THE CLASSIFICATION OF LANGUAGE OF HIGH SCHOOL CHORAL DIRECTORS

by

MATTHEW LYNN STRAUSER

A DISSERTATION

Presented to the School of Music and Dance
and the Graduate School of the University of Oregon
in partial fulfillment of the requirements
for the degree of
Doctor of Musical Arts

June 2008

University of Oregon Graduate School

Confirmation of Approval and Acceptance of Dissertation prepared by:

Matthew Strauser

Title:

"THE CLASSIFICATION OF LANGUAGE OF HIGH SCHOOL CHORAL DIRECTORS "

This dissertation has been accepted and approved in partial fulfillment of the requirements for the Doctor of Musical Arts degree in the Department of Music by:

Harry Price, Chairperson, Music
Phyllis Paul, Member, Music
Sharon Paul, Member, Music
Roland Good, Outside Member, Special Education and Clinical Sciences

and Richard Linton, Vice President for Research and Graduate Studies/Dean of the Graduate School for the University of Oregon.

June 14, 2008

Original approval signatures are on file with the Graduate School and the University of Oregon Libraries.

© 2008 Matthew Lynn Strauser

An Abstract of the Dissertation of

Matthew Lynn Strauser for the degree of Doctor of Musical Arts

in the School of Music and Dance to be taken June 2008

Title: THE CLASSIFICATION OF LANGUAGE OF HIGH SCHOOL CHORAL DIRECTORS

Approved: _____

Dr. Harry E. Price

The revised Bloom's cognitive taxonomy classifies thinking into ways and kinds of knowing. The ways of knowing are remember, understand, apply, analyze, evaluate, and create. The kinds of knowing are factual, conceptual, procedural, and metacognitive. Higher order thinking requires analysis, evaluation, or creation. It has been suggested that ensemble directors spend little time teaching higher order thinking and concepts. Rehearsals of six expert high school choral directors were audio-recorded at the beginning, middle and end stages of performance preparation. The directors' language was classified by type of activity. Language containing cognitive content was further categorized using the revised Bloom's taxonomy. The data were coded using audio annotation software developed by the author. The software enabled the user to hear the

recorded audio, mark event locations, and add annotations. Annotations included transcribed text, coding, and comments. The software tracked event time and frequency and calculated event duration and word counts of transcribed text.

Results found that student performance was 44% of rehearsal and teacher talk 47%. Teacher vocal modeling was 12% of rehearsal. Teacher talk percentages of rehearsals overall were 26% task presentation, 2.4% questioning, and 2.5% specific feedback. Cognitive content was split almost evenly between lower levels of thinking—recall, understand, apply—and higher levels—analyze, evaluate, create. Conceptual thinking occurred in 4.3% of rehearsal. Rehearsals were fast paced with average overall event durations of 6.3s. Several ways to define higher order thinking in the two-dimensional revised taxonomy are presented as are suggestions for challenging students to higher order thinking. The concept of a cognitive topography or cognitive signature is proposed as a key component for describing a director's teaching style and may have implications for teacher training and assessment.

CURRICULUM VITAE

NAME OF AUTHOR: Matthew Lynn Strauser

GRADUATE AND UNDERGRADUATE SCHOOLS ATTENDED:

University of Oregon, Eugene, Oregon
Wheaton College Graduate School, Wheaton, Illinois
Oregon State University, Corvallis, Oregon
University of Montana, Missoula, Montana

DEGREES AWARDED:

Doctor of Musical Arts in Music Education, 2008, University of Oregon
Master of Arts in Biblical Studies, 1982, Wheaton College Graduate School
Bachelor of Music Education, 1980, University of Montana
Bachelor of Arts in Geology, 1980, University of Montana

AREAS OF SPECIAL INTEREST:

Teacher education
Sight singing and audiation
Conducting
Mountaineering

PROFESSIONAL EXPERIENCE:

Associate Professor of Music, Corban College, Salem, Oregon. 1999-present
Graduate Teaching Assistant, University of Oregon, Eugene, 2002-2004
Adjunct Choral Director, Oregon State University, Corvallis, 1997-1999
Music Teacher, Grades 7-12, Santiam Christian Schools, Corvallis, Oregon, 1984-1999
Music Teacher, Grades K-12, Charlo Public Schools, Charlo, Montana, 1982-1983

GRANTS, AWARDS AND HONORS:

Research Award, University of Oregon, Spring 2007

American Choral Directors Association, Life Membership, 2007

Graduate Teaching Assistant, University of Oregon, Eugene, 2002-2004

Association of Christian Schools International, Lifetime certification, 1999

ACKNOWLEDGMENTS

Many friends, teachers, colleagues, and family members have urged me on during this project. I wish to thank my dissertation committee: Dr Harry Price, for his expert guidance and willingness to ask the hard questions; Dr. Sharon Paul, for her encouragement and enthusiasm for the choral art; Dr. Phyllis Paul, for sharing her love of teaching; and Dr. Roland Good, for revealing the joy of statistics. I especially would like to thank Dr. Randall Moore who encouraged me in the early days of my degree. His friendship will be appreciated always. My gratitude goes to Dr. Shannon Chase who constantly challenged me to do my best. Thank you Dr. Ann Tedards, whose open office door and heartfelt interest in my studies was a constant support. I want to thank the graduate school secretaries, Jill Michelle and Anne Merydith, who in so many ways were always there to help guide me through the important program checkpoints.

A very special thanks to the administration and staff at Corban College who made this possible. I want to thank president Hoff for encouraging the faculty to pursue academic excellence. I need to thank my deans, Dr. Bernard and Dr. Samek, for making the schedule and teaching load conducive to doctoral work. Thank you to my department chairman, Dr. Cross, for her everlasting patience, support, and respect. I wish to express my gratitude to my coworkers, Mr. Shuholm and Mr. Bartsch, for taking up the slack during these last six years.

Thank you to my wife Naomi for her encouragement, help, and patience. She provided invaluable assistance in the many weeks spent in data transcription and coding.

I would like to thank my children, Hannah, Kara, Paul, and Alethea, for their continued love during the days when dad was away doing doctoral work. I want to thank my son-in-law, Seth, for running the race alongside me as he worked on and finished his degree.

Special thanks go to the teachers who gave so freely of their time during the data collection phrase of this study. I spent many hours listening to your rehearsal recordings and with each hearing my respect grew for you as skilled music educators. Oregon is fortunate to have you.

Let the word of Christ richly dwell within you,
with all wisdom teaching and admonishing one another
with psalms and hymns and spiritual songs,
singing with thankfulness in your hearts to God.
(Colossians 3:16, NASB, 1995).

Dedicated to my wife Naomi.

TABLE OF CONTENTS

Chapter Page

LIST OF FIGURES

LIST OF TABLES

CHAPTER I

INTRODUCTION

There are data indicating that students are not engaged in higher order thinking in rehearsal (Watkins, 1994). These data also suggest that music teachers spend little time teaching concepts in rehearsal. To better understand these issues, this study examined the rehearsal language of experienced successful choral directors at the beginning, middle, and end points of song preparation.

Choral directors use spoken language as an essential teaching tool. Directors have a variety of modes of communication but still use the spoken word as one of the primary ways to interact and direct students in the rehearsal setting. Among other things, choral directors use spoken language in rehearsal to instruct. These phrases of instructional syntax are purposeful and reflect instructional objectives.

The teacher's style is composed of rehearsal tasks and the levels of thinking exercised in these tasks. This style, when viewed graphically, begins to look like a terrain. The topography of the terrain is the data about teacher tasks and thinking. The classification work in this study allowed us to better understand the cognitive topography traveled by successful music educators in the choral rehearsal setting.

Statement of Purpose

This study collected, classified, and analyzed the language of six expert high school choral directors. This analysis should help us to better understand the cognitive content of choir directors' language. Specifically, it was hoped this analysis would shed light on the cognitive levels of thinking being used and the cognitive processes that are employed in these rehearsals.

The directors' rehearsal language was categorized into type of activity using the modified coding method based on the sequential pattern of music instruction developed by Yarbrough and Price (1989). Language containing cognitive content was further classified according to the revised Bloom's taxonomy of educational objectives (Anderson & Krathwohl, 2001). The cognitive domain uses ways of knowing (remember, understand, apply, analyze, evaluate, and create) and kinds of knowing (factual, conceptual, procedural, and metacognitive) as the classification system (see Table 1.1).

Table 1.1: *Revised Taxonomy of the Cognitive Domain. Adapted from Anderson & Krathwohl (2001)*

Knowledge Dimension	Cognitive Process Dimension					
	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual	List	Summarize	Classify	Order	Rank	Combine
Conceptual	Describe	Interpret	Experiment	Explain	Assess	Plan
Procedural	Tabulate	Predict	Calculate	Differentiate	Conclude	Compose
Metacognitive	Appropriate Use	Execute	Construct	Achieve	Action	Actualize

The revised Bloom's taxonomy presents the concept of lower and higher levels or orders of knowing or thinking. This is reflected in both dimensions of the table: Cognitive process or way of knowing/thinking, and knowledge dimension or kind of knowing/thinking. Going toward the lower-right corner of the Table 1.1 requires higher levels of thinking or deeper kinds of knowing. The taxonomy suggests that learners must first begin in the upper-left corner and then work their way toward the right and down. The lower-right corner requires the highest level of knowledge and thinking process.

Justification for the Study

It should be a priority for us to improve the quality of music education (Lindeman, 1998). The analysis of choral conductor instructional language in this study might contribute to the framework of tools used for teacher assessment (Gumm, 1993) and a better understanding of the rehearsal process. This could reveal key descriptive factors of an instructional style consistent with excellent teaching. The identification of a teacher's style must rely, partly, upon the teacher's choice of language. This kind of study might provide detailed qualitative and quantitative information about teaching styles and lead to measures for teacher assessment.

This study yielded frequency and percentage distributions for the classified language according to rehearsal activity and cognitive level. It examined how the directors' statements are distributed within the cognitive domain using the revised Bloom's taxonomy (Anderson & Krathwohl, 2001). Specifically, does director language

have more statements classified in the higher cognitive processes of analyze, evaluate, and create or in the lower processes of remember, understand and apply (Anderson & Krathwohl, 2001)? This includes the question of what kinds of knowing are most utilized: Factual, conceptual, procedural, or metacognitive. A related question is does the director's language change while rehearsing a song from introduction to performance? This could lead to the creation of the concept of a cognitive signature or profile for each director. The cognitive signature is a map representing the topography of how the director's language explores the cognitive domain during certain teacher activities.

Research Questions

The specific research questions examined in this study are:

1. Can director language be effectively coded and classified into the cognitive domain taxonomy?
2. What are the general characteristics of the rehearsal language of expert high school choral directors in terms of rehearsal activity and cognitive content?
3. Does the director's use of rehearsal time and cognitive language content change during the stages of song preparation?
4. Do directors challenge students to think within the higher cognitive levels of analyze, evaluate, and create?

Scope and Delimitations of the Study

The study data were collected from rehearsals of expert high school directors in Oregon. The participants included six directors who had taken their choir to the OSAA state choral championships at least three of the five years prior to the study. The choirs were mixed soprano, alto, tenor, and bass ensembles. Rehearsals were recorded during the beginning, middle, and end of song preparation.

Data collection was done in fall 2006 between the beginning of the school year and each choir's first concert. It was hoped that this time frame would help to find all the directors and choirs in the similar learning context of a new school year, new music, preparing for the fall concert, and no festival preparation.

The only criterion for selecting a choir for the study was that it had participated in the OSAA state choir championships at least three of the previous five years. I hoped that the rehearsals of this choir would reveal the director's teaching style in terms of instructional language. Demographic data regarding the students within the choral groups was not considered. Specific details of the choirs' or students' rehearsal activity such as correctness of responses to teacher questions or quality of choral sound were not factors addressed in the study.

Definitions

Table 1.2 defines terms and concepts relevant to the study.

Table 1.2: *Definition of Terms Used in the Study*

Term	Definition
Activity	A specific rehearsal event such as teacher task presentation, student performance, or teacher feedback and identified using a sequence code (See Table 3.2).
Sequence or Sequence Code	Identifiers used to label rehearsal activity developed by Yarbrough and Price (1989) as modified and used in the study. Examples include 1m (teacher presenting musical task), 1q (teacher asking question), 2p (students performing), and 3vas (teacher providing specific verbal approval). Table 3.2 lists the coding system used in the study. Sometimes referred to as activity or activity code.
Cognitive Level	Kind and way of thinking or knowing as defined by the revised Bloom's taxonomy (Anderson & Krathwohl, 2001). Ways of knowing are remember, understand, apply, analyze, evaluate, and create. Kinds of knowing are factual, conceptual, procedural, and metacognitive. Detailed definitions are given in chapters 2 and 3.
Cognitive Code	Identifier used to name a level of thinking by column (1 - 6) and row (a - d) in the revised Bloom's taxonomy as presented in Table 3.4. Examples include t1a (recall a fact), t1b (recall a concept), t3c (apply a skill), t4a (analyze a fact), and t4c (analyze a procedure or skill).

Table 1.2: *Definition of Terms Used in the Study (continued)*

Cognitive Domain	Thinking and knowing as described in the revised Bloom's taxonomy and formalized in *A Taxonomy for Learning, Teaching, and Assessing*, (Anderson & Krathwohl, 2001).
Concept	Thinking or knowing that involves the relationship of several facts reflecting a model, idea, categorization, or organization (Anderson & Krathwohl, 2001, p. 44). See Table 3.6 for examples.
Director, conductor, or teacher	High school choral educators, such as the six choral educators who participated in the study.
Fact	The basic elements to be known to be acquainted with a discipline (Anderson & Krathwohl, 2001, p. 45).
Knowing	Cognitive activities of the teachers and students.
Recording	Digital audio collected from a high school choir rehearsal or portion of a rehearsal used for the study.
Rehearsal	Normal high school choir instructional time.
Stage	Refers to three rehearsal time slices of song preparation for the fall concert: when the song is new to the choir, midway to concert preparation, and just before the concert.
Thinking	Used synonymously for the ways and kinds of knowing defined in the revised taxonomy.

CHAPTER II

REVIEW OF RELATED LITERATURE

Many studies of rehearsals have described the director and focused on the use of time, nonverbal teacher activity, and use of language. Among other ways, uses of time have been characterized in terms of rehearsal organization, teacher intensity, and pace. Nonverbal teacher activity included conducting, facial expression, and eye contact. The use of language has been analyzed regarding sequential patterns, frequency of talk, type of teacher talk, and type of reinforcement. Teacher language has been classified in the cognitive domain according to higher level, lower level thinking, and concept presentation. Studies overlapped making it challenging to classify a study into one category. Specifically, studies about director language provided valuable background for this research project.

Several researchers in music education have laid a solid foundation for the procedures and method of activity categorization used in the present study. Activities and time were studied by Madsen and Madsen (1998). Moore (1976) developed and used the Music Teaching Reinforcement-Activities Form (MTRA). The MTRA allowed the observer to quantify teacher and student activities in a continuous manner over time (Wagner & Strul, 1979). Duke, Prickett, and Jellison (1998) presented methods to record

teacher and student language. Yarbrough and Madsen (1998) categorized teacher reinforcement. Yarbrough and Price (1989) developed a concise system for coding rehearsal activity.

Language is the primary teaching tool for the choral director. Directors use visual and audio aids, and nonverbal conducting techniques but, ultimately, choral directors use their words to teach. Studies in this area have examined the frequency, duration, and type of teacher talk. Music director language has been studied in the context of pace, use of time, teacher intensity, style, and rehearsal organization. The director's language has been classified regarding feedback, in the context of sequential patterns, into high/low cognitive domain levels, and by general type of language using Bloom's taxonomy. Studies have also compared the characteristics of experienced teachers with novice and student teachers.

Describing the Director

Many studies target the characteristics of the director. The director's use of language is a defining characteristic and has been measured by type and quantity. Studies have focused on the director's language as it related to use of time, use of sequential patterns, kind of reinforcement, type of talk, and nonverbal factors. Studies have also explored factors that correlate with teacher skill and experience. The studies that have helped to identify the presentation of concepts in teacher instructions, task presentation, and feedback were particularly relevant for this study.

Sequential patterns have been shown to be an important teaching tool (e.g., Byo, 1994; Maclin, 1993; Yarbrough & Price, 1981, 1992; Yarbrough & Hendel, 1993; Yarbrough & Price, 1989). The effect of sequential patterns on student's perception of rehearsals was studied by Yarbrough and Hendel (1993), Yarbrough, Price and Hendel (1994), and Price and Yarbrough (1994). In the 1993 study, high school and elementary students rated a choral director's effectiveness. The choral director followed a script that included 20 sequential patterns. A 20-minute videotape of the director and the script provided the evaluation material. Student evaluators ranked patterns higher when the sequence ended in an approval. Students preferred sequences that began with musical information rather than directions.

Yarbrough and Madsen (1998) examined choral rehearsals of two contrasting pieces during a semester to ascertain the relationship between teaching skills and rehearsal ratings. They used seven videotaped university choral ensemble excerpts that focused on the director. Data were collected regarding sequential patterns and musical concepts covered in director task presentations. Complete sequential patterns were defined as task presentation, student response, and director feedback. Information was collected about the director's eye contact, facial expression, body movement, inflection of speaking voice, and conducting gesture. Student off-task behavior was measured. The director self assessed her videotaped rehearsals and excerpts were rated by college music majors. Comparisons of the highest and lowest rated excerpts showed that the highest rated excerpt contained less student off-task behavior, more teacher approvals, more eye

contact, and more frequent activity changes, with a mean length of activity between five and six seconds.

Davis (1998) identified director behaviors and the connection between preparation and achievement. Rehearsal activities of advanced and beginning choirs were categorized and analyzed, in general, by achievement, verbal instruction, student performance, teacher conducting, instruction rate, teacher feedback, and positive teaching sequences. The study videotaped 83 rehearsals, four final performances and used beginning and advanced groups from two different high schools. Directors in this study demonstrated a decrease in verbal instruction as their choirs progressed (also in Witt, 1986). Director feedback included more negative than positive feedback. Davis noted that the results of this study were limited because only two directors were studied.

"Two of the foremost goals of research in music education are to (1) identify and define observable behaviors of music teaching and learning, and (2) determine the function of those behaviors in producing excellence in music performance" (Yarbrough & Madsen, 1998, p. 469). The authors point out that most of the research in music education from the previous 25 years has focused on the first goal.

Modeling is an important teaching tool (Grimland, 2001). Gonzo (1977) identified three modes of teaching: explanation (cognitive), demonstration (modeling), and descriptive language (imagery, analogy, or metaphor). Grimland pointed out that directors would use extensive sessions of modeling without explanation or verbal feedback. A director would ask students to listen and repeat while paying close attention

as they modeled vowel formation, diction, accent, or rhythm. In that context the director used no verbal feedback as the modeling continues.

Type of teacher language is related to rehearsal activity context. Identifying the kinds of rehearsal activity is crucial to categorizing teacher language. Yarbrough and Price (1981) identified three kinds of activities: presentation, student response, and teacher feedback. They established a concise system of coding or labeling for each of these activities. Teacher presentation activity was labeled (1), student response was labeled (2), and teacher feedback was labeled (3). Teacher presentation activities included (1m) musical task presentation, (1d) directions about who should sing or where to begin singing, (1c) counting to get the group singing, (1q) questioning, (1s) social task presentation, and (1o) off-task statements. Student responses were labeled (2p) performance, (2v) verbal, and (2nv) nonverbal. Teacher feedback was labeled (3va) verbal approval and (3vd) verbal disapproval. Table 2.1 summarizes this coding system.

The studies in this section, that described the director, indicated that director language might be a factor in student on-task behavior. Students had a better rehearsal experience when directors used complete sequential patterns and gave positive feedback. Music directors appeared to spend little time teaching concepts. These studies have provided a framework for the classification of teacher rehearsal language.

Comparisons Based on Director Experience

The experience level of a director has provided a dimension worthy of study. The studies presented in this section compare directors of differing experience levels. These

data include kind of talk, pace, timing, talk content, content level based on Bloom's taxonomy, and use of time.

Table 2.1: *Symbols Used in Rehearsal Analysis (Yarbrough & Price, 1989)*

(1) Teacher Presentations	
1m	Academic musical task presentation (talking about musical or performance aspects, including modeling by teacher or piano)
1d	Direction (giving directions regarding who will, or where to sing/play; not how)
1c	Counting (counting beats, usually ending in "ready go" and a downbeat)
1q	Questioning (asking students questions about, musical, social, or directional tasks; providing no information and requiring a response)
1s	Social task presentation (presenting rules of behavior)
1o	Off-task statement (statements not related to social behavior or academic tasks)
(2) Student Responses	
2p	Performance (entire ensemble, sections or individual performing)
2v	Verbal (ensemble members asking or answering a question, or making a statement)
2nv	Nonverbal (ensemble members nodding heads, raising hands, or moving in response to teacher instruction)
(3) Teacher Feedback	
3va	Verbal academic or social approval (positive statement about student performance or social behavior)
3vd	Verbal academic or social disapproval (negative statement about student performance or social behavior)

Goolsby (1996) investigated the use of time in rehearsals by experienced, novice, and student teachers. He examined 60 high school band rehearsals and divided the time use into initial activities, teacher activities, performance activities, and final activities. Initial activities consisted of preparation, initial teacher talk, and total ensemble warm-up. Teacher activities included verbal instruction, nonverbal instruction, verbal discipline, and the number of times the teacher stopped. Performance activities were full ensemble, group/sectional, individual, breathing/humming/clapping/singing/counting exercises, the number of rehearsal segments, break after warm-up, first selection, second break, second selection, third break, third selection, fourth break, and fourth selection. The final activities were final teacher talk and dismissal time. The study did not find a significant difference between music instruction/performance and nonteaching activities for the student teachers and experienced teachers. A significant difference was found for performance time of experienced versus student and novice teachers. Goolsby found that experienced teachers spent less time getting started, using verbal discipline, and verbal disapproval. The shorter start-up time allowed the experienced teachers to spend more time in warm-up. Experienced teachers spent significantly more time in performance and in using nonverbal modeling. The experienced teachers also allowed longer breaks, longer performance segments, and their teaching segments were shorter.

In the choral setting, Pence (1999) categorized director rehearsal language into talk, model, directive, off-task, explain, question, feedback, response to inappropriate behavior, and student talk. The Pence study, modeled on Goolsby (1996), used 19 choral directors representing three experience levels: expert, novice, and student teacher. Each

director was videotaped with the camera focused on the director. The study analyzed the warm-up and the first rehearsal piece. This resulted in 17 to 30 minutes of tape for each rehearsal. The data revealed that the total percentage of teacher talk was about the same across teacher experience levels (Mean = 40%) with a mean percentage of 43.4 % (expert), 37.5% (novice), and 43.3% (student teacher). Novice teachers had the most student talking. Student teachers modeled less but had about the same rate of giving directives (about 2.5 per minute).

Pace and timing in the music classroom have been shown to be as important as content (Madsen & Madsen, 1998). Director language is a component of pace and timing. Duke, Prickett, and Jellison (1998) had novice teachers categorize taped rehearsal excerpts by pace into the six semantic differentiations of fast/slow, appropriate/inappropriate, tense/relaxed, smooth/uneven, too fast/too slow, and good/bad. The study used short, one- to three-minute videotaped rehearsal excerpts from four novice teachers during choral and band rehearsals, and elementary music classes. Video recordings of two differently paced excerpts of good teaching, as determined by the researchers, by the same novice teacher were evaluated by other novice teachers using a 5-point scale for each of the six semantic differentiations.

Observers in the Duke, Prickett, and Jellison study rated excerpts higher that had higher rates (shorter durations) of teacher activity and student performance episodes. The evaluators consistently rated the faster paced excerpt, of each pair, as the better of the two. Timing analysis of the teaching excerpts looked at relative duration and frequency of teacher talk, teacher demonstration, full group student activity, and individual student

activity. This analysis revealed that there was more teacher activity in the faster paced, higher frequency, excerpts with shorter mean episode durations. The faster paced episodes also had more, and consequently, shorter opportunities for student performance. The faster paced excerpts had higher rates of teacher directive and feedback and lower rates of teacher information giving and questioning. This study noted that good teaching was characterized by using a variety of pacing. One should also remember that the study focused on perceived pace, as opposed to actual measured behaviors, as it related to quality of teaching.

Goolsby (1997) considered many performance and rehearsal variables in comparing the language content of instrumental directors at the expert, novice, and student level. The descriptive variables related to performance and rehearsal. The 15 performance variables used were posture, rhythm/tempo, notes, airstream, tone quality, dynamics, balance/blend, articulations, style, expression/phrasing, energy, tuning, intonation, guided listening, and unguided listening. The 10 rehearsal variables were teacher demonstrations, explanations, unspecific posture feedback, specific posture feedback, "again," "watch," "one more time," no instruction, focused questions, and vague questions. He also looked for sequential patterns. Goolsby found that expert directors stopped more often than novice directors and addressed several performance variables at each stop. Compared with novice directors, the expert directors asked fewer questions, focused on rhythm/tempo, addressed tone quality, intonation, expression, used adverbs to encourage the band to play a certain way, and used more nonverbal explanations and demonstrations. Novice directors asked more vague questions and often

stopped and started without any verbal instructions. The expert directors completed more than 20% of their sequential patterns while the novice and student directors completed less than 14%.

Watkins (1994) analyzed performance and nonperformance time in rehearsal. This study built upon her previous work (Kvet & Watkins, 1993) as well as that of Caldwell (1980) and Thurman (1977). She not only looked at basic time data but also examined the goals of the nonperformance activities: exposition, modeling, questioning, seeking to develop higher-order thinking (analysis, synthesis, evaluation), and nonspecific, or critical thinking. She also sought to examine the correlation between years of teaching experience and the amount of nonperformance time spent seeking to develop the students' higher-order thinking skills. Watkins employed Bloom's original (1956) taxonomy to classify director language regarding the higher-level, critical-thinking areas of analysis, synthesis, and evaluation. The study looked at 15-minute videotaped rehearsal excerpts of 32 advanced high school choirs. Rehearsal taping began when the first song was rehearsed. Taped material was classified as performance or nonperformance. Nonperformance material was then classified into activity directed toward lower thinking, activity directed toward higher-order thinking, and nonspecific or silence.

Results of the Watkins study showed that 38.6% of the rehearsal was nonperformance, with 34.3% of activity directed toward lower level thinking, 1.3% to higher-order thinking activity, and 3.0% nonspecific verbal activity. The study showed no significant correlation between nonperformance activity and higher-order thinking

verbalizations or between years of teaching experience and higher-order thinking directives.

A recent dissertation by Arthur (2002) used videotape analysis to compare the use of time in beginning and advanced choirs by experienced choral directors. She videotaped five directors rehearsing a beginning and advanced choir each, for 10 rehearsals. The tapes were transcribed and behaviors were classified. She used as models Moore, 1976; Yarbrough & Price, 1989; and Duke, Prickett, & Jellison, 1998 (Arthur, p. 48). Director activity was coded, timed, and converted to duration, frequency, and percentage. She found that directors used a variety of pacing, mixed easy and hard music, and all used three or more rehearsal segments in each rehearsal. Teacher instruction mean durations were about 16 seconds and student performance segment means were between 26 and 31 seconds. Advanced choirs showed a higher rate of activity change.

Blocher, Greenwood, and Shellahamer (1997) investigated to see how much time music teachers devoted to teaching concepts. This study categorized middle school and high school band directors' teaching behaviors as nonmusical, nonverbal or verbal instruction, noninteractive listening, nonverbal or verbal feedback, or conceptual teaching. Directors in this study used nonverbal instruction or direction about 27% of the time. High school directors used nonverbal instruction or direction almost four times as much as middle school directors. Twenty-two percent of the rehearsals were noninteractive listening. Middle school directors used noninteractive listening three times more than high school directors. Very little feedback was given by the directors. Possibly most importantly, time spent in teaching concepts was less than 3%.

