THE EFFECTS OF TEACHER-DIRECTED VERSUS SELF-REGULATED PRACTICE ROUTINES ON UNDERGRADUATE GROUP PIANO STUDENTS PERFORMING FOUR-PART CHORDAL MUSIC

by

TERRELL BLAKE HOOPER

(Under the Direction of Mary Leglar)

ABSTRACT

The purposes of this study were 1) to determine whether teacher-directed practice routines or self-regulated practice routines are more effective for students learning to play four-part chordal piano music; and 2) to investigate self-regulated practice behaviors of group piano students. Forty-five students enrolled in a third-semester piano class at a large university in the southeastern United States volunteered to participate in the study. Students were randomly assigned to either a self-regulated practice routine (control group, $N = 24$) or a teacher-directed (experimental group, $N = 21$) 12-step sequential practice routine. The study took place over eight class sessions. Pre- and post-tests were recorded during sessions 1 and 8. During sessions 2–7 students in both groups practiced the same four-part chorale; a different chorale was used in each session. Over the treatment period both groups made significant gains, but no significant difference ($p > 0.05$) was found between groups. Practice behaviors of group piano students enrolled in the study were examined using a questionnaire with five sub-scales: Self-Efficacy, Behavior, Motive, Time Management, and Social Influence. Each of the sub-scales was compared to performance gain and the following demographic factors: Gender, Major, Primary

Instrument, and Years of Piano Experience. Within the constraints of the study, higher Time Management scores were found to be positively related to performance gains ($p < 0.05$). Significant relationships also appeared between Self-Efficacy and Years of Piano Experience and between Behavior and Primary Instrument.

INDEX WORDS: Practice; Self-Regulation; Class Piano; Four-Part Chordal Piano Music

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TABLE OF CONTENTS

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER 1

INTRODUCTION

Keyboard competency is traditionally regarded as an essential skill for undergraduate music students (NASM Handbook, 2012-13), and class piano instruction is usually a required part of the curriculum for non-keyboard majors. Colleges and universities in the United States that require students to demonstrate keyboard competency usually adhere to a multi-semester sequence and a culminating piano proficiency exam. Given an established group piano curriculum, students are usually expected to demonstrate keyboard proficiency within the framework of several semesters.

Accomplishing complex piano skills within a short time frame can become a daunting task. When acquainting themselves with the geography of the piano, group piano students can become easily overwhelmed. This is especially true when these students approach such tasks as accompanying, sight-reading, improvisation, and transposition (Timmons, 1980).

Need for the Study

It is well established that practice and persistence are essential to the acquisition of any physical skill. This is particularly true of musical skills; individual practice is recognized as the most prevalent music activity among musicians (Lehmann, Sloboda, & Woody, 2007). However, research on the teacher's role in developing effective practice habits among group piano students is extremely limited, and the topic warrants further exploration (Hanberry, 2004).

Purpose of the Study and Statement of the Problem

The purpose of this study is to provide situated evidence on the effect of guided versus self-regulated practice routines on the success of third-semester class piano students in learning to play four-part chordal music. Therefore, the objectives for this study are: 1) to investigate self-regulated piano practice behaviors of group piano students; and 2) to determine whether teacher-directed practice routines or self-regulated practice routines are more effective in facilitating the ability to play four-part chordal music. Specifically, the following questions guided the study:

1) What is the individual performance gain for students using a teacher-directed practice routine?
2) What is the individual performance gain for students using a self-regulated practice routine?
3) Do class piano students express preference for self-regulated or teacher-directed practice routines?
4) What practice behaviors do students using self-regulated practice routines prefer?
5) Does strong preference for self-regulation correlate with gain in ability to perform four-part chordal music?
6) Does strong self-regulatory preference correlate with: more than two years of keyboard experience; primary instrument; major field of study; gender?

Definitions

1) Effective practice: "that which achieves the desired end product, in as short a time as possible, without interfering negatively with longer-term goals" (Hallam, 1997, p. 181).

2) Piano proficiency: the ability to sightread, harmonize melodies, transpose, and improvise in all meters and keys.
3) Teacher-directed practice routine: a sequence of practice steps determined by the teacher and to be followed as strictly as possible during individual music practice.
4) Self-regulated practice routine: the set of procedures chosen by a music student during individual practice.
5) Self-regulated learning: "the processes whereby learners personally activate and sustain cognitions, affects, and behaviors that are systematically oriented toward the attainment of personal goals" (Zimmerman & Schunk, 2011, p. 1).
6) Self-regulated practice behavior: the self-report measure of a five-dimension questionnaire (developed and validated by Miksza, 2012), including self-efficacy, time, behavior, method, and social factors influencing music practice.
7) Performance achievement: a measure of performance skill as determined by a five-criteria rating scale (validated by Miksza, 2013) with five being a perfect score.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

A comprehensive review of music practice research includes studies by musicians, psychologists, and educators investigating how practice can be made more effective (Barry & Hallam, 2002; Hallam, 1997; Jorgensen, 2004; Jorgensen & Hallam, 2009; McPherson & Zimmerman, 2011). According to Susan Hallam (1997), effective practice refers "to that which achieves the desired end product, in as short a time as possible, without interfering negatively with longer-term goals" (p. 181). Musicians learn how to be effective in their own practice through teacher-directed practice routines or self-directed teaching, known as self-regulated learning. The paucity of research on teacher-directed practice suggests the need for the current study. Contrarily, self-regulated practice, or music practice as an act of self-teaching, has been widely discussed in the research (Jorgensen, 2004) and has been associated with theories of self-regulated learning from the field of educational psychology. Considering the prominence of self-regulated learning in music practice research, two important theoretical frameworks from educational psychology, adapted for music practice research, are discussed and provide a relevant framework for comprehensively reviewing research pertinent to this study.

Teacher-Directed Music Practice

Research on music practice (Miksza, 2011a; Miksza, 2013; McPherson & Zimmerman, 2011) has become increasingly focused on how music teachers influence the instructional

process associated with a student's individual practice. Considering the influence traditionally exerted by teachers on students being trained in western art music, there has been limited research pertaining to the teacher's direct influence on a student's individual music practice (Hallam, 1997; Barry & Hallam, 2002; Jorgensen, 2004; McPherson & Zimmerman, 2011; Miksza, 2011a). Peter Miksza's review of literature on music practice research (2011a) attempts to synthesize and provide an original instructional theory based on extant research pertaining to music practice. Miksza's rationale for an instructional theory, as seen in Figure 1, is to align descriptive theoretical research with practical instruction. To date, however, there has been no further research using the proposed framework as a basis for examining instructional practices associated with music practice.

Hallam's (1997) synthesis of music practice research includes such topics as teachers' encouragement of students, teaching about practice, and the implications associated with teachers as models. However, Hallam cites no studies examining the direct impact of teacher-directed practice routines, as defined by the current study. Since Hallam's synthesis reviews 243 studies, and Miksza (2011a) reviews a total of 119 studies, it may be concluded that research pertaining to the implementation and usefulness of teacher-directed music practice as it pertains to strategies and routines is limited.

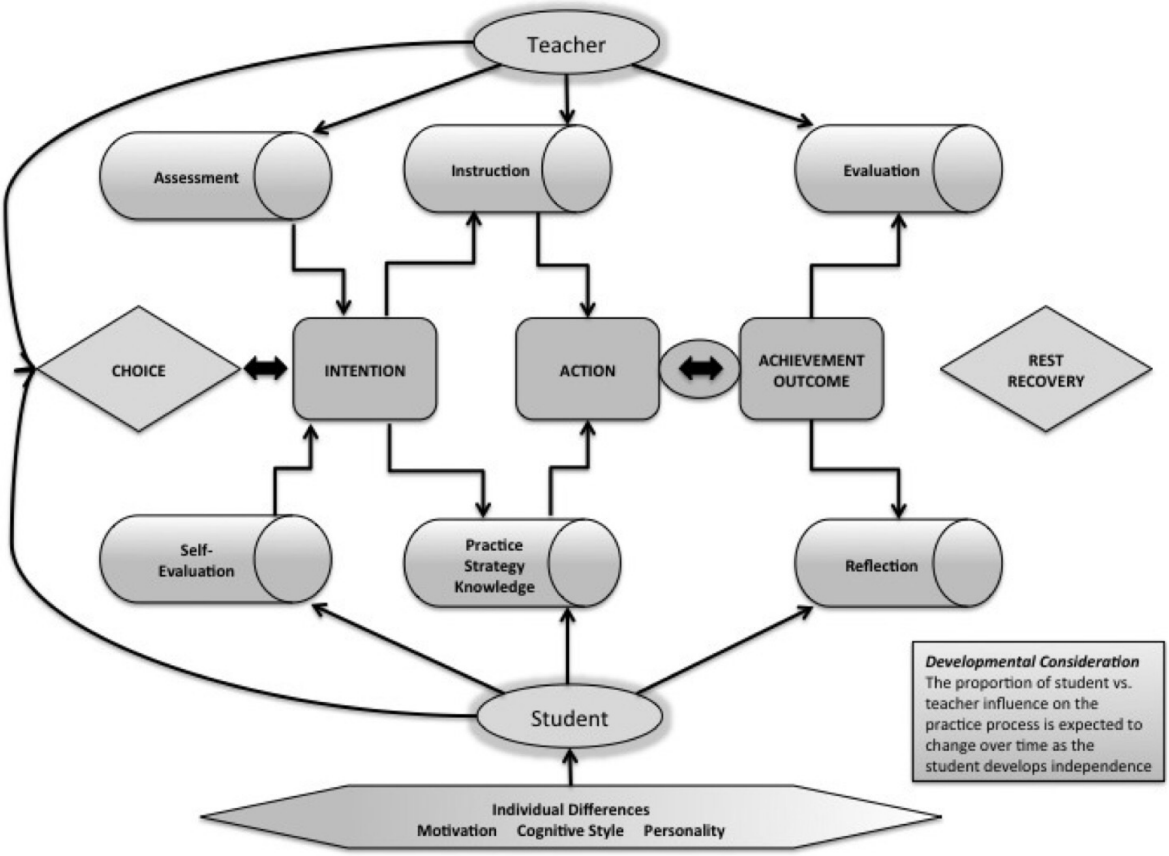

Figure 1. Figural model of an instructional theory for practicing. From "A review of research on practicing: Summary and synthesis of the extant research with implication" by P. Miksza, 2011, Bulletin of the *Council for Research in Music Education*, Vol. 190, p. 83. Copyright 2012 by University of Illinois Press.

