring to example 1) - How about you guys?
Sara - (exasperated) - I don't have it (the solfege written out) on my paper.
Margie - So what!
Sara - Oh, I'm supposed to look at it and then automatically know what it is?
Karen - Try it.
Sara - OK, go on.
Karen - (establishes tempo) - OK, 1, 2, ready, go.
All - (sing but at a much slower tempo than Karen set) - “Do, Re, Mi, Mi, Fa, Mi, Fa, Mi...” (then they break down.)

If the section of the exercise was understood by all, students would proceed to the next section. If there was an error, then the group would return to the
appropriate previous step and divide the exercise into smaller phrases of one or two measures thus correcting the problem.

Another way errors were solved was that at times, one or two members of the team would perform the section for the remaining member(s). This was used to diagnose specific problems or model the correct performance.

Notice the effective way Las Chicas uses this strategy:

Las Chicas Transcript 11/10/97

Beth - (patching and singing) - OK. 1,2, begin.
All - “Do, Do, Re, Ti, Do,” (they make mistake)
Beth - Wait a minute. OK, it goes “Do, Re, Ti, Do, Do, Do.”
Carol - What?
Beth - (turning and showing Carol her paper) - Cause that is the same as that (she points), right?
Carol - No....
Beth - (interrupting and correcting herself) - Yeah right, sorry I screwed up.

When the team became satisfied with their performance, they would move on to the next assignment, as demonstrated later in this same session.

Las Chicas Transcript 11/10/97

All - “Do, Re, Ti, Do, Do, Do, Sol, La, La, Sol, Sol, Do, Ti, La, Ti,
La, Sol, Fa, Sol, Fa, Mi, Fa, Mi, Re, Do.”
Beth - (with confidence) - That was easy!
Amy - You’re all looking at me like (she smiles) well, all right.
Carol sits quietly and smiles.

STEP 5) Students individually record a performance of the exercise or perform it live for the teacher.

The final step of the process is individual accountability. As previously established, individual accountability is an important component of the
choruses cooperative learning model. Therefore, study teams' achievement was measured by individually by assessing each student.

Regularly team members were required to either submit an individual audio tape recording of a specific exercise, or to perform it for the teacher. Most students, including members of the study teams, chose to turn in individual tape recordings. Every student tape was evaluated in two areas:

1. The rhythmic performance.
2. The singing of the correct solfege syllables in tune.

Listed below is a representative example of two sets of student scores from these tape recording assignments. The first example contains grades from the first quarter marking period, the second example comes from the second marking period (September 1997 to November 1997).

These grades display a pattern that was consistent with the pre-test and post-test results. Specifically, that Las Chicas members scored in the high levels of the class on the achievement tests and MKS members scored in the middle to lower levels of the class on the achievement tests. (See Table 2.)

QUESTION 2) Do the cooperative team members regularly use any specific teaching strategies and learning strategies to assist each other in their construction of knowledge? If so, which ones?

Three professional educators with varying levels of formal music study were asked to watch four representative videotapes of cooperative team sessions. They were looking for evidence of nine specific learning and
Table 2
Study Team Scores, Quarter 1 and 2

<table>
<thead>
<tr>
<th>Student</th>
<th>Tape 1 Rhythm/Solfege</th>
<th>Tape 2 Rhythm/Solfege</th>
</tr>
</thead>
<tbody>
<tr>
<td>Las Chicas scores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amy</td>
<td>100 100</td>
<td>100 100</td>
</tr>
<tr>
<td>Beth</td>
<td>100 100</td>
<td>100 100</td>
</tr>
<tr>
<td>Carol</td>
<td>98 100</td>
<td>94 93</td>
</tr>
<tr>
<td>MKS scores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Margie</td>
<td>88 74</td>
<td>100 83</td>
</tr>
<tr>
<td>Karen</td>
<td>85 86</td>
<td>95 98</td>
</tr>
<tr>
<td>Sara</td>
<td>88 88</td>
<td>95 92</td>
</tr>
</tbody>
</table>

Teaching strategies observed for this study. The specific strategies and their definitions for this study are listed as follows:

1. **Modeling (Mod.)** - An example for the students to emulate.
2. **Imagery (Imag.)** - The use of vivid or figurative language to represent objects, actions, or ideas.
3. **Elaborative Interrogation (E. I.)** - Generating responses to "why" questions activates prior knowledge.
4. **Prior Knowledge Activation (P. K.)** - Relating a concept to previous similar concepts, a skill to previous skills, or a feeling to previous feelings.
5. **Predicting and Question Generating (Pred. or Q. G.)** - Anticipating what will be next.
6. **Thinking Aloud (T. A.)** - Asking the student to talk through the process explaining how he or she arrived at the answer.
(7) Clarification (Clar.) - To make a skill, fact or concept understandable oneself or for others.

(8) Summarization (Summ.) - Periodically stopping to construct and articulate the principle points of the topic under study.

(9) Direct Explanation (D. E.) - Describing the process or concept so the recipient understands.

**Examples of Team Strategy Use**

The following dialogues were observed by the panel. However, the descriptors that are included in these examples were omitted from the panel members' transcripts. The first dialogue demonstrates students using the strategies “modeling” and “clarification.”

*Las Chicas Transcript 10/2/97*

**Episode 1**

The dialogue begins with the team members discussing the assigned exercise.

Beth (referring to the next measure as already being understood) - We've got four.

Students patch and chant Measure 5, but are having difficulty counting the dotted eighth note that falls on beat 1. Beth and Amy are trying to work out the rhythm while Carol listens, staring at her worksheet.

Beth (speaking to Carol) - It gets “one,” and the dot gets “and.”

Beth demonstrates how to count a dotted eighth note which lasts 3/4 of a beat. Amy and Beth model Measure 5 together while Carol listens and follows on her worksheet. After the isolated measure is completed, Carol interrupts and asks a clarifying question.

Carol - Wait, what is it at Measure 5? (She now chants the Measure correctly.)

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Carol has listened to the other two members work out the exercise and model it for her. She in turn responds by chanting back the exercise as she has learned it while Amy and Beth evaluate her performance. In the next dialogue are examples of the strategies “predictions,” “question generating,” “prior knowledge activation,” “summarizing” and “thinking aloud.”

Las Chicas Transcript 10/8/97

Episode 1

The session begins with students discussing assigned exercises from the Jenson Sight Singing Course workbook.

Beth - We should be doing #147, or #144, or #142?
Carol - I thought #147, but we don't know where “Do” is anymore. How about #147?
Beth - OK.
Amy - Is this “B” or “Bb”? (Her question refers to key the in which the exercise is written. It is in “Bb Major”.)
Beth (cautiously) - There is a lot of sharps in #153. (key of “E Major”)
Carol - And in #142 there is only one flat. (key of “F Major”)
Beth (agrees with starting with the simplest exercise) - Let's do #142 first.

Team members were thinking aloud to arrive at which exercise would be the easiest to begin with. They generated questions to decide upon which exercise was the easiest to perform. In choosing the “easiest” exercise, students are able to reduce the number of accidentals they had to take into consideration. Thus, they were able to direct greater mental energy towards the process of learning the assignment. The dialogue continues:

Carol - Where do you want to try “Do”? (searching for the correct pitch) “Do” would be like, ah....
Amy (interrupting) Wouldn’t it be “Fa”?
Beth (speaks up) I think “C” is “Do”. (correcting herself) No, the note it ends on is “Do,” most likely. (She is referring to the conclusion of the exercise in which “Do” is “F”.)
Beth bases her reasoning for finding "Do" upon previous musical knowledge. She reasoned that as most exercises she has experienced end on "Do," than "Do" could be found by observing the final note of the exercise. This was an example Beth predicting where "Do" falls based upon her past experiences.

The next two dialogue examples students tried to understand the concept that sequential solfege patterns repeat in different registers. The team will use the strategies of "clarification," "prior knowledge activation," and "direct explanation" to develop their understanding.