Conceptual teaching behavior was defined as introducing a concept, reinforcing a concept, asking questions about a concept, or answering questions about a concept. They stressed three aspects of conceptual teaching. First, it gives students "opportunities for awareness and understanding with a potential for transfer" (Blocher, Greenwood, & Shellahamer, 1997, p. 462). Second, conceptual teaching helps students to formulate "relationships, new ideas, or expansion of categories." Lastly, the "conductor answers questions in such a way that the answers relate to a broader array of instances than the one at hand" (p. 462).

These studies found that experienced directors had many distinguishing characteristics. They modeled more, had more student on-task behavior, spent less time getting started, used a variety of pace, tended to have high rates (short durations) of teacher/student activity, and used more complete sequential patterns. However, it appeared that most directors, regardless of level of experience, did not challenge students with higher-order thinking typified by analysis, evaluation, or synthesis. These studies identified key characteristics of expert choral directors and provided an important basis of comparison for the present study.

Cognitive Studies

Several studies have examined the level of cognitive thinking to which the teacher directs the class. Watkins (1994) showed that there was little higher-order thinking evidenced in the rehearsals studied. Other studies (e.g., Goodlad, 1984; Blocher,

Greenwood, & Shellahamer, 1997) also indicate that little conceptual teaching occurred in rehearsals.

Goodlad (1984) observed more than 27,000 students and the teachers of more than 1000 elementary and secondary school classrooms to find that less than one percent of instructional time was devoted to soliciting a reasoned response from students. Most instruction, at best, required the students to remember mere facts and none, or very little, of the instruction asked students to understand the implications of the facts. The bulk of student activity was "listening to teachers, writing answers to questions, and taking tests and quizzes" (p. 124). Goodlad believes that the arts are one of the "five givers" of human knowledge, along with mathematics and science, literature and language, society and social studies, and vocations. The arts are not optional to the curriculum.

Watkins (1994) analyzed performance and nonperformance time use in rehearsal. Part of the study sought to examine the correlation between years of teaching experience and the amount of nonperformance time spent seeking to develop the students' higher-order thinking skills. Bloom's (1956) taxonomy was used to classify the director language regarding the higher-level, critical-thinking areas of analysis, synthesis, and evaluation. She found that 34.3% of nonperformance activity was directed toward lower level thinking, 1.3% in higher-order thinking activity, and 3.0% toward nonspecific verbal activity. It was of interest that 21 of the 32 subject directors did not use any higher-order thinking verbalizations.

Conceptual teaching would logically seem to be an important, but apparently a little used or investigated, part of musical task presentation. Conceptual teaching could

challenge students at many cognitive levels—ways and kinds of knowing. The revised Bloom's taxonomy (Anderson & Krathwohl, 2001) classified language into different ways of knowing and kinds of knowing that appear applicable to the music teacher setting.

The Revised Bloom's Taxonomy

The idea that knowledge or thinking could be organized from simple to complex was the thesis of the original Bloom taxonomy (Bloom et al., 1956). This organization of thinking was explored in the context of assessment relating to the formulation of educational objectives and test questions. The creators of the taxonomy explored the cognitive domain of educational objectives to arrange kinds of knowing into an order of increasing complexity. This order used the six headings of knowledge, comprehension, application, analysis, synthesis, and evaluation.

The main purpose of the original Bloom's taxonomy was to facilitate the exchange of examination questions by test preparers. It was never meant to be a static document, but a work in progress. Bloom hoped that educators would translate the taxonomy into terms relevant to their own subject areas (Anderson & Krathwohl, 2001, p. xxvii). The revised taxonomy (Anderson & Krathwohl, 2001), in the spirit of the original authors, reorganized, modified, and expanded the taxonomy to fit better with current thought about learning, teaching and assessment; however, it has a major change in emphasis. While the original was designed to facilitate test construction and assessment, the revised taxonomy "emphasizes the use of the taxonomy in [the alignment of the three

areas of] planning curriculum, instruction, and assessment" (p. 305). The revisers wanted the taxonomy to be used by teachers. This present study fits well with the emphasis of the revised taxonomy.

This research project is concordant with the desire of the authors for others to adapt and expand the revised taxonomy and it was hoped that this study would add another stage to the taxonomy's journey. The standard approach is to use the taxonomy in the writing of curriculum, instructional objectives, and assessments. The present study attempted to classify rehearsal language of experienced choral teachers into the revised taxonomy.

The revised taxonomy (Anderson & Krathwohl, 2001) is encapsulated in Table 2.2. The left column lists the knowledge dimension of the taxonomy. The knowledge dimension categorizes kinds of knowing into factual, conceptual, procedural, and metacognitive. The top row lists the cognitive process dimension or ways of knowing. These are remember, understand, apply, analyze, evaluate, and create. The cells within the table give one-word verbs that fit cognitive processes and kinds of knowledge found at each row and column intersection of the table.

Anderson & Krathwohl (2001) provide many examples of using the taxonomy. An instance of this is in the first cell that contains the word "List." When the teacher asks the students to recall a list the student is being asked to remember (cognitive process or way of thinking) facts (type of knowledge or kind of thinking). Another example would be to ask a student to make a conclusion (evaluate) about a procedure (procedural knowledge).

Table 2.2: *Revised Taxonomy of the Cognitive Domain. Adapted from Anderson & Krathwohl (2001)*

Knowledge Dimension	Cognitive Process Dimension					
	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual	List	Summarize	Classify	Order	Rank	Combine
Conceptual	Describe	Interpret	Experiment	Explain	Assess	Plan
Procedural	Tabulate	Predict	Calculate	Differentiate	Conclude	Compose
MetaCognitive	Appropriate Use	Execute	Construct	Achieve	Action	Actualize

The taxonomy contains types of knowledge. Factual knowledge involves details or data. Conceptual knowledge is about ideas or models. Procedural knowledge is about how things are done. Metacognitive knowledge, or self-knowing, relates to thinking about what one knows.

Metacognitive is perhaps the least familiar label in the revised taxonomy. It relates to what we think about what we know. An example of this could be found in the question: "How well do you know Bach?" Instead of asking us to recall a specific fact such as the date of Bach's birth, we are being asked to think about what we know about Bach. Another example is when we think about the best way to study for a particular test. We are not thinking about a specific test question; instead we are thinking about how we best learn certain content. Asking the singers about how well they know a piece requires

metacognitive thinking. Asking the choir what is the best way to solve a tuning problem at a particular measure and beat may be metacognitive.

The cognitive process dimension of the revised taxonomy is remember, understand, apply, analyze, evaluate, and create. It is useful for our understanding of this dimension to examine word groupings for each cognitive level. An example such as instructing students to generate, plan, or produce something would fit within the creative process. This process level could also be viewed as hypothesizing, designing, or constructing (see the last row of Table 2.3). These cognitive processes could also be called hypothesizing, designing, or constructing. Table 2.3 provides more detailed descriptions of the cognitive process dimension. The table lists subcategories for each process along with alternatives names.

Table 2.3: A m*ore Detailed View of the Cognitive Process Dimension from Table 5.1 of the Revised Taxonomy of the Cognitive Domain. Anderson and Krathwohl (2001)*

Category	Cognitive Process	Alternative Names
Remember	Recognizing Recalling	Identifying Retrieving
Understand	Interpreting Exemplifying Classifying Summarizing Inferring Comparing Explaining	Clarifying, paraphrasing, representing, translating Illustrating, instantiating Categorizing, subsuming Abstracting, generalizing Concluding, extrapolating, interpolating, predicting Contrasting, mapping, matching Constructing models
Apply	Executing Implementing	Carrying out Using
Analyze	Differentiating Organizing Attributing	Discriminating, distinguishing, focusing, selecting Finding, coherence, integrating, outlining, parsing, structuring Deconstructing
Evaluate	Checking Critiquing	Coordinating, detecting, monitoring, testing Judging
Create	Generating Planning Producing	Hypothesizing Designing Constructing

Similar to Table 2.3, Table 2.4 lists the subcategories for the knowledge dimension. Each type of knowledge is divided into more specific kinds of knowing. Factual thinking includes terminology, details, and elements. Conceptual is composed of classifications, categories, principles, generalizations, theories, models, and structures. Procedural encompasses skills, techniques, and methods. Metacogntive is thinking about strategy, thinking about thinking, and self-knowledge.

Table 2.4: *A more Detailed view of the Knowledge Dimension from Table 4.1 of the Revised Taxonomy of the Cognitive Domain. Anderson & Krathwohl (2001)*

Major Knowledge Type	Subtypes
A. Factual	Knowledge of terminology Knowledge of specific details and elements
B. Conceptual	Knowledge of classifications and categories Knowledge of principles and generalizations Knowledge of theories, models, and structures
C. Procedural	Knowledge of subject-specific skills and algorithms Knowledge of subject-specific techniques and methods Knowledge of criteria for determining when to use appropriate procedures
D. Meta-Cognitive	Strategic knowledge Knowledge about cognitive tasks, including appropriate contextual and conditional knowledge Self-knowledge

The concepts outlined in Tables 2.3 and 2.4 provided the framework for classifying a teacher statement into the cognitive domain according to the revised

Bloom's taxonomy. Table 2.5 combines and condenses the details of Table 2.3 and Table 2.4 and provides a coordinate pair in the form of the intersection of the cognitive process dimension and the knowledge dimension. A coordinate of (1a) refers to factual remembering. A coordinate of (3c) references the application of a procedure or skill and so on.

Table 2.5: *Revised Taxonomy of the Cognitive Domain Showing Column and Row Coordinates*

Knowledge Dimension	Cognitive Process Dimension					
	Remember 1	Understand 2	Apply 3	Analyze 4	Evaluate 5	Create 6
(a) Factual	(1a)	(2a)	(3a)	(4a)	(5a)	(6a)
(b) Conceptual	(1b)	(2b)	(3b)	(4b)	(5b)	(6b)
(c) Procedural	(1c)	(2c)	(3c)	(4c)	(5c)	(6c)
(d) Metacognitive	(1d)	(2d)	(3d)	(4d)	(5d)	(6d)

Tables 2.1 and 2.5 form the core rubric that was used in this study to classify teacher language. Teacher talk classified as 1m (musical task presentation in Table 2.1) was then further categorized using Table 2.5. An example would be a teacher task presentation (1m in Table 2.1) asking the students the dates for J. S. Bach. This is asking the students to remember a fact and would receive the coordinate 1a using Table 2.5. Another example is the teacher asking the altos to look at the other parts (soprano, tenor, and bass) in the musical score to see if any of the other sections are singing the same note

as the altos within a certain measure or phrase. This teacher task presentation (1m) is asking the students to analyze facts about the music which is 4a in Table 2.5.

Each cognitive level is built upon its supporting levels. The taxonomy table contains six columns and four rows making 24 column and row intersections. Moving to the right and down is a process built upon the cells to the left and above. Conceptual knowledge is built upon factual knowledge. Facts cannot be understood until they are recalled. A procedure cannot be applied unless it is remembered.

Wendell Hanna (2007) placed several of the MENC national standards into the revised Bloom's taxonomy. Table 2.6 shows her analysis of how several of the national standards fit into the taxonomy. Singing (national standard 1a) was matched with the cognitive level of apply a skill. Playing by ear (national standard 2d) was matched with thinking about apply or as a strategy for apply. Analyzing music (national standard 6a) was placed in the cell for analyze a fact. Hanna notes that teacher modeling is analyzing a skill. This article was extremely useful as a guideline for coding teacher statements.

Using Bloom's Taxonomy outside Music Education

A small number of studies have used Bloom's taxonomy outside of music education. In an examination of elementary science texts Risner, Skeel, and Nicholson (1992) found little to encourage student critical thinking. Risner, Nicholson, and Webb (2000) later classified the questions in an elementary level social studies textbook according to the cognitive levels outlined in the taxonomy, and were pleased to find more textbook materials challenging students to apply, synthesize, and analyze information.

Table 2.6: *The New Bloom's Taxonomy Applied to Selected National Standards for Music Education. Hanna (2007, p 11)*

Knowledge Dimension	Cognitive Process Dimension					
	Remember Recognize Recall	Understand Interpret Exemplify Classify Summarize Infer Compare Explain	Apply Execute Implement	Analyze Differentiate Organize Attribute	Evaluate Check Critique	Create Generate Plan Produce
Factual				6a Analyzing music		
Conceptual		8a Understanding relationships between arts and other disciplines 9a Understanding music in relation to history and culture	5a Read and notate music	6a Analyzing music		
Procedural			1a Singing			3b Improvising 4a Composing
Meta-Cognitive			2d Playing by ear	6a Analyzing music	7a Evaluating music performances	

Need for the Study

"Two of the foremost goals of research in music education are to (1) identify and define observable behaviors of music teaching and learning, and (2) determine the function of those behaviors in producing excellence in music performance" (Yarbrough & Madsen, 1998, p. 469). Many teaching behaviors have been identified by research.

These include the use of sequential patterns (e.g., Yarbrough & Price, 1981), teacher approval versus disapproval (e.g., Madsen & Duke, 1985; Yarbrough, Hendel, & Price, 1994), teacher magnitude (Yarbrough, 1975), nonverbal teaching behaviors, pace (e.g., Gundersen & Williams, 1998), duration of verbal instruction, and use of instructional time (e.g., Madsen & Geringer, 1989; Goolsby, 1996 & 1997). These studies are a response to the need to better quantify teacher effectiveness and teacher skillfulness.

There is finite contact time for music in schools and music teachers must maximize effective use of rehearsal time to achieve their instructional goals. It might be found to be more efficient to frame instructional syntax within certain domains and within specific parts of these domains.

Choral rehearsals are interactive. Music teachers in training may not always discriminate the complexities of the teacher/ensemble interaction. There is a constant interplay between the director's input and the student's output. The director's skillful use of language is likely critical for the musical growth of the ensemble.

Madsen (1998) notes that effective teaching strategies do not happen by accident but are the result of teacher behavior. Teaching skills are as important as musical skills (Madsen, Standley, & Cassidy, 1989; Teachout, 1997).

Some may wonder about what kind of teaching choir directors do and what is the curriculum for a choir? The first word of the first content standard of the MENC National Standards for Music Education is "singing" (MENC, 1994) and most people understand choir to be about singing. This means that music educators need to understand how singing advances the education of the student and becomes a vital component of the

school curriculum. This study may help to clarify how students are being cognitively challenged as they sing.

The teacher's language should reflect the teacher's objectives. The objectives reflect the curriculum. What are the objectives as suggested by an examination of the director's language? More specifically, what instructional domains are employed to execute the curriculum? We can say with certainty that the choir is singing. But, we may find ourselves less certain of the answer when we ask the question about how that relates to the general cognitive development of students. It is hoped that this study has begun to answer some of the important questions about how the cognitive instructional domains are targeted, what kinds of knowing are accessed, and what kind of cognitive processes are exercised in choral rehearsals.

Information from this study may help to define why choral music is an important component of the school curriculum. It could be important for us to understand, for example, the routine cognitive activities shared between choir and calculus. An understanding of the ways and kinds of knowing employed could build a bridge between choir and calculus in the understanding of educators, administrators, students, and parents. Content may change but the relevant domains, ways of knowing, and the types of knowing used in the choral rehearsal may be the same as those used in other disciplines. It is important for choral educators to be able to speak in specific, educational language about the cognitive processes and types of cognition used in the rehearsal setting. Clear verbiage can help to clarify the relevance of choral education to the school curriculum.

It is essential for us to be able to identify the cognitive process and kind of knowing employed for instructional statements in choirs. For this reason I chose to investigate choral director language. I hoped that the results of this study would help to quantify and clarify our understanding of how the cognitive domain is explored in the teaching of choir.

CHAPTER III

METHODOLOGY

An examination of the relevant literature revealed that choral directors spend little time teaching concepts and say little that challenges students in the cognitive domain. This study proposed to investigate these issues by audio recording six expert high school choral directors, transcribing verbatim their instructional language, classifying the transcribed statements into specific rehearsal activities, and analyzing certain activity statements for cognitive domain level. The study's methodology included:

1. Pilot Study
2. Participants
3. Equipment
4. Procedure
    a. Recording the Rehearsals
    b. Tracking the Audio Recordings
    c. Dividing the Audio into Rehearsal Activities
    d. Transcribing Teacher Language and Activity Coding
    e. Data Coding for Cognitive Level
    f. Audio Annotation and Coding
    g. Reliability
5. Plan for Analysis
    a. Data Import and Factor Coding
    b. Analyses

Pilot Study

A pilot rehearsal was done to test recorder placement, appropriateness of individual recording storage format, and adequacy of audio quality. The pilot study tested all the various brands of MP3 recorders that would be used in the formal study. During the pilot study the recorders were tested while being suspended around the director's neck by a short lanyard or placed on the director's music stand. Recorded audio was transferred to my computer via USB port and converted using commercial audio editing software.

One important goal of the pilot study was to test the quality of the recorded audio. The software program Adobe™ Audition 1.0 (2003) was used to convert all MP3 recorder data to 16 bit, stereo, 8 kHz audio in wav file format. Results verified that the audio quality of the teacher's voice would be of sufficient clarity for the purposes of data collection and transcription. Loud speaking or piano playing was somewhat distorted at times. Choral performance could be clearly heard at lower amplitude.

Participants

Participants for this study were six ($N = 6$) expert high school choral directors in the state of Oregon and were chosen using criteria similar to previous studies (Pence, 1999) for identifying expert choral directors. The directors met the following criteria:

1. They have taught at the same public school for the last five years or more
2. They have taught six or more years
3. They have a masters degree

4. They taught a mixed SATB high school choir
5. The mixed choir had qualified and participated in the Oregon State Activities Association (OSAA) state choir championships during Spring semester for three or more of the last five years (2002-2006)

The ensembles used in this study were the same ensembles that participated in the State Choir Championships under the OSAA 1A to 4A classification. In this classification the smallest schools were 1A and the largest schools were 4A. It was found that 65 high school choirs have participated at the State Championships during the years 2002 – 2006 in the larger, 3A and 4A, classification. Thirty-four of these choirs performed three or more times during the last five years. Several of these 34 choirs did not qualify for this study. Twenty were not considered for data collection because they were either too far away ($N = 7$), a private school ($N = 1$) or there had been a change in director ($N = 12$). This left a pool of 14 choirs from which nine were recruited for the study in order to accommodate the possibility of attrition.

After obtaining human-subjects approval from the University of Oregon I contacted prospective participants by email and phone. I traveled to the school of each participant and asked them to read and sign an informed consent form and fill out a brief biographical survey (see Appendix A). A school administrator at each subject school also signed for human-subjects approval.

Equipment

Three different MP3 player/recorders were used. The Muvo® TX FM by Creative Labs (Creative Labs, 2006), the Truly® Digital MP3 Player (Truly, 2006), and the Mambo (Kaiser, 2006) BW MP3 Player. All three players had 512 kb of memory which allowed for about 30 hours of recording per player. These particular players were chosen because of relatively low price and availability. All of the players had USB computer connection ports.

Procedure

Recording the Rehearsals

Each subject was issued an MP3 player/recorder, lanyard, batteries, and printed instructions for using the recorder (see Appendix B). Using the built-in microphone of a portable MP3 audio recorder allowed the directors to record themselves without supervision. Subjects were instructed to record at least three rehearsals of each song during the three target stages or weeks. This helped to insure that at least two good recordings of each of the two songs were made during the three target stages. Several of the subjects were on a block type schedule which required that the songs be recorded over more than a one week time period to get the required number of recordings. Subjects were requested to say the date at the beginning of the recording.

Communication with the subjects was by email and phone to remind them to record and to check on recording progress. I visited each subject approximately five times including the initial invitation to participate, the delivery and instruction in the use of the

recorder, and the periodic collection of data. Audio was collected by plugging the recorder into the USB port of my laptop to transfer the audio files to the laptop's disk drive. At each visit during the data collection phrase I replaced the recorder's AAA battery.

Each director was recorded rehearsing two different songs in an effort to be representative of his or her teaching. The recordings were analyzed from three stages in the songs' concert preparation. The stages encompassed the song rehearsed as new to the choir, midway to the concert, and the week before the concert. The midway point was selected by finding the middle week between the date of the introduction of the song and the date of the first performance of the song. This allowed an examination of each director's instructional language at three stages of rehearsal within the same ensemble and repertoire. Only the target songs' portions of the rehearsals were recorded, not the entire rehearsal.

Two songs were recorded from each choir. The director was requested to rehearse each song for at least 15 minutes during the recording. Two recordings of each song were selected from the same week at three stages of rehearsal. This produced four recordings for each rehearsal stage. These recordings yielded approximately 6x15 minutes of recording for each song for a total of approximately 90 minutes per song. This equated to about an hour of recording for each rehearsal stage. The total recorded material for all directors was approximately 18 hours; seventy-two rehearsal segments (12 for each director) of 15 minutes each. Specifically: Six directors x 2 songs x 2 rehearsals x 3 stages x 15 minutes = 18 hours.

Tracking the Audio Recordings

The recorded audio was transferred to my computer via USB port and converted to wav format. Each director was coded as A, B, C, D, E, or F. Recordings were numbered in sequential order. Each recording was audited for quality, content, and length. Some recordings contained rehearsal time for more than the target song. These recordings were broken into separate segments using the audio editing software. The final sets of recordings were labeled by teacher identifier and recording number; teacher A's recordings were labeled a01, a02, a03…a11, a12; teacher B's recordings were labeled b01, b02, b03…b11, b12, etc.

Dividing the Audio into Rehearsal Activities

Each recording was analyzed to identify rehearsal activities or events. The beginning of each rehearsal recording was time indexed as zero seconds. Marked events that contained teacher language were time indexed just before the first audible word of each statement. The coding software allowed very accurate timings for rehearsal events. All time indexes were rounded to a hundredth of a second.

Choral director speaking, student talk, silences, pauses, and singing were identified in the recordings. All director language during student performance was ignored. Most nonverbal communication was not classified due to the fact that only audio was recorded, not video. Some nonverbal student response was coded when it was clearly in response to the teacher's instructions. Examples of this included asking the students to raise their hands, stand, or move into a new riser formation.

Transcribing Teacher Language and Activity Coding

The director's recorded language was transcribed verbatim and coded using a modification of the method described by Yarbrough and Price (1989). Table 3.1 summarizes the modified system. This classification system labels each activity with a sequence number: 1, 2, or 3. Sequence number 1 is teacher presentation activity, sequence number 2 is student response, and sequence number 3 is teacher feedback. Each activity within a sequence is labeled with a modifier to identify the specific kind of activity. This system is referred to as the sequence code or activity code.

Two codes were added: 1e and s. The 1e code represents "extra" kinds of teacher activity including conversational exchanges like, "yes, John," "yes," and so on. The 1s code was used to indicate a silence of more than a few seconds. The audio recording did not allow accurate identification of the activity occurring during the silence periods. Possible activities during these periods could have included teacher moving from the piano to the music stand, conducting, or waiting for something or someone. Table 3.2 shows sample text with activity codes.

Table 3.1: T*he Yarbrough and Price (1989) Coding System with Modifications Showing the Sequence Number (1, 2, 3) and the Activity Modifiers*

(1) Teacher Presentations	
1m	Academic musical task presentation (talking about musical or performance aspects, including modeling by teacher or piano)
1d	Direction (giving directions regarding who will, or where to sing/play; not how)
1c	Counting (counting beats, usually ending in "ready go" and a downbeat)
1q	Questioning (asking students questions about, musical, social, or directional tasks; providing no information and requiring a response)
1s	Social task presentation (presenting rules of behavior)
1o	Off-task statement (statements not related to social behavior or academic tasks)
1e	Exchange or extra talk such as a verbal exchange with a student
(2) Student Responses	
2p	Performance (entire ensemble, sections or individual performing)
2v	Verbal (ensemble members asking or answering a question, or making a statement)
2nv	Nonverbal (ensemble members nodding heads, raising hands, or moving in response to teacher instruction)
(3) Teacher Feedback	
3vas	Specific verbal academic or social approval. A positive statement about student performance or social behavior that identifies the particular student activity.
3van	Nonspecific verbal academic or social approval A positive statement about student performance or social behavior that does not identify the activity.
3vds	Specific verbal academic or social disapproval. A negative statement about student performance or social behavior that identifies the particular student activity.
3vdn	Nonspecific verbal academic or social disapproval. A negative statement about student performance or social behavior that does not identify the activity.
Other	
s	Silence is a period of no audible sound or activity

Table 3.2: *Activity Coding with Sample Text*

Code	Text
1c	1, 2....
1d	Page 7.
1e	Yes, Bill
1m	It's a consonant.
1o	I don't know. It's not on the calendar yet.
1q	Cause E sharp is the same as what?
1s	Shhh....hey, hey, hey....
3van	Very good.
3vas	Ah, that balance was good
3vdn	Man, we're just killing ourselves today.
3vds	Too loud tenors

Data Coding for Cognitive Level

Teacher statements with cognitive content (1m, 1q, 3vas, and 3vds) were further classified within the cognitive domain using the revised taxonomy as presented by Anderson and Krathwohl (2001) and explained in chapter two. The taxonomy is summarized in Table 3.3. Statements in the cognitive domain were coded according to the cognitive process dimension and the knowledge dimension. A statement that asked students to remember or recall a fact or detail was classified as "remember a fact" and was coded as t1a. A statement that asked students to apply a procedure was classified as "apply a procedure" and was coded t3c. The "t" prefix is added to avoid any ambiguity with the sequence codes. Non cognitive events were coded as z.

Table 3.3: *Revised Taxonomy of the Cognitive Domain Showing Column and Row Coordinates*

Knowledge Dimension	Cognitive Process Dimension					
	Remember t1	Understand t2	Apply t3	Analyze t4	Evaluate t5	Create t6
(a) Factual	(t1a)	(t2a)	(t3a)	(t4a)	(t5a)	(t6a)
(b) Conceptual	(t1b)	(t2b)	(t3b)	(t4b)	(t5b)	(t6b)
(c) Procedural	(t1c)	(t2c)	(t3c)	(t4c)	(t5c)	(t6c)
(d) Metacognitive	(t1d)	(t2d)	(t3d)	(t4d)	(t5d)	(t6d)

Teacher activities were coded for the highest order thinking possible. Some activities contained several sentences of teacher language. These sentences were analyzed to identify the highest level of thinking. An example could be a 1m event where the teacher asked students to recall a procedure (t1c) and then to apply the procedure (t3c). This event contained t1c and t3c content but was coded t3c.

The Hanna (2007) article was used to guide the cognitive coding. Table 3.4 shows Hanna's placement of several MENC national standards into the new, revised Bloom's taxonomy. Examples include: Singing (national standard 1a) is aligned with apply a skill (t3c in Bloom's). Music analysis (national standard 6a) is analyze a fact (Bloom's t4a).

Table 3.4: *The New Bloom's Taxonomy Applied to Selected National Standards for Music Education Hanna (2007, p 11)*

Knowledge Dimension	Cognitive Process Dimension					
	1) Remember Recognize Recall	2) Understand Interpret Exemplify Classify Summarize Infer Compare Explain	3) Apply Execute Implement	4) Analyze Differentiate Organize Attribute	5) Evaluate Check Critique	6) Create Generate Plan Produce
a) Factual				6a Analyzing music		
b) Conceptual		8a Understanding relationships between arts and other disciplines 9a Understanding music in relation to history and culture	5a Read and notate music	6a Analyzing music		
c) Procedural			1a Singing			3b Improvising 4a Composing
d) Meta Cognitive			2d Playing by ear	6a Analyzing music	7a Evaluating music performances	

Table 3.5 summarizes Hanna's alignment of the revised cognitive taxonomy with music education instructional activities. This table provided a framework of definitions for coding rehearsal statements into the cognitive domain. A common teacher task presentation method was modeling. Modeling is conceptualized as an active exchange between teacher and class that requires students to pay careful attention to the teacher, to analyze the teacher model in order to compare it with their own technique, and to apply it

for necessary changes in their performance. Hanna's work helped to code this as t4c (analyze a skill or procedure). Other examples of applying her work to cognitive coding include singing (t3c - apply a skill), recalling a musical fact (t1a - recall a fact), and understanding a musical concept (t2b – understand a concept).