Music Practice as Self-Regulated Learning

Self-regulatory learning (self-teaching) is defined as "the processes whereby learners personally activate and sustain cognitions, affects, and behaviors that are systematically oriented toward the attainment of personal goals" (Zimmerman & Schunk, 2011, p. 1). Research on self-regulation was initiated with psychological investigations in self-control and the development of self-regulation in children (Zimmerman, 1989). Although initial studies concerning self-regulation were conducted in therapeutic contexts, research has since transferred the idea of self-

regulated learning to other areas of learning, such as practicing a musical instrument (Zimmerman & Schunk, 2011).

To date, self-regulatory learning encompasses many diverse disciplines and addresses a variety of fields in academia, as well as the development of motor skills (Zimmerman & Schunk, 2011). Specific to music, Gary McPherson & Barry Zimmerman (2011) have addressed self-regulated learning in the context of individual music practice. The chapter contains a framework for studying self-regulatory music learning in the context of social cognitive theory. With a focus primarily on the ways in which music students develop into self-regulated learners, the authors present self-regulated learning as a cyclical process occurring in three phases: forethought, performance/volitional control, and self-reflection.

The relatively new term, "self-regulated learning," resembles aspects of Lev Vygotsky's theories on developing learning skills from a social perspective (McPherson & Zimmerman, 2011). While Vygotsky, Piaget, and many others have proposed theories on the developmental aspects of various skill acquisition, it is important to discuss individual music practice as it relates to the developmental process of self-regulatory skills proposed by McPherson & Zimmerman (2011).

Theoretical Frameworks in Music Practice Research

Research on practicing must consider all components of the learning process: personal aspects of the musician, the task being practiced, and the learning environment. In addition, Hallam (1997) suggests that there are "complex relationships between motivation, goals, self-esteem, attribution of success and failure, learning styles and approaches, level of expertise,

processing strategies, metacognitive strategies, practice strategies and time spent practicing" (p. 217). These are best investigated when attached to a particular learning theory.

There are several prominent practice models in the research literature that have provided approaches to viewing and conducting music practice research (Miksza, 2011). Hallam (1997) and McPherson and Zimmerman (2011) have provided two comprehensive models of learning theories. Hallam (1997) attempted to integrate the 3P (presage-process-product) model of learning proposed by Biggs and Moore (1993), whereas McPherson and Zimmerman (2011) adopted self-regulated learning as the precipice of music practice within the social cognitive learning theory (Bandura, 1986). These two perspectives are both relevant and useful in understanding a plethora of complex relationships in music practice research.

Susan Hallam (1997) completed one of the first significant compilations that attempted to synthesize what is known about music practice research. The majority of research literature (243 references) surrounding music practice is attached to the 3P Model (Biggs & Moore, 1993). Hallam (1997) provides a learning model in the area of music practice research that identifies presage (what the student and the institution bring to the learning experience), process (the educational setting), and product (learning outcome) as the three main phases of practice. By including task requirements between the presage and process phases, Hallam (1997) is able to adapt the 3P Model to fit into the area of music practice. In addition, the proposed model tries to account for all levels of expertise from the beginner to the professional musician. The components of the music practice framework provide both insight into the main characteristic areas of individual music practice and useful information about what is known in music practice research.

By situating music practice research within the social cognitive theory of self-regulated learning, McPherson and Zimmerman (2011) take a different approach than Hallam (1997). While Hallam's model (1997) was broad and inclusive of all music practice research, McPherson and Zimmerman (2011) synthesized the research literature in music practice by aligning with the six psychological dimensions (motive, method, time, behavior, physical environment, and social) associated with Bandura's social cognitive theory (1986) as the main components of self-regulated musical learning (see Table 1). Although the intent of grounding self-regulated musical learning, inclusive of individual music practice, in a social cognitive perspective is noble and provides one of the first attempts to give individual music learning a theoretical framework, it is somewhat sparse in research studies supporting such a framework. By combining the substantial music practice research from Hallam's proposed framework in 1997 and organizing a knowledge of research highlighting the essential components contained in McPherson and Zimmerman's (2011) music practice based on self-regulated learning, a more comprehensive and relevant framework can be used to examine music practice research pertaining to the current study.

A Framework for Studying Relevant Music Practice Research

McPherson and Zimmerman (2011) provide a useful framework for understanding the ways in which musicians are able to develop self-regulatory performance skills. To date, self-regulated learning theory provides a comprehensive perspective on the multifaceted aspects of music practice. McPherson and Zimmerman (2011) propose that self-regulated learning is useful in studying "how learners acquire the tools necessary to monitor and control their own thoughts, emotions, impulses, performance, and attentional resources to improve their performance" (p. 131). The self-regulation needed in learning an instrument does need validation; however,

Table 1 Dimensions of Musical Self-Regulation

Scientific Question	Psychological Dimensions	Socialization Processes	Self-Regulation Processes
Why?	Motive	Vicarious or direct reinforcement by others	Self-set goals, self-reinforcement and self-efficacy
How?	Method	Task strategies are modeled or guided socially	Self-initiated covert images and verbal strategies
When?	Time	Time use is socially planned and managed	Time use is self-planned and managed
What?	Behavior	Performance is socially monitored and evaluated	Performance is self-monitored and evaluated
Where?	Physical environment	Environments are structured by others	Environments are structured by self
With whom?	Social	Help is provided by others	Help is sought personally

Note. Adapted From "Self-Regulation of Musical Learning" by G. E. McPherson and B.J. Zimmerman, 2011, in R. Colwell and P. R. Webster (Eds.), *MENC Handbook of Research on Music Learning*, Vol. 2, p. 164. New York: Oxford University Press. Copyright 2011 by Oxford University Press.

studying self-regulatory processes may provide knowledge about how music students develop into self-regulated learners. This knowledge can then be fully digested and made available to music teachers who want to help their students develop self-regulated learning habits. In an attempt to provide useful information for the latter objective, it is necessary to fully exhaust the literature pertinent to the self-regulation of musical learning. In doing this, a workable framework is necessary to help organize the seemingly convoluted research surrounding self-regulated learning theory and its direct application to developing music performance skills.

The proposed framework is organized in the following paragraphs and divided into two main sections: Pre-stage and Process. The first section, Pre-stage, will present a variety of extrinsic and intrinsic factors that influence music practice. The second section, Process, discusses music practice research related to the hierarchical structure of regulated skill

development and the cyclical process of self-regulated learning (McPherson & Zimmerman, 2011).

Pre-stage

The Practicing Musician. The performing musician, whether professional or novice, is at some point faced with the challenge of learning the necessary skills to play his or her instrument. The ways in which musicians achieve expertise is central to the issue, and, as a result, a considerable amount of energy within the past 30 years has been concerned with the practicing musician (Jorgensen & Hallam, 2009). Before discussing the practicing processes of musicians, it is necessary to examine what research has to say about why musical expertise and learning style affect the practicing musician.

The level of musical expertise a musician has obtained will inevitably shape and guide individual practice (Jorgensen, 2004). However, the achievement of expertise in music performance is primarily concerned with the individual and the musical task being practiced. Although expertise in any field of study is determined by a multitude of factors, musical expertise is relevant to the many dimensions within music practice research. Research on achieving music expertise has been primarily concerned with the performing musician and the skills required of a professional performing musician. Research studies abound in resourcefulness and in the investigation of how musical growth happens (Bloom, 1985; Harnischmacher, 1995; Manturzewska, 1990; Sosniak, 1985). Current research concludes that factors such as parental support and home environments are extremely important in the initial stages of music development and have the ability to impact the likelihood of students practicing their given instruments (McPherson & Zimmerman, 2011). Other studies have not necessarily

been concerned with the holistic development of musical expertise, but have instead chosen to concentrate on music performance skills and how those skills are acquired. For example, McPherson (1995) delineates music performance skills as sight-reading, performing from rehearsed music, playing from memory, playing by ear, and improvising. In the research study on high school instrumental students, McPherson (1995) found higher correlations between playing by ear and improvising and lower correlations between improvisation and performing rehearsed music. The research from the study suggests music skills, such as improvisation and performing rehearsed music, are learned independently of one another and do not necessarily improve without specific attention to a particular skill.

Just as musical expertise is congruent with musical skill development, so too is the manner in which the music learner shapes his or her practice session congruent with various learning styles. Music practice researchers concerned with identifying various learning styles have investigated how novice and professional musicians approach learning inside individual practice. Barry (1992) examined the effects of field independent, dependent cognitive styles, and gender upon instrumental performance achievement in structured versus free practice of novice musicians. Results found structured practice to be more effective than free practice in regard to performance achievement. In addition, significant interactions were observed in rhythmic accuracy: gender x practice condition, with females more successful than males during free practice, and cognitive style x gender x practice condition, with field dependent males performing at the lowest level. Other studies on learning styles of novice musicians, such as studies done by Cantwell and Millard (1994), examined the practice habits of adolescent instrumental students who were selected based on scores on a learning process questionnaire (Biggs, 1987) and subsequently labeled either deep level learners or surface level learners. The

study concluded that surface level learners, who practiced using rote learning, sought external sources for help, whereas deep level learners defined the musical task using musical, as opposed to technical terms, and understood the technical abilities needed for achieving success while practicing.

Music practice research on learning styles and the practicing professional musician has been conducted by Hallam (1992, 1995a, 1995b); Ghent (1989); McLaughlin (1985); and Miklaszewski (1995). It is important to consider the research by Hallam (1992, 1995a, 1995b), as it relates to the study by Cantwell and Millard (1994). Hallam (1992, 1995a, 1995b) studied 22 professional musicians and observed substantial differences in practice orientation, detailed practice, and interpretation; however, Hallam describes the processes between deep and surface level learning in music as very complex relationships. She goes on to explain how some musical tasks, such as difficult technical passages, are oftentimes accomplished through rote learning (Hallam, 1997). The issue Hallam proposes with categorizing music learners as surface or deep level learners, with regard to observed behavior during a practice session, can be ambiguous. On the other hand, the process of music practice, discussed latter in this chapter, is mostly concerned with how students practice apart from what several researchers highlight as distinct learning styles. Although there is little research to determine learning styles and music practice organization, the research suggests learning style is an important factor in how a musician decides to practice his or her instrument.