MKS Transcript 10/9/97

Episode 1

MKS members are having difficulty understanding that the pattern of solfege intervals repeat in different musical registers.

Karen (pointing to her music) - Did you say that that one right there though is always "Do"?
Sara - No, cause see now (she mumbles something indiscernible).
Karen (shakes her head in frustration) - I thought I could get it yesterday cause I was like, cause I felt, ah...... (she shakes her head again)
Margie (her eyes focused on the workbook) - The next one's "Re".
Sara - It goes, "Do, Re, Me, Fa, Sol, Sol, Fa, Me, Fa, Me, Fa, Me,....
Margie (agitated, interrupts) - I know, but you are confusing me.

The group is silent for a moment and studies the exercise.
Karen (breaking the silence asks) - Oh, do we have to do these things too? (She points to the beginning of the exercise) Like, are we just on......
Sara (responding) - Those aren't notes.
Karen - I know, but you know when we do this thing......
Sara (interrupts) - No, but sing the measure (not quite sure herself).
Karen (still searching for an explanation) - Yeah, I know but, you know when we do like this, before we sing it, should we sing that, though? (She points directly to the problem section so that Sara could respond directly to her problem. Margie is not participating; her head is still buried in her workbook) - What is it, what does it mean? Does that mean, like, you hold it?

During this episode, Karen sought clarification for which note was "Do." Sara, though not completely sure she understood, tried her best to clarify by describing what she believed to be the correct sequential solfege pattern. Margie, because she didn't understand, became frustrated and shut down.

In the next episode Sara and Karen both work to clarify the concept for Margie. They accomplish this by including the strategies of "prior knowledge activation" and "direct explanation.

MKS Transcript 10/9/97

Episode 2

MKS members are still having difficulty describing the concept of registers to Margie.
Margie (still confused) - That can not be "T."
Sara (putting her forehead into her hands) - It is! Cause "Ti," you know "Ti", is on the top.
Karen (reaches over, takes Margie's book, and points to the example) Margie - Yeah but there is no low "Ti."
Karen (in a calming voice) - Yes there is, see like there is ah - you know when we sing like "Do, Re, Me" and they say go one lower? (Karen is referring to the vocal exercises the entire chorus does at the beginning of the rehearsal.) When you're at low "Do", you're an alto right?
Margie - Yeah.
Sara (interjects) - And you go one lower, that would be "Ti."
Karen (continuing on) - You know when you do that?
Margie (taking back her workbook) - We never did that though.
Sara - Yes we have.
Karen (immediately after Sara) - Yeah. When like....
Sara (interrupts) - Oh wait, (she's thought of an example) wait listen to this. There's low "Do" and then there's high "Do." High "Do" is just starting off another thing. Cause after the high note is, "Re" "Me," "Fa," "Sol," "La".....
Karen (jumps in with great energy) - You just keep saying it forever.
Margie (she has been nodding along, and understanding the concept) - OK, OK, I get the picture.... I get it.

Although none of these students were able to explain the concept using appropriate music terminology, they used direct explanation to explain different registers to Margie based upon prior knowledge common to all.

The previous dialogues demonstrated examples of strategies found and labeled by the committee panel. Next, the process used by the panel to observe the video tapes will be described.

**Observation Process**

The panel of three observers was asked to watch four representative video examples lasting approximately 10-15 minutes each. Panel members were supplied a transcript of the cooperative team dialogue without descriptors, and asked to chronicle specific strategies. Members were also provided a list of the nine specific strategies and definitions to be watched for. Transcripts from the four sessions were further subdivided into separate episodes, producing a total of 15 episodes. After each video tape, any panel members questions were answered and at the conclusion of all of the tapes, a

**Results**

A strategy had to be observed by two or more members to be included. For the complete transcription of the four representative examples divided
into episodes including descriptors, see Appendix 2. The panel observed the following strategies (Table 3).

**Discussion**

There were three examples in which all four of the observers agreed on a specific strategy. Those strategies were examples of modeling, clarification, and direct explanation, which also were the most commonly used strategies in the sample.

**Table 3**

<table>
<thead>
<tr>
<th>Strategies Observed by the Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transcript 1-10/2</strong></td>
</tr>
<tr>
<td><strong>Episode 1</strong></td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
</tr>
<tr>
<td><strong>Episode 2</strong></td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
</tr>
<tr>
<td><strong>Transcript 2-10/8</strong></td>
</tr>
<tr>
<td><strong>Episode 1</strong></td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
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<tr>
<td><strong>Strategy</strong></td>
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<td><strong>Strategy</strong></td>
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<tr>
<td><strong>Strategy</strong></td>
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<tr>
<td><strong>Episode 2</strong></td>
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<td><strong>Strategy</strong></td>
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<tr>
<td><strong>Strategy</strong></td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
</tr>
<tr>
<td><strong>Episode 3</strong></td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
</tr>
<tr>
<td><strong>Episode 5</strong></td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
</tr>
</tbody>
</table>
There were nine examples in which three of the observers agreed on a specific strategy. In eight of these examples, two other observers agreed with the study researcher - Teacher D.
There were nineteen examples of two observers agreeing on a specific strategy. In nine of these examples, an observer agreed with the study researcher.

Finally, there were four examples in which no observers agreed with the study researcher.

**Strategies Documented**

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Observed Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Explanation</td>
<td>24</td>
</tr>
<tr>
<td>Clarification</td>
<td>22</td>
</tr>
<tr>
<td>Modeling</td>
<td>18</td>
</tr>
<tr>
<td>Prior Knowledge Activation</td>
<td>5</td>
</tr>
<tr>
<td>Predictions and Question Generating</td>
<td>5</td>
</tr>
<tr>
<td>Thinking Aloud</td>
<td>2</td>
</tr>
<tr>
<td>Summarization</td>
<td>2</td>
</tr>
</tbody>
</table>

The panel found no examples of the strategies of imagery and elaborative interrogation.

It must be noted that the researcher documented fewer strategies when viewing team sessions with accompanying transcripts than when simply reading the transcript text (see Appendix 2). The disparity between these two classifications further demonstrate the subjectivity of this process. It is suspected that more thorough panel training would have demonstrated more consistency in the strategies observed. However, that was not possible during this study. That is why it is important to compare the strategies most observed in this study to strategies observed in traditional ensemble rehearsals.
Costanza and Russell, in researching strategies used in traditional ensemble rehearsals, found that the most commonly used strategies by directors are modeling, question answering, and imagery (1994). The three most common strategies observed in the teams were modeling, direct explanation, and clarification. It can be assumed that the strategy of question answering, as described by Costanza and Russell (1994), is analogous to the strategy of direct explanation in this study, i.e. someone explains a concept or idea to someone else. Therefore, these two cooperative teams have effectively used two of the three most common choral teaching and learning strategies to learn to read music. And from a strategic perspective they are similar to students who are educated in a traditional chorus rehearsal style.

QUESTION 3) What kind of measurable improvement in music reading resulted from the cooperative approach?

Quantitative data were collected to measure evidence of growth in the ability of Girls chorus students to read music. The Iowa Tests of Music Literacy -LEVEL 1 were used in a pre-study and post-study test design which generated data regarding chorus students' ability to listen, read and write tonal and rhythmic patterns. As this study focused on how cooperative teams learned to read music, only data from the Tonal Concepts Audiation/Reading (T2) and Rhythm Concepts Audiation/Reading (R2)tests are included here. The results of both tests were analyzed in comparison to the test's national norms and are presented next. For the complete Iowa Tests of Music Literacy - LEVEL 1 results see (Appendix 3).
The pre-test was administered to the entire class over two class periods in early September, 1997. The post-test was administered over two class periods in March six months later. The sample of 36 students came from the class of 44 students. The sample included those students who completed each part of the six tests over the four class periods, \( N = 36 \). From the sample, individual student scores were converted into standard scores which include both the Tonal Concepts Audiation/Reading (T2) and the Rhythm Concepts Audiation/Reading (R2) tests.