Table 3.5: *Application of the Revised Bloom's Taxonomy to Music Education (based on Hanna, 2007, p. 10)*

Type of knowledge	1) Remember Recognize, recall	2) Understand Interpret, exemplify. classify, summarize, infer, compare, explain	3) Apply Execute, implement
a) Factual • Terminology • Basic elements	Recognize and recall music vocabulary, symbols, note values, instrument parts, etc.	Understand music terminology and basic elements such as time periods, styles, peda-gogical concepts, etc.	Apply basic musical knowledge
b) Conceptual • Interrelationships among the basic elements within the larger structure. • Classification and category • Principals and generalization • Theories, model, and structure	Recognize and recall concepts of music theory, time periods, musical styles, specific composers, etc.	Understand, explain, and discuss music concepts and music's relationships to other areas both within and outside of music	Apply music concepts to the performing, composing, improvising, or listening to music
c) Procedural • Skills • Techniques and methods • Performance criteria	Recognize and recall basic procedures for musical notation, instru-mental and vocal per-formance skills, and other musical methods and techniques	Understand, explain, and discuss performing, composing, improvising, or listening to music using correct procedures	Apply certain skills, methods, techniques, and performance criteria to music
d) Metacognitive • Knowledge of self and personal cognition of music • Strategic knowledge • Knowledge of cognitive demands • Self-knowledge	Recognize and recall self-knowledge and personal cognition in music; strategies for remembering musical symbols, procedures, facts, techniques, etc.	Understand, explain, and discuss self-knowledge and personal cognition in music; personal strategies for listening to music, "audiation"	Apply metacognition ability to musical tasks

Table 3.5: *Application of the Revised Bloom's to Music Education (extended)*

Type of knowledge	4) Analyze Differentiate, organize, attribute	5) Evaluate Check, critique	6) Create Generate, plan, produce
a) Factual • Terminology • Basic elements	Analyze basic musical elements	Evaluate music by checking for correct notes, rhythms, and other basic music elements	Improvise, compose, and perform music by using basic elements
b) Conceptual • Interrelationships among the basic elements within the larger structure. • Classification and category • Principals and generalization • Theories, model, and structure	Analyze music concepts in a variety of ways such as music theory analysis, ethnomusicology, philosophy, music education, transcription, etc.	Evaluate music through conceptual critique	Improvise, compose, and perform music by using principles, theories, and multiple musical concepts
c) Procedural • Skills • Techniques and methods • Performance criteria	Analyze how to apply specific types of skills, methods, and techniques to music	Evaluate music through checking and critiquing whether certain techniques, methods, and skills were used correctly	Improvise, compose, and perform music by using a variety of skills, techniques, and methods
d) Metacognitive • Knowledge of self and personal cognition of music • Strategic knowledge • Knowledge of cognitive demands • Self-knowledge	Analyze how metacognition assists in understanding a given piece of music or analyzing a musical problem	Critique and self-evaluation of performances, how music is personally perceived	Improvise, compose, and perform music by using self- knowledge and personal cognition

Table 3.6 shows sample text and assigned cognitive codes based on the application of the Revised Bloom's Taxonomy as described in Table 3.5.

Table 3.6: *Cognitive Coding with Sample Text*

Code	Text
1a	What was the other thing we said? Measure what?
1b	It is homophonic.
1c	When the note goes down, sing?
1d	Are you memorized?
2a	The text is about the sea.
2b	Contrasting style
2c	Understand what I did? Nod your head if you understand.
2d	Do you see what I'm saying there?
3a	1 and then your entrance.
3b	Ready...it goes to forte.
3c	Pencil friend. Just mark it sharp, it's a very easy fix.
3d	That's the idea, now think about that, what did you just do?
4a	Examine your next note, analyze it
4b	Major, F major triad. Alright, F major.
4c	Listen very carefully to this sound [teacher models]
4d	You know the difference, right?
5a	Which one do you like better?
5b	You like that better? I sure do!
5c	What did they do that was right?

Audio Annotation and Coding

Verbatim rehearsal transcripts were analyzed using audio annotation software that I created using the Java™ computer language from Sun Microsystems (Java, 2006). All events were coded by sequence. Director cognitive statements 1m, 1q, 3vas, and 3vds

were classified into the cognitive domain taxonomy. These details were recorded into a data table in a spreadsheet and became the basis for subsequent quantitative analyses.

Each audio recording was broken into rehearsal events. Figure 3.1 shows a sample audio recording under analysis using the Audio Annotation software that I developed. The software program enabled me to mark the various rehearsal events in the recording, transcribe teacher language, add comments, code the events for sequence and cognitive level, and to perform reliability checks.

The Audio Annotation program is divided into lower and upper parts (see Figure 3.1). The lower part is the audio view and the upper part is the data view. The lower part of the image shows a graphical representation of the audio. The graphical view of the audio is labeled with seconds and event marks. Within the graphical audio view the time in seconds is indicated by the numbered vertical lines (251, 252, etc.). The rehearsal events are indicated by the small boxes (labeled 66 and 67 in this example).

The upper, data view consists of a table with a row of data representing each event marked in the audio view. The data includes an event index, time, and duration. The duration is calculated by the difference between the two consecutive events. The comment column is for comments that can help clarify an event. The column labeled text contains the transcribed teacher talk. The "Words" column contains the word count for the text data. The table columns labeled A, B, and C were used for coding the event. Each event was coded with a sequence code in column B and a cognitive code in column C. Column A was used for reliability checking.

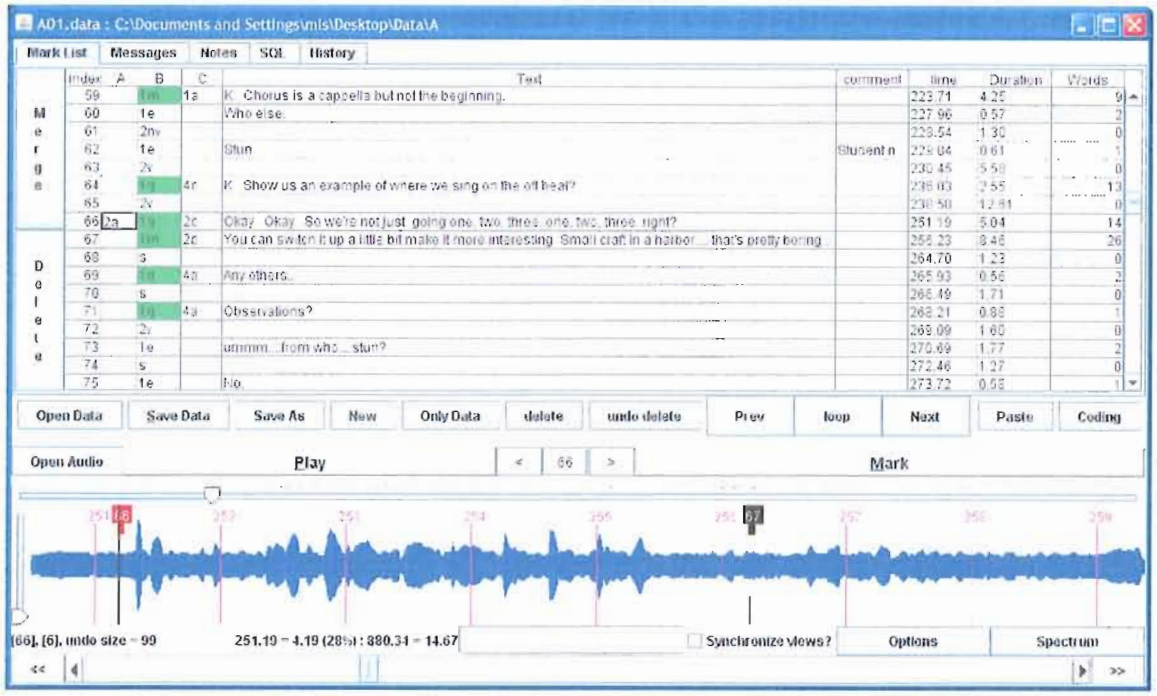


Figure 3.1: Sample Recording in the Audio Annotation Software.

Data for the Audio Annotation program were saved in a tab-delimited ascii file. This ascii file was opened, or copied and pasted into the Microsoft Excel spreadsheet program (see Table 3.7). The spreadsheet contained all the data for all the directors. The Ti column is a total index (1, 2, …) for all data rows. The Ndex column is the index (1, 2, …) for all the data from a particular teacher. The N column is the index (0, 1,…) for each rehearsal recording. The T code (ta, tb, tc, td, te, or tf) identifies each of the six directors. The Song column tracked song A and song B. The Reh column recorded the rehearsal number (reh1, reh2, reh3, reh4, reh5, or reh6) for each song. The Stage column tracked the three rehearsal stages. Each statement's time index in seconds was measured from the start of each rehearsal recording in the Time column. The event duration is in the

Duration column and is the difference between two consecutive time indexes. The cognitive coding is in the B column and the sequence coding is in the C column. The verbatim transcribed text of the statement is in the text column and any comments are in the comment column (these two columns are not visible in this Table 3.5 due to space considerations). The word count for the event's transcribed text is in the Words column.

Table 3.7: *Sample Spreadsheet Data*

Ti	Ndex	N	T	Song	Reh	Stage	Rec	Time	Duration	B	C	Words
1	1	0	ta	songa	reh1	stage1	rec01	0.00	3.27	z	1d	7
2	2	1	ta	songa	reh1	stage1	rec01	3.27	16.57	t2c	1q	64
3	3	2	ta	songa	reh1	stage1	rec01	19.84	1.40	z	2v	0
4	4	3	ta	songa	reh1	stage1	rec01	21.24	2.38	z	3van	11
5	5	4	ta	songa	reh1	stage1	rec01	23.63	9.04	t3c	1q	36
6	6	5	ta	songa	reh1	stage1	rec01	32.66	4.56	z	1d	22
7	7	6	ta	songa	reh1	stage1	rec01	37.22	4.92	z	2nv	0
8	8	7	ta	songa	reh1	stage1	rec01	42.14	1.67	z	1d	7
9	9	8	ta	songa	reh1	stage1	rec01	43.81	21.60	z	2nv	0
10	10	9	ta	songa	reh1	stage1	rec01	65.41	0.73	z	1e	1
11	11	10	ta	songa	reh1	stage1	rec01	66.14	1.46	z	2nv	0

Note: The text and comment columns are not shown

The transcribed teacher text was coded into the cognitive domains. Table 3.8 is a summary of the revised Bloom's taxonomy showing the column numbers and row letters used for coding. The cognitive process dimension headings of remember, understand,

apply, analyze, evaluate, and create are numbered 1 through 6. The knowledge process dimension headings of factual, conceptual, procedural, and metacognitive are labeled a, b, c, and d. The row and column intersections are labeled t1a, t1b…t6c, t6d and have the "t" (taxonomy) prefix added to avoid confusion with the sequence code 1c and 1d.

Table 3.8: *Revised Taxonomy of the Cognitive Domain Showing Codes*

Knowledge Dimension	Cognitive Process Dimension					
	Remember 1	Understand 2	Apply 3	Analyze 4	Evaluate 5	Create 6
(a) Factual	(t1a)	(t2a)	(t3a)	(t4a)	(t5a)	(t6a)
(b) Conceptual	(t1b)	(t2b)	(t3b)	(t4b)	(t5b)	(t6b)
(c) Procedural	(t1c)	(t2c)	(t3c)	(t4c)	(t5c)	(t6c)
(d) Metacognitive	(t1d)	(t2d)	(t3d)	(t4d)	(t5d)	(t6d)

A few examples should help to clarify the process of coding into the cognitive domain. The teacher statement "did we rehearse this song yesterday?" asked students to recall a fact and was coded t1a. The statement "sing it forte" asked students to apply a skill and was coded t3c. Teacher modeling required the student to analyze a skill and was coded t4c. Modeled two different ways and asking "which is better?" asked students to evaluate a skill and was coded t5c. The question "how well do you know this piece?" asked students to think about their understanding and was coded t2d. The question "basses, does anyone else sing the same note you are singing?" asks students to analyzes

a fact and was coded t4a. The statement "do you have this memorized?" asks students to think about their recall and was coded t1d.

Reliability

High reliability was essential to the success of the study. Reliability was achieved at multiple levels by an iterative process using a second coder. Reliability was required for four steps in the process of coding the recordings: 1) Correctly marking events using the audio annotation software, 2) transcribing the recorded teacher language, 3) coding the activity using the sequence codes and, 4) coding teacher activities 1m, 1q, 3vas, and 3vds for cognitive level. All of this activity was done using the audio annotation software I created and a second coder.

The first two steps of event marking and transcribing were continually refined as we worked with the data until no more improvements could be made in event markings or transcriptions. The recorded audio for each event was played from its mark and all teacher language was represented in the transcribed text. As we listened to the audio we would drag the event markers to accurately adjust the starting time of each event.

During the sequence coding step events were added, deleted, and merged as needed. Consecutive events with the same activity code were merged into one longer event. An example of this was when the teacher would make several statements regarding a single topic as part of a single task presentation event.

After the preliminary sequence coding a second person coded the data again making note of where their coding varied from my initial coding. I then coded the data a

third time paying special attention to the places were our codes varied. This same procedure was repeated for the cognitive coding. Every cognitive coding pass provided another detailed examination of event marks, transcriptions, and sequence coding. Events in which there was still disagreement were discussed and coded by consensus. These consensus events represented less than 1% of the data.

Table 3.9 represents a sample of the reliability process. The table represents 7 rehearsal events labeled in column N as 3, 4, 5, 6, 7, 8, and 9. The time and duration of each event are in the Time and Dur columns. The verbatim teacher text is in the Text column. The first coder's coding is in column B and the second coder's coding is in column A. The events had previously been coded and checked for sequence coding in the C column. In this example the events were coded for cognitive level and the coders were in disagreement about the cognitive content for three 1m events. The issue revolves around the question of the kind of knowledge referenced in the teacher's 1m events. Is the knowledge a fact or a concept? Is "unaccompanied" a fact or a concept, is "lyrical" a fact or a concept, and so on. Note that this process is still being done using the audio annotation program which made it easy to listen to the teacher's voice again and again to verify the event marking and text transcriptions. It can be seen that this process enabled a very close examination of the data many times. This reduced the likelihood of errors occurring through to the final stage of analysis.

Table 3.9: *Sample of Reliability Data Table*

N	Time	Dur	A	B	C	Text
3	12.6	1.5	t4a	t4b	1m	raise your hand if you think it is unaccompanied
4	14.2	1.4			2nv	
5	15.6	5.8	t4a	t4b	1m	raise your hand if you think this is a piece with lyrical, melodic lines
6	21.4	0.7			2nv	
7	22.1	3.7	t4a	t4b	1m	raise your hand if you think this piece is more rhythmic in nature
8	25.8	1.3			2nv	
9	27.0	4.3			3van	yeah. you're exactly right, you're exactly right. ok.

Plan for Analysis

The analysis was designed to examine teacher activity and cognitive levels of specific teacher statements. Sums and means of event durations were tabulated for each teacher activity and cognitive level. These values were calculated by teacher, by stage, and overall. The sums were used to calculate the percentage of time spent in each teaching activity and cognitive level. The event frequencies and durations were used to calculate the frequency of each event per minute.

Statistical analysis was done using R (2008). R is an open source program widely used in academic settings. R runs on Windows, Linux, and Apple computers. I ran R on my Windows XP Hewlett Packard laptop. Examples of using R for this study can be found in the Appendix C. Tables and figures were produced to present the data and results.

Data Import and Factor Coding

The data were loaded, organized, and formatted in a spreadsheet (see Table 3.10). The data set contained columns for rehearsal event index (N), time (Time), duration (Duration), cognitive coding (B), sequence coding (C), and word count (Words). Columns were added to code for overall event index (Ti), teacher event index (Ndex), rehearsal recording index (N), teacher (Teacher), song (Song), rehearsal (Rehearsal), stage (Stage), and recording (Recording). The addition of these columns allowed the data to be grouped, or sorted for analyses by the various factors of teacher, rehearsal, song, stage, recording, cognitive code, and activity code.

Table 3.10: *Sample Data Coded for Analysis*

Ti	Ndex	N	Teacher	Song	Rehearsal	Stage	Recording	Time	Duration	B	C	Words
1	1	0	ta	songa	reh1	stage1	rec01	0.00	3.27	z	1d	7
2	2	1	ta	songa	reh1	stage1	rec01	3.27	16.57	2c	1q	64
3	3	2	ta	songa	reh1	stage1	rec01	19.84	1.40	z	2v	0
4	4	3	ta	songa	reh1	stage1	rec01	21.24	2.38	z	3van	11
5	5	4	ta	songa	reh1	stage1	rec01	23.63	9.04	3c	1q	36
6	6	5	ta	songa	reh1	stage1	rec01	32.66	4.56	z	1d	22
7	7	6	ta	songa	reh1	stage1	rec01	37.22	4.92	z	2nv	0
8	8	7	ta	songa	reh1	stage1	rec01	42.14	1.67	z	1d	7
9	9	8	ta	songa	reh1	stage1	rec01	43.81	21.60	z	2nv	0
10	10	9	ta	songa	reh1	stage1	rec01	65.41	0.73	z	1e	1
11	11	10	ta	songa	reh1	stage1	rec01	66.14	1.46	z	2nv	0

Analyses

The potential analyses factors included teacher, song, rehearsal, stage, recording, cognitive level, and activity sequence code. The cognitive level and sequence factors could also be grouped by number and, for the cognitive code, by row letter. The factors of teacher, stage, sequence, and cognitive level were chosen for analysis as being most pertinent to this study. Data for each factor included duration in seconds and word count. Durations data sets containing sums and means were collected for each factor (see Appendix C for examples of using R for this analysis). Descriptive statistics of minimum, maximum, mean, median, outliers, quartiles, variance, and standard deviation were calculated for each grouped duration data set.

The sums and means were used to calculate the number of events (count = sum/mean), percent of time used (percent of time = factor duration sum/total duration sum x 100), and frequency (frequency = factor count / total duration). Percent durations and frequencies were calculated at the levels of stage, teacher, and overall.

CHAPTER IV

RESULTS

Restatement of Purpose

This study analyzed the rehearsal language of six expert high school choral directors for activity and cognitive content. Each director's verbiage was audio recorded. The director language was transcribed verbatim, divided into rehearsal events, coded, and analyzed. Activities containing cognitive content were further classified according to cognitive level. Activity and cognitive data were analyzed for event count, duration, percentage of rehearsal time, and frequency of occurrence.

Participants

Nine directors were recruited to allow for attrition. Six directors successfully completed the requirements for the study. Attrition was, in most cases, due to directors forgetting to record, not recording two rehearsals per stage, not recording two songs per stage, or recording too little time. One director accidentally deleted the first half of his/-her recordings.

Recorded Audio

The six directors (N=6) who completed all phases of data collection recorded audio that consisted of rehearsal segments representing two rehearsals of two songs at three stages of rehearsal resulting in 6 recordings of each of the 12 songs for a total of 72 recordings. The average length for each recording was 14m 24s (sd=6.5m). The average total amount of audio recorded for each teacher was 172m 54s (sd=33.0m). The mean amount of audio for each teacher and stage (see Table 4.1) was 57m 38s (sd=19.6m). Rehearsal time declined with each stage: Stage 1 was 36.2%, Stage 2 was 35.8% of the total audio recording time, and Stage 3 was the shortest of the three stages at 28.0% of total time.

Table 4.1: *Amount of Audio Recorded by Teacher and Stage*

Director	Stage 1	Stage 2	Stage 3
A	73:32	49:29	80:24
B	59:23	47:28	38:09
C	41:58	48:21	31:36
D	61:43	105:00	73:18
E	74:26	60:17	22:54
F	64:22	59:32	44:28
Total	375:24	371:07	290:29

Note: Time in minutes and seconds

Activity Sequence Data

The rehearsal was divided into events. The events were coded by activity using a modified version of the sequential patterns coding method developed by Yarbrough and Price (1989). The codes are summarized in Table 3.1.

The text of the total recorded audio of 1037.5 minutes was coded into 9899 events (see Table 4.2). The average length of each event was 6.3 seconds at a rate of about 9.5 events a minute. The events that accounted for the most rehearsal time were 44.0% for student performance (2p) and 26.4% for teacher musical task presentation (1m). All teacher task presentation events, coded 1 (1c, 1d, 1e, 1m, 1o, 1q, and 1s), accounted for 47.1% of rehearsal. Teacher feedback (3van, 3vas, 3vdn, and 3vds) took 3.1% of rehearsal. Student activities (2nv, 2p, and 2v) were 49.3% of rehearsal.

Overall there were 6.2 events per minute for teacher talk (1c, 1d, 1e, 1m, 1o, 1q, and 1s), 2.7 events per minute for student activities (2nv, 2p, and 2v), and 0.5 events per minute for teacher feedback (3van, 3vas, 3vdn, and 3vds). These corresponded with overall mean event durations of 4.5 seconds for teacher talk, 11.0 seconds for student response, and 3.7 seconds for teacher feedback.

Table 4.3 shows the Table 4.2 activity in order of decreasing percent time, count, and frequency. Student performance (2p) and teacher musical task presentation (1m) consumed the larger percentages of total rehearsal. All other events represented much smaller proportions. Nonspecific teacher disapproval consumed the least at 0.5%. Nonspecific feedbacks (3vdn and 3van) represent only about 0.6% of the time combined and were less common than specific teacher feedbacks (3vds & 3vas).

Table 4.2: *Summary Data for each Activity with Subtotals*

Activity	Minutes	%	Freq	Freq/ Min	MD
1c	42.6	4.11	1240	1.20	2.1
1d	88.9	8.57	1741	1.68	3.1
1e	14.1	1.36	631	0.61	1.3
1m	273.6	26.37	1925	1.86	8.5
1o	30.9	2.97	186	0.18	10.0
1q	25.0	2.41	514	0.50	2.9
1s	13.7	1.32	235	0.23	3.5
Subtotal	488.8	47.11	6472	6.24	4.5
2nv	20.4	1.97	305	0.29	4.0
2p	456.9	44.04	1721	1.66	15.9
2v	33.8	3.25	762	0.73	2.7
Subtotal	511.1	49.26	2788	2.69	11.0
3van	5.4	0.52	137	0.13	2.4
3vas	14.3	1.38	194	0.19	4.4
3vdn	0.5	0.05	20	0.02	1.6
3vds	11.6	1.11	170	0.16	4.1
Subtotal	31.8	3.06	521	0.50	3.7
s	5.9	0.56	118	0.11	3.0
Total	1037.5	100.00	9899	9.54	6.3

Note: MD=Mean duration in seconds.

Event counts and frequency values paralleled each other. Teacher task presentation was most frequent at 1.9 events per minute. Giving directions (1d) was the second most frequent with 1.7 events per minute. Student performance (2p) was a close third. The rate of 1.9 events per minute for task presentation (1m) would be equivalent to 28 events every 15 minutes or 112 per hour. The lowest frequency was for nonspecific disapproval (3vdn) at 0.02 events per minute or about one event per hour. The feedback ratios were 1.7 approvals (3van + 3vas) per disapproval (3vdn + 3vds) and 2.3 specific

feedbacks (3vas + 3vds) per nonspecific (3van + 3vdn). The visual representation of these data in Figure 4.1 might help to illuminate relative event frequencies.

Table 4.3: *Activities in Increasing Order of Percent Time, Count, and Frequency*

Percentage		Frequency				
Activity	Percent	Activity	Freq	Activity	Freq/Min	Freq/ 15 Min
2p	44.04	1m	1925	1m	1.9	27.8
1m	26.37	1d	1741	1d	1.7	25.2
1d	8.57	2p	1721	2p	1.7	24.9
1c	4.11	1c	1240	1c	1.2	17.9
2v	3.25	2v	762	2v	0.7	11.0
1o	2.97	1e	631	1e	0.6	9.1
1q	2.41	1q	514	1q	0.5	7.4
2nv	1.97	2nv	305	2nv	0.3	4.4
3vas	1.38	1s	235	1s	0.2	3.4
1e	1.36	3vas	194	3vas	0.2	2.8
1s	1.32	1o	186	1o	0.2	2.7
3vds	1.11	3vds	170	3vds	0.2	2.5
s	0.56	3van	137	3van	0.1	2.0
3van	0.52	s	118	s	0.1	1.7
3vdn	0.05	3vdn	20	3vdn	0.0	0.3

Note: Activity=Sequence code and Percent=Sum of activity durations / total time.

Duration within activities varied greatly. Teacher task presentation (1m), teacher off-task (1o), and student performance (2p) events had the largest standard deviations (see the SD column of Table 4.4). All categories had minimum durations of less than 1 second. Teacher task presentation (1m), teacher off-task (1o), and student performance (2p) had maximums of more than two minutes. Events with the smallest ranges of duration included counting (1c), exchanges (1e), and nonspecific disapproval (3vdn).

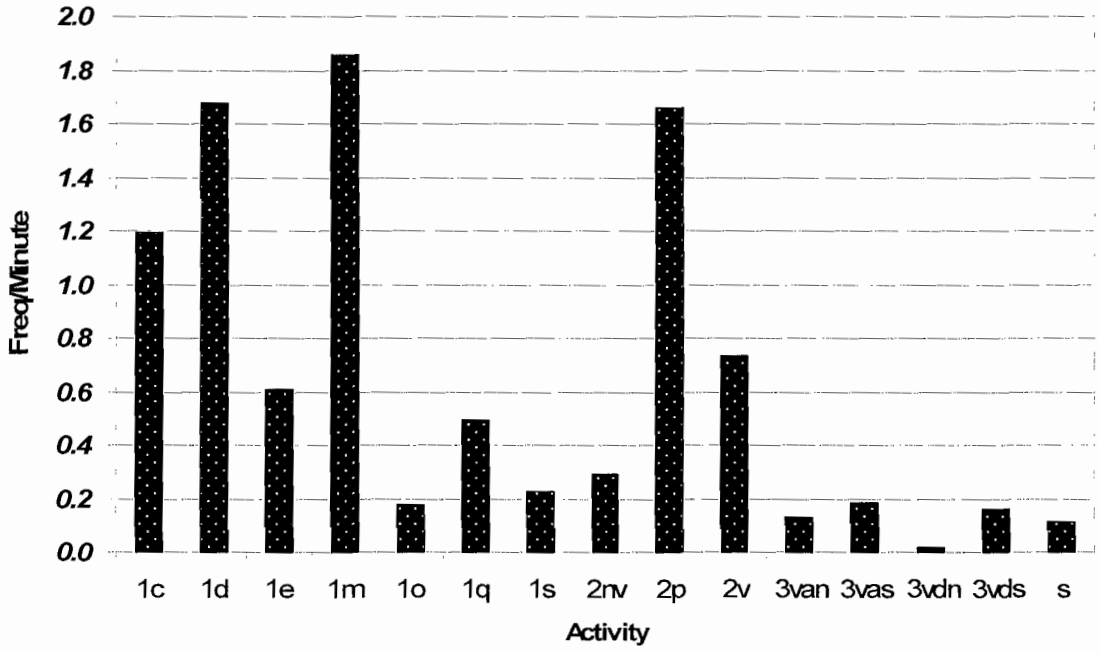


Figure 4.1: Frequency of Rehearsal Activity per Minute

Mean duration for activities ranged from 1.3 seconds for teacher exchanges (1e) to almost 16 seconds for student performance (2p). The largest mean duration for teacher events was for off-task (1o, only 3% of total time) at almost 10 seconds. Teacher feedback mean durations ranged from 1.6 seconds for nonspecific disapproval (3vdn) to 4.4 seconds for specific approval (3vas). Giving directions (1d) averaged 3.1 seconds and counting (1c) 2.1 seconds.