The Practice Environment. As Zimmerman (1998) states, self-regulated learners intuitively know that their physical environment affects their learning, which consequently leads them to seek structuring or organizational techniques that optimize their learning (McPherson & Zimmerman,

2011). In relation to music practice research, external sources such as learning environments, can have an impact on the amount of time a student spends practicing. For instance, Jorgensen (1997) examined relationships between practice time, practice constraints, and institutional factors reported by students attending the Norwegian State Academy of Music. Results indicated that instrumental students practiced more as a result of the institution valuing high instrumental standards. To date, research concerned with the practice environment and the control of the environment is fragmented and lacks generalizable results; however, limited research is presented on how teachers, peers, and practice space have an impact on music practice habits. Learning a musical instrument is often accomplished through one on one interaction between a student and a teacher. On the other hand, music instructional environments, such as master classes and group class instruction, provide an easy approach for students to interact and learn from their peers. Whether interactions happen between music students and their peers or their teachers, it would be naive to think environmental interactions do not affect a student's success at learning a musical instrument within the confines of individual practice. For instance, research by Rexroad (1985), Sloboda and Howe (1991), and Sosniak (1985) all note the impact a first teacher who provides a source of encouragement to practice has on the trajectory of a student's musical development. Additionally, Hallam (1983) found girls to be influenced to practice by both parents and teachers, while boys were influenced by their peers. Hallam (1997) concludes her research by stating that self-determination is the only true indicator of practicing.

The practice space a musician chooses is sometimes dependent on the instrument; however, the manner in which a space is organized can contribute to successful and focused practice. Much to the dismay of several researchers, Geringer and Kostka (1984) found college students to exaggerate actual practice room behaviors. This overestimation of actual practice

behavior among college students was found by examining self-reported versus actual use of practice time. Results indicated that college students spend a total of 28% of practice time in other activities not associated with practice, such as 10% in getting ready and 18% in off-task activities (Geringer & Kostka, 1984). Geringer and Kostka (1984) give evidence that musicians do spend time during a given practice session to organize the practice space in a way that is suitable for practicing.

Practice Attitudes. Many factors contribute to success in the music practice room; however, the attitudes surrounding practice are influential factors in helping students develop self-regulated learning skills. The sub-processes associated with this inner motivation fall into the categories of self-motivation, self-belief, and self-efficacy (Zimmerman & McPherson, 2011). Investigating areas such as these can help explain why some students continue to practice and some students give up on practice. Considering how self-motivation, self-belief, and self-efficacy are related to music practice is of interest as it helps music teachers determine how better to give students the necessary encouragement and practice tools so that success is achieved in individual music practice.

It is useful to explore the many contrasting viewpoints associated with music practice (Kostka, 2002; Barry, 1991). Kostka (2002) studied attitudes toward music practice in college teachers and students. Kostka administered a questionnaire to college teachers and students who played a variety of music instruments. The questionnaire asked students and teachers to describe their attitude about practicing as tedious but necessary, relaxing, challenging, or fulfilling. Of the 134 music majors and 127 teachers who answered the questionnaire, the greatest number of students described practice as challenging, and teachers as fulfilling (Kostka, 2002). The study

illuminates the fact that this population of students sought the challenge of practice to help motivate themselves to practice, whereas teachers sought satisfaction as a motivating factor. A study similar to Kostkas's study (2002) is a small survey conducted by Nancy Barry (1991). Barry found general attitudes about practice to be generally positive among both students and professionals (1991). However, a cross-tabulation revealed significant differences between students and professionals, with students giving more positive results. Barry's findings are extremely limited because of a small population size and possible external contributing factors. On the other hand, the study helps explain the intuitive assumptions that successful music students usually demonstrate a degree of enjoyment toward practicing. However, professionals would see practice as a necessity for performances to provide a high level of self-satisfaction.

Practice attitude is no doubt a contributing factor to music success, even if it is seen as necessary and not particularly enjoyable. As explained in the sub-processes of self-regulated learning, self-motivation, self-belief, and self-efficacy are intrinsically tied to why students continue to practice in the midst of continuous challenges (McPherson & Zimmerman, 2011). Although attitude toward music practice can be extrinsically motivated by peers or teachers, intrinsic motivation to practice is sometimes determined not by a student's innate ability but rather by his or her inner determination to work harder (O'Neil, 1997). It is important to always consider the person, environment, and attitude and how each of these areas contributes to the pre-stage aspect of learning inside individual music practice.

Process

The process of music practice, as defined by Hallam (1997), refers to the "complex relationships between motivation, goals, self-esteem, attribution of success and failure, learning

styles and approaches, level of expertise, processing strategies, metacognitive strategies, practice strategies and time spent practicing" (Hallam, 1997, p. 217). Music practice research has also focused on these processes. A primary objective of this review is to connect performance skill development with a useful theoretical model for reviewing relevant research related to the process of music practice. In line with this objective, McPherson and Zimmerman (2011) provide a model attempting to create a structure inclusive of learning complex skills and not based on maturation (see Table 2). The model is hierarchical rather than cyclical. This model for skill development within the domain of music proposes that a novice music student would progress in self-regulated learning tendencies provided he or she receives effective teaching, social modeling, task structuring, and encouragement (Schunk & Zimmerman, 2003). Applying a learning theory, such as social cognitive theory, holds potential for developing self-regulatory skill as well as encouraging further research on music practice. However, to date there is relatively little research in music practice research using such a framework (McPherson & Zimmerman, 2011). Although research is needed for further expanding the model shown in Table 2, the current study is relevant to the final process of the hierarchy, self-regulated learning, and the potential it has to help further research in the area of group piano instruction. Because the current study focuses on self-regulated learning, the following discussion will cite only relevant music practice research and will be structured according to the three cyclical phases of self-regulated learning: forethought, performance control, and self-reflection (see Figure 2). Since many current music practice researchers (McPherson & Renwick, 2011) have fully embraced a social cognitive perspective on self-regulated learning, little research exists using the theoretical perspective. Considering the limitations, the researcher intends to present studies that align with the three cyclical phases of self-regulated learning, even though research studies discussed are

not necessarily representative of a particular theoretical perspective, provided that the methodology and results lead to a deeper understanding of self-regulation.

Table 2. Developmental Levels of Regulatory Skill

Level of Development	Description	Social Influences	Self Influences
Observational	Vicarious induction of a skill from a proficient model	Models Verbal description	
Emulative	Imitative performance of general pattern or style of a model's skills with social assistance	Social guidance Feedback	
Self-Controlled	Independent display of the model's skill under structured conditions		Internal standards Self-Reinforcement
Self-Regulated	Adaptive use of skill across changing personal and environmental conditions		Self-regulatory processes Self-Efficacy beliefs

Note. Adapted From "Self-Regulation of Musical Learning" by G. E. McPherson and B.J. Zimmerman, 2011, in R. Colwell and P. R. Webster (Eds.), *MENC Handbook of Research on Music Learning*, Vol. 2, p. 164. New York: Oxford University Press. Copyright 2011 by Oxford University Press.

Forethought Phase. The first cyclical phase of self-regulated learning, forethought, is defined as the thought processes and personal beliefs a person engages before setting out to accomplish a given task (Jorgensen, 2004). Forethought, according to McPherson and Zimmerman (2011), includes task analysis and self-motivational beliefs. These two categories of forethought (task analysis and self-motivation) have been examined with studies relating to music practice (Zimmerman & Schunk, 2011). Music practice research pertaining to forethought has included studies on goal setting (McPherson, 2005), as well as self-efficacy, outcome expectations, task valuing, and goal orientations (McCormick & McPherson, 2003; McPherson & McCormick, 2000 & 2006; Nielsen, 2008; Renwick & McPherson, 2002). Although all of the sub-processes

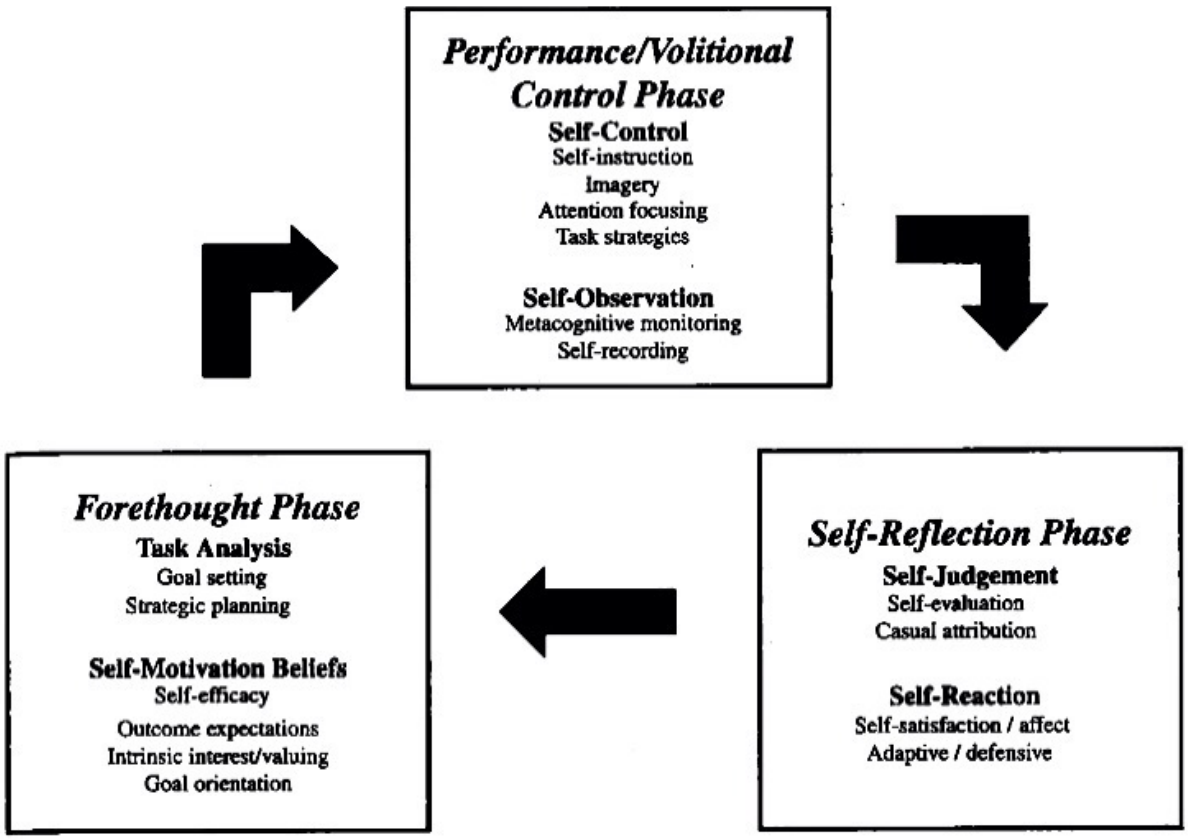

Figure 2. Phases and subprocesses of self-regulation. From "Motivating Self-Regulated Problem Solvers" by B.J. Zimmerman and M. Campillo, 2003, in J.E. Davidson and R.J. Sternberg (Eds.), *The Nature of Problem Solving*, p. 239. New York: Cambridge University Press. Copyright 2003 by Cambridge University Press

of forethought are valid in music practice research, categories important to the current study include practice planning, goal setting, and self-efficacy.