The following tables demonstrate the statistical means and the differences between the Pre-Test and the Post-Test scores. Standardized scores for both subtests were analyzed using a single tailed t-test. The results are listed in Table 4.

Table 4
Pre Test and Post Test Results

<table>
<thead>
<tr>
<th></th>
<th>Pre Test</th>
<th>Post Test</th>
<th>t-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Dev.</td>
<td>Mean</td>
</tr>
<tr>
<td>36 T2</td>
<td>52.5</td>
<td>10.02</td>
<td>58.52</td>
</tr>
<tr>
<td>36 R2</td>
<td>51.25</td>
<td>9.87</td>
<td>57.72</td>
</tr>
</tbody>
</table>

(* = Significant improvement)

To control for an experiment-wide error rate, the alpha was set at .005, or approximately .05/9 to account for both t-tests (Tables 5 and 6).
Audiation/Reading (R2) tests. These results demonstrate that the choral curriculum, which includes cooperative learning teaches to students to sight-read music as effective as similar students taught in a traditional manner using a nation established music curriculum.

QUESTION 4) Is there any evidence that the students are transferring this knowledge to other choral situations?

This question will be answered from edited interviews made with the director.

Table 5
Tonal and Rhythmic Mean Scores, Standard Deviations and Standard Error of Measurement for Grades 7-8-9 Iowa Tests of Music Literacy — Level 1

<table>
<thead>
<tr>
<th>Test</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tonal Concepts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T2</td>
<td>55.8</td>
<td>8.32</td>
<td>4.4</td>
</tr>
<tr>
<td>Rhythm Concepts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td>57.1</td>
<td>8.98</td>
<td>4.1</td>
</tr>
</tbody>
</table>

Table 6

<table>
<thead>
<tr>
<th>N</th>
<th>Test</th>
<th>Mean Dif.</th>
<th>Std. Dev.</th>
<th>t-test</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>T2</td>
<td>6.03</td>
<td>8.26</td>
<td>4.39</td>
<td>.0001*</td>
</tr>
<tr>
<td>36</td>
<td>R2</td>
<td>6.48</td>
<td>6.81</td>
<td>5.70</td>
<td>.0001*</td>
</tr>
</tbody>
</table>
Interview Transcript 2/6/98

The director - They couldn't read at the beginning of the year. They had no clue. Maybe one or two of them could. Completely novice most of them.... And now we're getting to the point of transferring those skills from the chorus sheets that they do (in cooperative team sessions), to the (chorus) music. I've started this second semester, having them do more and more of finding the pitches themselves without me playing it (on the piano). We started a new piece this week called Oh Susanna. I haven't played the notes for them (and) they're up to the third page of the song. It's all been done through (students working) in their section. (He describes the process.) "This is "Do" (playing a single note on the piano), find your pitch." But understand that it's not always black and white like that. Sometimes you have to help them out.

During the preceding dialogue the director described how the skills developed in the cooperative team sessions were beginning to be effectively transferred to the full chorus rehearsal.

QUESTION 5) How do selected teams work on exercises in music concepts such as rhythm and harmony?

Rhythm was presented as an intricate part of the curriculum, during five-step reading process which was regularly observed during team sessions. In presenting rhythm contextually and not as an isolated separate component, it became, less abstract and was therefore easier and more meaningful for these students.

There was no evidence of students discussing harmony theory during team sessions. However, the director frequently explained harmonic relationships through solfege syllables during rehearsal. Though these presentations could be interpreted as an introduction to harmony theory, there was no observed harmonic analysis during team sessions.
QUESTION 6) How do students in these selected teams feel about learning this way?

Study students preferred learning in cooperative teams. Students believe that their peers better understood the problems they faced in learning to read music. As members experienced similar problems in learning, they were able to relate with each other and provide a support network. Study students reported not feeling as comfortable with their teacher because he "knows the material so well.”

Las Chicas Transcript 1/7/98

Amy - I like it.
Carol - Its a good idea. I feel a lot more comfortable. Like with them (referring to the other team members), I'm friends with them already. So, I'm more comfortable doing stuff with them--and like messing up. I'm OK. I can mess up and they're not going to make fun of me or anything.

MKS Transcript 2/5/98

Margie - Its easier to learn from your friends than it is from the director, I found that out quick (giggle). Because he knows it (the music) so well and he explains it all the time, that he begins to just start talking and you have no idea of what he was talking about.

While your friend knows what to do and hasn't explained it as much as he has and its easier to understand that. Someone coming from your (back) - ground.

These finding is also consistent with research in cooperative learning presented in Chapter Two (Johnson & Johnson, 1994).

QUESTION 7) What attitudes towards choral music singing do students develop in teams?
All students report enjoying the chorus class and have elected to continue with chorus during their sophomore year. As no student reported being forced to continue with this class, it can be assumed that study student attitudes remained positive towards choral music singing throughout the school year.

QUESTION 8) How does the director feel about cooperative learning?

"If the goal is to make better musicians, then this is the right way to go about this." The director believes that cooperative learning has allowed his students to become effective music readers and independent musicians. As a result of working in cooperative student teams, he believes that his students become engaged and spend more time on task. The director lists specific reasons for the success of the cooperative teams:

(1) Student questions are answered more fully in the teams than questions can be answered by a teacher in a full rehearsal.

(2) Team members become more involved in their learning. This is done in part from the individual accountability component of team evaluation.

(3) The ownership of the learning process and the subsequent knowledge belongs to the student.

These findings are also consistent with multiple findings in the cooperative learning research (Slavin, 1995; Johnson & Johnson, 1994).

QUESTION 9) What strengths and weaknesses to cooperative learning are apparent compared to students taught in a traditional choral rehearsal?
Students report that they have learned to read music more effectively than in their past choral experiences. Team members' improvement in reading ability is also supported by the results of the quantitative data. Students attribute their successful learning to team members who share a similar level of music comprehension and are able to understand and identify with the problems they individually encounter. Whereas the teacher, because he understands the material so well, sometimes does not understand their confusion. This student belief is supported in the literature of cooperative learning (Chapter Two).

MKS members reported feeling separated from class because there were a few times when they were forgotten and not asked to return to the full ensemble rehearsal. In order to obtain clear audio on the videotapes it was suggested study teams be videotaped in isolation. As team isolation was unique due to the qualitative data collection needs in this study, there should not be this problem in future years.

QUESTION 10) Does the cooperative learning approach have any other noticeable effects on student performance in chorus.

Students often work in sections during the full ensemble rehearsal. According to the director, these section rehearsals are a continuation of the process begun in the cooperative teams. The skills that were first learned in teams are reinforced in larger and still larger groupings.
Interview Transcript 2/6/98

Director - ..... when they come back after those small groups, they go into the group of the section (soprano 1, 2 or alto). In which they sit in a circle. It's just a larger group. So we're going (from) group process to another group process to the big group process (full ensemble). But those group skills are still there and that (as) they're diligent in their small group, then they're going to be diligent in the larger groups.

Girls chorus students developed into skilled young musicians who performed music at a sophisticated level of understanding. Their knowledge was acquired in part by reading skills first learned in teams then transferred and reinforced in the full ensemble.
CHAPTER FIVE

CONCLUSIONS AND IMPLICATIONS

In this chapter conclusions will be presented and interpreted along with implications that may guide future research. The conclusions will be drawn from the ten study questions that guided this study. The chapter will conclude with a few personal reflections derived from this project.