Table 4.4: *Descriptive Statistics for the Activity Durations*

Act	Count	Med	Min	Max	M	SD
1c	1240	1.9	0.2	14.6	2.1	1.1
1d	1741	1.9	0.2	56.5	3.1	3.8
1e	631	0.8	0.2	33.1	1.3	2.2
1m	1925	4.1	0.3	207.3	8.5	13.3
1o	186	4.6	0.5	126.2	9.9	17.9
1q	514	2.1	0.4	20.8	2.9	2.6
1s	235	2.0	0.4	20.5	3.5	3.8
2nv	305	2.2	0.4	39.6	4.0	5.1
2p	1721	6.9	0.5	324.3	15.9	26.0
2v	762	1.6	0.3	57.7	2.7	3.5
3van	137	1.8	0.3	16.5	2.4	2.2
3vas	194	3.2	0.7	27.5	4.4	3.8
3vdn	20	1.4	0.4	5.1	1.6	1.1
3vds	170	3.2	0.7	26.8	4.1	3.3
s	118	2.3	0.5	14.2	3.0	2.0

Note: Act=rehearsal activity code, Med=median, M=mean

Event frequencies were close for each teacher (see Figure 4.2). Standard deviations were 31% or less of mean for 1c (14.5%), 1o (18.1%), 1d (19.2%), 1m (22.3%), 2p (25.5%), 1q (29.4%), and 2v (30.9%). Standard deviations were more than 70% of mean for s (69.7%), 3vds (70.5%), 3van (80.7%), and 3vdn (85.7%). The overall mean frequencies per minute for each teacher were A=10.14, B=9.69, C=9.81, D=9.38, E=9.32, and F=8.93 events per minute (SD=0.42 events per minute). These corresponded

with mean event durations of A=5.9s, B=6.2s, C=6.1s, D=6.4s, E=6.4s, and F=6.7s (SD=0.3s). Overall event frequency was 9.5 events per minute or 6.3 seconds per event.

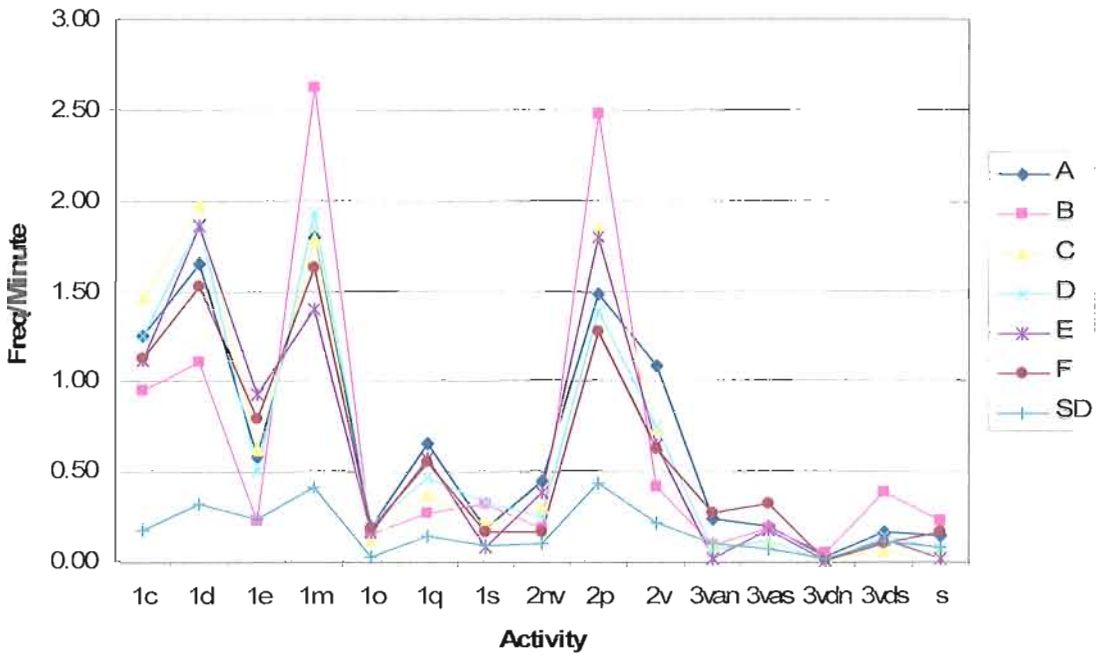


Figure 4.2: Activity Frequencies by Teacher with Standard Deviation

The six directors spent similar overall percentages of time in each rehearsal activity with standard deviations across conductors less than 4.1% (see Table 4.5). The largest variation was for 2p, student performance (sd=4.0%, M=44.5%). The second largest was in 1m, task presentation (sd=3.5%, M=26.4%). Teacher feedback standard deviations were the smallest due to short mean durations.

Table 4.5: *Percent Time Spent in each Activity by Teacher*

Act	A	B	C	D	E	F	M	SD
1c	4.26	2.96	4.89	5.03	3.43	3.67	4.04	0.83
1d	7.11	6.70	10.26	10.13	10.00	7.15	8.56	1.73
1e	1.08	0.70	0.91	1.81	1.84	1.48	1.30	0.48
1m	24.85	28.10	22.65	24.51	25.75	32.67	26.42	3.54
1o	2.74	4.94	0.88	3.35	2.69	2.81	2.90	1.31
1q	3.27	0.90	1.77	2.32	3.11	2.61	2.33	0.88
1s	1.07	1.80	1.28	1.67	0.96	1.06	1.31	0.35
2nv	3.33	1.27	1.21	1.40	3.56	0.82	1.93	1.19
2p	43.47	45.72	52.06	42.97	42.38	40.55	44.52	4.05
2v	4.65	1.66	2.55	4.19	3.30	2.07	3.07	1.19
3van	0.86	0.29	0.34	0.32	0.14	1.10	0.51	0.38
3vas	1.34	1.27	0.59	1.00	1.64	2.36	1.37	0.60
3vdn	0.07	0.10	0.05	0.01	0.04	0.05	0.05	0.03
3vds	1.05	2.36	0.33	0.87	1.07	1.09	1.13	0.67
s	0.86	1.21	0.23	0.43	0.10	0.53	0.56	0.41

Note: Act = Rehearsal Activity, A-F = Teacher A-F, M = Mean, Var = Variance, and SD = Standard Deviation.

Percentage of time for each activity, except student performance (2p), tended to decrease from stage 1 to stage 3 (see Figure 4.3). This included teacher task presentation (1m) which had a slight decrease from 27.3% to 26.4% to 25.5% in stages 1, 2, and 3 respectively. A corresponding increase was observed in student performance (2p) going from 40.9% to 43.3% to 49.0%. Teacher off-task (1o) was the next largest increase from 1.9% to 3.6%. The activity with the largest decrease was teacher questioning (1q) going from 3.5% to 0.9%. In general, the teacher talked less and the students performed more.

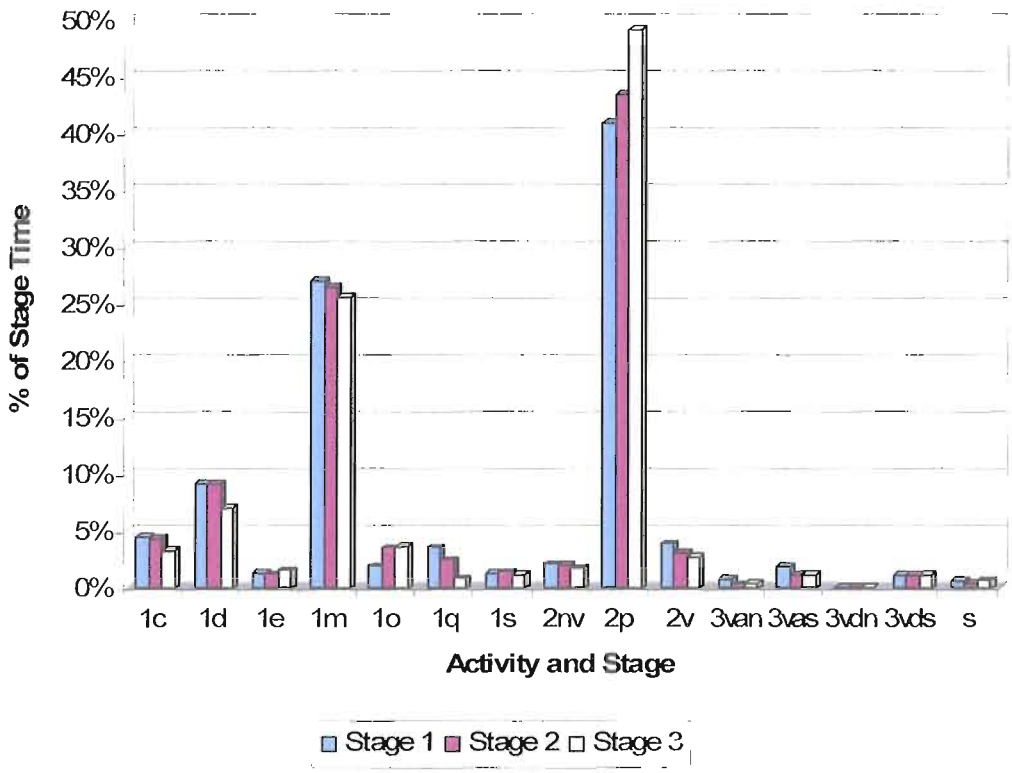


Figure 4.3: Stage Time for each Activity

Two out of three of the activities' mean durations increased from stage 1 to stage 3 (Table 4.6). The largest increases were for teacher off-task and student performance. There was a corresponding decrease in frequency (Figure 4.3). Teacher questioning and student performance event frequency decreased by about one event every two minutes. The largest decreases were in teacher questioning, teacher social, and teacher verbal non-specific feedback. Teacher task presentation and giving directions decreased by about one event every 2.5 minutes. Student verbal response, teacher counting, and teacher student exchange decreased by almost one event per every three minutes.

Table 4.6: *Activity Mean Durations by Stage*

Act	Stage 1	Stage 2	Stage 3	Delta
1c	2.11	2.06	1.98	-
1d	2.96	3.29	2.91	+
1e	1.06	1.25	2.03	+
1m	8.06	8.40	9.48	+
1o	6.66	11.70	11.75	+
1q	2.96	3.18	2.15	-
1s	3.78	3.84	2.77	-
2nv	3.30	4.45	5.01	+
2p	13.09	15.74	21.14	+
2v	2.66	2.58	2.77	+
3van	2.27	2.13	2.97	+
3vas	4.09	4.53	5.10	+
3vdn	1.36	2.62	0.89	-
3vds	4.11	3.63	4.80	+
s	2.46	3.31	3.52	+

Note: Values in seconds

Event frequencies tended to decrease from stage 1 to stage 3 (see Figure 4.4). This was a consequence of the general increase in event durations in stages 2 and 3. In summary, stage teacher activities by were 49%, 49%, and 43% for stages 1, 2, and 3, respectively. Student responses by stage were 47%, 48%, and 54%. Teacher feedback by stage was 4%, 3%, and 3%.

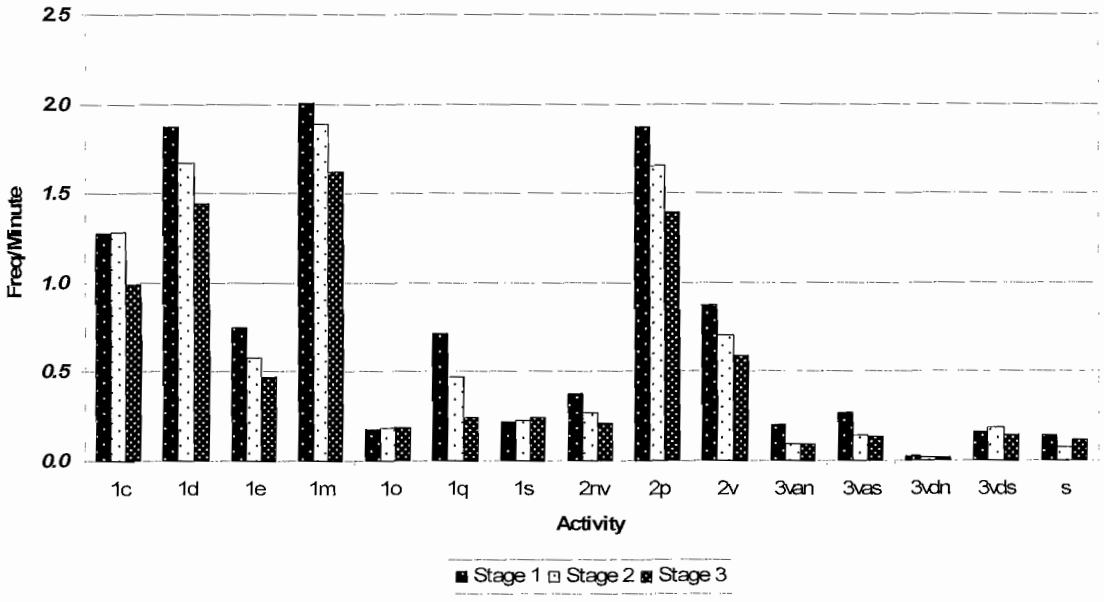


Figure 4.4: Activity Frequency per Minute by Stage

Sequences

The study did not tally sequences but it was possible to look at the proportion of task presentation, student response, and teacher feedback. There were 1925 task presentations and 1721 student performance events. This is almost a one to one ratio (1.1/1). In contrast there were only 521 teacher feedback events. This was 3.3 student performance events for every feedback and about 3.6 task presentations per feedback. At best, less than one in four sequences could have been complete.

Teachers tended to give specific and positive feedback. Specific feedback was 364 of the 521 (70%) teacher feedback events. There were 331 positive feedback events compared with only 190 disapprovals yielding a ration of 2/1 for approval/disapproval. The directors were 64% (331/521*100) positive. It probably goes without saying that

specific feedback took more time because the feedback included more detail. Out of all the recordings there were only 30 seconds of nonspecific disapproval compared with almost 12 minutes of specific disapproval. Specific feedback (3vas & 3vds) represented 81% of all feedback time (25.9/31.8 minutes, freq/min=0.4). Positive feedback (3van & 3vas) was 62% (19.7/31.8 minutes, freq/min=0.3) of the total feedback time.

The percent of stage time devoted to task presentation and feedback was almost constant (see Table 4.6). It has already been noted that student performance time increased for each stage. The ratio of task presentation events to student performance events for each stage was similar to the overall ratio.

There were fewer feedback events as the stages progressed. There was only one feedback for 2.8 (35%) student performance events in stage 1 and this decreased to one out of 3.6 (28%) performance events in stage 3 (see Table 4.7). Stage 2 showed the smallest percentage (26%) of feedback per student performance.

Table 4.7: *Frequencies and Percentage of Stage Time for Task Presentation, Performance, and Feedback*

Activity	Stage 1		Stage 2		Stage 3	
1m	754	27.0%	701	26.4%	470	25.5%
2p	703	40.9%	613	43.3%	405	49.0%
3xxx	248	3.8%	161	2.6%	112	2.8%
Ratios of Counts	1m/1p=1.1 2p/3xxx=2.8		1m/1p=1.1 2p/3xxx=3.8		1m/1p=1.2 2p/3xxx=3.6	

Note: 3xxx includes 3van, 3vas, 3vdn, and 3vds.

It was of interest to see if the type of feedback showed any variation with stage. Table 4.8 and Figure 4.5 show that a larger percentage of time was spent in feedback during stage 1. Approvals, specific and nonspecific, made up a larger percent of stage 1 time. Specific and nonspecific approvals decreased in stage 2 and stayed about the same for stage 3. Specific approvals and disapprovals were an almost equal percent of time for stages 2 and 3.

Table 4.8: *Event Counts and Percentage of Stage Time for Teacher Feedback*

Act	Stage 1		Stage 2		Stage 3	
3van	79	0.77%	64	0.32%	27	0.46%
3vas	101	1.84%	54	1.10%	39	1.14%
3vdn	10	0.06%	5	0.06%	5	0.03%
3vds	61	1.11%	68	1.11%	41	1.13%
Total	248	3.8%	161	2.6%	112	2.8%

Cognitive Data

The revised Bloom's taxonomy of the cognitive domain was used to code (see Table 4.9) the cognitive teacher events. This code started with t1a (recall a fact). The teacher events that were coded for cognitive level were task presentation (1m), teacher questioning (1q), and teacher specific feedback (3vas and 3vds). All other events (1c, 1d,

1e, 1o, 1s, 2nv, 2p, 2v, 3van, 3vdn, and s) were coded with the code z representing an event that was not given a cognitive code.

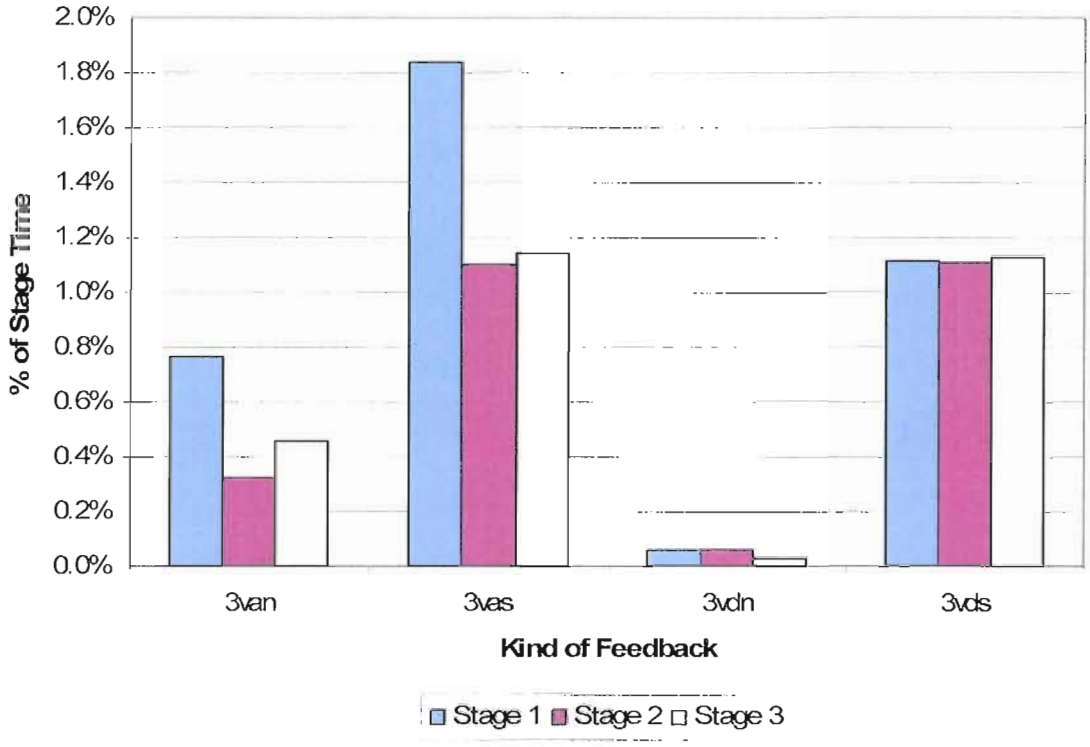


Figure 4.5: Stage Time for each Kind of Teacher Feedback

The overall percentage of rehearsal time used by the cognitive events was 31% and occurred at a rate of 2.7 events per minute or about one event every 22 seconds. The 31% cognitive component was almost evenly divided between lower level thinking (16.2%) and higher level thinking (15.1%).

Table 4.9: *Revised Taxonomy of the Cognitive Domain Showing Coding*

Knowledge Dimension	Cognitive Process Dimension					
	Remember 1	Understand 2	Apply 3	Analyze 4	Evaluate 5	Create 6
(a) Factual	(t1a)	(t2a)	(t3a)	(t4a)	(t5a)	(t6a)
(b) Conceptual	(t1b)	(t2b)	(t3b)	(t4b)	(t5b)	(t6b)
(c) Procedural	(t1c)	(t2c)	(t3c)	(t4c)	(t5c)	(t6c)
(d) Metacognitive	(t1d)	(t2d)	(t3d)	(t4d)	(t5d)	(t6d)

It can be seen in Figure 4.6 that four cognitive levels stand out. Cognitive level t4c, analyzing a procedure or modeling, contributed the highest percentage of time (12.2%) and frequency of presentation (0.9/minute). Applying a skill (t3c, singing) was second at 7.7% and 0.8 events per minute. Understanding a concept (t2b) and understanding a fact (t2a) were in third and fourth. The top four cognitive levels (t4c, t3c, t2b, and t2a) made up 26% out of the 31% cognitive activity faction. All other cognitive levels accounted for 5%. It was noted that no metacognitive analysis (t5d) and no create (t6a-t6d) cognitive content were found.

Cognitive content changed during the rehearsal stages (see Figure 4.7). There were decreases in remember a fact (t1a), understand a fact (t2a), and analyze a fact (t4a). Analyze a skill (t4c) was greatest during stage 2. Apply a skill (t3c) was about the same for all three stages. The general decrease in cognitive language by stage (33.5%, 31.1%,

and 28.7) was due to teachers asking students to recall and understand factual information (t1a & t2b) and analyze a fact (t4a) more during the early rehearsal stages.

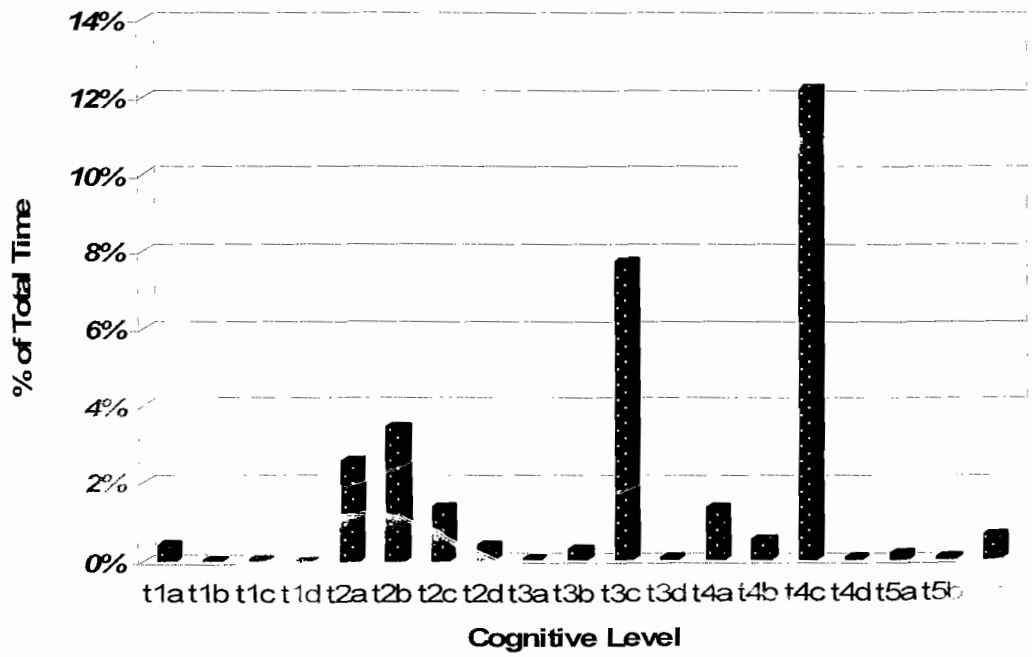


Figure 4.6: Time Spent at each Cognitive Level (z is not included)

Table 4.10 presents the percentage of time each teacher spent at each cognitive level. It can be seen that these data are consistent with the overall trends, with some exceptions. Teacher C spent the largest percentage of time, compared to others, asking students to apply a procedure or skill (t3c, singing) and less time asking students to analyze a skill (t4c, modeling). Conversely, Teacher F spent more time asking students to

analyze a skill or procedure (t4c, modeling) and less time asking them to apply a skill (t3c, singing).

Table 4.10: *Time at each Cognitive Level by Teacher*

Code	A	B	C	D	E	F	M	SD
t1a	0.75	0.01	0.36	0.42	0.52	0.19	0.38	0.26
t1b	0.05	0.00	0.00	0.00	0.00	0.00	0.01	0.02
t1c	0.18	0.11	0.00	0.00	0.10	0.00	0.06	0.08
t1d	0.02	0.00	0.04	0.05	0.00	0.00	0.02	0.02
t2a	3.06	2.25	1.06	2.32	4.20	2.07	2.49	1.05
t2b	3.62	3.36	0.95	3.71	5.02	3.02	3.28	1.33
t2c	0.94	0.74	0.09	1.81	1.63	2.30	1.25	0.81
t2d	0.18	0.38	0.00	0.10	1.50	0.27	0.41	0.55
t3a	0.03	0.00	0.03	0.00	0.00	0.00	0.01	0.02
t3b	0.43	0.70	0.00	0.00	0.00	0.48	0.27	0.31
t3c	6.29	8.72	13.49	8.43	6.42	4.64	8.00	3.08
t3d	0.14	0.00	0.00	0.04	0.04	0.02	0.04	0.05
t4a	1.16	0.41	0.92	0.98	2.73	2.07	1.38	0.85
t4b	0.19	0.00	0.00	0.03	1.26	1.90	0.56	0.82
t4c	12.09	15.39	7.94	9.96	7.47	20.26	12.19	4.91
t4d	0.21	0.17	0.00	0.00	0.00	0.00	0.06	0.10
t5a	0.57	0.23	0.08	0.05	0.00	0.14	0.18	0.21
t5b	0.14	0.01	0.09	0.07	0.00	0.03	0.06	0.05
t5c	0.46	0.14	0.28	0.72	0.69	1.33	0.60	0.42
z	69.49	67.37	74.66	71.30	68.43	61.28	68.75	4.47

Note: All values are percentages.

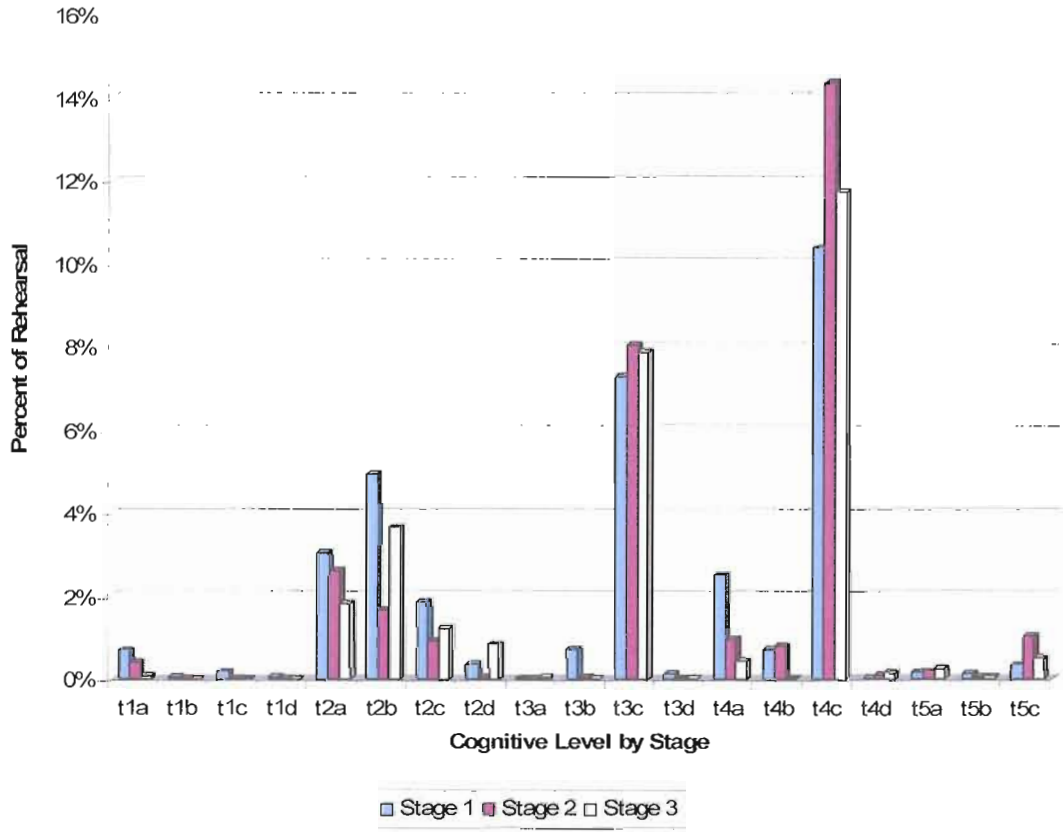


Figure 4.7: Cognitive Percentages by Stage

Percentage of time at each cognitive level by row or by column is summarized in Table 4.11. It revealed that teachers spent most of their cognitive time in procedural and analytical thinking. Teachers spent little time asking students to remember, evaluate, or in metacognitive skills. Strikingly, no rehearsal content was found for column 6 – create.