According to a survey of undergraduate music education majors, three-fourths of students reported following a structured approach to practice (Hanberry, 2004). However, structured practice could have been confused with the rote routine of playing through a piece or practicing for a set amount of time. Music practice research (Barry, 1992, 2003; DeNicola, 1990; Hanberry, 2004) confirms that practice is effective only when organized and structured in a logical and efficient manner (Hanberry, 2004). Most studies relevant to the structuring and planning of individual practice prescribe a selected routine or practice sequence (Barry, 1992; DeNicola,

1990; and Pedrick, 1998), with results confirming the benefits of having a structured practice agenda.

Teacher/researcher-structured practice agendas are contrary to the idea of self-regulated learning because they do not allow students to structure or plan according to their own knowledge, skills, or intuition. Music practice research centered on studying how student's structure their own practice time has helped enlighten students' thought processes in the planning of practice. In an effort to understand how expert musicians practice, research has focused on observing and interviewing novice and professional musicians. Attempting to understand how music students practice, Hallam (1992) interviewed and recorded 55 novice string players practicing. Hallam (1992) found that the more advanced students were more organized in their practice and demonstrated a considerable amount of task planning in their recorded practice sessions.

With regard to professional musicians, Manturzewska (1969) found a disparity in how high- and low-achieving professional pianists organized practice time (Hallam, 1997). Hallam (1992) found diversity in the way professional musicians organized practice time. Of the 22 interviewees, five reported being organized; seven lacked organization skills and used various techniques such as practice agendas to obtain more organization; and ten reported being moderately organized (Hallam, 1992). As reported (Manturzewska, 1969; Hallam, 1992, 1997), practice planning and structuring is important to achieving success in the practice room. Equally important, however, is the fact that self-regulated learners, reported by Zimmerman (2011) exhibit planning and structuring habits within their practice session so that the self-regulated musician may set long term and short term goals and proceed in musical practice with a clear direction.

Goal setting within domains such as music practice allows students to feel confident in their ability and learning effort, and encourages them to maintain a persistent work ethic in difficulty (McPherson & Zimmerman, 2011). In essence, the main objective of setting goals in individual music practice is to help the musician take larger, unobtainable goals and prioritize small, more manageable goals contained in the larger goal (McPherson & Zimmerman, 2011). Goal oriented practice is important in achieving a degree of success with music practice (Barry & Hallam, 2002; Barry & McArthur, 1994; & Brandstrom, 1995). According to a survey of applied music teachers (Barry & McArthur, 1994), 70% of the respondents reported "always" or "almost always" asking students to set their own practice goals, but 51% stated that they "rarely" or "never" required students to maintain a written record of practice objectives. Barry and McArthur (1994) provide evidence that a majority of applied music teachers are using goal setting strategies, although a gap exists between instructing students to set goals and actually requiring them to demonstrate self-formulated goals in applied music lessons.

Research by Brandstrom (1995) helps bridge the gap between teachers encouraging students to set practice goals versus students setting practice goals and acting on them. Brandstrom focused on trying to understand how students learn to play the piano. As a result, the action research study involved 53 college students enrolled in a Swedish university setting self-formulated goals and engaging in self-determined activities and self-evaluation for learning to play the piano. The results of the study indicated that three-fourths of the students participating in the research study reported a positive or very positive attitude toward the study as a whole. Although not made apparent, Brandstrom's methodology aligns with self-regulated learning theory because students were given opportunities to self-determine goals, activities, and evaluation for learning to play the piano. The results may suggest that students with high levels

of self-regulated learning tendencies were able to demonstrate independence and an ability to plan, which would affect participants' beliefs about improving as a pianist and reporting a more positive attitude toward the study (Brandstrom, 1995). In turn, setting goals within individual practice has an effect on the level of self-efficacy demonstrated toward a particular performance task (McPherson & Zimmerman, 2011).

Self-efficacy impacts self-regulated learning: students believe "in their own abilities because they adopt hierarchical process goals that are personally satisfying and see these as milestones in a lifelong mastery process" (McPherson & Zimmerman, 2011, p. 160). The relationship between self-efficacy and self-regulated learning is paramount in how a music learner will begin to plan, structure, and set goals for his or her practice sessions. Self-efficacy in music practice is not any different from other performance-related domains in that "the more capable people believe themselves to be, the higher the goals they set for themselves and the more firmly committed they remain to those goals" (Zimmerman, 2000, p. 18). In music practice, a musical learner who believes that he or she can complete the musical task being practiced is more likely to proceed with a practice plan, goal-setting, and persistence.

Performance Control Phase. The second phase of self-regulated learning, known as performance or volition control, is the process that affects concentration and performance (Jorgensen, 2004). As seen in figure 2, the two primary areas contained within the performance phase are self-control and self-observation (McPherson & Zimmerman, 2011). According to McPherson and Renwick (2011), self-observation in music practice is focused on how musicians monitor or mentally track a given performance. Self-observation is a complex interaction, especially as a musician progresses in skill development and intentional monitoring of a particular motor skill

becomes more or less automatic (McPherson & Zimmerman, 2011). Green (1986) stresses the importance of limiting this type of metacognitive monitoring in performance situations because too much monitoring can cause interference and disrupt a musician's performance. Self-observation in relation to the performance phase of self-regulated learning focuses on the feedback and self-monitoring occurring during a music performance in practice and in an actual performance. However, due to the small amount of research on self-observation during music performance and its tenuous relationship to practice, it is only useful to mention self-observation as the initial process in performance control, as the musician begins to develop self-control in determining appropriate strategies for learning a new piece or correcting a faulty performance during the practice process.

Self-control is a crucial aspect of self-regulated learning and could be considered the most important aspect of the practice process. According to McPherson and Renwick (2011), "self-control processes help musicians focus on their performance and what they are playing because they help optimize their efforts through such means as self-instruction, imagery, attention focusing, and task strategies" (p. 241). According to Jorgensen (2004), the aspect of self-control can also be viewed as the executive phase of practice, whereby the performer has to implement useful mental, cognitive, and psychomotor strategies for engaging in efficient and effective independent music practice. Relating the self-control process of practice to the amount of music practice research taken place in the past 30 years (Jorgensen & Hallam, 2009), it is readily apparent how much of the research focused on music practice has centered on strategy use and its application with varying levels, as well as expert musicians (Hallam, 1997). With this understanding, important aspects of the self-control process of self-regulated learning, such as

self-instruction and task strategies, can be examined, as these topics have direct relevance to the current research study.

As a musician begins to learn how to play an instrument or sing, self-instruction is inevitable. As expertise develops, so does the ability to assess, monitor, and direct attention to problematic areas found within a given music practice session. Research investigating musicians who are engaged in self-instruction and how it fits into the self-control process of self-regulated learning is exemplified in studies by Siw Nielsen (1997, 2001, 2008). Nielsen, a Norwegian music educator, was the first person to earn a doctorate investigating how students practice; her findings were in alignment with a self-regulated theoretical perspective. Nielsen's research (2001) has since complemented and provided validity to each of the phases included in self-regulated learning (see Figure 2 on p. 19); however, her 1997 study provided insight into the learning strategies involved with self-regulatory learning. Nielsen's research is qualitative in that she is observing (overtly and covertly) how music students address problems during practice and how various learning strategies are used to solve the technical or expressive problematic areas found in the music. For example, Nielsen (2001) provides an in-depth case study analysis of two advanced conservatory organ students practicing. The results of the study found the two students to exemplify self-regulatory skills in their practice and provided evidence for using self-regulated learning theory as a framework for helping music students develop habits that allow deliberate practice to take place. The learning strategies Nielsen addresses in her research (1997, 2001, 2008) center on the self-instruction aspects of music practice. Nielsen (2001) states, "self-instruction involves overtly or covertly describing how to proceed as one executes a task" (p. 160). Nielsen (2001) video recorded students and observed verbal, as well as non-verbal behavior as students addressed problematic areas within their practice. As a result, Nielsen

provides a flow chart for helping understand how her two organ students progressed appropriately when encountered with either a technical or expressive problem during practice (see Figure 3). Nielsen clearly points to self-guiding instructions as being important for "concentrating one's attention, following each step of a strategy, and praising oneself to sustain motivation" (p. 160). As seen in the research by Nielsen, self-instruction does not follow a set formula; however, the act of assessing, monitoring, and actively addressing one's attention is an integral habit of music students who have developed self-regulated skills.

As discussed in the self-instruction section, various learning strategies and the use of different task strategies are important in helping achieve efficient practice. The word "strategy," however, is ambiguous and needs defining. Strategy, according to Schneider and Weinert (1990) refers to "the goal-directed or purposeful processes, originally consciously applied, but normally undergoing automatization as a result of development and practice" (Hallam, 1997, p. 200). According to Hallam (1997), the primary long-term goal of practice is to enable "complex, physical, cognitive, and musical skills to be performed fluently with relatively little conscious cognitive control" (p. 200). Given the definition of strategy and the fact that the overall long-term goal of practice is automatization, it is easy to realize how conscious strategy use helps eventually develop practice and performance skills with complete automaticity. Music practice research concerned with the use of task strategies (Barry & Hallam, 2002; Miksza, 2007; Gruson, 1988; Miklaszewski, 1989) has confirmed what is intuitive: that is as expertise grows, according to Chaffin and Logan (2006), so does the ability to utilize strategies in a "highly more systematic and flexible, but also automatic, manner" (McPherson & Renwick, 2011). Although research sometimes illuminates the obvious, it is particularly relevant to investigate current studies that have yielded positive results from certain strategies employed during music practice.