Noteworthy Findings

It was found that both study teams used a five-step sequential process to learn to read music notation. As the students’ music reading ability developed, steps were often combined to solve team exercises. However, when faced with a challenging section of an exercise, students isolated the difficulty and worked out the problem by returning to the appropriate sequential step. In this way team members autonomously solved problems independent from the teacher. The five-step sequential process included individual accountability for each student and is consistent with cooperative learning research on successful teaming (Slavin, 1994). Study students effectively learned to read music in cooperative teams.

Quantitative data supports the conclusion that students learned to read in cooperative teams. It was found that Girls chorus students demonstrated significant growth at the .05 level in their ability to read tonal and rhythmic phrases. The chorus students reading achievement scores were consistent
with students of similar grade and experience levels who were taught using a nationally known music curriculum in the traditional manor. Furthermore Girls chorus students demonstrated significant improvement in the entire Iowa Tests of Music Literacy - LEVEL 1. Students showed significant gains in eight of the nine test scores (see Appendix 2). Therefore based on a quantitative data, it can be assumed that cooperative teams in this curriculum learn comparatively to students taught in a traditional way.

**Alternative Interpretations of the Findings**

An argument could be made that cooperative learning was not the best way for the students of MKS to learn. This is because of the occasional conflict that was at times characteristic of this team. And that this intermittent conflict, effected the ability for the team to function well. Possibly, if the MKS members were instructed in a traditional choral learning environment, then the teacher could have provided these students with more structure and guidance as needed.

Cooperative learning research demonstrates that over time occasional discourse between members who are learning in groups and is acceptable (Slavin, 1995; Johnson & Johnson, 1994; Cazden, 1988; Elkind, 1981). and will be resolved by team members (Slavin, 1995). Furthermore, there never was claim made that the curriculum under study was the best type of choral curriculum, only that it was an effective alternative.
Suggestions for Future Research

Research is needed to see if the cooperative learning method described in the Girls chorus is effective at other age level. Would students in choruses at middle school or elementary school levels effectively learn to read music in cooperative teams? Also, a logical next step would be to set up a comparative study between this method and the tradition method of educating chorus students. Finally, would cooperative teams be an effective way of teaching the sight singing component of music theory courses? These questions would also support the external validity of this method. For at present external validity of this method is still unsubstantiated.

Strategic Learning in Cooperative Teams

It was found that study teams regularly used identifiable teaching and learning strategies to assist each other in the construction of their knowledge. According to a panel of trained observers, student teams unknowingly incorporated two of the most common strategies used in traditional choral education into their learning. The strategies of modeling and direct explanation were two of the three most often observed strategies used in the study teams a were consistent to the findings of Costanza and Russell (1994).

However, students did not demonstrate effective use of more advanced strategies such as elaboration and scaffolding to assist their learning. This finding would support the recommendation that students should be coached in when and how to use specific strategies for their effective implementation. (Pressley et al., 1994).
The panel completely agreed only three times. This could be do to insufficient training or the subjectivity of this undertaking. There was agreement between the researcher and at least one other panel member 19 out of the 26 times strategies were recorded. Perhaps in a funded study greater time and resources could be spent on training observers. This effort could result in more consistent findings in strategies observed by the panel members.

Alternative Interpretations

It is possible that students did not develop these strategies, rather students remembered these strategies from their past choral experiences. Two of the strategies observed were two of the most common found in traditional chorus rehearsals. In response, the strategies of modeling and direct explanation are also commonly used to teach other academic subjects. Furthermore, the strategy of clarification was observed second most often. As this is considered a learning strategy, its repeated observation suggests that students are learning in teams. Finally, a better question is not where the strategies came from, but rather have the students used them effectively. The quantitative data does support that student reading skills improved. Therefore, students have used strategies effectively in creating knowledge.

Suggestions for Future Research

There is a need for a comparative study investigating the learning of cooperative teams using this method who are coached in the effective use of strategies with students who are not coached in strategy usage. As these study
teams functioned with great autonomy, coaching of when and how to use strategies may improve the performance of the team and have great educational benefits.

**Other Findings**

It was found that students regularly transferred knowledge gained in cooperative teams into the full ensemble rehearsal. In chapter four, the director described learning patterns begun in cooperative teams were gradually transferred into sectional rehearsals and on into the full ensemble rehearsals. The transfer and use of reading skills developed in teams was observed during one rehearsal at the conclusion of this six month study. Specifically, chorus members sight read in three vocal parts, five pages of a difficult choral piece. This researcher observed students singing three distinct well balanced parts, a cappella, after being given only “Do” as a starting note. It is suggested here that few beginning high school choral groups are able to display this level of music reading ability. It is recommended that a thorough investigation of the transfer of music skills developed in cooperative teams is worth careful examination.

Study students report they enjoyed learning in cooperative teams and maintained a positive attitude towards the subject. These reports are supported by the fact that every study team member elected to continue with the program into their sophomore year. Students also reported that they learned to read music more effectively than in their past choral experiences. Team members linked their successful learning to their colleagues who share...
a similar level of music comprehension and are able to understand and identify with the problems they individually encounter. This belief is supported in the findings of similar cooperative learning research (Humphreys, Johnson & Johnson, 1982; Slavin & Karweit, 1981).

**Personal Reflections**

It is difficult not to be somewhat influenced by a curriculum understudy for so long a period of time. As a teacher with 20 years experience working with chorus students of various ages, it takes an important event to change my educational approach. Yet, after this study, I have. For years, I have been disappointed with the results of my efforts to teach chorus students to read music. Too often, the actual reading ability of students at the end of the year was not near the level I expected. Plus, the best readers invariably were the students who also played piano, band, or orchestral instruments.

In reflecting back upon my own learning experience, I now realize that any improvement in my reading ability was dependent upon my own efforts. From this study I have learned that turning over part of the responsibility for learning to the students, is an effective educational alternative.

This school year both my colleague and I have incorporated cooperative teams who use this five-step process into the ten seventh and eighth grade choruses we teach. It is our opinion that this years average chorus student reads music better than students past years. Our students have learned to independently read music and are effectively contributing toward the development of the entire ensemble.
In conclusion, it seems appropriate to paraphrase the director, "If the goal is to make them better musicians," then cooperative learning is an effective way to teach them to learn to read music.
BIBLIOGRAPHY


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Smith, P. K., & Whitney, S. (1987). Play and associative fluency experimenter effects may be responsible for previous positive findings. Developmental Psychology, 23 (1). 49-53


Appendix 1

Diagram of Student Hand Patching Procedure
Appendix 2

Strategy Transcripts

This appendix contains the accompanying transcripts for the video examples the panel observed. The descriptors removed from the panels transcripts to prevent bias are included here. Also, the strategies listed in parentheses were documented only from the written transcriptions and did not include video tape observation. This different classification of strategies chronicled further demonstrate the subjective nature of strategy classification.

Episode 1

<table>
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<tr>
<th>Strategy</th>
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<tr>
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(+++ = no strategy observed)

Transcription 10/2 Las Chicas

Students were working on Chorus 2 Term 1 - Test 2, Example 1. The team was observed for 30-second intervals starting after the first 90 seconds. The seating arrangement is B, C, A - left to right in relation to the camera’s lens.

The dialogue begins with the team members discussing Measure 3.

Beth - (referring to the next measure as already being understood) - We’ve got four.
Students patch and chant Measure 5 and are having difficulty counting the dotted eighth note on beat 1. Beth and Amy are actively trying to work out the rhythm while Carol is listening and staring at her worksheet.

Beth - (interrupting Carol) - It gets one, and the dot gets “and.” (Mod)
Beth demonstrates how to count a dotted eighth note lasting 3/4 of a beat. Measure five can be subdivided into two rhythms:
1. a repeated sequence of a dotted eighth note tied to a sixteenth note lasting 1 beat.
2. a sixteenth note tied to a dotted eighth which repeats.

Amy & Beth correctly chant Measure 5 together while Carol follows on her worksheet. After the measure is chanted Carol interrupts to asking question.