Table 4.12 shows the percent of time each teacher spent in the lower cognitive levels (1-3), in the higher cognitive levels (4-6), and in noncognitive activity (z). The

time spent at each cognitive division was almost the same for teachers A and B. Teacher C, D, and E spent more time at the lower levels. Teacher F spent much more time at the higher levels. Teacher C spent the least percent of time (25.3%) in cognitive activity and teacher F spent the most (38.7%).

Table 4.11: *Row and Column Sums of Cognitive Percentages*

	1 Remember	2 Understand	3 Apply	4 Analyze	5 Evaluate	Row Sums
a Factual	0.40	2.55	0.01	1.37	0.19	4.52
b Conceptual	0.01	3.41	0.26	0.54	0.06	4.29
c Procedural	0.06	1.34	7.72	12.20	0.63	21.96
d Metacognitive	0.02	0.38	0.05	0.06	0.00	0.52
Column sums	0.49	7.68	8.04	14.18	0.88	31.28

Table 4.12: *Time Spent at Low/High Levels by Teacher*

	Teacher						
Level	A	B	C	D	E	F	Total
1-3	15.7	16.3	16.0	16.9	19.4	13.0	16.2
4-6	14.8	16.4	9.3	11.8	12.2	25.7	15.1
Sum	30.5	32.6	25.3	28.7	31.6	38.7	31.3
z	69.5	67.4	74.7	74.3	68.4	61.3	68.7

Note: All values in percent.

The percentage of time at each cognitive level and stage showed little change (see Table 4.13). Teachers spent about the same amount of time asking students to sing (t3c) at all three rehearsal stages. They spent the most time modeling (analyzing a skill, t4c) and the least time in understanding a concept (t2b) at stage 2. Cognitive activities involving understanding (t2a, t2b, and t2c) and analyzing a fact (t4a) occurred more during stage 1. Applying a concept (t3b) only transpired in stage 1. There was a slight increase for metacognitive understanding (t2d) during stage 3 and for evaluating a skill (t5c) during stage 2.

Table 4.13: *High/Low Cognitive Level as Percentage of Stage*

	Stage 1	Stage 2	Stage 3
Lower t1a-t3d	19.26%	13.69%	15.50%
Higher t4a-t5c	14.19%	17.43%	13.17%
Total	33.45%	31.11%	28.67%
Ratio Higher/Lower	0.7	1.3	0.8

It may be helpful to put a few of these percentages into context. The stage 2 modeling (t4c) activity was 312 events and almost 39 minutes of the six hours and 11 minutes of stage time (14.4% of stage time, freq/min=0.9). The t2d activity of stage 3 represented 12 events and a little less than 2.5 minutes out of nearly five hours of time (0.9% of stage time and freq/min=0.04).

Word Counts

Word counts were divided by total event duration to calculate teacher speaking rates in words per minute. Table 4.14 shows the percentage of rehearsal time used for each event, the percentage of total words spoken in each event, and the average rate of speaking in words per minute. In general, the percentage of words spoken paralleled the percentage of time used by an event. The one exception was during teacher off-task when the quantity of words showed a decrease.

The rate of speaking was fairly steady throughout the three rehearsal stages (see Figure 4.8). Rate decreases were found in giving directions (1d), specific approval (3vas), non-specific disapproval (3vdn), and specific disapproval (3vds). Small rate increases were found in teacher counting (1c) and teacher task presentation (1m). Teacher questioning (1q) had the largest increase in rate. Exchanges (1e), social (1s), nonspecific approval (3van), and specific disapproval (3vds) were at their highest rate during stage 2.

A total of 68,351 words were transcribed (see Table 4.15). Of these, 41,459 (60.7%) received a cognitive code. Analyzing a skill (t4c) had the largest number of words (n = 13,852) representing 20.3%. Applying a skill (t3c), understanding a fact (t2a) and a concept (t2b) had word counts in the middle. Many cognitive levels had very small word counts, with recalling a concept (t3b) having the least number of words (n = 48).

Table 4.14: *Teacher Words for each Activity*

Activity	Minutes	Percent	Word Count	Word %	Words/ Min
1c	42.59	4.11	4228	6.19	99
1d	88.89	8.57	13112	19.18	148
1e	14.08	1.36	1937	2.83	138
1m	273.63	26.37	31983	46.79	117
1o	30.85	2.97	1607	2.35	52
1q	25.02	2.41	4993	7.30	200
1s	13.69	1.32	1422	2.08	104
2nv	20.45	1.97			
2p	456.90	44.04			
2v	33.75	3.25			
3van	5.42	0.52	773	1.13	143
3vas	14.28	1.38	2503	3.66	175
3vdn	0.52	0.05	102	0.15	197
3vds	11.57	1.11	1980	2.90	171
s	5.85	0.56			
Total	1037.50	100.00	63789	100.0	62.2

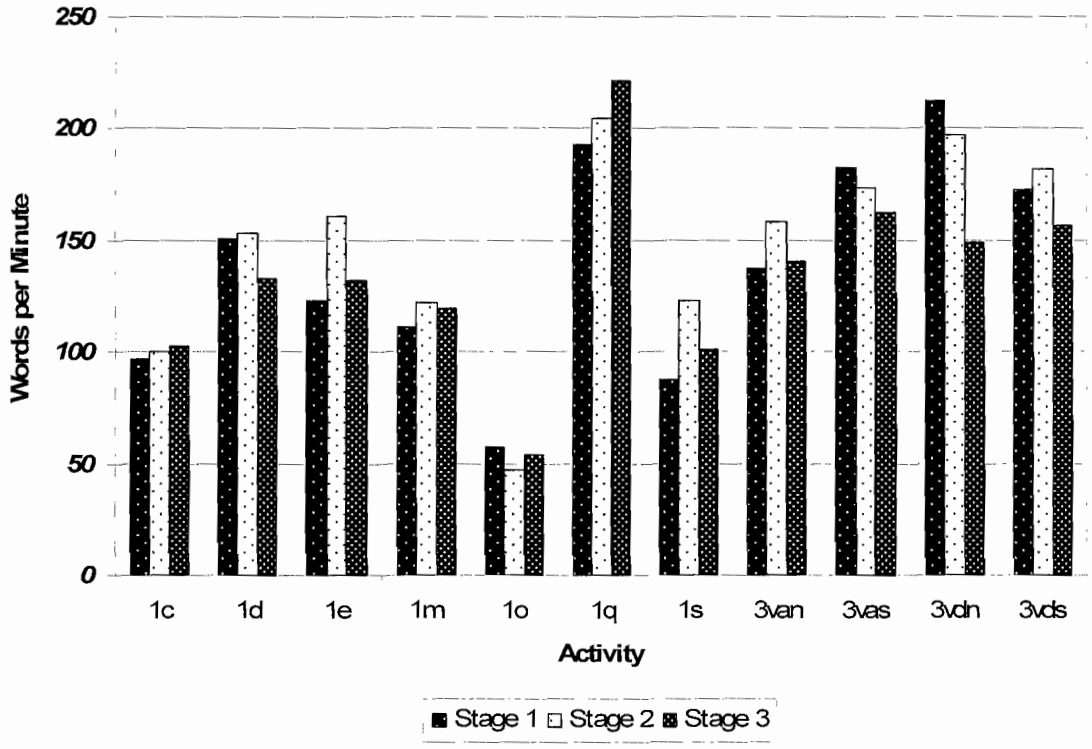


Figure 4.8: Speaking Rates for Rehearsal Activity and Stage

Speaking rates (see Figure 4.9) during each cognitive level ranged from 109 wpm (t4c) to 230 wpm (t1d). The second most common level (14.6% of all words) of t3c had a rate of 125 wpm and the third most common level (6.9%) of t2b had a rate of 134 wpm. The average wpm for the cognitive text was 128 wpm.

Table 4.15: *Words for each Cognitive Level by Count, Frequency, and Percent*

Cognitive	Count	Freq/ Min	Percent
t1a	665	161	0.97
t1b	15	148	0.02
t1c	151	224	0.22
t1d	48	230	0.07
t2a	4378	165	6.41
t2b	4754	134	6.96
t2c	2138	154	3.13
t2d	684	172	1.00
t3a	16	169	0.02
t3b	315	116	0.46
t3c	9987	125	14.61
t3d	85	177	0.12
t4a	2129	150	3.11
t4b	756	134	1.11
t4c	13852	109	20.27
t4d	113	168	0.17
t5a	348	178	0.51
t5b	124	191	0.18
t5c	901	138	1.32
z	26892	38	39.34
Total	68351	66	100.00

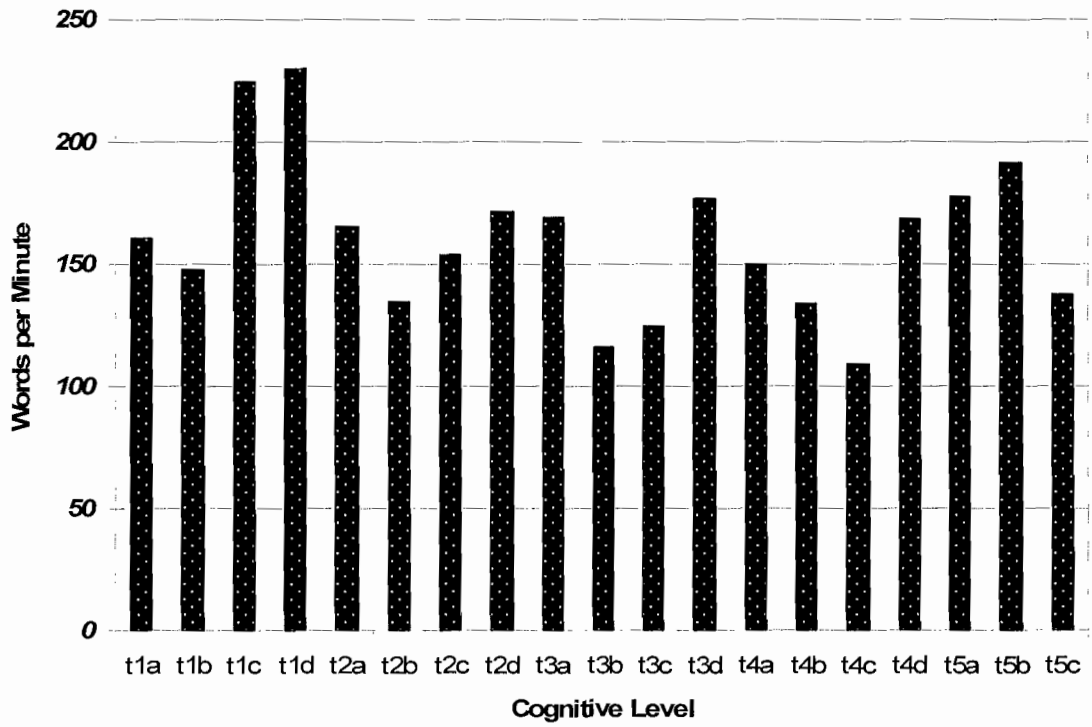


Figure 4.9: Speaking Rates for each Cognitive Level

Cognitive and Activity Combined

Cognitive levels and teacher activities could be deconstructed in terms of each other. Looking at the 1m column in Table 4.16 we can see that teacher task presentation contained mostly cognitive codes of t2a (understand a fact), t3c (apply a skill) and t4c (analyze a skill) with lesser amounts of t2b (understand a concept), t2c (understand a skill), and t1a (recall a fact). The cognitive level t2a (understand a fact) was found in all

four teacher cognitive activity codes of 1m, 1q, 3vas, and 3vds whereas t3c (apply a skill) occurred most frequently only in teacher task presentation (1m).

Table 4.16: *Coding Count Composition Matrix for each Cognitive Level and Teacher Activity*

Level	1m	1q	3vas	3vds	Total
t1a	35	40	8	1	84
t1b	1	2	1	0	4
t1c	2	5	1	1	9
t1d	1	5	0	0	6
t2a	148	96	84	54	382
t2b	84	28	29	17	158
t2c	47	17	24	8	96
t2d	9	21	2	0	32
t3a	2	0	0	0	2
t3b	7	0	0	0	7
t3c	769	41	21	33	864
t3d	1	6	0	0	7
t4a	35	112	2	4	153
t4b	14	32	0	0	46
t4c	751	61	16	49	877
t4d	2	1	0	0	3
t5a	4	19	1	1	25
t5b	0	8	0	1	9
t5c	13	20	5	1	39
z	0	0	0	0	7096
Total	1925	514	194	170	9899

Note: 1c=1240 events, 1d=1741, 1e=631, 1o=186, 1s=235, 2nv=305, 2p=1721, 2v=762, 3van=137, 3vdn=20, and s=118

The cognitive level component of teacher activities 1q, 3vas, and 3vds was examined in terms of percentage of rehearsal time (see Figure 4.10 and Table 4.17). These activities represented a mere 4.9% of total rehearsal time. The lower cognitive levels 1-3 were 2.9% and levels 4-5 were 2.1%.

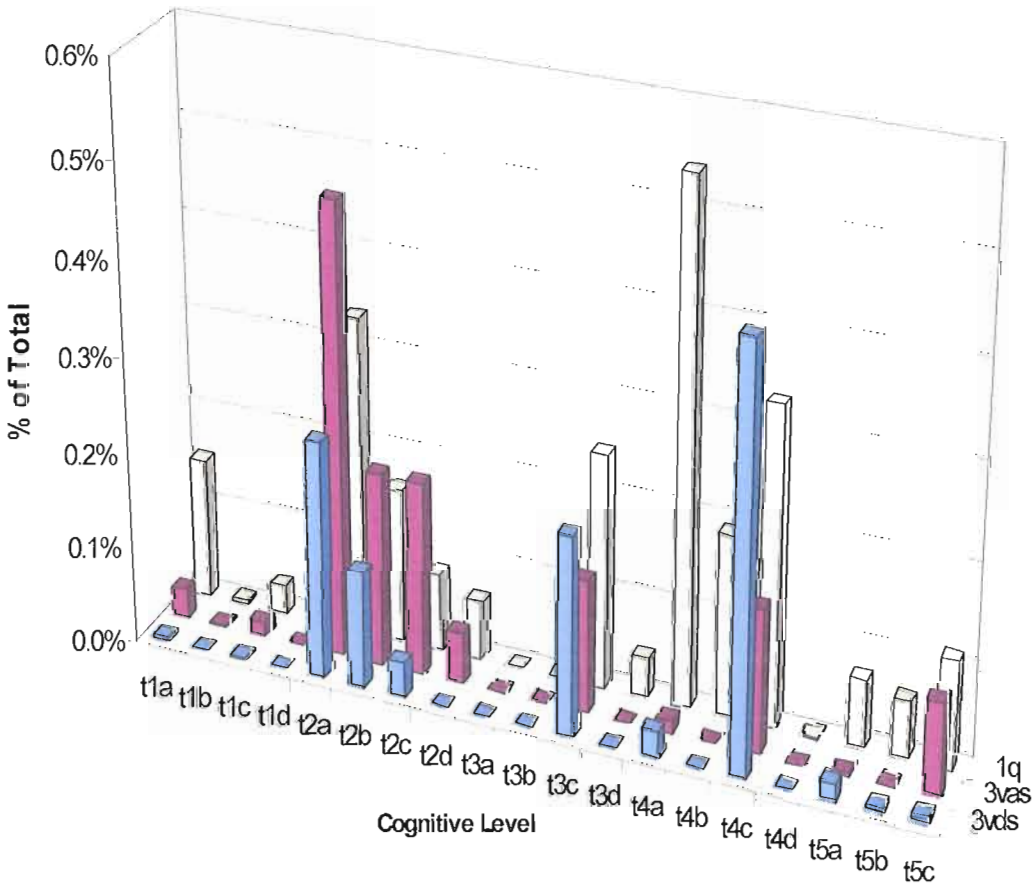


Figure 4.10: 1q, 3vas, and 3vds Rehearsal Time Spent by Cognitive Level

Table 4.17: *Cognitive Level by Cognitive Activity Percentages*

Level	1m	1q	3vas	3vds
t1a	0.216	0.148	0.032	0.004
t1b	0.003	0.004	0.003	0.000
t1c	0.019	0.029	0.015	0.002
t1d	0.007	0.013	0.000	0.000
t2a	1.501	0.333	0.471	0.248
t2b	2.921	0.162	0.201	0.124
t2c	1.018	0.082	0.201	0.037
t2d	0.269	0.062	0.053	0.000
t3a	0.009	0.000	0.000	0.000
t3b	0.261	0.000	0.000	0.000
t3c	7.134	0.244	0.138	0.208
t3d	0.005	0.041	0.000	0.000
Subtotal	13.363	1.117	1.114	0.622
Subsum		16.2%		
t4a	0.793	0.536	0.013	0.028
t4b	0.356	0.188	0.000	0.000
t4c	11.284	0.329	0.150	0.436
t4d	0.063	0.002	0.000	0.000
t5a	0.096	0.070	0.004	0.019
t5b	0.000	0.059	0.000	0.004
t5c	0.418	0.110	0.096	0.006
Subtotal	13.010	1.294	0.262	0.493
Subsum		15.1%		
Total	26.374	2.412	1.377	1.115
Grand sum		31.3%		

The lower cognitive levels (t1a-t3d) for teacher task presentation (1m) were 13.4% and the higher levels (t4a-t5c) were 13.0% for a total of 26.4%. Applying a skill (t3c) and analyzing a skill (t4c) made up the bulk of the 1m activity (see Figure 4.11). The 1m activity occupied more than five times the rehearsal time (26.4%) compared with activities 1q, 3vas, and 3vds combined (4.9%).

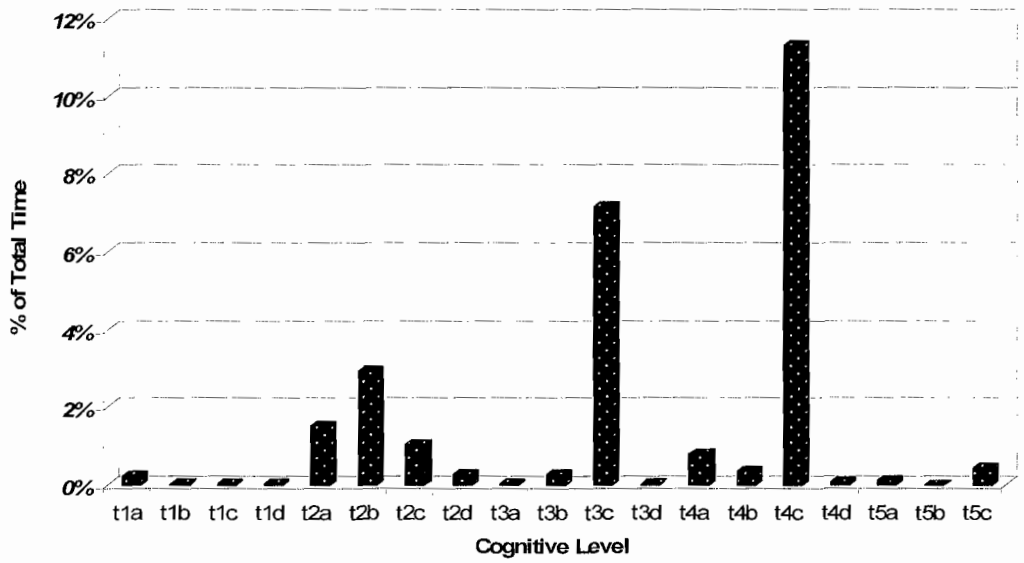


Figure 4.11: 1m Cognitive Component

By Stage

One of the research questions was about type and quantity of cognitive content during the three rehearsal stages. This question was investigated using the deconstruction of the cognitive levels by the teacher activities.

A sample comparison for activity 1m may be seen in Figure 4.12. It portrayed a general trend of fewer 1m events from stages 1 to 3. Notice that there are very few t1a (recall a fact) or t4a (analyze a fact) events after stage 1. Singing (t3c) and modeling (t4c) are abundant at each stage but decrease as overall 1m stage time decreased.

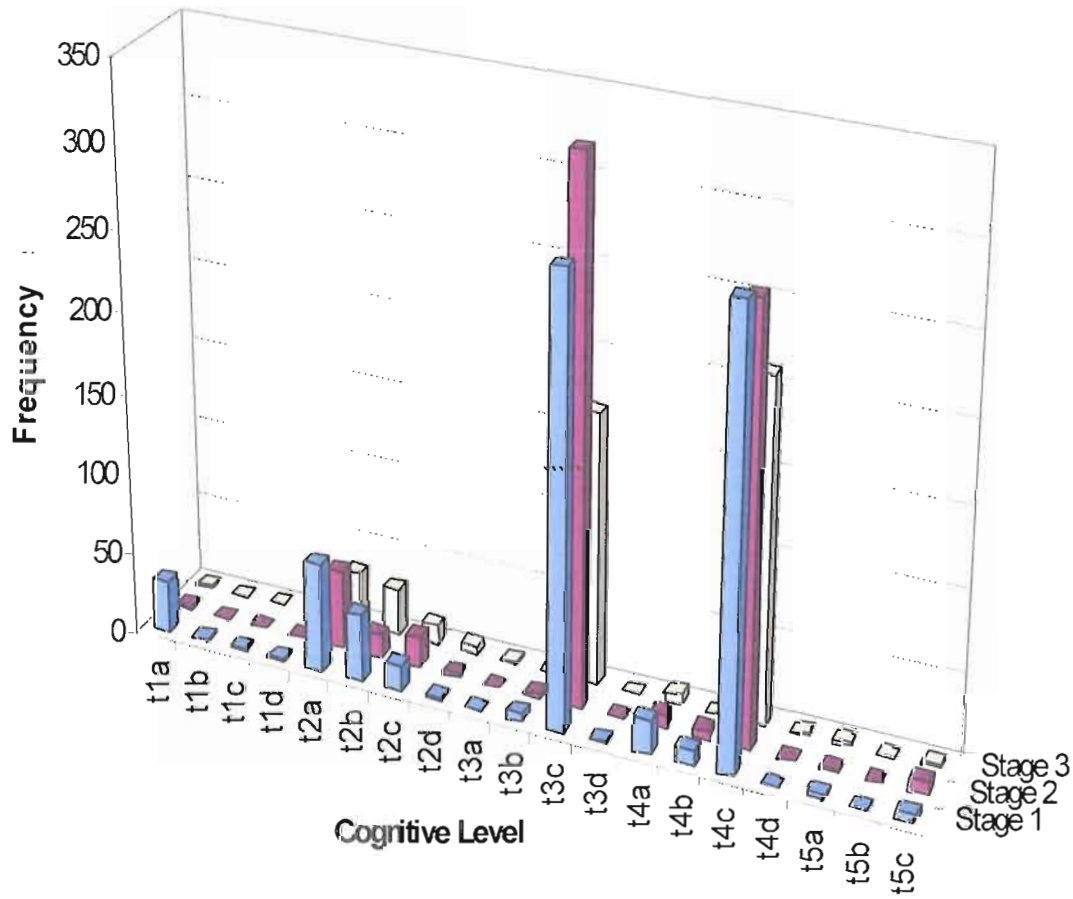


Figure 4.12 1m Frequency by Cognitive Level and Stage

Stage 1 duration percentages reflected a focus on understanding facts, concepts, and skills (t2a, t2b and t2c), applying a skill (singing, t3c), analyzing facts (t4a), and analyzing a skill (teacher modeling, t4c). Several other cognitive levels were present in small amounts (see Figure 4.13).

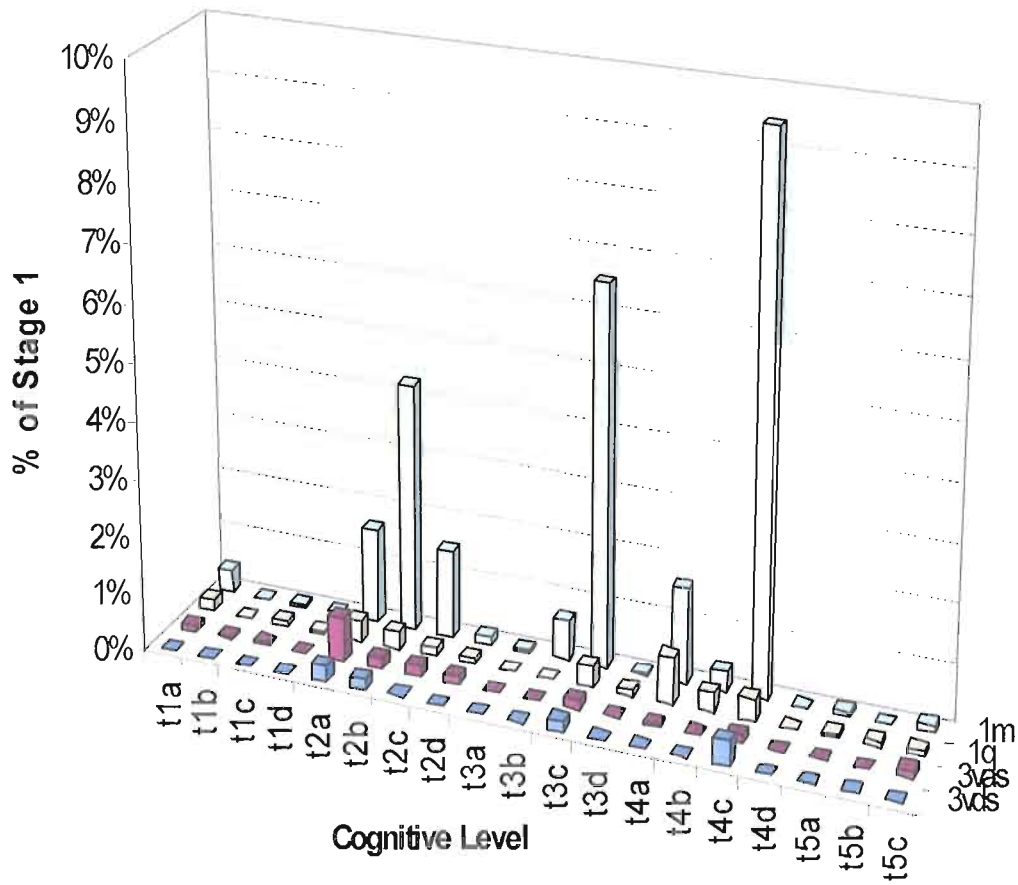


Figure 4.13: Stage 1 Rehearsal Time for each Cognitive Level and Teacher Activity

Stage 2 percentages demonstrated a sharper teacher focus (Figure 4.14) with only a few cognitive levels presented. These included t3c and t4c with lesser amount of t2a, t2b, and t2c. Teacher questioning and feedback were down compared with stage 1. One small, but notable, increase was in evaluating a skill, t5c.