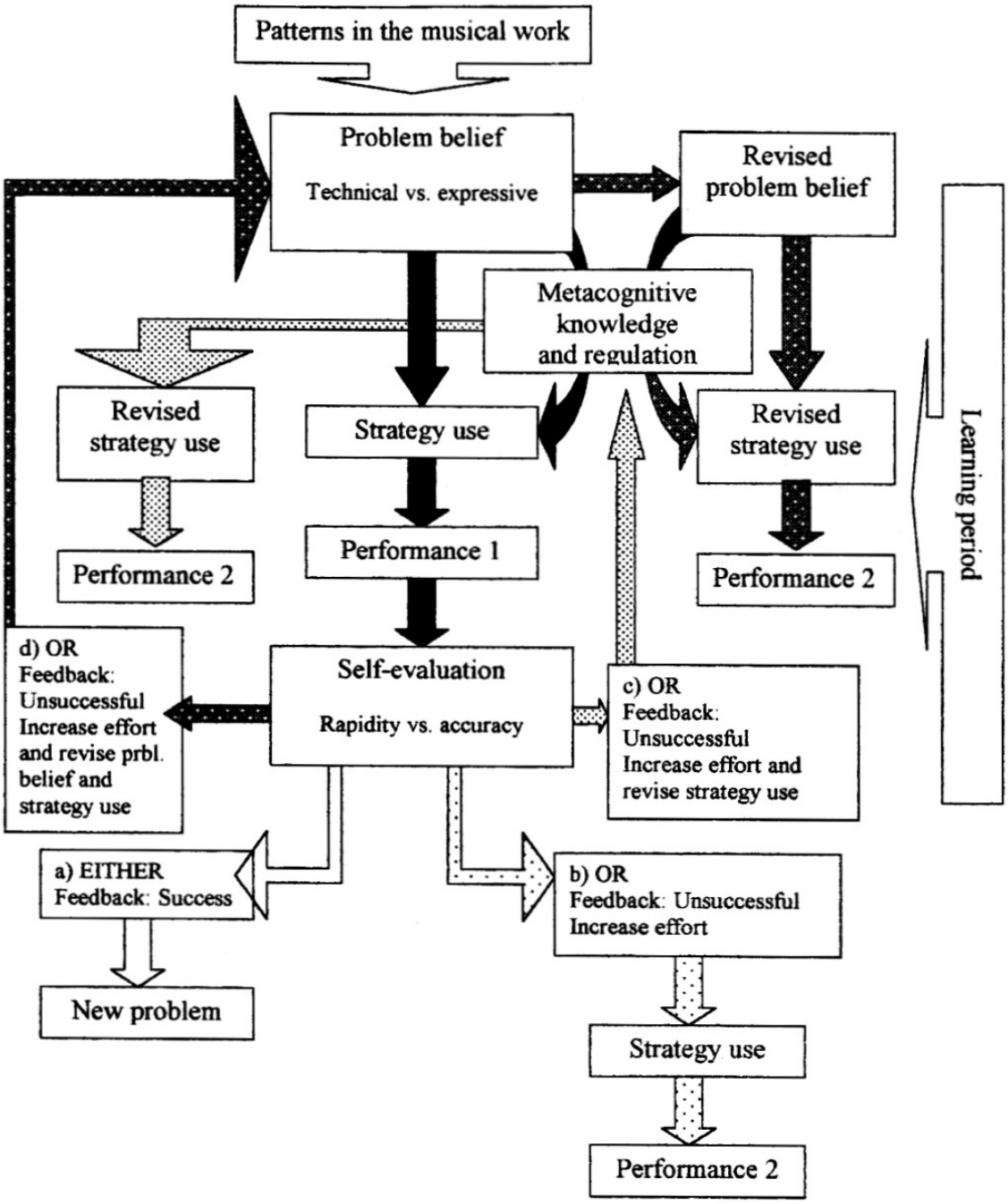

Figure 3. Cyclic self-regulation of learning strategies during practice, showing the basic first step and all four alternative problem-solving activities to follow it. From Self-regulating learning strategies in instrumental music practice. By S. Nielson (2001) in *Music Education Research, 2*(2), 155-167. Copyright 2001 by Carfax Publishing.

For example, Miksza (2007) reports that the most common practice behaviors in high school wind players are repeat measure, repeat section, and mark part. Practice behaviors such as repeat section, whole-part-whole, and slowing were found to have a positive relationship on

performance achievement. While studies such as Miksza's (2007) help substantiate the positive use of strategies, it is important to realize that a strategy is only one of the many ways a self-regulated music student can decide to practice. As stated above, level of musical expertise is a factor in students choosing efficient practice strategies (Barry & Hallam, 2002) and is associated with self-regulated learning tendencies, but self-regulated learning is a process, whereby students can develop and grow as expertise and independence coexist.

Self-Reflection Phase. As reported by McPherson and Renwick (2011), self-reflection occurs in four distinct ways: self-evaluation, causal attributions, self-satisfaction/affect, and adaptivity. Considering a musical performance or music practice session, the musician involved is likely to engage in some type of self-evaluation. As a result the musician evaluates the given performance in relation to progress, other performances, or feedback (McPherson & Renwick, 2011). The perceived success or failure of the particular performance or practice session can be attributed to either a lack of ability or effort; however, according to Zimmerman (2000) the latter allows the musician to improve and face difficult circumstances while still obtaining a degree of satisfaction. Self-satisfaction, as reported by Zimmerman (2000), "is the means by which people give direction to their actions and create self-incentives to persist in their efforts. Thus, a person's motivation does not stem from the goals themselves, but rather from self-evaluative reactions to behavioral outcomes" (McPherson & Zimmerman, 2011, p. 243). Renwick (2008) reports how a saxophonist demonstrated intrinsic motivation as he made reference to the actual satisfaction received from success within a given practice session. Finally, as the musician evaluates effort, adaptive or defensive inferences can be harnessed as a result of perceived effort. As a musician adopts adaptive inferences after a performance or practice session, it is likely that he or she will

find other ways to continue progressing in self-regulated learning tendencies (McPherson & Renwick, 2011). On the other hand, if defensive inferences are adopted, there is a tendency toward procrastination, task avoidance, and overall apathy about wanting to improve (McPherson & Renwick, 2011).

As self-reflection is seen as the third phase of the cyclical process of self-regulatory learning theory, it is vitally important to emphasize how self-reflection directly affects forethought and thus impacts the cycle of self-regulation (McPherson & Zimmerman, 2011). For example, as a music student garners more self-satisfaction from success experienced from a performance or individual practice session, there is a direct impact on the student's Self-Efficacy in mastering new and challenging repertoire (McPherson & Renwick, 2011). The cycle of self-regulation is constantly changing and being expanded as a musician increases in expertise, but understanding such a framework can prove useful to the music teacher wanting to better guide the music student to a path of self-regulated musical success.

Summary

The current analysis of music practice research is congruent with McPherson and Zimmerman's (2011) model of self-regulatory learning. The in-depth analysis of the literature helps substantiate the fact that a musician with expertise in music performance skills does demonstrate a great deal of self-regulation when practicing. When considering the research questions of the current study, it is readily apparent how self-regulatory learning and music practice are the two main tenets of the research study and have provided the backbone to the current review of literature. As mentioned previously, the proposed framework for looking at music practice and self-regulated learning theory includes the pre-stage and the processes of

music practice. Held within the pre-stage, the practicing musician, practice environment, and practice attitude is addressed in regards to relevant music practice research. Pre-stage is important to consider in terms of the current study and the group piano student. The group piano student in the study is a college music major enrolled in a group piano class in order to obtain a level of proficiency in his or her keyboard skills. The practicing musician, in this case, is learning a secondary instrument, and attitude is affected by the fact the student is required to take group piano class. On the other hand, the environment of the practicing musician, or the group piano student, is especially pertinent to McPherson and Zimmerman's model of self-regulated learning and social cognitive theory because of the social interactions between group piano students and the teacher. The piano lab and group piano students fit nicely into the framework of socialization processes involved in Zimmerman's self-regulated learning theory, and this helps us better understand how a student enrolled in group piano can develop self-regulated behaviors associated with practicing the piano.

Continuing with the second element of the proposed framework and its direct impact on the group piano student, the process of music practice is divided into the three phases of self-regulation: forethought, performance control, and self-reflection. The three phases of self-regulation provide a nice framework for organizing music practice research relating to each of the three phases, but when considering how to make the theoretical model a reality for group piano students, it is ever so difficult in that there is a need for evaluating self-regulated learning tendencies. Realizing this importance, Miksza (2012) developed a questionnaire centered on five of the six psychological dimensions in Bandura's (1986) social cognitive theory. In wanting to better understand the process of practice from a self-regulatory perspective, Miksza's questionnaire serves best to better inform the group piano class instructor what areas the student

is self-regulated and in other areas he or she is struggling. As Hallam (1997) concludes in a review of music practice research, the practice process contains many "complex interactions" and as a result no one thing is indicative of successful practice. With regards to the current research study, a practice agenda, whether pre-planned sequential or self-selected, can be viewed as an important aspect within the process of music practice. While research studies (Barry, 1992; Cremaschi, 2012; DeNicola, 1990) have dealt with organizational aspects of music practice, finding practice to be most effective and efficient when organized and structured, it is important to continually investigate music practice research within theoretical models, such as self-regulated learning. Given the fact self-regulated learning theory has made its way into music practice, to date, there are still relatively few research studies implementing this model when exploring the process of music practice (Miksza, 2013). The need for future studies in music practice could be considered pedantic, considering the wealth of information in the research field already, however, empirical studies on music practice research situated within self-regulated learning theory, is not as prominent and further guidance is needed in helping teachers provide research driven advice for helping students progress within their own music practice.

CHAPTER 3

METHODOLOGY

Participants. Subjects for the study consisted of approximately 48 music majors enrolled in third-semester piano classes at a large university in the southeastern United States. The students, enrolled in separate sections of group piano, were asked to voluntarily participate in a four-week study investigating the effect of using sequential (teacher-directed) versus self-regulated practice routines. The recruitment statement is found in Appendix F.

Time Requirement. To determine approximate times for data retrieval, a procedural trial run was administered before the study began (See Appendix E). Upon consulting the procedural trial run, two hours of class time was allotted for the study: 30 minutes for pre-test/post-test practice and performance, and six monitored 15-minute practice sessions. Using five different intact classes, a total of eight instructional class periods were devoted to the study.

Materials. The study took place in a classroom containing 12 student piano stations, each equipped with a Yamaha Clavinova digital piano, headphones, music rack, an iMac computer and a teacher workstation at the front of the room containing a Macintosh computer, a Yamaha Clavinova digital piano, and a control board for the student pianos. Display capability included an overhead projector with screen and a dry-erase board.

Music. Music used in the pre-test/post-test and all six practice sessions was chosen and approved by the group piano coordinator. The music chosen was consistent with the selected piano class curriculum. Due to instructional time constraints within each piano class, the four-part chordal music was adapted to only four measures for the practice sessions and eight measures for the pre-test and post-test.