Carol - Wait, what is it at Measure 5, (Clar) (She now chants the Measure correctly.)

Carol has been listening to the other two members work out the exercise. She responds back by chanting back the exercise. They in turn listen and evaluate her performance.

### Episode 2

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Students working on the same exercise but are now reviewing and evaluating each members learning. As the dialogue begins students are attempting to chant Measure 6 of the exercise.
Amy (referring to Measure 5) - I always get screwed up (pointing at her worksheet to Measure 5)

Carol (D.E.) demonstrates the correct patch and rhythm chant for her. Beth assists Carol when she starts to falter.

Amy (responding to her group) - I get, I get these ones (pointing to Measure 5 on her worksheet) - But right from these two, the two dotted ....,(Clar.)

Beth immediately models the correct rhythm for her.

Carol - Maybe like, I don’t know, like Da, da, da, da, - One, &, Two, &, Three, &, Four &. I Mean, I know there’s not that many beats but......

Beth - OK, Measure 2 goes, (She performs the measure correctly and is joined by Carol half way through the exercise).

The process described in the first episode continues throughout this episode as well. Students individually seem to fluctuate between confusion and understanding the rhythmic exercise. They assist each other with the frequent use of modeling while continuously evaluating each others’ performance.

Transcript 2 - 10/8

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Transcription 10/8 Las Chicas

Episode 1

The session begins with students discussing which exercise from pages 12 and 13 of the Jenson Sight Singing Course workbook to work on.

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Episode 1

Beth - We should be doing #147, or #144, or #142?
Carol - I thought #147, but we don't know where "Do" is anymore.
     How about #147?
Beth - OK.
Amy - Is this "B" or "Bb"? (Clar) (Her question refers to the key the
     exercise is written in, "Bb Major.")[1]
Beth (cautiously) - There is a lot of sharps in #153. (T.A.) (key of "E
     Major")
Carol - And in #142 there is only one flat. (T.A.) (key of "F Major")
Beth (agrees to start with their perception of the simplest exercise) -
     Let's do #142 first.
Carol - Where do you want to try "Do"? (searching for the correct
     pitch) "Do" would be like, ah....
Amy (interrupting) Wouldn't it be "Fa"?  (Clar)
Beth (speaks up) I think "C" is "Do." (correcting herself) No, the note it
     ends on is "Do," most likely. (Pred., Q.G., P.K.)

In this exercise "F" is "Do," although her reasoning is sound.

Beginning sight reading exercises in a major tonality often end on the note
"Do." However, this exercise is in two parts, part one in the treble clef, ends
on "A" or "Mi"; part two in the bass clef end of "F" or "Do." Beth is not clear
as to which part she is refers to.

Beth, theorizing that most exercises end on "Do," is an example of
predictions and past knowledge. Here she anticipates what "Do" will be by
checking the ending. Or, she is checking her ability to read a key signature by
observing the final note. Though not a very reliable method, she does
conceive the exercise as complete melody with a beginning, middle and end.
The importance here is that rather than singing the exercise as a sequential set
of notes, one after another, she is conceptualizing the exercise as a single unit.
By thinking of an exercise as a small piece of music she is beginning to think
about the structure of music. Which, in turn leads to more advanced musical considerations such as phrasing.

During the segment between episodes 1 & 2 the students try to decide upon the correct pitch for "Do." Finally, Beth predicts that "Do" is "F." The others accept Beth's prediction unchallenged. At this point the teacher checks on the team. Amy asks him how to find "Do." He explains the procedure and watches as Beth works out the correct answer. The teacher assures her that she has the correct answer and carries the lesson further by explaining how to find "Do" using sharps.

### Episode 2

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Teacher - And you can always find where "Do" is. (reinforcing the instructions he just gave) You can read (the key in) any clef by just finding the last flat to the right. (He draws on an imaginary music staff in the air) If that line or space is "Fa" than you, find "Do." (He reminds the students to move closer to the video camera and then leaves)

Students physically move closer to the camera.
Beth - So, "F" is "Do" (T.A.).
Carol - OK.
Beth (singing the starting pitch and establishing the rhythm) - "Do," 1, 2, ready go. (She incorrectly counts the 4/4 meter as if it were in 3/4 time, a triple meter).
All Students - "Do, Sol, Fa, Me," (they pause to figure out where the next note "Do" is. The students appear to know the solfege names of the notes but do not conceptualize the interval skip.)
Episode 3

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Beth - OK, let's try that again.
Carol - All-right,
Beth - "Do" 2, 3, 4, -
All Students - "Do," "Sol," "Fa," "Me," "Do," (Amy starts to cough, but collects herself and continues with the group.) "Sol," "La," "Ti," "Do," "Re."... (they don’t hold the half note for 2 beats) "Sol," "Sol," "Me," "Fa," "Me." (Again, the half note is not held for two beats. The resulting dead space is longer than the half note should be) "Sol," "La," "Sol," "Fa," "Me." ("Me" is not held for the required three beats).
Beth - Sorry I couldn’t ....
Amy - (interrupts) I started choking (Carol imitates her choking and they all giggle.)

The team members knew their performance of the exercise was incorrect, but they were not sure of where and how many mistakes were being made. The ability to diagnose the problems and to suggest proper solutions requires more experience.

Episode 4

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Amy (to Beth) - Bass clef is harder.
Beth - Yeah!
Carol (looking at Student Beth) - Do you want to start, - do you want to start? (Clar)

Students are now starting to show signs of fatigue. The team has been working for approximately six minutes. The pace of student interactions has slowed down. As no one is leads in attempting to sing “Do,” they refer instead to the synthesizer.

Amy (plays a few notes in the wrong register and asks Beth) - What do you want “F”? (Clar.) (She is looking for a note that is comfortable to sing.)
Beth - Yeah “F” (Amy plays the pitch in a register that is too low) - I can’t do that low. (Amy plays “F” an octave higher) - Yeah, I can do that.

Students incorrectly sing the rhythm in Measures 2 & 3 and then the performance breaks down. Beth has taken over responsibility for the group. The others remain passive while Beth analyses the second exercise.

As students fatigue, they tend to rely on the synthesizer to play the correct pitches for their starting notes. The pace of the team dialogue which was quick at the beginning of the session has slowed down. Also, they rely on direct explanation more often.

Episode 5

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<tbody>
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<td>Episode 5</td>
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Students appear to have regained their energy.
Beth - OK now we can put them both together. "Do, 2, 3, 4" (The team performs Exercise A and continues on into Exercise B.)

All Students - "Do," "Sol," "Fa," "Me" (they are still having difficulty singing the intervals "Mi" and "Do" and continue to make rhythmic mistakes. As a result they are unable to complete Exercise 1.)

Beth - All right.

Carol (to Amy) - Are you having problems?
Amy - Yeah, I can’t breath. (she has a cold)
Beth - Do you think we should try it in two parts? (she looks at them individually)
Amy (hesitant) - Not yet
Carol (challenging) - I say we could do it.
Amy (argumentative) - I say I'll listen.
Beth (positively) - I say we could because I think, you sing the first (exercise, she points to the others) cause I think I can hold the part. (D.E.) (She means she will sing Exercise 2 by herself.)

Amy is sick, her behavior is not typical. Carol tries hard to balance her singing with Beth. Though she sings the correct notes her voice is not as strong as Beth's.

There were several examples of strategies being used during this session. In Episode 1 there was an example of predictions and question generating, or thinking aloud - Student Beth predicts that the piece will end on "Do" and uses that as a way to check for "Do" and the proper key.

In Episode 2, the teacher used direct explanation and then scaffolding to help the team read key signatures. Beth either developed her own strategy of transposing the syllable down an octave and singing up the scale to find the correct note, or she transferred it from somewhere else, possibly piano lessons.