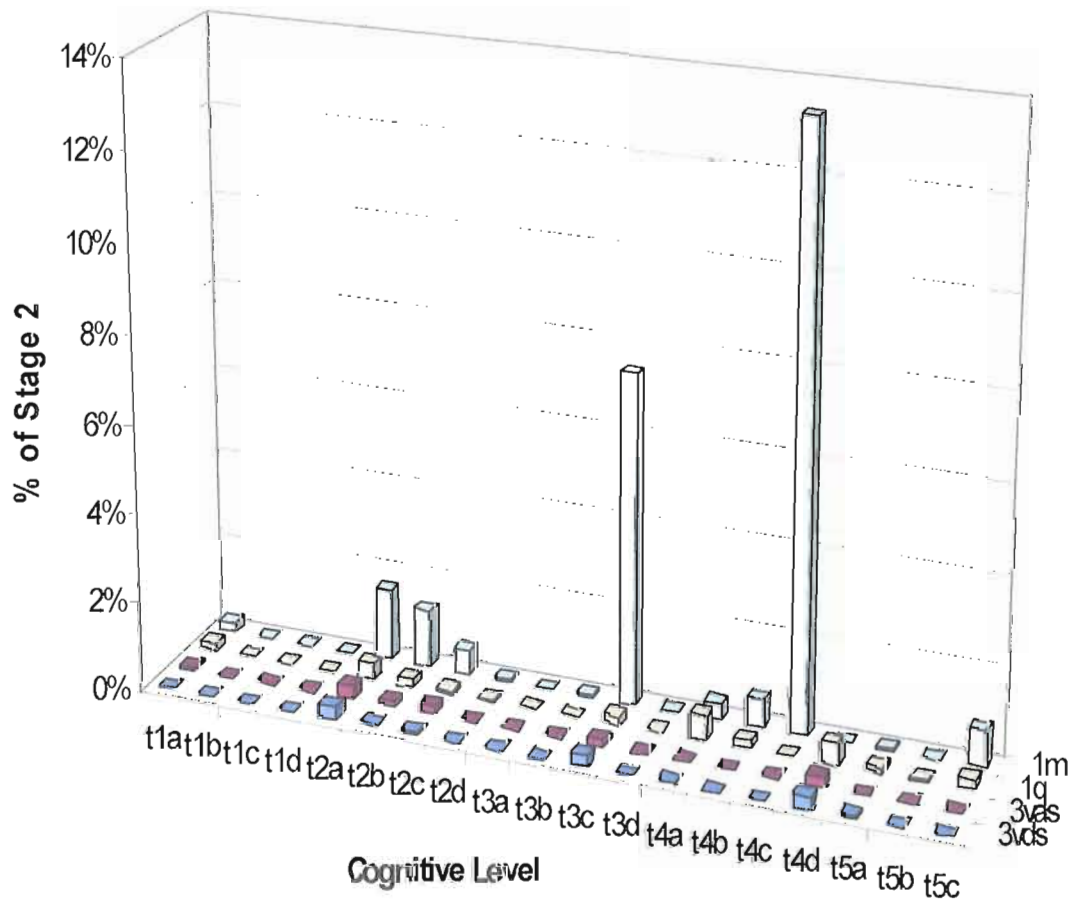


Figure 4.14: Stage 2 Rehearsal Time for each Cognitive Level and Teacher Activity

Stage 3 (Figure 4.15) showed a slight increase in the variety of cognitive levels composing teacher task presentation (1m) events with some emphasis on instructing students to think about what they understand (t2d). At only 0.77% it is probably an inconsequential amount but a large increase from previous values of 0.11% and 0.03% for stages 1 and 2 respectively.

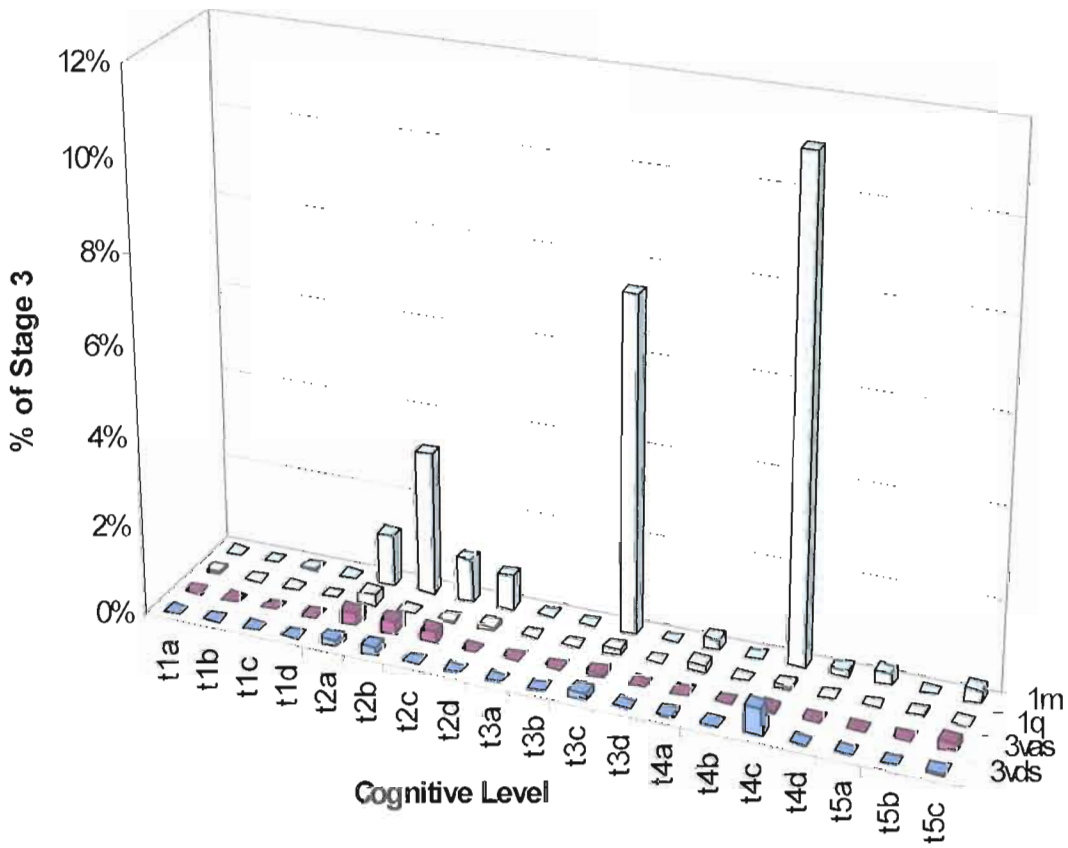


Figure 4.15: Stage 3 Rehearsal Time for each Cognitive Level and Teacher Activity

The second largest percentage of cognitive activity was during teacher questioning (1q). It was a small percentage of activity and decreased from 3.58% at stage 1, to 2.39% at stage 2, to only 0.87% at stage 3. Even though small in percentage, it is an important teacher activity. The 1q activity was examined at each stage in terms of its cognitive level composition. The 1q activity was by far the most diverse level for cognitive levels as seen in Figure 4.16.

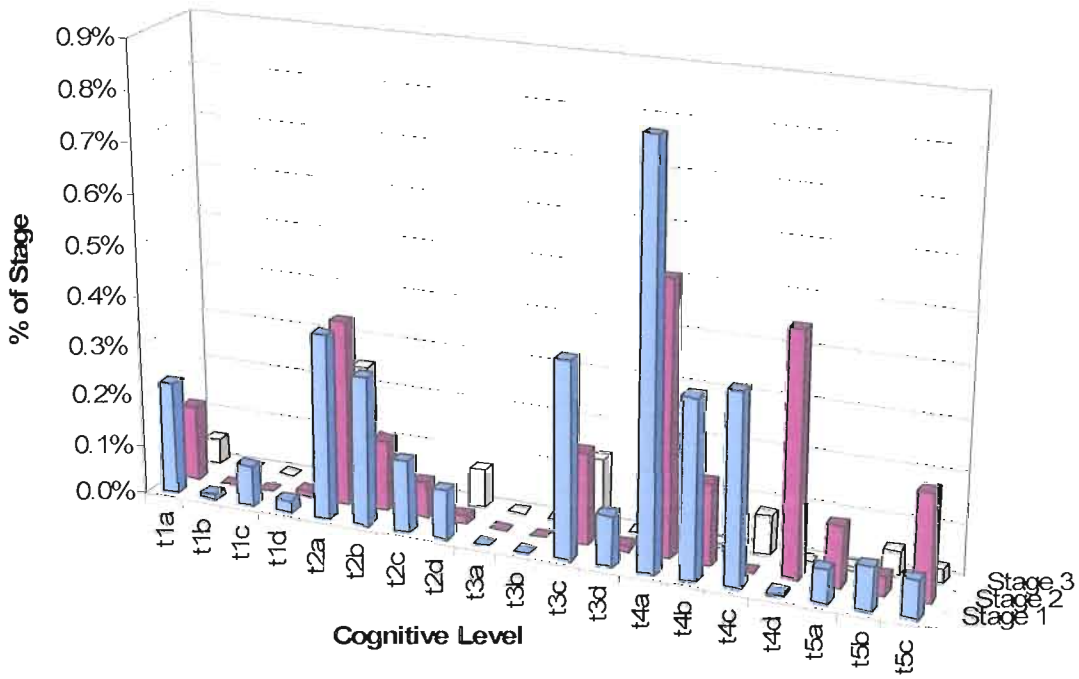


Figure 4.16: 1q Activity by Cognitive Level and Stage

Percentage of rehearsal time spent in the 1q activity (teacher questioning) for each stage was very small. The 1q activity showed a bump up in stage 2 for cognitive levels

t4d, t5a, and t5c. Remembering a fact (t2a) was strong during stage 1 and 2. Analyzing a fact (t4a) was strongest during stage 1. Most cognitive levels showed a general decrease indicating an increasing emphasis on student performance.

The proportion of rehearsal time for each cognitive level at each stage was examined for the 1m teacher activity (see Figure 4.17). Stage 2 showed an increase in the t4c (analyze a procedure) level. Level t2b (understand a concept) was least during stage 2. There was a general decrease in remember a fact (t1a) and evaluate a fact (t4a) cognitive levels. The t3c (apply a procedure) level stayed fairly constant.

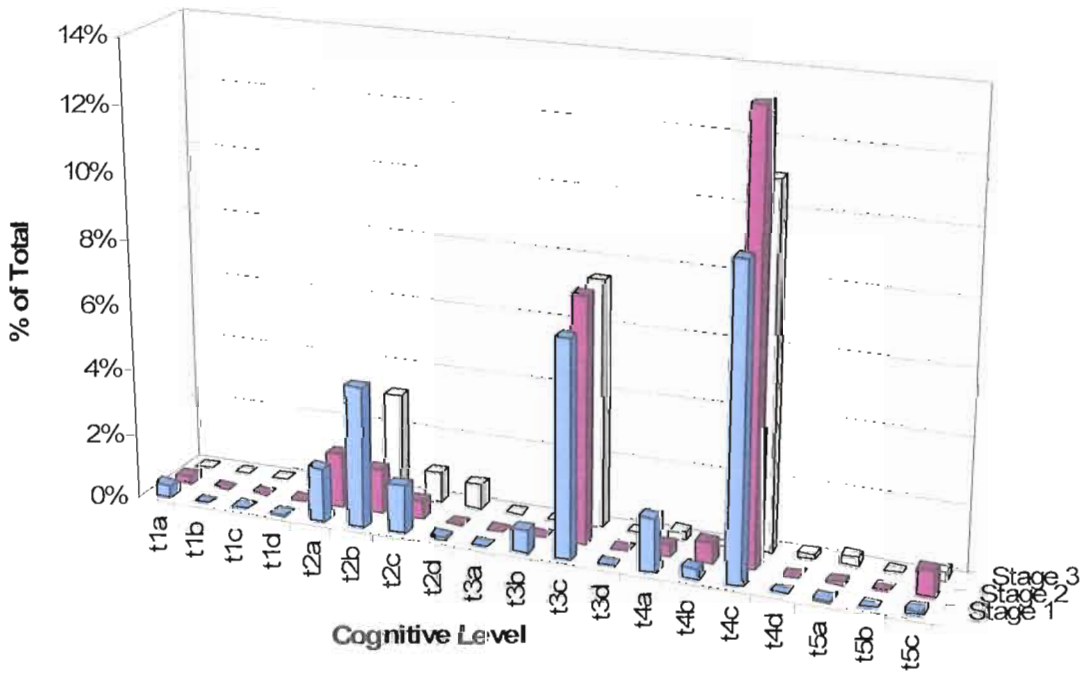


Figure 4.17: 1m Activity by Cognitive Level and Stage

By Kind and Way of Thinking

The cognitive data was examined by kind of thinking (remember, understand, apply, analyze, evaluate, and create) and way (factual, conceptual, procedural, and metacognitive) of thinking referring to the rows and columns of the revised taxonomy (see Table 4.9). The cognitive levels represented 31.3% of total rehearsal time. It can be seen in Table 4.18 that procedural knowledge was the most common kind of thinking and that analyze was the most common way of thinking. Factual and conceptual, rows a and b, account for 8.8% of rehearsal compared with 22.5% for procedural and metacognitive, rows c and d. Columns one, two, and three were 16.2% of the total rehearsal time compared with columns four, five, and six at 15.1%. This indicated that a larger percentage of time was spent at the higher kinds of thinking and about the same percentage of time was spent in the lower and higher ways of thinking.

Table 4.18: *Percentage of Rehearsal by Kind and Way of Thinking*

Kind	%	Way	%
a) Factual	4.52	1) Remember	0.49
b) Conceptual	4.29	2) Understand	7.68
Subtotal	8.81	3) Apply	8.04
		Subtotal	16.21
c) Procedural	21.96		
d) Metacognitive	0.52	4) Analyze	14.18
Subtotal	22.48	5) Evaluate	0.88
		6) Create	0.00
		Subtotal	15.06

Figure 4.18 explores the kind of knowing or thinking by stage. Factual thinking decreased. Conceptual was highest during stage 1. Procedural was at its maximum during stage 2, with stages 1 and 3 being similar. There was a slight, but possibly inconsequential increase in metacognitive thinking from stage 1 to stage 3. Metagcognitive stage levels were all 1% or less.

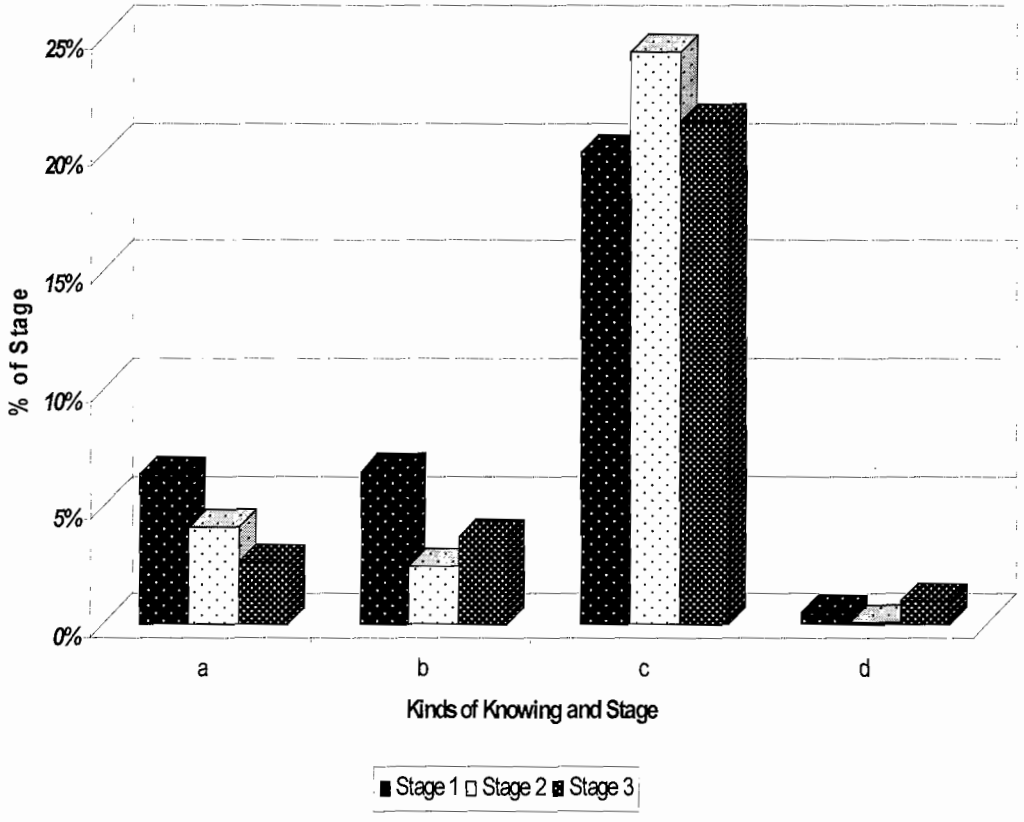


Figure 4.18: Kind of Knowing (row) as a Percentage of Stage Time

Note: a=factual, b=conceptual, c=procedural, and d=metacognitive.

Figure 4.19 graphs the way of knowing by stage. Stage 1 had the most time asking students to understand (10%). Applying was equal in all three stages. Analyzing was highest during stage 2 (16.2%) and represented the largest proportion of cognitive activity for all stages. Only negligible percentages of remember and evaluate were found. Column 6, create, was not observed at any stage.

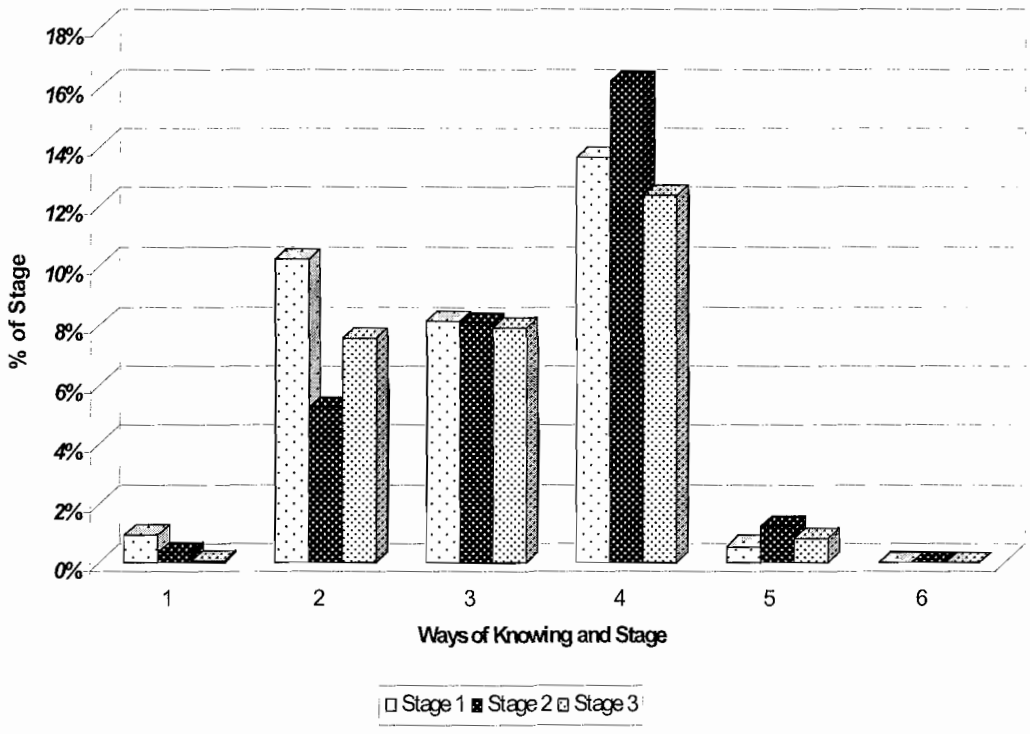


Figure 4.19: Way of Knowing (column) as a Percentage of Stage Time

Note: 1=remember, 2=understand, 3=apply, 4=analyze, 5=evaluate, and 6=create.

Speaking Rates and Cognitive Level

Teacher language was investigated to uncover any patterns in speaking rates and cognitive level. Table 4.19 presents the revised taxonomy with the teacher's speaking rate in words per minute. I expected the wpm numbers to decrease from left to right and from top to bottom. Looking at adjacent cells, it can be seen that this is not always the case.

Table 4.19: *Revised Taxonomy with Words/Minute*

	1 Remember	2 Understand	3 Apply	4 Analyze	5 Evaluate
a Factual	161	165	169	150	178
b Conceptual	148	134	116	134	191
c Procedural	224	154	125	109	138
d Metacognitive	230	172	177	168	

Note: No column six (create) data present

Table 4.20 shows the words per minute for the cognitive levels grouped by combining rows a and b into one row, and combining rows c and d into a second row. Again, it was expected the words per minute would decrease but this only happened in columns four and five.

Table 4.21 shows the word per minute data grouped into four quadrants of the revised taxonomy. It was found that moving from the lower rows (a and b) to the higher rows (c and d) resulted in slower speaking. Moving across columns it can be seen that

teacher speaking rates stayed about the same for the factual and conceptual language but slowed down for procedural and metacognitive content.

Table 4.20: *Words/Minute by Cognitive Level (10)*

	1	2	3	4	5
	Remember	Understand	Apply	Analyze	Evaluate
a, b	160.3	147.7	118.0	145.3	181.2
Factual +	1.6%	22.0%	0.8%	7.0%	1.1%
Conceptual					
c, d	225.8	157.9	124.9	109.8	137.6
Procedural +	0.5%	6.8%	24.3%	33.7%	2.2%
metacognitive					

Note: % refers to percentage of total cognitive words

Table 4.21: *Words/Minute by Cognitive Level (4)*

	1, 2, 3	4, 5
	Remember, understand, apply	Analyze, evaluate
a, b	147.2	149.4
Factual +	24.4%	8.1%
Conceptual		
c, d	131.8	111.1
Procedural +	31.6%	35.9%
metacognitive		

Note: % refers to percentage of total cognitive words

Summary of Results

Six directors recorded an average of about 15 minutes of audio per rehearsal for 72 rehearsals resulting in more than 1000 minutes of data. Approximately 9000 events were identified in the audio. Student performance made up 44% of the audio and teacher task presentation was 26%. Teacher feedback was 3.1%. There was more specific feedback compared with nonspecific feedback and more approvals than disapprovals. The ratio of task presentations to student performance events was 1.1/1 and the ratio of student performance to teacher feedback was 3.3/1.

Student performance time percentage increased from stage 1 to stage 3 as teacher talk percentages decreased. Most activity frequencies per minute decreased because either there were less events per minute or event duration increased.

Teacher task presentation, questioning, and specific feedback comprised 31% of the total time. The cognitive content of these events was approximately evenly divided between lower cognitive levels and higher cognitive levels. Modeling made up 12% of the cognitive content and tasks asking students to sing was almost 8%.

Rate of teacher talk was not the same for all activities. Questioning was spoken at about 200 words per minute (wpm). Teacher off-task language was less than 60 wpm. Teacher speaking rates showed various rates for cognitive content. Remembering a concept and thinking about what was remembered showed rates greater than 220 wpm. Applying a concept, applying a procedure, and analyzing a skill were the slowest at 125 wpm or less.

Creating a three dimensional graph of cognitive level percentages and teacher activities resulted in an image resembling a landscape. This landscape represents the cognitive topography for our teachers. It is possible that this landscape is unique to expert teachers.

CHAPTER V

DISCUSSION

Purpose of the Study

Teaching style of the expert teacher is an ongoing concern for music educators and rehearsal language is a key ingredient. The main purpose of this study was to examine the cognitive content of the language used by expert high school choral directors. I hoped this analysis would help us visualize the quantitative details of the cognitive rehearsal topography created by the directors' activities and language.

Summary of Results

Research Question 1: Can director language be effectively coded and classified into the cognitive domain taxonomy?

I was able to code and classify director language into cognitive levels using the methods outlined in the study. Transcribing and coding were time intensive tasks. Part of the time was spent in refining the coding skills and the coding system. In the early phases this required recoding data. I did not discover any technologies or methods that would expedite the process.

The coding process was self-correcting and therefore effective. Any rehearsal event that did not fit the event classification system required me to reconsider the system, adjust it, and start over. The same was true for the cognitive coding. In general these refinements were made early in the data coding process. The sequence coding method was modified to handle teacher exchanges (1e) with students that were neither off-task nor social. The s code was added to label periods of silence that were long enough to be an identifiable event.

I added Fourier frequency analysis to the audio annotation software to see if this could help distinguish teacher talk from other audio. I hoped that this graphical image of audio frequencies would facilitate the delineation of rehearsal events. It had some value but was not effective in replacing careful listening to accurately locate rehearsal events. It is possible that more advanced work along these lines would prove fruitful.

Research Question 2: What are the general characteristics of the rehearsal language of expert high school choral directors in terms of rehearsal activity and cognitive content?

The answer to this question laid the groundwork for the construction of a later recognizable landscape visualizing the directors' style. The resulting topography represented a cognitive signature for the directors. Several features stood out. The directors, on average, spent about 15 minutes on each song in each rehearsal. The average rehearsal length decreased from stage 1 to stage 3. Stage 3 was recorded just before the fall concert and most of the teachers spent shorter periods rehearsing each song. They

would sing through the songs and spend time on stage movement and concert logistics. This resulted in less music rehearsal time available for analysis.

The overall average duration for all events—teacher task presentations, student responses, feedback— was 6.3s. Teacher task presentation (1m) was 26.4% of rehearsal. Teacher talk (1c, 1d, 1e, 1m, 1o, 1q, and 1s) accounted for 47.1% of rehearsal time. This result is similar to the 40% found by Pence (1999), Thurman (1977), and Witt (1986) but larger then the 19% reported by Caldwell (1980).

Student activity (2nv, 2p, and 2v) used 49.3% of rehearsal time, with student performance (2p) accounting for 44.0%. Teachers spent 8.6% of rehearsal time giving directions (1d) and 4.1% counting (1c) to start the choir singing. This yielded 56% of rehearsal as nonperformance which matches Watt (1986), Davis (1998), Gundersen and Williams (1998), but is much higher than the 38.6% found by Watkins (1994).

Pence's teachers (1999) gave directives at a rate of 2.5 per minute. Our teachers gave directions at an overall rate of 1.7 per minute (Tables 4.2 & 4.3, Figure 4.1). The most frequent event was teacher task presentation at 1.9 events per minute. Choir performance frequency was approximately 1.7 events per minute. Giving directions also occurred at a rate of 1.7 events per minute. Teacher counting to get the group singing was 1.2 events per minute. Teacher questioning occurred only once every two minutes on average (see Figure 4.2).

Our teachers spent little time off-task (3%) and in social activity (1.3%). Consequently, the frequency for both of these activities was only 0.2 events per minute.

This is about 12 events per hour compared with 114 task presentations per hour and 102 choir performance responses per hour.

The overall mean duration of teacher events was short (Table 4.4). Teacher task presentation was 8.5s, giving directions was 3.1s, 2.1s for counting, and 2.9s for teacher questioning. Social mean duration was 3.5s. Off-task had a relatively long mean duration of 10s. Choir performance had a mean duration of 15.9s. My values are similar to Gunderson and Williams (1998) choral group mean durations of 11.8s for teacher instruction and group activity. My values are smaller than teacher presentation mean durations of 16s and performance means of about 28s found by Arthur (2002).