Classroom Environment. Instructors for each of the five piano lab sections were present for all eight sessions and were vetted by the piano lab coordinator before the study. Each piano lab instructor was instructed to adhere to the script reproduced in Appendix F for the entire study. The piano lab instructors only monitored the students during the entire study. The researcher was removed from the entire study.

Design and Measures

The study used a pre-test/post-test experimental design.

Pre-test/Post-test. The pre-test was administered during the initial day of the research study. Subjects were given ten minutes to practice a four-part chordal piano selection using a practice strategy of choice. At the conclusion of the practice interval, students recorded their performances of the selection. Based on the 5-point performance achievement rating criteria (see Appendix A), pre-test recordings were rated by three judges with advanced degrees in music**.** Each of the 8 measures was rated individually, giving a composite score ranging from 5 to 40. The post-test was administered during the final day of the research study where students

performed/recorded the same music selection given under pre-test conditions. The same three judges, using the same assessment criteria, evaluated the performances.

Questionnaire. To determine self-regulated learning tendencies, a questionnaire (Miksza, 2012) was administered on the initial and final days of the study. After agreeing to participate in the study via signed consent form (Appendix G), students logged on to the iMac computers found at their individual piano stations and completed the questionnaire via Google forms (See Appendix B). Each student completed the form using a designated identification code. The provided code was used throughout the entire study and gave anonymity to each participant. The data from the questionnaire was compiled in a secure spreadsheet by the researcher.

Experiment. Students were randomly assigned to experimental and control groups in each of five intact piano classes, resulting in 24 members in each group. Random assignment was conducted by the researcher by assigning to each student email address a number drawn at random. Over the course of three weeks, six 15-minute practice sessions were conducted during the regularly scheduled class piano periods. At the beginning of each session, students received a practice log via Google Forms with musical score and practice directions. Students in the control group were instructed to practice without interruption for a total of 15 minutes using any routine they deem appropriate (see Appendix D); students in the experimental group were instructed to follow a pre-determined step-by-step sequential practice plan (see Appendix C). The sequential practice plan was adopted from a previous experiemental study conducted by DeNicola (1990). At the end of each practice session, students recorded a performance of the selected score and

responded to reflective questions on the answer template. A different four-part chordal selection was used in each of the 15-minute practice sessions over the four-week period.

Data Retrieval. Data were retrieved using email, Garageband, and Google Forms. The entire study was administered electronically using Google Forms. Subjects in both experimental and control groups were sent a link to a Google form via their university email address. Subjects followed instructions contained within the form and submitted the form after each of the eight sessions. In addition to using Google Forms, subjects recorded themselves during each of the eight sessions using Garageband. The Garageband file was then zipped and emailed as an attachment to the researcher using the subject's university email address. The recording process was trial tested with all students before the study began. An explanatory video was recorded by the researcher to provide to consistency among the five sections of piano labs and to make sure no issues arose as a result of students recording each performance and sending the file via email.

CHAPTER 4

RESULTS

Research Objective

The primary objectives of the research study were to investigate self-regulated piano practice behaviors of group piano students enrolled in a third semester piano class and to determine whether teacher-directed practice routines or self-regulated practice routines are more effective in facilitating the ability to play four-part chordal music. The following research questions will be used to outline the results obtained from the research study.

- What is the individual performance gain for students using a teacher-directed practice routine?
- What is the individual performance gain for students using a self-regulated practice routine?
- Do class piano students express preference for self-regulated or teacher-directed practice routines?
- What practice strategies do students using self-regulated practice routines prefer?
- Does strong preference for self-regulation correlate with gain in ability to perform four-part chordal music?
- Does strong self-regulatory preference correlate with: more than two years of keyboard experience; primary instrument; major field of study; gender?

Participants

The study was administered to third-semester piano classes at a large state university in the southeastern United States. Forty-eight students in the five sections of third-semester piano class voluntarily participated in the four-week study (eight sessions). Of the original 48 students, only 45 were used in analysis. Of the three removed from the analysis, one did not participate in the post-test and the other two missed at least half of the six practice sessions.

Descriptive Statistics. In the questionnaire, students were asked questions regarding demographic information and the results are provided in the following analysis.

Gender. Included in the study were 45 students, 24 females and 21 males. Table 3 provides gender distribution in each group. The control group had 24 students; the experimental group had 21. Although the percentage of females is greater in the control group, the difference is not large.

Table 3. Participants by Group and Gender

Gender	Control	Experimental	Total
Female	14 58.33%	10 47.62%	24 53.33%
Male	10 41.67%	11 52.38%	21 46.67%
Total	24	21	45

Major. The distribution of students in each group by major is seen in Table 4. Music education is the most popular major, followed by performance, other, and then music therapy. A lower percentage of music education students was found within the experimental group. A higher percentage of performance majors was found within the experimental group.

Table 4. Participants by Group and Major

Major	Control	Experimental	Total
Music Ed	12 50.00%	6 28.57%	18 40.00%
Music Therapy	3 12.50%	3 14.29%	6 13.33%
Performance	5 20.83%	8 38.10%	13 28.89%
Other	4 16.67%	4 19.05%	8 17.78%
Total	24	21	45

Primary Instrument. As shown in Table 5, woodwind/brass was the most popular instrument category overall. Note that the experimental group contained more percussionists and the control group had a greater number of singers and woodwind/brass players.

Table 5. Participants by Group and Instrument Category

Instrument Category	Control	Experimental	Total
Percussion	1 4.17%	5 23.81%	6 13.33%
Strings	3 12.50%	3 14.29%	6 13.33%
Voice	7 29.17%	4 19.05%	11 24.44%
Woodwind/Brass	13 54.17%	9 42.86%	22 48.89%
Total	24	21	45

Years of Piano Experience. Table 6 summarizes participants' piano experience. The mean years of experience for the control group was 3.21; for the experimental group, the mean was 3.57. Thus means for the two groups were reasonably comparable.

Table 6 Participants by Group and Years Piano Experience

Years Piano Experience	Control	Experimental	Total
0	6 25.00%	9 42.86%	15 33.33%
1-2	9 37.50%	4 19.05%	13 28.89%
3 or more	9 37.50%	8 38.10%	17 37.78%
Total	24	21	45

Data Analysis

Inter-Rater Reliability. Inter-rater reliability is the measure of the degree of agreement found among raters. Simply put, an inter-rater reliability gives a statistic to indicate how much similarity exists between ratings among the judges. In the current research study, three qualified judges were invited by the researcher to listen to the same five piano performances. The rating criterion was the same as those used in the research study (Appendix A). The researcher asked each judge to listen to five recordings of the same eight-measure chorale resembling the chorale used in the study (See Appendix A). Four recordings were randomly selected from a pre-trial of the study (see Appendix E) and one recording was obtained from a Midi reproduction. The chorale resembled the eight-measure chorale used in the pre-test/post-test in that it contained similar homophonic textures and the same number of chords. Although there are multiple indicators that can be used to evaluate inter-rater reliability, the intraclass correlation coefficient (ICC) was used to check the rating reliability. The ICC was calculated by using the R package "psych."

Table 7 shows the total scores for the five piano recordings. Using the rating scale seen in Appendix A, the potential scores ranged from 5 to 40; in practice, the scores ranged from a low

of 15 to a high of 40. Performance 5, the Midi performance, indicated close agreement among all three raters with a high of 40 and low of 39, showing a close to perfect performance. For performance 3 and 4, the judges were less in agreement, with a six-point range across the three judges. Finally, for performances 1 and 2 the evaluations among judges were quite different with ranges of 11 and 16 points.

Table 7. Total Score for Five Piano Recordings by Three Judges

	Judges		
Recordings	1	2	3
1	20	26	15
2	16	28	31
3	17	23	20
4	32	27	33
5	40	40	39

Since these three judges were the only judges of interest, and the performances were chosen at random, the panel of judges was seen as fixed and the performances random. Since one effect (performances) was random and the other effect (judges) was fixed, the specific ICC used to calculate inter-rater reliability was for "mixed" effects. The average of the three judges was used in determining the score for each rater in the actual study; the ICC presented here measured the reliability of the average score of the three raters. As seen in Table 8, the value of 0.88 is fairly high and is statistically significant ($F(4,8) = 8.6$, $p = 0.0053$). The p-value of 0.0053 indicates that the probability of a level of agreement this high being reached from a single sample of five recordings is only 0.53%. In other words, there was a high and statistically significant level of agreement among the three judges.

Table 8. Interclass Correlation Coefficient

ICC	F Value	DF1	DF2	*P*-value	Lower bound	Upper bound
0.88	8.6	4	8	0.0053	0.42	0.99

Rates of Individual Performance Gain and Comparison

Research questions one and two investigated the individual performance gain associated with students in a third-semester piano class using teacher-directed and self-regulated practice routines. The data collected from pre-test and post-test evaluations were used to answer the first two research questions. The statistical method used was the paired *t*-test to provide the mean difference between the two tests. The analyses were conducted using SAS procedure TTEST. The output from this test indicated whether the average difference between the pre-test and the post-test was actually different from zero for the entire population of students who participated in this study.

Table 9 gives a statistical summary of the performance gain and confidence limits for the students who used a self-regulated practice routine (control group). The average performance gain in the control group was 2.2639. A standard deviation of 5.1910 indicates that the scores of a student in the control group could change about 5 points away from the average in either direction. The standard error helps determine the average change for the entire control group. The greatest decrease in scores among these students was 5.6667 points; the greatest increase was 17 points. The *t*-test had a *p*-value of 0.0435, which indicated the increase was significantly positive at the 0.05 level of significance ($t(23) = 2.14$, $p = 0.0435$). The 95% confidence interval was 0.0719 to 4.4559.

Table 9. Performance Gain in Control Group

N	Mean	Std Dev	Std Err	Minimum	Maximum	95% CL Mean		t Value	DF	*P*-value
24	2.2639	5.1910	1.0596	-5.6667	17.0000	0.0719	4.4599	2.14	23	0.0435

Table 10 gives a statistical summary of the performance gain and confidence limits for the students who used a teacher-directed practice routine (experimental group). The average performance gain for the experimental group was 4.8730. A standard deviation of 4.1653 indicates that scores for a student in the experimental group could change about 4 points away from the average in either direction. The standard error helps determine the average change for the entire experimental group. The greatest decrease in scores among these students was 5 points; the greatest increase was 14 points. The *t*-test had a *p*-value of 0.0001, which indicates the increase was significantly positive at the 0.05 level of significance ($t(20) = 5.36$, $p < 0.0001$). The 95% confidence interval was 2.9770 to 6.7690.