Student fatigue influenced the team during Episode 3. Students started to rely more on the synthesizer for correct pitches and intervals. Also, Amy
and Carol were satisfied with passively receiving instruction with direct explanation from Beth. The question raised here is what does fatigue do to the cooperative learning process over a long session.

In the final episode, students seemed revived and the pace as well as interaction sped up. Though Amy did not want to participate the others tried various ways to involve her.

The most striking observations made of this session was that when fatigue starts to set in, the cooperative learning process dissolves into one student becoming a disseminator of information and the others passively accepting her opinions. This suggests that in a team members fatigue they tend to accept the opinion of the member with the most energy. The result is that an unqualified student becomes the disseminator of information.

**Transcript 3 - 10/9**

**Episode 1**

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**Transcript 10/9**

The team is using solfege on sight singing exercises from the *Jenson Sight Singing Course* #177 p. 15, and are having a disagreement about how to
find the pitch “Do.” Karen refers to the way they did it in the last session.

This is an example of prior knowledge activation.

Episode 1

Karen (pointing to her music) - Did you say that that one right there though is always “Do”? (Clar)

Sara - No, cause see now (she mumbles something indiscernible).
Karen (shakes her head in frustration) - I thought I could get it yesterday cause I was like, cause I felt, ah......(P.K.) (she shakes her head again)
Margie (her eyes focused on the workbook) - The next one’s “Re” (T.A.).
Sara - It goes, “Do, Re, Me, Fa, Sol, Sol, Fa, Me, Fa, Me, Fa, Me,.... (D.E.)
Margie (agitated, interrupts) - I know, but you are confusing me!

The group is silent for a moment and studies the exercise

Karen (breaking the silence asks) - Oh, do we have to do these things too? (She points to the beginning of the exercise) - Like, are we just on...... (Clar)
Sara (responding) - Those aren’t notes (D.E.).
Karen - I know, but you know when we do this thing (she points to Example #158, p.14 (Q.G.)
Sara - No, but sing the measure (not quite sure herself)
Karen (still searching for an explanation) - Yeah, I know but, you know when we do like this before we sing it, should we sing that though? (Q. G.) (She points directly to the problem section so that Sara could respond directly to her problem. Margie is not participating, her head is still buried in her workbook) - What is it, what does it mean? Does that mean like you hold it? (Clar)

During this episode Karen and Sara were trying to work through and understand the assignment. While Margie was not involved remaining inactive with her head lowered. The only time she did communicate was to be aggressive to Sara. Her behavior might be due to frustration of not understanding what is going on.
There were several examples of strategies during this session Karen used activation of previous material to attempt to find “Do.” She also asked Sara to clarify the meaning of unfamiliar symbols in the music. When her question was not answered she sought direct explanation by clearly articulating where she was confused.

### Episode 2

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**Interlude**

During the interlude Margie rejoined the group, she asked how to recognize certain solfege pitches. For example she was confused by the possibility of “Ti” appearing in two different registers or on a line or a space. She confessed she was really confused and the others seemed to welcome her back into the team.

Team members then started working together to label the notes with the appropriate solfege.

### Episode 2

Margie (still confused) - That can not be “Ti.”
Sara (putting her forehead into her hands) - It is! Cause “T,” you know “Ti” is on the top. (D.E.)
Karen (reaches over, takes Margie’s book, and points to the example) Margie - Yeah but there is no low “Ti” (Clar)
Karen (in a calming voice) - Yes there is, see like there is ah - you know when we sing like “Do, Re, Me” and they say go one lower? (D.E. (Karen is referring to the vocal exercises the entire chorus does at the beginning of the rehearsal) - When your at low “Do,” your an alto right?
Margie - Yeah.
Sara (interjects) - And you go one lower, that would be “Ti.” (D.E.)
Karen (continuing on) - You know when you do that?
Margie (taking back her workbook) - We never did that though. (T.A.)
Sara - Yes we have.
Karen (immediately after Sara) - Yeah. When like....
Sara (interrupts) - Oh wait, (she’s thought of an example) wait listen to this, there’s low “Do” and then there’s high “Do,” high “Do” is just starting off another thing. Cause after the high note is, “Re” “Me,” “Fa,” “Sol,” “La” .... (T.A.)
Karen (jumps in with great energy) - You just keep saying it forever.
Margie (she has been nodding along, and understanding the concept) - OK, OK, I get the picture.... I get it.

There is a pause and each student adjusts her hair. This grooming is a nonverbal form of closure to the interaction.

This episode demonstrated how Margie was able to become a more active member of the group. In the first episode she rebuked Sara and was not a part of the team. Here, she asked the members for help confessing she doesn’t understand. By confessing her confusion the other students, they were able to help her to rejoin the group. Karen and Sara worked hard to explain the concept of different registers to Margie. Although none of these students has a working knowledge of the proper music terminology, they are able to explain concepts well.

Direct explanation was the strategy used to help Margie. However, in that direct explanation, Sara modeled a pattern of solfege and related it to past experience in the chorus rehearsal. Therefore, there were three strategies
observed during this episode, direct explanation, modeling and prior knowledge activation.

To conclude this transcription there were examples of clarification, prior knowledge activation and direct explanation in both the first and second episodes.

Transcript 4 - 11/5

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Transcription 11/5 - Las Chicas

Interlude

Students discuss what they are going to do for the day. Beth asks if anyone has provided the observer with a copy of their exercise.

Episode 1

Beth (suggests to the others as they begin to patch the exercise) - We’ll do it with “Dahs” first, then we’ll do it with the things (solfege).

Amy - OK.
Beth (setting the tempo) - 1, 2, ready, go....
They chant and patch together ......

Amy - No it’s dah, dah (she has chanted a sixteenth note tied to a dotted eighth note, the correct rhythm). It’s not dah, dah (dotted eighth tied to a sixteenth) it’s dah, dah (She repeats the correct response) it’s sixteenth then eighth. (D.E.) Amy is referring to the fourth beat of measure one.
Beth and Carol - Oh yeah.
Next, Beth chants the last two beats of Measure 1 correctly and is followed by Carol who does the same. Amy monitors and assesses these individual attempts.

Interlude

During the interlude students try to develop the correct patch to account for the dotted sixteenth note tied to an eighth note on the fourth beat of measure one. Finally, Beth comes to understand the rhythm and suggests they try the measure using solfege.

Episode 2

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Beth (pointing to the fourth beat of measure one to Amy) - The dot on that note gets the "and." (referring to the dotted eighth, the second part of the fourth beat) and then this and this get the four (D.E.). (The sixteenth note and the dotted eighth are tied as well.)

Amy - Oh, oh OK. Right, I though that was getting that. (she refers to the alignment of the patch with the second half of the fourth beat. The rhythm goes "4" ("ee" "&" "ah") these articulated counts are part of the dotted eighth note. The upward part of the patch, the slap occurs on the "and" after the beat. This is where the confusion is occurring. Students are trying to place the slap early with the "ee" rather than the "and." ) - all right never mind.

Beth (starting the team as they all patch at the same tempo) - One, and Two, and Ready, and Go and.....

All Chant - "Sol, Me, Do, Re, Ti, Do, Re, Do, Ti, Do, Do," Members chant the rhythm correctly until sixteenth note dotted eighth note rhythm occurring on the fourth beat. It is here where they break down.)
Interlude

Students still are having difficulty with the fourth beat of the first measure. Beth models the correct patch with the rhythm and then encourages the rest of the group be saying, “That’s not as hard as it looks.” An interesting point is that Amy, who originally diagnosed the problem, is now having difficulty in combining the solfege with the rhythm. Even though the solfege is being chanted and not sung. This may be due to the fact that she is also an instrumentalist. Instrumentalists are sometimes taught to count rhythms using numbers and rarely, if ever, are they asked to sing their part using solfege.

Students continue on writing out the solfege. The second measure is presenting a problem to the group. They are having trouble with the interval of “Re, (low) Sol, Re.”