These findings replicate, however, Goolsby (1997), that expert teaching is fast paced with few questions. The overall event frequency of 9.5 events per minute, or an event about every six seconds, represented a fast pace. This 5- 6s event frequency was also found by Yarbrough and Madsen (1998). The teachers asked questions at a rate of one question for every three task presentations and spent only one minute on questioning for every 11 minutes of task presentation. Questioning accounted for 2.4% of rehearsal and represented only 5.1% of all teacher nonfeedback data 1c, 1d, 1e, 1m, 1o, 1q, and 1s.

Teacher feedback was only 3.1% of rehearsal. This study did not specifically code for complete sequential patterns. The ratios of task presentations to student response to teacher feedback indicated that our teachers, at best, completed 35% of sequential patterns. This percentage is an overestimate but compares favorably with the 20% completion rate found by Goolsby (1997) in instrumental ensembles and with findings

that good teaching is characterized by complete sequential patterns (Price, 1992; Yarbrough & Hendel, 1993).

Very little disapproval was nonspecific (one per hour). Teachers gave more specific feedback (21 per hour) and the percentages of rehearsal for specific approval (1.4%) and disapproval (1.1%) were almost the same (see Table 4.2). Teachers gave slightly more approval (1.9%) than disapproval (1.2%). These results are in accord with previous studies (Price, 1983; Yarbrough, Price, & Bowers, 1991) that expert teachers give more positive feedback. These percentages, though small, describe our teachers as approving and specific. This might be an indication that they are carefully focused on details throughout.

Our teachers did not speak at the same rate of words per minute (wpm) for different activities (see Table 4.14). Teachers spoke the most words per minute during questioning (200 wpm) and the slowest when off-task (52 wpm). It may be that when the teacher was off-task they were distracted and trying to think as they spoke.

The reason for the fast questioning rate is puzzling. Examples of some of the questions are "What's the word?" "So 3/4 means what?" "Do you understand this?" "When the note goes up sing?" "Who is singing that note for me?" The fast rate may be a result of teacher familiarity with these common questions.

I did not discern any pattern between teacher activity and speaking rates. There does seem to be an inverse relationship between speaking rates and mean words per event (mwpe). The four teacher activities analyzed for cognitive content, 1m, 1q, 3vas, and 3vas, followed this pattern. Questioning (1q) had the smallest mean words per event (9.7)

and the fastest speaking rate (200 wpm). Specific approval and disapproval were in the middle (approximately mwpe=12, wpm=173). Task presentation (1m) was last with the mwpe (16.6) and the slowest speaking rate (117 wpm). The teachers' rates of speaking stayed approximately the same during the three rehearsal stages (see Table 4.14).

It seemed more likely that teachers' rates of speaking were connected with the cognitive content of the teacher language (see Table 4.15 and Figure 4.9). There are at least two ways to move to higher order thinking in the revised taxonomy. Higher order thinking can be achieved by moving down the rows or by moving across the columns of the taxonomy. Procedural and metacognitive (row c and d) are higher order thinking than factual and conceptual (rows a and b). Analysis and evaluation (columns four and five) are higher than remember, understand, and apply (columns one, two, and three).

Speaking rates were slower in columns four and five, analyze and evaluate, at the procedural and metacognitive levels compared with columns one, two, and three (see Table 4.19). Speaking rates stayed about the same for lower and higher level thinking in factual and conceptual language.

These results might indicate that the teachers tended to speak slower when they used higher order thinking language. It also suggests that it may be easier for the teacher to speak at the lower kinds of knowing (factual and conceptual) compared with the higher kinds (procedural and metacognitive).

Teachers spoke faster at the cognitive level of remember a skill (t1c) and thinking about what is remembered (t1d). Teachers spoke slower when modeling (t4c). The slower

modeling rate is consistent with the act of actually singing and sustaining vowels, which in general, is slower than speaking.

Research Question 3: Does the director's use of rehearsal time and cognitive language content change during the stages of song preparation?

Our teachers spent less time talking and let the choirs sing more as the rehearsals progressed from stage 1 to stage 3. This replicates findings by Davis (1998), Witt (1986), and Yarbrough and Price (1989). Here student performance time increased (see Figure 4.3) through all three stages (41%, 43%, and 49%) and the mean durations (see Figure 4.6) of performance events increased (13.1, 15.7, and 21.1s). Task presentation mean duration increased slightly (8.1 to 9.5s) across stages. Obviously, an increase in event duration meant a general decrease in event frequency as the stages progressed.

Teacher task presentation percentages stayed about the same through the stages (27.0%, 26.4%, and 25.5%). This was accompanied by percentage decreases in other kinds of teacher talk while, as has been noted, student performance times increased. Teacher feedback decreased from 3.8% to 2.8%. Counting, giving directions, and questioning decreased. This would suggest that at stage 3 the teachers still had detailed instructions but spent less time in feedback, counting, giving directions, and questioning. This allowed more time for the choirs to sing.

Teachers spent more time in approvals in stage 1. Disapprovals showed little change across the stages. This might indicate that teachers were trying to establish a positive, reinforcing rehearsal atmosphere to start the new school year and music.

Teachers did the most vocal modeling during stage 2 and the least during stage 1. This might indicate that their modeling goals were less toward pitches and rhythms and more toward expressive musical concepts of phrase shape and articulations. During stage 3 the teachers spent less time modeling. This is consistent with more choir singing time in stage 3. It could also mean that the teachers felt the choirs were singing correctly and would no longer benefit from more modeling.

There was a decrease in cognitive language by stage (33.5%, 31.1%, and 28.7%). There were decreases in remember a fact (t1a), understand a fact (t2a), and analyze a fact (t4a). Analyze a skill (t4c) was greatest during stage 1. Apply a skill (t3c) was approximately the same for all three stages (see Figure 4.7). The greater percentage of cognitive language in the early stages was due to focusing on learning factual information at the remember, understand, and analyze levels.

The work on research questions three and four yielded a three-dimensional view of the teacher (see Figures 4.10, 4.12 – 4.17). The controlling factors of this view were the cognitive content of teacher presentation, questioning, and specific feedback. This topographic view might represent a unique cognitive signature for expert teachers.

Research Question 4: Do directors challenge students to think within the higher cognitive levels of analyze, evaluate, and create?

In retrospect, there was a problem with this question. It was based on the original Bloom's taxonomy, a one-dimensional model, and did not take into account the two-dimensional revised taxonomy.

The revised taxonomy (Table 1.1) presents at least three ways to define higher order cognitive levels or thinking. First, higher-order thinking could be cognitive tasks that go beyond remember, understand, and apply. This definition focuses on taxonomy columns four, five, and six. This aligns with the original Bloom's taxonomy and the wording of research question four. Second, higher order thinking can be defined as leaving factual and conceptual thinking, and moving into procedural and metacognitive thinking. This focuses on moving from taxonomy rows a and b toward rows c and d. And the third combines the first two definitions by seeing higher order thinking as the lower-right corner of the taxonomy where analyze, evaluate, and create meet procedural and metacognitive. This third view combines the first and second definitions and focuses on the intersection of columns four, five, and six with rows c and d.

Applying definition one, the cognitive language of our directors was 31% of all director talk and was composed of 16.2% higher level thinking and 15.1% lower level (see Table 4.18). The directors did challenge students in higher cognitive levels.

Teacher modeling was identified as asking students to analyze a skill or procedure (Hanna, 2007). Modeling is an active exchange between teacher and class. Modeling requires the students to pay careful attention to the teacher, analyze the teacher model in order to compare with their own techniques, and to apply changes. As such, modeling was coded as analyze a skill (t4c) and represented higher order thinking by all three definitions. However, modeling could well have been placed into the category t3c (apply a skill), dramatically changing some of the interpretation of these results, since it was the bulk of the activity labeled analyze (see Figure 4.6). Modeling composed the largest

percent (12%) of all cognitive activity. This is much higher than the 1.3% upper level thinking in the Watkins (1994) study; however, if she categorized modeling differently than I did, it could explain some of the difference.

Blocher, Greenwood, and Shellahamer (1997) found very little teaching of concepts. Conceptual thinking is row b in the revised taxonomy. As such, it is higher than thinking about facts but lower than procedural and metacognitive. I found 4.3% of rehearsal as cognitive thinking by summing the percentages for t1b, t2b, t3b, t4b, and t5b (see Table 4.18). The lower levels of t1b, t2b, and t3b summed to 3.7% and the higher levels of t4b and t5b summed to 0.6%. By far our directors spent most of their time in procedural thinking (22.0%) and very little time (0.5%) in metacognitive. The amount of time in conceptual thinking (4.3%) was about the same as the time in factual thinking (4.5%).

There was no teacher language asking the students to create. Why was no creative language found? I think there are three possible answers. First, providing rehearsal situations for student creativity, although it is one of the nine MENC standards, may be difficult; however, creativity is often used as one justification for the existence of music programs. Create is the last column of the revised taxonomy and represents the highest way of thinking. As such, it may be difficult for the teacher to implement. This leads to the second possible reason; it can be time intensive. Setting up a rehearsal situation for student creativity and assessment might slow down the rehearsal. And lastly, it may seem difficult to make student creativity serve a directly relevant performance purpose in the rehearsal. Choral directors are trained to develop a concept of how a musical piece should

sound before they walk into rehearsal. While this provides an assessment framework to apply to student performance, it might not provide a place for student creativity.

Discussion

The study focused on the teacher but my goal is to illuminate aspects of teaching that might enhance the quality of student learning. Expert teachers were examined because I hoped that they cultivated a superior learning environment for their students.

I do not believe we can assume reciprocity between teacher cognitive language and student thinking. Using specific teacher language to access a particular way and kind of knowing within the cognitive domain may not generate the same order of thinking for the student; however, if there is not higher order cognitive language it is less likely that there will be higher order student thinking. There may be many reasons for this but one stands out; unless each student is addressed and assessed, it is easy in the large group rehearsal to let someone else answer the question, know the measure and beat, listen to the pitch, pay attention to another part, or think about how the vowel is formed. Bennett (1984) observed this in group sight singing, where the strength of a few individuals greatly affected the sight singing achievement of the whole group.

I do believe that students can develop higher order thinking. This could affect the quality and efficiency of rehearsal. A student's ability to respond at the cognitive level fostered by the teacher may be a critical factor in the effective rehearsal.

Is higher order thinking better than lower order thinking? Operating at a higher level within the cognitive domain may not be an end in itself at all times. There might be

a parallel to this is learning styles research. It has been found that the primary issue in teacher presentation is not student learning style or mode of learning but, matching appropriate mode of presentation with content (Arter & Jenkins, 1979, Kampwirth & Bates, 1980, Kavale & Forness, 1987). The same may be true when applying the cognitive domain taxonomy to teacher instructional language. The teacher must use the appropriate cognitive domain level relative to the subject and objectives. If the objective is to learn a few significant Renaissance composers and their dates then "remember" may be more appropriate than "understand." If the goal is students' understanding of these dates then the students must be able to remember the dates and relevant historical context. To use higher cognitive levels could miss the lesson objective and confuse the student.

Limitations of the Study

Choices and definitions were made in order to do the study. These were based upon research, logic, and assumptions that may not be shared by all researchers. Coding teacher language into the cognitive domain clearly involved many decisions. There was not always a clear line between what was a fact or a concept. Modeling was categorized as analyze a skill. Coding modeling differently, for example, could change the results of the study in terms of the percentage of higher order thinking.

Several other factors limit the study's ability to represent choral directors as a population. Limiting factors are small teacher sample size (n = 6), single ensemble level (high school), and only one ensemble voicing (mixed chorus). More directors should be

studied with ensembles at other levels and voicings. Clearly, more research is needed to clarify these issues.

Implications for Further Study

Many questions arise from this study. We should explore the types and quantities of singer thinking during rehearsal and performance. More study of the teacher cognitive signature or topography could yield data influencing teacher training and assessment. It might be helpful to discover the cognitive signature of expert teachers and directors. A related question would be whether there are different cognitive signatures of directors teaching select versus nonselect choirs.

Directors make decisions about how to interpret music to create an aesthetic performance. But, as an educator, these decisions are only the beginning. The director must then decide how to implement these ideas into each rehearsal moment. Some directors rehearse their ensembles until every performance nuance is completely memorized. This can create wonderful performances where conductors need only convey simple temporal cues and interpretive reminders to ensembles. Does memorizing nuance mean the students understand the principles behind these interpretive choices and thus operate at higher cognitive levels? Other ensembles could give equally expressive performances by applying the principles and skills of expressive singing without memorizing every nuance in advance. Future studies could help determine how students think during rehearsal and performance.

Many cognitive levels appeared in small quantities and some were not observed at all. How many minutes of rehearsal are needed to create a cognitive signature for a director? Was three hours per director enough? It is possible that a larger sample would reveal the presence of more cognitive levels. Future studies could determine the resolution needed to get reliable results. This could lead to the comparison of the cognitive signature of expert and novice teachers. The cognitive signature could enable novice teachers to develop language and rehearsal skills for effective teaching. Cognitive signature analyses could provide teacher assessment tools.

How would college directors compare to our high school directors? A question related to this would be "do select choir rehearsals look different than nonselect choirs?" We might find that college choirs spend even less time teaching concepts and employing higher order thinking. This could be due to directors selecting skilled singers who already know the fundamentals and many advanced concepts and skills.

Implications for Teaching

Given the paucity of higher-order thinking found in this study, teachers should consider ways to introduce it in rehearsals. They can challenge students to evaluate and create. The teacher could, for example, model two ways and ask students which is better (evaluation). The director could direct a section of a song using two dynamic interpretations and ask students to judge which is more appropriate. Students could be grouped in duets or trios for peer assessment and evaluation.

Students could be asked to create a different model. Students could lead a group with their ideas for dynamic shape of a phrase by simply raising and lowering their hands while the director conducted the tempo.

We should ask more questions. Teacher questioning revealed diverse cognitive content (see Figure 4.16). Asking the question, allowing time for student response, and giving quality feedback (sequential pattern of music instruction) may take time and slow down the rehearsal pace, but could result in more efficient and deeper student learning and ultimately save rehearsal time.

Ensemble directors can become overly focused on the singular product of performing a particular work and give insufficient attention to the process and concepts. The stage by stage analysis in chapter four indicated that we may be creatures of habit. It is possible that our concept of rehearsal is limited to repeating the same rehearsal processes with little variation. Thinking about the cognitive content of our language and stretching ourselves to higher order thinking might invigorate us and provide our rehearsals with more variety of activity and cognitive involvement.

Conclusion

This study has presented a view of the language of experienced choral educators. This view created a topographic landscape of rehearsal activity and cognitive content. More work in building and defining this cognitive topography or signature may help to identify key characteristics of music teachers. One possible consequence of work in this area could be a dynamic view of key features of a teaching style over time. This set of

time lapse images could expose new information. A fundamental result would reveal how the teacher's skills and emphases change over time. These changes could be in response to teacher training or classroom stimuli. The topographic signature could provide a quantitative basis for comparison of teacher styles and characteristics. These results could facilitate advances in teacher training and assessment.

It is critical to advancement in music education research that we continue to investigate how to describe what might be good teaching. Further, results of the study have application to teacher training and teacher assessment. This will enable educators to speak in scientific detail about the cognitive tools applied in the choir rehearsal setting. The teachers that participated in this study created rehearsals with almost even amounts of task presentation and student response. Teacher task presentation, questioning, and feedback were rich with cognitive content.

APPENDIX A

INFORMED CONSENT FORM

You are invited to participate in a research study conducted by Matthew Lynn Strauser, from the University of Oregon department of Music and Dance. The purpose of this study is to learn more about the high school choral director's use of language. This study will collect, parse, classify, and analyze the language of high school choral directors. This process will help us to better understand what kinds of statements choir directors make during a rehearsal. Specifically, this study will reveal into which instructional domain the director's language fits, the kinds of knowledge being used, and the cognitive processes that are employed. You were selected as a possible participant in this study because you have demonstrated expert skill as a choral director as demonstrated by your participation in at least three out of the last five years at the OSAA State Choral Championships.

If you decide to participate, you will be asked to audio record parts of your rehearsal. Specifically you will be asked to audio record two songs from the time the songs are new to the choir until just before the songs are performed in concert. This is approximately 30 or 40 minutes of each rehearsal. There should be no risk to you as a participant in this

study. However, I cannot guarantee that you personally will receive any benefits from this research and there is no financial compensation.

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. Subject identities will be kept confidential by coding the recorded text without reference to the identity of the director.

Your participation is voluntary. Your decision whether or not to participate will not affect your relationship with your school of employment or the researcher. If you decide to participate, you are free to withdraw your consent and discontinue participation at any time without penalty.

Participant's Consent:

I have received an adequate description of the purpose and procedures for audio recording sessions during the course of the proposed research study. I give my consent to be audio recorded during participation in the study, and for those audio recordings to be listened to by persons involved in the study, as well as for other professional purposes, including transcription of text and time durations, as described to me. I understand that all information will be kept confidential and will be reported in an anonymous fashion, and that the audio recordings will be erased after an appropriate period of time after the

completion of the study. I further understand that I may withdraw my consent at any time.

Print Name_____

Signature of participant_____

Date_____

Do you have a masters degree: Yes No

How many years have you been teaching music? _____

How many years have you taught in your current position? _____

How many years has your choir gone to OSAA stage during the last five years? _____

A copy of this consent form will be given to the participant.

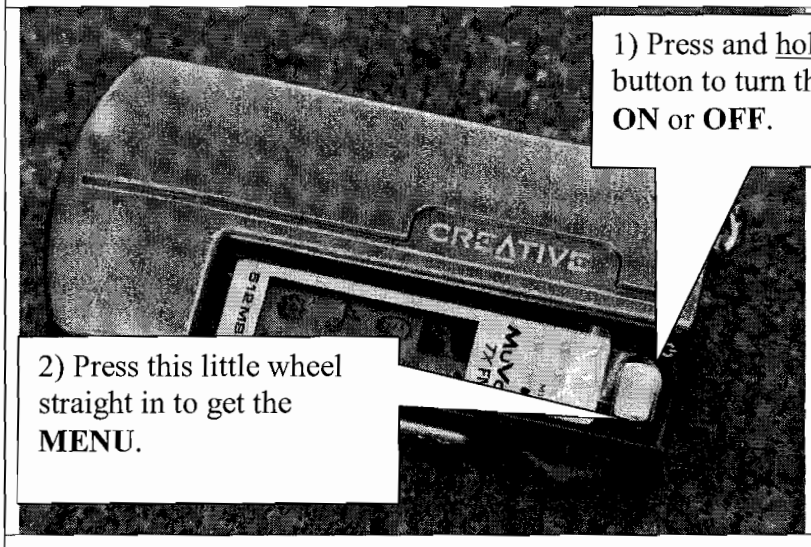
If you have any questions, please feel free to contact Matthew L. Strauser, (503) 589-8167, mstrauser@corban.edu or his advisor: Dr. Harry E. Price, (541) 346-3777, hprice@uoregon.edu of the University of Oregon School of Music and Dance.

If you have questions regarding your rights as a research subject, contact the Office for Protection of Human Subjects, University of Oregon, Eugene, OR 97403, (541) 346-2510.

APPENDIX B

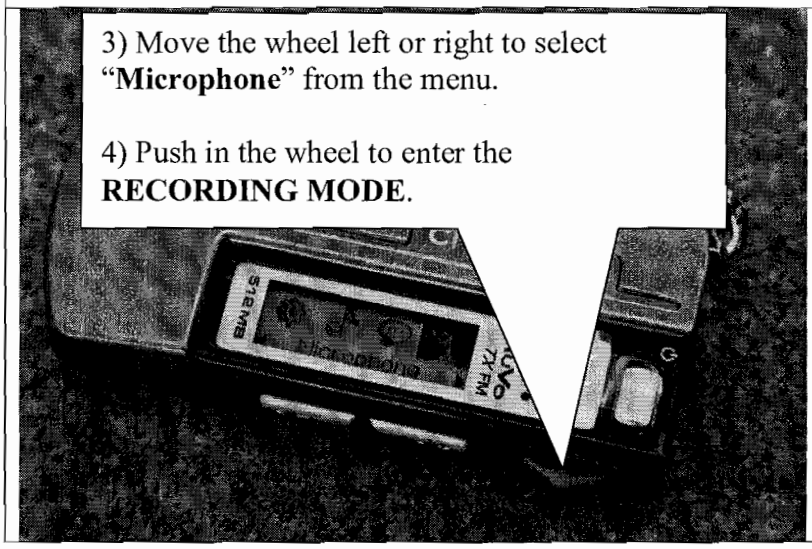
INSTRUCTIONS FOR USING THE MP3 RECORDERS

Creative Muvo MP3 Player/Recorder



1) Press and hold this button to turn the player **ON** or **OFF**.

2) Press this little wheel straight in to get the **MENU**.

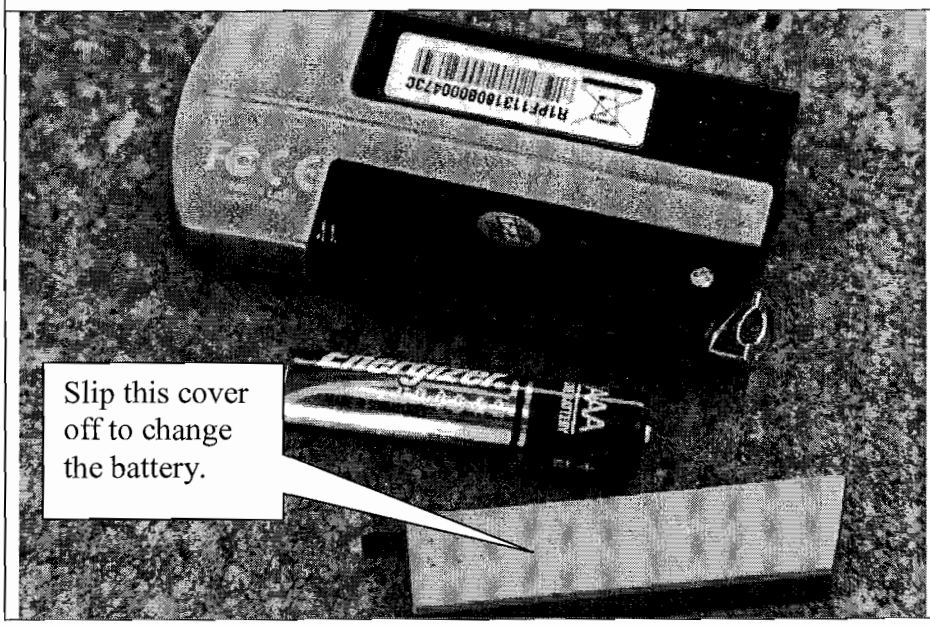


3) Move the wheel left or right to select "**Microphone**" from the menu.

4) Push in the wheel to enter the **RECORDING MODE**.

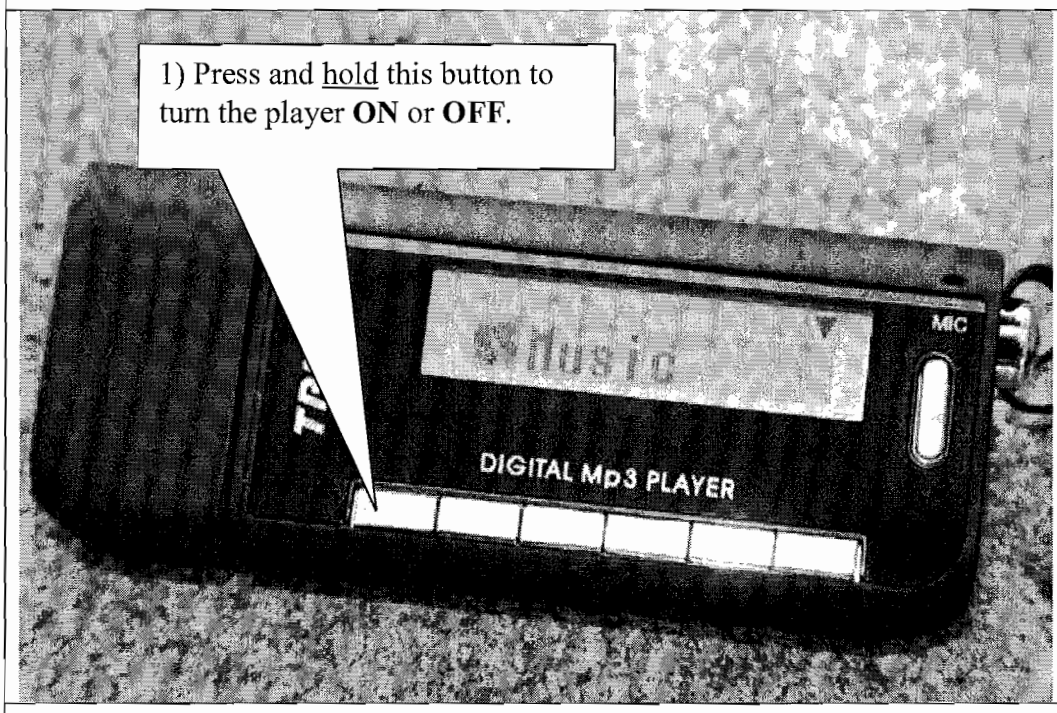
5) Push this button to **START** or **STOP** recording.

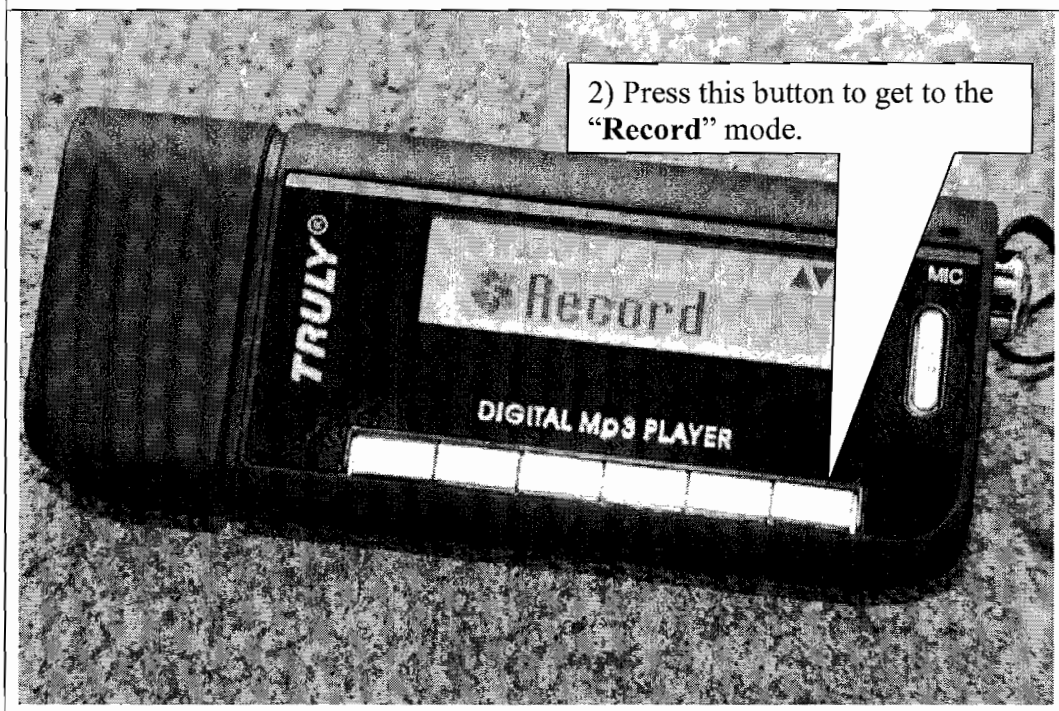
6) Make sure the **counter** is counting. In the photo the counter shows 9 seconds of a recording in progress.