Table 10. Performance Gain in Experimental Group

N	Mean	Std Dev	Std Err	Minimum	Maximum	95% CL Mean		t Value	DF	*P*-value
21	4.8730	4.1653	0.9089	-5.0000	14.0000	2.9770	6.7690	5.36	20	<0.0001

The control group and experimental group both experienced significant performance gains. To investigate whether one group improved over the other, an independent *t* test was conducted to directly compare the changes of the two groups. The independent *t* test was chosen because it analyzes numbers that are unrelated. Table 11 shows that performance gain between the two groups was not significantly different ($t(43) = 1.84$, $p = 0.0724$). As seen in Table 11, the

average change of those students using a teacher-directed practice routine would be somewhere between 0.2482 points lower and 5.4664 points higher than those using a self-regulated practice routine.

Table 11. Comparison of Changes Across Groups

t Value	DF	*p*-value	95% CL Mean	
1.84	43	0.0724	-0.2482	5.4664

Preference for Self-Regulated Versus Teacher-Directed Practice Routines

Research question three was concerned with the way students described their practice sessions. During each practice session, students in both control and experimental groups were asked, "Did you find this practice session to be boring?" Response choices included 1) never, 2) rarely, 3) sometimes, 4) almost always, 5) always. Student responses were converted to a five-point scale, with 1 representing a never boring practice and 5 representing an extremely boring practice. It should be noted that four students did not include ratings in four or more practice sessions, so they were excluded from this analysis.

The analysis used to compare the ratings from the control and experimental groups was another independent *t*-test. Table 12 shows an average preference rating for the control group of 2.54 and an average preference rating for the experimental group of 2.37. The 95% confidence interval indicates a difference of 0.76 points lower and 0.42 points higher for students in the experimental group. It is important to note that there was no statistically significant difference between the two groups with respect to their overall boredom during each practice session ($t(39) = 0.59$, $p = 0.5566$).

Table 12. Results of *t*-test for Preference by Groups

Group	*N*	Mean	Std Dev	Std Err	Minimum	Maximum	95% CL Mean		*t* Value	DF	*P*-value
Control	21	2.54	1.09	0.24	1.00	4.83	2.04	3.03			
Experimental	20	2.37	0.73	0.16	1.50	4.50	2.02	2.71			
Difference		-0.17	0.93	0.29			-0.76	0.42	0.59	39	0.5566

Since no significant difference was found between the two groups, Figure 4 indicates the average percentages of both the experimental and control groups during all six practice sessions. As seen in Figure 4, both groups found the practice routine to be "rarely" boring at least 35% of the time.

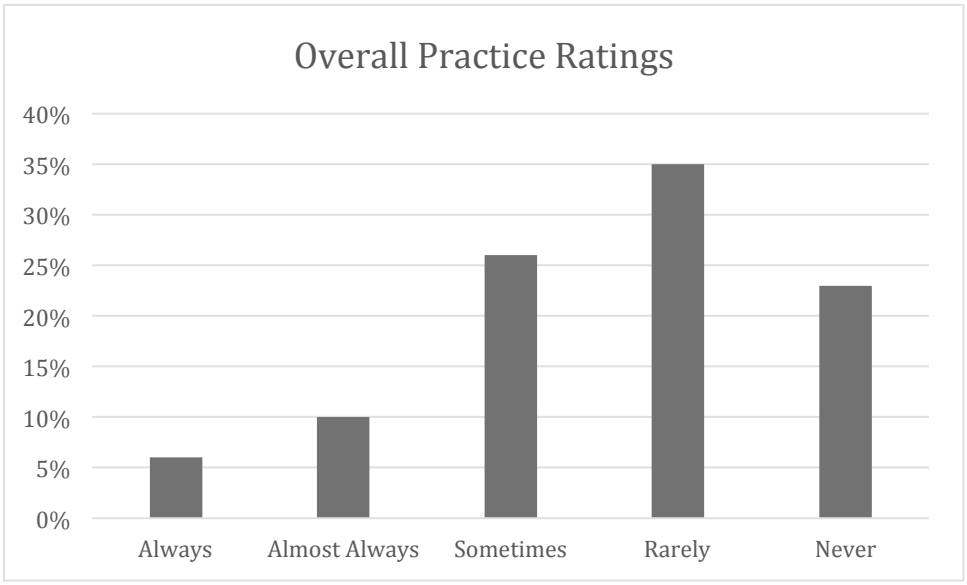

Figure 4.

As a follow-up to the self-ratings of the practice sessions, participants were asked to share why they chose their answers. Qualitative data were collected from both the experimental and control groups after each of the six practice sessions. Commonalities were sought within each practice rating, and the themes that emerged can be seen in Tables 13 and 14.

Table 13. Themes from Students Using a Self-Regulated Practice Routine

Boredom Levels	Student Commentary
Always	Too easy
	Too much time
Almost Always	Not difficult
	Too much time
Sometimes	Too much time
	Learned the chorale quickly/not challenging
	Enjoyed the practice but too much time
Rarely	Worked the entire time
	Challenging
	Felt success
Never	Useful
	Liked the music
	Worked the entire time
	Needed the practice time
	Challenging

Table 14. Themes from Students Using a Teacher-Directed Practice Routine

Boredom Levels	Student Commentary
Always	Too many steps
	Distracted easily / Not enough to do
	Lack of Improvement
Almost Always	Too much time
	Too easy
Sometimes	Music and practice routine was boring
	Tedious and redundant
	Too much time
	Process became too familiar
	Boring but was effective
	Practice routine did not always fit
	Lack of interest with music and practice
Rarely	Involved Thinking
	Provides a sense of accomplishment
	Steps kept interest with new a task
	Different from personal preferences
	Good for my level
	Some redundancy
Never	Different steps were helpful
	Kept me thinking
	Helped with progress and practice efficiency
	Kept my interest
	Made the assignment harder
	Was not enough time to practice

Preferred Practice Strategies

The final practice session included a checklist of practice strategies derived from a study conducted by Cremaschi (2012). At the end of practice session 7, students were asked to check the practice strategies used throughout practice sessions 2 through 7. Figure 5 indicates a ranking for each practice strategy. Note that slow practice is the number one practice strategy used, followed by one hand and sectional practice.

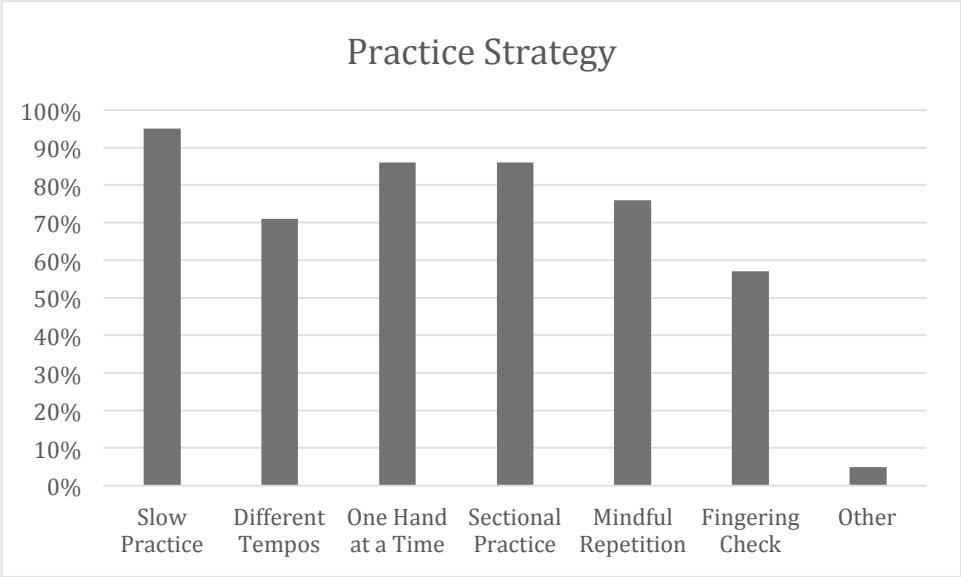

Figure 5.

In order to provide validity to the self-report checklist of practice strategies used by the control group, each student was asked at every practice session to give a sequential list of how he or she practiced the selected chorale. The researcher analyzed these data according to the practice strategies set forth by Cremaschi (2012). Practice lists from each practice session were analyzed according to the frequency of the six practice strategies, and a practice strategy that did not fit was categorized as "other" (see Table 15). Figure 6 shows one hand practice to be the

most commonly used practice strategy, followed by sectional practice. Other practice strategies seen in Table 15 include score analysis and marking the score.

Table 15. Other Practice Strategies Reported by Self-Regulated Students

Techniques Reported	Specific Practice Strategies Used
Score Analysis	Key and Time Signature; Chord Analysis; Voice Leading and Common Tones; Patterns; Intervals between chords
Audiate	Selected voice part
Memorize	Entire composition; certain chord changes
Score Marking	Circling accidentals

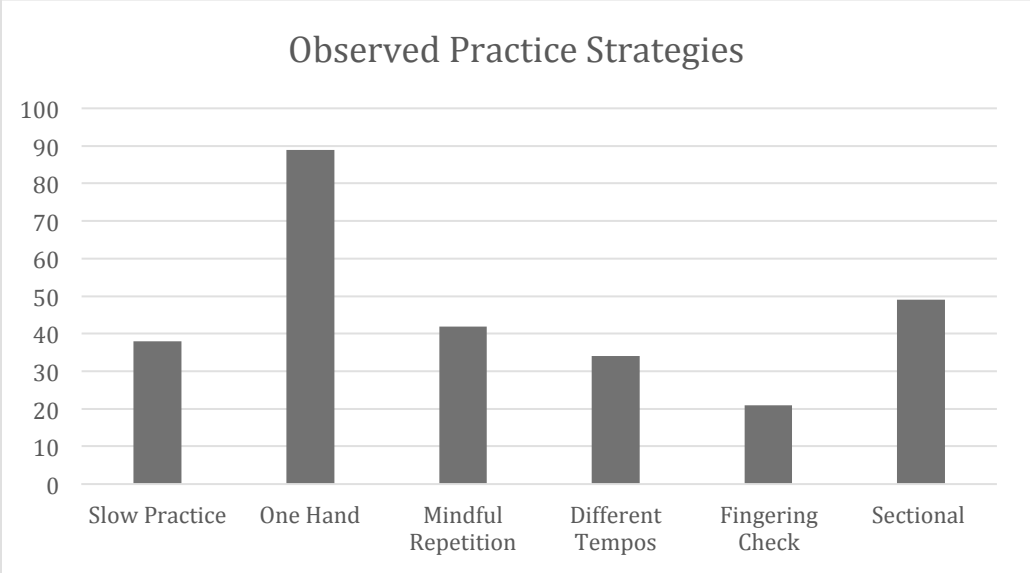

Figure 6.