<table>
<thead>
<tr>
<th>Episode 3</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Teacher C</th>
<th>Teacher D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy</td>
<td>+++</td>
<td>Mod.</td>
<td>Mod.</td>
<td>Mod.</td>
</tr>
<tr>
<td>Strategy</td>
<td>+++</td>
<td>Clar.</td>
<td>Clar.</td>
<td>+++</td>
</tr>
<tr>
<td>Strategy</td>
<td>+++</td>
<td>P.K.</td>
<td>P.K.</td>
<td>+++</td>
</tr>
</tbody>
</table>

Beth (sings the correct interval using the solfege syllables) - “Re, Sol” (Mod) (there is a long pause - students do not appear to be convinced of the melody).
Beth (writing on her worksheet) - 1 & 2.....
Amy - Are we ready?
Beth - And to there 3 & 4... (Amy & Beth pause while Carol continues to write).

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Students decide before they attempt the second measure, they should first sing the first measure as a lead in. This is also a standard rehearsal practice. By beginning with a section of music the students know, the conductor can establish a good sense of tempo and pitch with the singers so that when singing becomes more difficult there are fewer variables for the singers to be concerned with.

Team members sing the correct pitches in measure one but there is no difference between the length of the eighth notes and the length of the sixteenth notes. As they enter the second measure the breakdown at the “Re, (low) Sol, Re” sequence on the “&” after beat one and beat two. Again, Beth models the correct intervals and finishes the measure. Next, the other two students imitate her performance.

**Episode 4**

no strategies observed

All students sing measure two “Ti, Re, low Sol, Re, Do, Re, Do, Ti, Do, Do.”

Carol - That’s not hard if your going to do it that way.
Beth - If it was going from “Sol” to something else it would be harder.
Carol - Yeah.
Beth was referring to the interval going from “Re” down to low “Sol” and returning back to “Re” and not something new.
Beth (Taking charge) - Next bar, lets write in the notes.
Carol - I can’t get that low though, its hard for me (She has a hard time singing in her lower range.)
Beth (being considerate of the others) - Yeah, we’ll have to start “Sol” higher.
Amy (discussing low “Fa” in measure three) - I think its a problem, yes.
Interlude

During the interlude the students continue to write in the solfege names on the exercise. Beth monitors student Amy’s work and offers help when she has difficulty.

Episode 5

<table>
<thead>
<tr>
<th>Episode 5</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Teacher C</th>
<th>Teacher D</th>
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</thead>
<tbody>
<tr>
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<td>D.E.</td>
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<td>+++</td>
</tr>
<tr>
<td>Strategy</td>
<td>Clar.</td>
<td>Clar.</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Strategy</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
</tbody>
</table>

Beth (to Amy) - Is that how it goes? Doesn’t that get the “And.” (D.E.) (Correcting Amy’s work while Carol keenly looks on.)
Carol - Oh its “3 & 4 &” (pointing to Beth’s worksheet), and the “2 &” gets split up between the four notes.
Beth - Mm hmm, OK.

This example demonstrates the flaw of counting of “1 & 2 &” by not including sixteenth notes. If the students count rhythms as “1 ee & ah 2 ee & ah,” then most smaller notation symbols can be articulated.

Interlude

Students practice the exercise as an ensemble as the teacher enters and listens to their work. He makes no evaluative statements but asks if the students have understood the directions at the top of the worksheet. He asked the question because the students were not using solfege, rather they were chanting the rhythm using the syllable “Da.”
Episode 6

<table>
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<tr>
<th></th>
<th>Teacher A</th>
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<th>Teacher C</th>
<th>Teacher D</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Episode 6</strong></td>
<td>+++</td>
<td>+++</td>
<td>Mod.</td>
<td>Mod.</td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
<td>+++</td>
<td>Clar.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
<td>+++</td>
<td>Clar.</td>
<td>Clar.</td>
<td>Clar.</td>
</tr>
</tbody>
</table>

Amy - I'm not sure where it was? (Mod) (She demonstrates that the rhythm does not work with the patch.)

Beth - The last measure's hard, this one is easy. (referring to Measure 4 in the first exercise)

They all chant Measure 4 together. Carol has a little difficulty and giggles.

Beth - All right, all right let's at the second line. Not with the pitch though, the rhythm with the names

Carol - OK!

Beth (Setting the tempo) - 1 & 2 & ready begin.

Together - "Fa, Sol, La, Ti, Do, Re, Me, Fa, Fa, Me, Re, Me" (they break down). Their rhythm on beats 3 and 4 of Measure 3 is wrong.

They incorrectly chant a repeated sequence of dotted eighth note tied to a sixteenth note as four equal eighth notes.

Beth - Wait a minute we stated too fast (Clar) (giggles)

Carol - OK.

Amy - "Fa Me Re Me" (practicing the rhythm in Measure 4).

**Interlude**

Students practice Measure 5 isolated and slowly. After the students understand the correct rhythm they add the pitches. In traditional choral rehearsal difficult sections of music are often practiced in isolated sections. For example the rhythm is learned and then the pitch is learned and then they are combined at a slower tempo and finally at the regular speed.

For the remaining minute of the session the students work on the rhythm for the second exercise in 6/8 time.
Appendix 3

Presented here is statistical data generated from the study teams and chorus members in the pre-test post-test using the Iowa Tests of Musical Literacy - LEVEL 1. Data generated from these tests measures students' ability to listen, read and write tonal and rhythmic patterns. Also, composite scores were generated for both the tonal and rhythm sections, as well as a final composite score which included all subtests. The pre-test and the post-test each yielded a total of nine separate musical scores for the subjects: three tonal scores, three rhythmic scores and three composite scores.

The pre-test was administered to the entire class over two class periods in early September, 1997. The post-test was administered over two class periods in March six months later. The sample of 36 students included all students who completed each part of the six tests over the four class periods, N = 36. From this sample, individual student scores were converted into standard scores for each of the six tests, yielding a total of nine separate scores for the pre-test and the post-test. The subtests are listed next by title:

**Tonal Concepts**

1. Audiation/Listening (T1)
2. Audiation/Reading (T2)
3. Audiation/Writing (T3)
4. Tonal Composite Score (TTC)
Rhythm Concepts

(5) Audiation/Listening (R1)
(6) Audiation/Reading (R2)
(7) Audiation/Writing (R3)
(8) Rhythm Composite Score (TRC)

Total Composite Score

(9) Composite Score (CTR)

The following tables demonstrate the statistical means and the differences between the Pre-Test and the Post-Test for the sample, N = 36 students completing all sections of the test. Standardized scores for each subtest, composite tonal scores, composite rhythmic scores, and total composite scores were analyzed using a single tailed t-test. To control for an experiment-wide error rate, the alpha was set at .005, or approximately .05/9 to account for the nine t-tests. The results are listed as follows.
(* = significant increases)

Pre-Test and Post-Test Scores

Table 7

Tonal Concepts Scores

<table>
<thead>
<tr>
<th>Test</th>
<th>Pre-Test Mean</th>
<th>Pre-Test Std. Dev.</th>
<th>Post-Test Mean</th>
<th>Post-Test Std. Dev.</th>
<th>Mean Dif.</th>
<th>t-Test</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>43.64</td>
<td>15.07</td>
<td>50.33</td>
<td>10.44</td>
<td>6.69</td>
<td>t=3.66</td>
<td>.0004*</td>
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<tr>
<td>T2</td>
<td>52.50</td>
<td>10.02</td>
<td>58.52</td>
<td>07.67</td>
<td>6.02</td>
<td>t=4.38</td>
<td>.0001*</td>
</tr>
<tr>
<td>T3</td>
<td>57.55</td>
<td>08.10</td>
<td>60.27</td>
<td>10.05</td>
<td>2.72</td>
<td>t=2.76</td>
<td>.0045*</td>
</tr>
<tr>
<td>TTC</td>
<td>51.16</td>
<td>09.36</td>
<td>56.38</td>
<td>07.27</td>
<td>5.22</td>
<td>t=6.33</td>
<td>.0001*</td>
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</tbody>
</table>