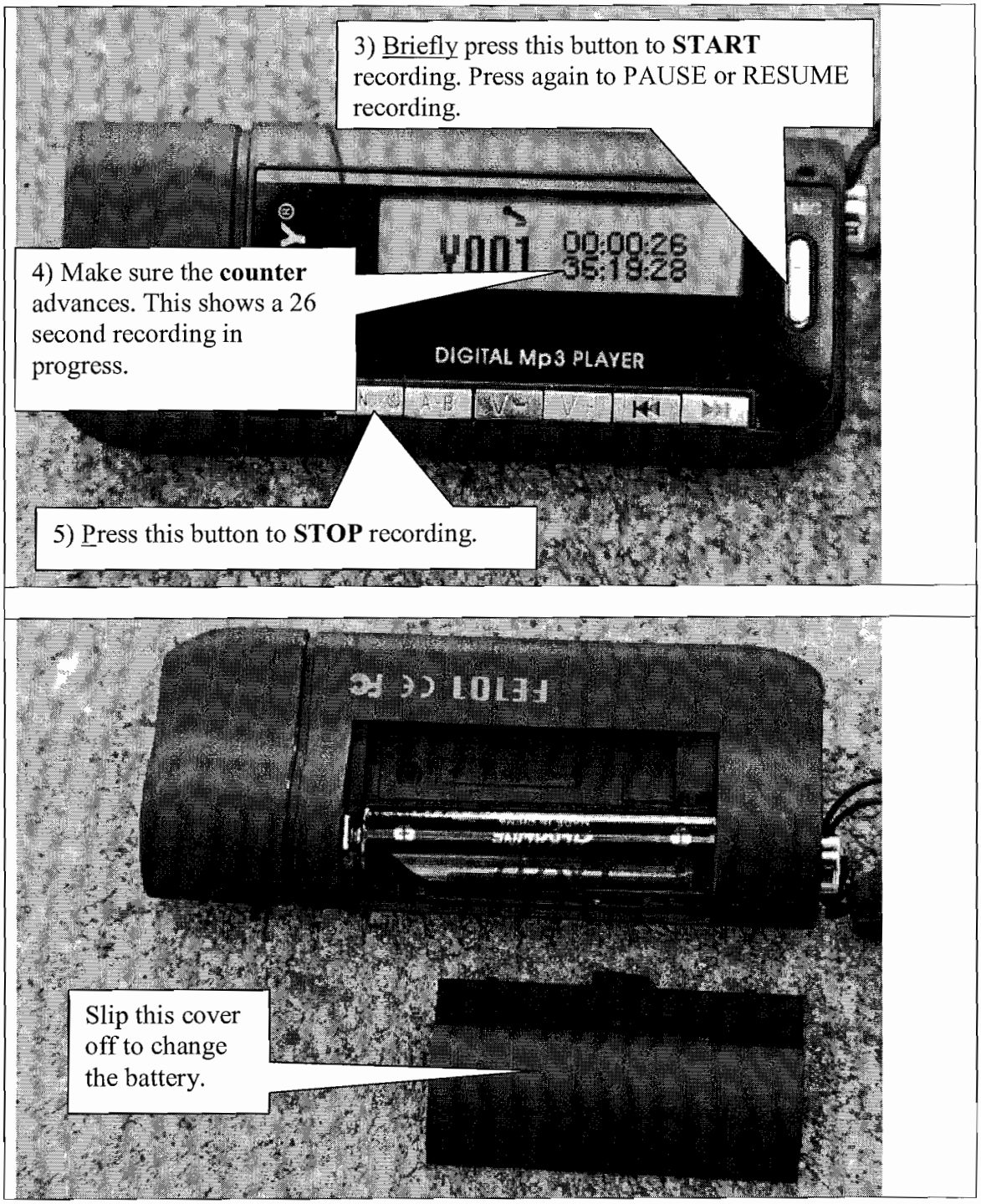


Slip this cover off to change the battery.

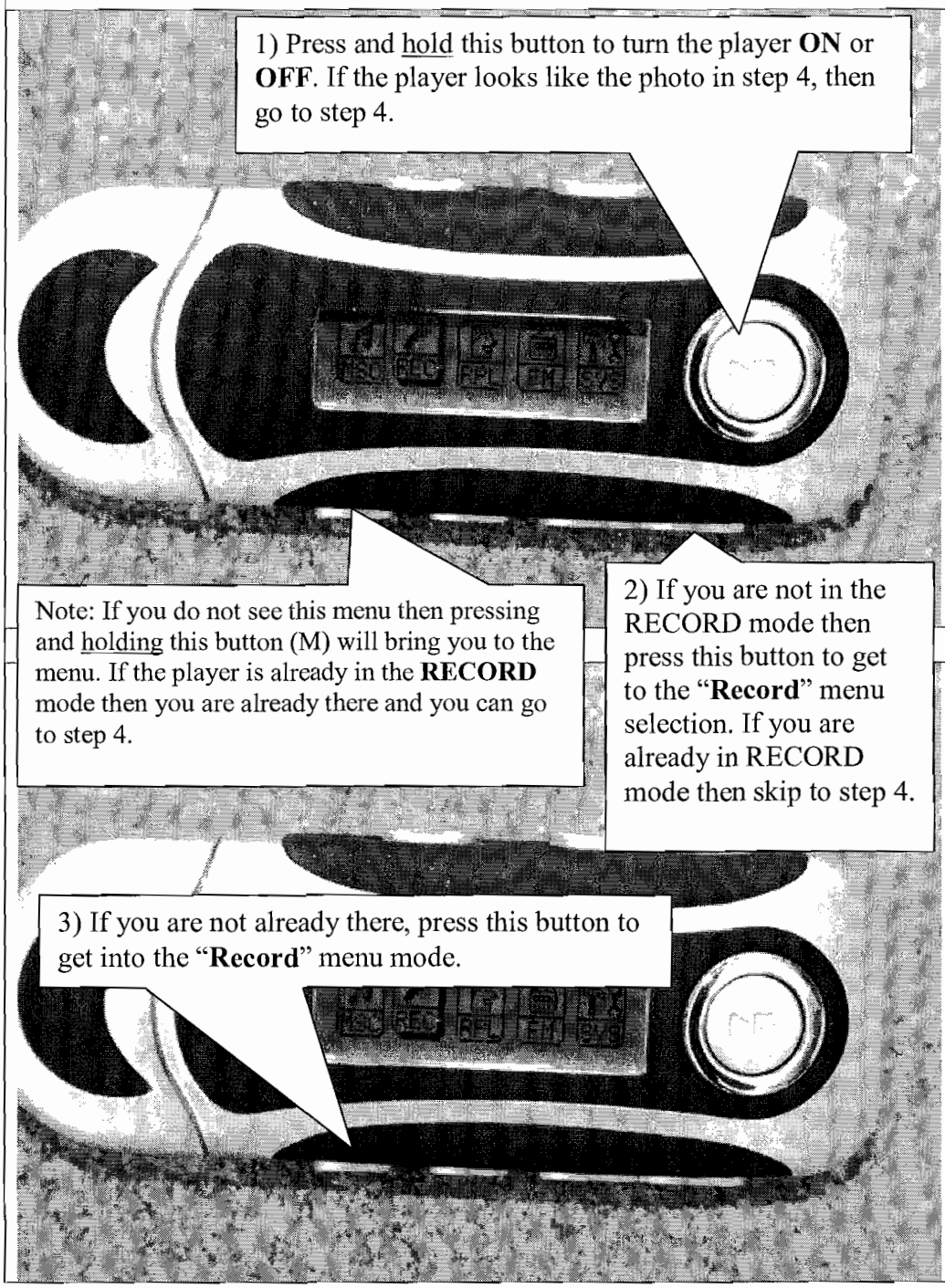
Truly MP3 Player/Recorder

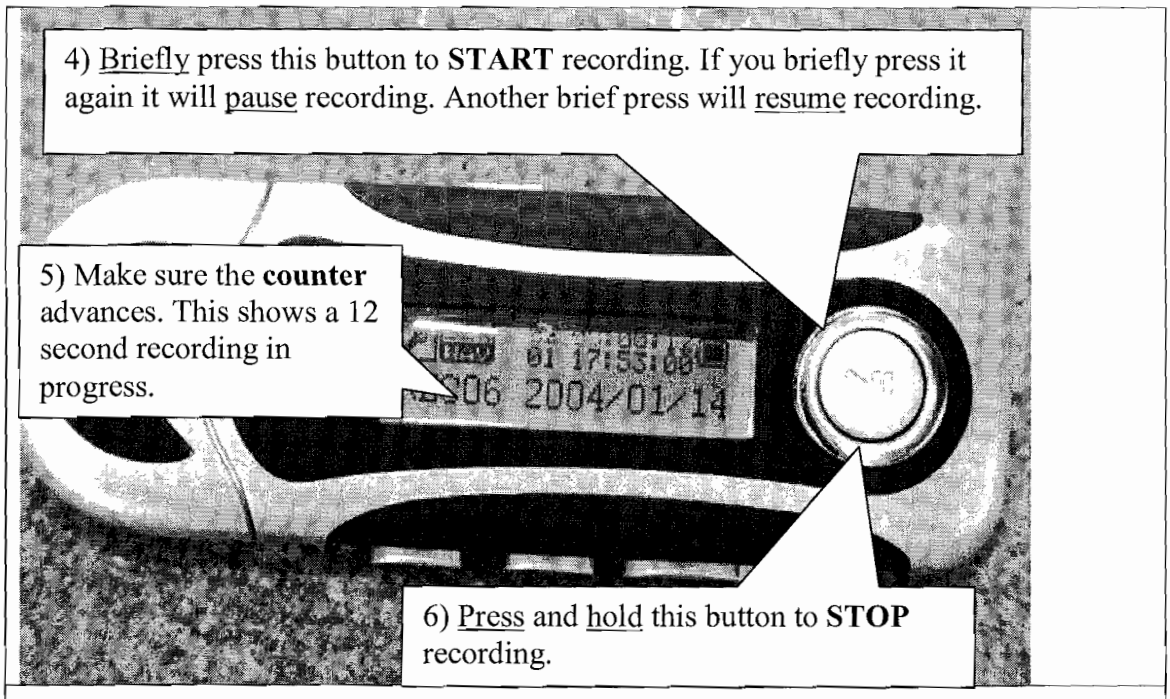


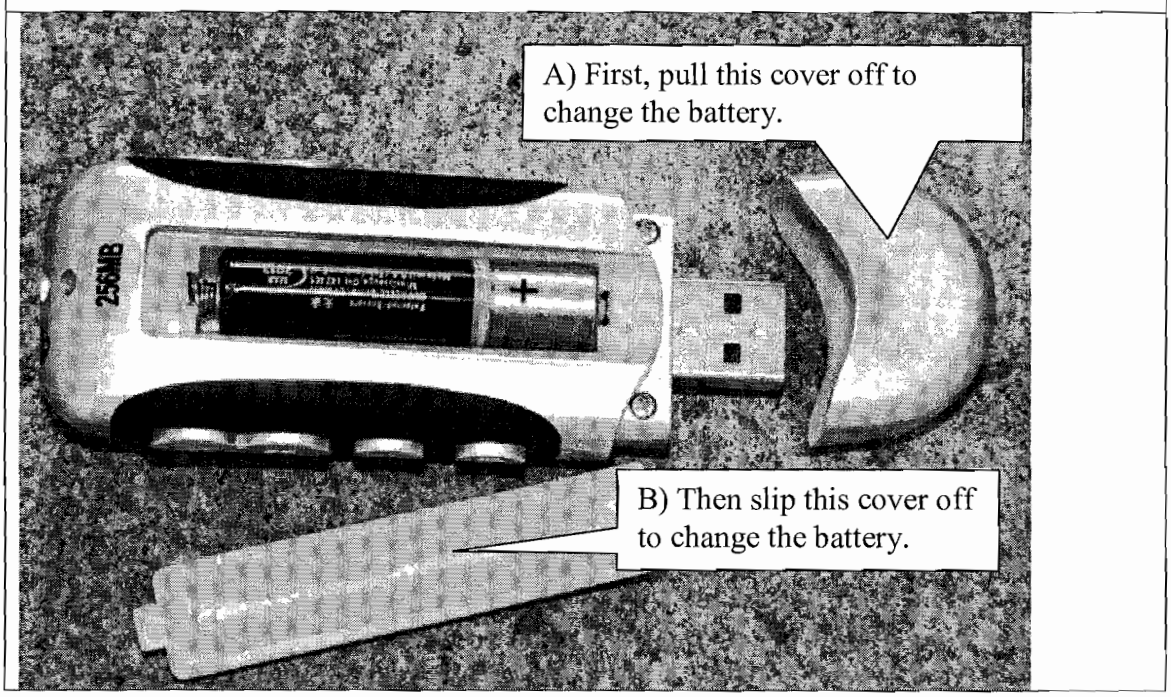



3) Briefly press this button to START recording. Press again to PAUSE or RESUME recording.
4) Make sure the counter advances. This shows a 26 second recording in progress.
5) Press this button to STOP recording.
DIGITAL Mp3 PLAYER
Slip this cover off to change the battery.

Mambo MP3 Player/Recorder




4) Briefly press this button to START recording. If you briefly press it again it will pause recording. Another brief press will resume recording.
5) Make sure the counter advances. This shows a 12 second recording in progress.
6) Press and hold this button to STOP recording.


A) First, pull this cover off to change the battery.
B) Then slip this cover off to change the battery.
256MB

APPENDIX C

USING R

What is R?

R (2008) is a powerful open source statistics program that runs on windows, mac, and linux. The data was collected in an Excel spreadsheet.

Getting Data into R

The spreadsheet data was copied to the Windows clipboard and then copied to an R dataframe using this command:

t <- read.table("clipboard", header=TRUE)

Sample Hypothetical Data from Dataframe t

Ti	Ndex	N	Teacher	Song	Rehearsal	Stage	Recording	Time	Duration	B	C
1	1	0	ta	songa	reh1	stage1	rec01	0.00	3.27	2c	1m
2	2	1	ta	songa	reh1	stage1	rec01	3.27	16.57	1a	1q
3	3	2	ta	songa	reh1	stage1	rec01	19.84	1.40	z	2v
4	4	3	ta	songa	reh1	stage1	rec01	21.24	2.38	3c	3vas
5	5	4	ta	songa	reh1	stage1	rec01	23.63	9.04	1a	1q
6	6	5	ta	songa	reh1	stage1	rec01	32.66	4.56	z	1d
7	7	6	ta	songa	reh1	stage1	rec01	37.22	4.92	z	2nv
8	8	7	ta	songa	reh1	stage1	rec01	42.14	1.67	z	1d
9	9	8	ta	songa	reh1	stage1	rec01	43.81	21.60	z	2nv
10	10	9	ta	songa	reh1	stage1	rec01	65.41	0.73	z	1e
11	11	10	ta	songa	reh1	stage1	rec01	66.14	1.46	2a	1m

Describing Data Structures in R

The str(t) command shows the structure of dataframe t (see Table AR.2).

str(t)

'data.frame': 9989 obs. of 12 variables:
$ Ti : int 1 2 3 4 5 6 7 8 9 10 ...
$ Ndex : int 1 2 3 4 5 6 7 8 9 10 ...
$ N : int 0 1 2 3 4 5 6 7 8 9 ...
$ Teacher : Factor w/ 6 levels "ta","tb","tc",..: 1 1 1 1 1 1 1 1 1 1 ...
$ Song : Factor w/ 2 levels "songa","songb": 1 1 1 1 1 1 1 1 1 1 ...
$ Rehearsal: Factor w/ 6 levels "reh1","reh2",..: 1 1 1 1 1 1 1 1 1 1 ...
$ Stage : Factor w/ 3 levels "stage1","stage2",..: 1 1 1 1 1 1 1 1 1 1 ...
$ Recording: Factor w/ 12 levels "rec01","rec02",..: 1 1 1 1 1 1 1 1 1 1 ...
$ Time : num 0.00 3.27 19.84 21.24 23.63 ...
$ Duration : num 3.27 16.57 1.40 2.38 9.04 ...
$ B : Factor w/ 20 levels "1a","1b","1c",..: 20 7 20 20 11 20 20 20 20 20 ...
$ C : Factor w/ 15 levels "1c","1d","1e",..: 2 6 10 11 6 2 8 2 8 3 ...

Working with Data in R

Using the **attach(t)** command made it possible to access the t dataframe structural objects with using the "t$" access modifier. All of the following examples assume that t has been attached to the current R session.

Means and sums for columns B and C by factor were calculated using:

agg.sum.t <- aggregate(Duration, list(seq=C, st=Stage, teach=Teacher), sum)

agg.mean.t <- aggregate(Duration, list(seq=C, st=Stage, teach=Teacher), mean)

These commands calculated sums and means for the durations of C events by stage and by teacher.

Sums and means by stage for factor B were calculated using:

agg.mean.b.stage.t <- aggregate(Duration, list(seq=B, st=Stage), mean)

agg.sum.b.stage.t <- aggregate(Duration, list(seq=B, st=Stage), sum)

Overall sums and means for factor B were calculated using:

mean.b <- aggregate(Duration, list(seq=B), mean)

sum.b <- aggregate(Duration, list(seq=B), sum)

mean.st.b <- aggregate(Duration, list(seq=B, st=Stage), mean)

sum.st.b <- aggregate(Duration, list(seq=B, st=Stage), sum)

mean.st.c <- aggregate(Duration, list(seq=C, st=Stage), mean)

sum.st.c <- aggregate(Duration, list(seq=C, st=Stage), sum)

This command totaled the durations of each recording for each stage and teacher:

sum.st.r.t <- aggregate(Duration, list(st=Stage, r=Recording, t=Teacher), sum)

Descriptive statistics for each of the factors were generated by first creating a list of the factor's duration data and then creating five number statistics using the R summary() command.

Commands such as these were used to split the data into a list of duration values the B and C factors:

```
dur1d <- Duration[C == "1d"]
dur1e <- Duration[C == "1e"]
durc1a <- Duration[B == "1a"]
durc1b <- Duration[B == "1b"]
```

The summary() command generated descriptive statistics:

```
summary(dur1d)
summary(dur1e)
summary(durc1a)
summary(durc1b)
```

Variance and standard deviation then become:

```
var(dur1d)
sqrt(var(dur1d))
```

Saving the dataframes to disk in tab separated format text files made it simple to open the text files, copy, and paste the data sets into an Excel spreadsheet for analysis and formatting. The following example saves the dur1d data object to a file called dur1d.txt:

write.table(dur1d, file = "C:\\r_data\\dur1d.txt", sep="\t",quote=FALSE)

The whole R session including all data objects was saved to disk like this:

save.image("C:\\r_data \\final.RData")

All the commands from an R session can be listed with the history command:

history(max.show = Inf)

These commands were copied and pasted into a excel worksheet. The commands could be copied and pasted back into the R session window to rerun any set of commands. This made it simple to rerun all the commands anytime.

REFERENCES

Adobe (2003). *Audition*. Adobe Systems Incorporated. San Jose, CA. http://www.adobe.com/.

Anderson, L. W., & Krathwohl, D. (2001). *A Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. New York: Longman.

Arter, J. A. and Jenkins, J. A. (1979). Differential diagnosis-prescriptive teaching: A critical appraisal. *Review of Educational Research, 49*, 517-555.

Authur, J. R. (2002). *Experienced teachers use of time in choral rehearsals of beginning and advanced choirs*. Unpublished doctoral dissertation, Florida State University. Retrieved November 8, 2005 from http://etd.lib.fsu.edu/theses/available/etd-03132003-162309/unrestricted/01_jra.pdf.

Bennett, P. (1984). Are we tricking ourselves into thinking our students are reading music? *Indiana Musicator, 39*(2), 12-13.

Blocher, L., Greenwood , R., & Shellahamer, B. (1997). Teaching behaviors of middle School and high school band directors in the rehearsal setting. *Journal of Research in Music Education, 45*(3), 457-469.

Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of educational objectives, handbook 1 Cognitive domain*. New York: McKay.

Byo, J. (1994). Tracing the evolution of a research line: The role of sequential patterns in structuring the rehearsal. *Journal of the World Association for Symphonic Bands and Ensembles, 1,* 67-79.

Caldwell, W.M., Jr. (1980). *A time analysis of selected musical elements and leadership behaviors of successful high school choral conductors*. Unpublished doctoral dissertation, The Florida State University, Tallahassee, Florida.

Creative Labs (2006). *Muvo 512 MB MP3 Player/Recorder*. http://us.creative.com.

Davis, A. P. (1998). Performance achievement and analysis of teaching during choral rehearsals. *Journal of Research in Music Education, 46*(4), 496-509.

Duke, R. A., Prickett, C. A., & Jellison, J. A. (1998). Empirical description of the pace of music instruction. *Journal of Research in Music Education, 46*(2), 265-280.

Elliott, D. (1995). *Music Matters: A New Philosophy of Music Education*. New York: Oxford University Press.

Gonzo, C. L. (1977). Metaphoric behavior in choral conducting. *The Choral Journal*, 17, No. 7 (March), 8-12.

Goodlad, J. (1984). *A place called school: Prospects for the future*. New York: McGraw-Hill.

Goolsby, T. W. (1996). Time use in instrumental rehearsals: A comparison of experienced, novice and student teachers. *Journal of Research in Music Education, 44*(4), 286-303.

Goolsby, T. W. (1997). Verbal instruction in instrumental rehearsal: A comparison of three career levels and preservice teachers. *Journal of Research in Music Education, 45*(1), 21-40.

Grimland, F. H. (2001). *Characteristics of teacher directed modeling evidenced in the practices of three experienced high school choral directors*. Unpublished doctoral dissertation, University of North Texas, Denton, Texas.

Gumm, A. J. (1993). The development of a model and assessment instrument of choral music teaching styles. *Journal of Research in Music Education, 41*(3), 181-199.

Gundersen, G. & Williams, J. M. (1998). Rehearsal pacing of expert middle school, high school, and university choral and instrumental conductors. *Texas Music Educators Association*. 33-38. Retrieved November 9, 2005 from http://www.tmea.org/080_College/Research/Gun1998.pdf.

Hanna, W. (2007). The new Bloom's taxonomy: Implications for music education. *Arts Education Policy Review, 108*(4), 7-16.

Java (2006). *Java Developers Kit*. Sun Microsystems. Santa Clara, CA. http://java.sun.com/.

Kaiser (2006). *Mambo MP3 Player*. Kaiser Corporation. http://www.kasercorp.com.

Kampwirth, T. J. and Bates, M. (1980). Modality preference and teaching method. A review of the research. *Academic Therapy, 15*, 597-605.

Kavale, K. A. and Forness, S. R. (1987). Substance over style: Assessing the efficacy of modality testing and teaching. *Exceptional Children, 54*(3), 228-239.

Kvet, E., Watkins, R. (1993). Success Attributes in Teaching Music as Perceived by Elementary Education Majors. *Journal of Research in Music Education, 41*(1), 70-80.

Lindeman, Carolyn A., et al. (1998). *A research agenda for music education.* Retrieved October 23, 2006 from http://www.menc.org/information/research/agenda.html #research. MENC

Maclin, J.P. (1993). The effect of task analysis on sequential patterns on music instruction. *Journal of Research in Music Education, 41*(1), 48-56.

Madsen, C. H., & Madsen, C. K. (1998). *Teaching/Discipline (4th ed.)*. Boston, Massachusetts: Allyn and Bacon, Inc.

Madsen, C. K., & Duke, R. A. (1985). Perception of approval/disapproval in music education. *Bulletin of the Council for Research in Music Education, 85*(fall), 119-130.

Madsen, C. K., & Geringer, J.M. (1989). The relationship of teacher "on task" to intensity and effective teaching. *Canadian Journal of Research in Music Education, 30*, 87-94.

Madsen, C. K., Standley, J. M., & Cassidy, J. W. (1989). Demonstration and recognition of high and low contrasts in teacher intensity. *Journal of research in music education, 37*(2), 85-92.

NASB. (1995). *The new American standard Bible.* La Habra CA: The Lockman Foundation.

MENC. (1994) *The school music program: A new vision. The K-12 National Standards, PreK Standards, and What They Mean to Music Educators*. Reston, VA: Music Educators National Conference.

Moore, R. S. (1976). Effect of differential teaching techniques on achievement, attitude and teaching skills. *Journal of Research in Music Education, 24*(3), 129-141.

Pence, S. M. (1999). An Analysis of Time use in the choral rehearsals of expert, novice, and student teachers. *Texas Music Educators Association*. 71-78. Retrieved November 9, 2005 from http://www.tmea.org/080_College/Research/Pen1999.pdf.

Price, H. E. (1983). Effect of Conductor Academic Task Presentation, Conductor Reinforcement, and Ensemble Practice on Performers' Music Achievement, Attentiveness, and Attitude, The. *Journal of Research in Music Education, 31*(4), 245-257.

Price, H. E. (1992). Sequential patterns of music instruction and learning to use them. *Journal of Research in Music Education, 40*(1), 14-29.

Price, H. E., & Yarbrough, C. M. (1994). Effect of scripted sequential patterns of instruction in music rehearsals on teaching evaluations by college non-music students. *Bulletin of the Council for Research in Music Education, 119*, 170-178.

R Development Core Team (2008). *R: A language and environment for statistical computing*. R. Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL http://www.R-project.org.

Reimer, B. (1989). *A Philosophy of Music Education*. Second Edition. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Risner, G., Nicholson, J. I., & Webb, B. (2000). *Cognitive levels of questioning demonstrated by new social studies textbooks: What the future holds for elementary students*. Paper presented at the annual meeting of the Mid-south educational research association, Bowling Green, KY, Nov. 15-17, 2000. (ERIC Document Reproduction Service No. ED448108).

Risner, G., Skeel, D., & Nicholson, J. (1992). A closer look at textbooks. *Science and Children, 1*(30), 42-45.

Teachout, D. J. (1997). Preservice and experienced teachers' opinions of skills and behaviors important to successful music teaching. *Journal of Research in Music Education, 45*(1), 41-50.

Thurman, V. L. (1977). A frequency and time description of selected rehearsal behaviors used by five choral conductors. (Doctoral dissertation, University of Illinois, 1977). *Dissertation Abstracts International, 38*(3135A), 765.

Truly (2006), *Truly Digital MP3 Player*. Truly Electronics Manufacturing Limited. http://www.truly.net.

Wagner, M. J., & Strul, E. P. (1979). Comparisons of beginning versus experienced elementary music educators in the use of teaching time. *Journal of Research in Music Education, 27*(2), 113-125.

Watkins, R. C. (1994). Nonperformance time use in high school choral rehearsals: A follow-up study. *Texas Music Educators Association*. 1-6. Retrieved November 9, 2005 from http://www.tmea.org/080_College/Research/Wat1994.pdf.

Witt, A. C. (1986). Use of class time and student attentiveness in secondary instrumental rehearsals. *Journal of Research in Music Education, 34*(1), 34-42.

Yarbrough, C. (1975). Effect of Magnitude of Conductor Behavior on Students in Selected Mixed Choruses. *Journal of Research in Music Education, 23*(2), 134-146.

Yarbrough, C., & Hendel, C. (1993). The effect of sequential patterns on rehearsal evaluations and high school and elementary students. *Journal of Research in Music Education, 41*(3), 246-257.

Yarbrough, C., & Madsen, K. (1998). The evaluation of teaching in choral rehearsals. *Journal of Research in Music Education, 46*(4), 469-481.

Yarbrough, C., & Price, H. (1989). Sequential patterns of instruction in music. *Journal of Research in Music Education, 37*(3), 179-187.

Yarbrough, C., Hendel, C., & Price, H. (1994). The effect of sequential patterns and modes of presentation on the evaluation of music teacher. *Bulletin of the Council for Research in Music Education, 120*(spring), 33-45.

Yarbrough, C., Price, H., & Bowers, J. (1991). The effect of knowledge of research on rehearsal skills and teaching values of experienced teachers. *Update: Applications of Research in Music Education, 9*(2), 17-20.