Table 8

Rhythm Concept Scores

<table>
<thead>
<tr>
<th>Test</th>
<th>Pre-Test Mean</th>
<th>Pre-Test Std. Dev.</th>
<th>Post-Test Mean</th>
<th>Post-Test Std. Dev.</th>
<th>Mean Dif.</th>
<th>t-Test</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>47.41</td>
<td>09.59</td>
<td>50.52</td>
<td>11.89</td>
<td>3.11</td>
<td>t=1.41</td>
<td>.0832*</td>
</tr>
<tr>
<td>R2</td>
<td>51.25</td>
<td>09.87</td>
<td>57.72</td>
<td>07.87</td>
<td>6.47</td>
<td>t=5.69</td>
<td>.0001*</td>
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<tr>
<td>R3</td>
<td>50.81</td>
<td>09.87</td>
<td>57.61</td>
<td>10.10</td>
<td>6.80</td>
<td>t=4.85</td>
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<tr>
<td>TTC</td>
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<td>5.66</td>
<td>t=5.73</td>
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</tbody>
</table>

(TRC = Total Rhythm Concepts)
Table 9

Composite Tonal and Rhythm Concepts Scores

<table>
<thead>
<tr>
<th>N</th>
<th>Test</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Mean Diff.</th>
<th>t-Test</th>
<th>Probability</th>
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<tbody>
<tr>
<td>36</td>
<td>R1</td>
<td>47.41</td>
<td>09.59</td>
<td>50.52</td>
<td>11.89</td>
<td>3.11</td>
<td>t=1.41</td>
<td>.0832*</td>
</tr>
</tbody>
</table>

(CTR = Composite Tonal and Rhythm Scores)

Table 10

Tonal, Rhythmic, and Composite Mean Scores, Standard Deviations, and Standard Error of Measurement for Grades 7-8-9

Iowa Tests of Music Literacy – Level 1

<table>
<thead>
<tr>
<th>Tonal Concepts</th>
<th>Test</th>
<th>Mean</th>
<th>S.D.</th>
<th>S.E</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T2</td>
<td>52.7</td>
<td>9.39</td>
<td>3.2</td>
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<tr>
<td></td>
<td>T2</td>
<td>55.8</td>
<td>8.32</td>
<td>4.4</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td>T</td>
<td>54.5</td>
<td>7.28</td>
<td>2.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rhythm Concepts</th>
<th>Test</th>
<th>Mean</th>
<th>S.D.</th>
<th>S.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R1</td>
<td>53.1</td>
<td>9.39</td>
<td>3.2</td>
</tr>
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<td></td>
<td>R2</td>
<td>57.1</td>
<td>8.98</td>
<td>4.1</td>
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<tr>
<td></td>
<td>R3</td>
<td>55.3</td>
<td>9.42</td>
<td>3.8</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>54.9</td>
<td>7.74</td>
<td>2.5</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Composite Scores</th>
<th>C</th>
<th>Mean</th>
<th>S.D.</th>
<th>S.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
<td>54.5</td>
<td>6.85</td>
<td>1.7</td>
</tr>
</tbody>
</table>

(Gordon, 1991, p. 62)
Table 11

t-Test Scores and Standard Deviation

<table>
<thead>
<tr>
<th>N</th>
<th>Test</th>
<th>Mean Dif.</th>
<th>Std. Dev.</th>
<th>t-test</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>T1</td>
<td>6.69</td>
<td>10.95</td>
<td>t =3.69</td>
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<tr>
<td>36</td>
<td>T2</td>
<td>6.03</td>
<td>8.26</td>
<td>t =4.39</td>
<td>.0001*</td>
</tr>
<tr>
<td>36</td>
<td>T3</td>
<td>2.72</td>
<td>5.91</td>
<td>t =2.76</td>
<td>.0045*</td>
</tr>
<tr>
<td>36</td>
<td>TC</td>
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<td>t =6.33</td>
<td>.0001</td>
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<tr>
<td>36</td>
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<td>36</td>
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<td>TCR</td>
<td>5.64</td>
<td>4.28</td>
<td>t =7.19</td>
<td>.0001*</td>
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</table>

Results

The series of t-Tests indicates that there is a significant growth as measured by the total and composite (tonal and rhythm) scores. These differences are also reflected in five of the six individual subtest scores. There is a significant difference between the composite score totals, the separate sets of tonal and rhythm tests, and finally, a significant difference in five of the six individual test scores. The only test which failed to show significant differences was the Audiation/Listening Rhythm Concepts Test.

Listed next are the individual scores from each study team as well as the cooperative team scores from both the pre-test, post-test and gain scores.
Table 12

Study Cooperative Teams Results: Las Chicas

<table>
<thead>
<tr>
<th>Las Chicas</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>TC</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>RC</th>
<th>C</th>
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</thead>
<tbody>
<tr>
<td>Pre-Test</td>
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<td>65.6</td>
<td>66.6</td>
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<tr>
<td>Post-Test</td>
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<td>67.6</td>
<td>66.0</td>
<td>69.0</td>
<td>67.0</td>
<td>68.3</td>
<td>68.0</td>
<td>67.6</td>
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<tr>
<td>Gain</td>
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<td>+2.4</td>
<td>+8.0</td>
<td>+7.3</td>
<td>+1.4</td>
<td>+5.6</td>
<td>+4.3</td>
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Table 13

Las Chicas Members

<table>
<thead>
<tr>
<th>Amy</th>
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<th>69</th>
<th>62</th>
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<tbody>
<tr>
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<td>69</td>
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<td>69</td>
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<td>68</td>
<td>Post</td>
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<td>5.</td>
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<td>7.</td>
<td>5.</td>
<td>6.</td>
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<td>Gain</td>
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Table 14

Study Cooperative Team Results: MKS

<table>
<thead>
<tr>
<th>MKS</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>TC</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>RC</th>
<th>C</th>
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<td>Post-Test</td>
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<td>55.3</td>
<td>48.6</td>
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<td>+6</td>
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<td>-.4</td>
<td>-1</td>
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<td>+1</td>
<td>+1</td>
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</table>

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Table 15

MKS Members

<table>
<thead>
<tr>
<th></th>
<th>Margie</th>
<th>Sara</th>
<th>Karen</th>
</tr>
</thead>
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<tr>
<td>Pre</td>
<td>48</td>
<td>47</td>
<td>52</td>
</tr>
<tr>
<td>Post</td>
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<td>48</td>
<td>53</td>
</tr>
<tr>
<td>Gain</td>
<td>2.</td>
<td>1.</td>
<td>1.</td>
</tr>
</tbody>
</table>

Study members' individual pre- and post-test mean scores compared with the established scores for comparable students.

Table 16

Members' Individual Pre- and Post-Test Mean Scores Compared with Established Scores for Comparable Students

<table>
<thead>
<tr>
<th>Team Las Chicas</th>
<th>Amy</th>
<th>Pre-Test</th>
<th>59.88</th>
<th>Post-Test</th>
<th>69.33</th>
<th>National Mean Score</th>
<th>54.5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beth</td>
<td>67.11</td>
<td></td>
<td>68.11</td>
<td></td>
<td>54.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carol</td>
<td>59.33</td>
<td></td>
<td>67.66</td>
<td></td>
<td>54.5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Team MKS</th>
<th>Margie</th>
<th>Post-Test</th>
<th>47.66</th>
<th>National Mean Score</th>
<th>54.5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Karen</td>
<td>51.55</td>
<td>48.77</td>
<td>54.5</td>
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<tr>
<td></td>
<td>Sara</td>
<td>47.00</td>
<td>47.11</td>
<td>54.5</td>
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