Self-Regulation and Performance Gain

Research question five investigated whether sub-scales of a self-regulation questionnaire correlated with performance gain. The researcher implemented a valid questionnaire (Miksza, 2012) that measured self-regulation by five sub-scales. They included self-efficacy, method, behavior, time management, and social influence (see Appendix B). Each of the five categories

was treated equally in the analyses. All responses for the questionnaire were converted from 1 to 5 and the range of scores for each category depended on the number of items.

Linear regression models were constructed to include performance gain as a response variable and pre-test scores and each of the sub-scales for self-regulation as predictors. Because no statistical significance was shown between the control and experimental groups, the group of the student was not included as a predictor. Pre-test scores were included to show a relation to performance gain increases or decreases.

Performance Gain and Self-Efficacy. Table 16 reports the results of the linear regression comparing performance gain and self-efficacy. The following equation was used to predict a student's performance gain:

$$\text{Performance gain} = 5.40 - (0.33 \times \text{Proficiency Pre-Test}) + (0.17 \times \text{Self-Efficacy Score})$$

The above equation indicates that for each extra point scored on the proficiency pre-test, a student's expected gain will decrease by 0.33 points. The higher a student scores on the pre-test, the less the increase for performance gain on the post-test. Each additional point on the self-efficacy score indicates that a student's expected gain will increase by 0.17 points. The increase between the pre-test and self-efficacy scores was not statistically significant at the 0.05 level. In other words, the students' self-efficacy scores were not significantly related to their gains in proficiency ($t(1) = 1.22$, $p = 0.2299$).

Table 16. Performance Gain and Self-Efficacy

Variable	DF	Parameter Estimate	Standard Error	*t* Value	*P*-value
Intercept	1	5.40	4.21	1.28	0.2071
Pretest	1	-0.33	0.10	-3.41	0.0015
Self-Efficacy	1	0.17	0.14	1.22	0.2299

Performance Gain and Method. Table 17 reports the results of the linear regression comparing performance gain and method. The following equation was used to predict a student's performance gain:

Performance gain = 8.84 – (0.29 x Proficiency pretest) + (0.03 x Method score)

As the formula indicates, for each extra point scored on the proficiency pre-test, a student's expected gain will decrease by 0.29 points. For each additional point on the method score, a student's gain will increase by 0.03 points. The increase between the pre-test and method scores was not statistically significant at the 0.05 level. The students' method scores were not significantly related to their gains in proficiency ($t(1) = 0.30$, $p = 0.7659$).

Table 17. Performance Gain and Method

Variable	DF	Parameter Estimate	Standard Error	*t* Value	*P*-value
Intercept	1	8.84	3.98	2.22	0.0318
Pretest	1	-0.29	0.09	-3.15	0.0030
Method	1	0.03	0.08	0.30	0.7659

Performance Gain and Behavior. Table 18 reports the results of the linear regression comparing performance gain and Behavior. The following equation was used to predict a student's performance gain:

Performance gain = 8.19 – (0.29 x Proficiency pretest) + (0.07 x Behavior score)

The above formula means that for each extra point scored on the pre-test, a student's expected gain will decrease by 0.29 points. For each additional point on the behavior score, a student's expected gain will increase by 0.07 points. The increase between the pre-test and behavior scores were not statistically significant at the 0.05 level. The students' behavior scores were not significantly related to their gains in proficiency ($t(1) = 0.46$, $p = 0.6494$).

Table 18. Performance Gain and Behavior

Variable	DF	Parameter Estimate	Standard Error	*t* Value	*P*-value
Intercept	1	8.19	4.20	1.95	0.0579
Pretest	1	-0.29	0.09	-3.10	0.0035
Behavior	1	0.07	0.15	0.46	0.6494

Performance Gain and Time Management. Table 19 reports the results of the linear regression comparing performance gain and time management. The following equation was used to predict a student's performance gain:

Performance gain = 19.64 – (0.39 x Proficiency pretest) – (0.48 x Time Management score)

The above formula means that for each extra point scored on the pre-test, a student's expected gain will decrease by 0.39 points. For each additional point on the time management score, a student's expected gain will increase by 0.48 points. The increase between the pre-test and time management scores were statistically significant at the 0.05 level. The students' time management scores were significantly related to their gains in proficiency ($t(1) = -3.55$, $p = 0.0010$).

Table 19. Performance Gain and Time Management

Variable	DF	Parameter Estimate	Standard Error	*t* Value	*P*-value
Intercept	1	19.64	3.34	5.89	<.0001
Pretest	1	-0.39	0.09	-4.55	<.0001
Time Management	1	-0.48	0.13	-3.55	0.0010

Performance Gain and Social Influence. Table 20 reports the results of the linear regression comparing performance gain and social influence. The following equation was used to predict a student's performance gain:

Performance gain = 9.67 – (0.29 x Proficiency pretest) + (0.01 x Social Influence score)

The above formula means that for each extra point scored on the pre-test, a student's expected gain will decrease by 0.29 points. For each additional point on the social influence score, a student's expected gain will increase by an average of 0.01 points. The increase between the pre-test and social influence scores were not statistically significant at the 0.05 level. The students'

social influence scores were not significantly related to their gains in proficiency ($t(1) = 0.05$, $p = 0.9593$).

Table 20. Performance Gain and Social Influence

Variable	DF	Parameter Estimate	Standard Error	*t* Value	*P*-value
Intercept	1	9.67	4.09	2.37	0.0227
Pretest	1	-0.29	0.10	-3.01	0.0044
Social	1	0.01	0.12	0.05	0.9593

Self-Regulation and Demographic Background

The sixth and final research question investigated whether self-regulation scores, a continuous variable, was related to categorical variables, such as major, instrument, gender, and years of piano experience. The statistical analysis used to analyze data from this research question was an analysis of variance (ANOVA). The ANOVA compares the means of scores from categorical variables and determines whether each variable is significantly different from one another. If any of the levels are found to be significantly different, then a post hoc pairwise comparison can be made to figure out which means are actually different. The analysis of data surrounding question six was completed using SAS procedure "GLM" and involved 20 analyses. Each of the five self-regulation scores was compared to the four demographic variables (major, instrument, gender, and years of piano experience). Note that years of piano experience were classified as 0, 1-2, and 3 or more. Summaries of each analysis are provided below and post-hoc tests are only provided when a significant relationship is found between each of the categories.

Self-Efficacy. Table 21 provides a summary of the four ANOVAs used to examine relationships of the demographic variables with self-efficacy scores. It is evident that years of piano experience is significantly associated with self-efficacy at the 0.05 level. Table 18a provides the average self-efficacy score associated with each experience category, as well as a statistical comparison among the scores. Means with no significant difference between them have the same letter next to their names. As shown in Table 21a, students with 3 or more years of experience had a greater self-efficacy score than those with 0 years of experience.

Table 21. Self-Efficacy and Demographic Variables

Predictor	DF1	DF2	F Value	*P*-value
Major	3	41	0.93	0.4371
Instrument	3	41	1.65	0.1925
Gender	1	43	0.01	0.9404
Years Piano Exp.	2	42	4.20	0.0217

Table 21a. Post-hoc Pairwise Comparisons of Experience Levels

Years Piano Exp.	Mean Self-Efficacy		
3 or more years	35.12	A	
1-2 years	31.31	A	B
0 years	30.40		B

Method. Table 22 provides a summary of the four ANOVAs used to examine relationships of the demographic variables with method scores. As represented in Table 19, none of the demographic variables are significantly associated with method.

Table 22. Method and Demographic Variables

Predictor	DF1	DF2	F Value	P-value
Major	3	41	0.15	0.9262
Instrument	3	41	1.81	0.1608
Gender	1	43	1.03	0.3154
Years Piano Exp.	2	42	0.36	0.6999

Behavior. Table 23 provides a summary of the four ANOVAS used to examine relationships of the demographic variables with the behavior scores. Instrument is significantly associated with behavior. Table 23a provides the mean average of behavior scores associated with each instrument category, along with a statistical comparison among those scores. Means with no significant difference between them have the same letter next to their means. As seen in Table 23a, students who play stringed instruments scored significantly lower on the behavior scale than those who sing or play a woodwind/brass instrument.

Table 23. Behavior and Demographic Variables

Predictor	DF1	DF2	F Value	P-value
Major	3	41	0.79	0.5065
Instrument	3	41	5.84	0.0020
Gender	1	43	1.84	0.1821
Years Piano Exp.	2	42	0.69	0.5067

Table 23a. Post-hoc Pairwise Comparisons of Instruments

Instrument	Mean Behavior		
Voice	25.09	A	
Woodwind/Brass	24.14	A	
Percussion	21.67	A	B
Strings	17.50		B

Time Management. Table 24 provides a summary of the four ANOVAs used to examine relationships of the demographic variables with time management scores. As seen in Table 24, none of the demographic variables were significantly associated with time management.

Table 24. Time Management and Demographic Variables

Predictor	DF1	DF2	F Value	*P*-value
Major	3	41	0.17	0.9186
Instrument	3	41	1.15	0.3401
Gender	1	43	1.51	0.2255
Years Piano Exp.	2	42	1.65	0.2034

Social Influence. Table 25 provides a summary of the four ANOVAs used to examine relationships of the demographic variables with social influence scores. As seen in Table 25, none of the demographic variables were significantly associated with social influence.

Table 25. Social Influence and Demographic Variables

Predictor	DF1	DF2	F Value	*P*-value
Major	3	41	0.26	0.8535
Instrument	3	41	0.46	0.7094
Gender	1	43	0.41	0.5274
Years Piano Exp.	2	42	0.65	0.5272

Conclusions

Considering the primary aim of the current research study, the results suggest that both teacher-directed and self-regulated practice routines help students achieve significant performance gain in performing four-part chordal piano music. However, when compared, there was no significant difference between a teacher-directed practice routine and a self-regulated practice routine with respect to the gains made during the six practice sessions.

Preference for a particular practice agenda revealed a similar level of interest. Students who primarily rated the practice session to be boring stated the practice session to take too much time and to be too easy. On the contrary, students who were never bored found each practice session to cause one to think about their practice and offer a sense of accomplishment.

Students who were given a self-regulated practice routine (control group) were also asked at the end of session 7 to report of the various strategies used within each practice session. As discussed earlier, slow practice was ranked highest in the most used strategy while practicing four-part chordal piano music.

Self-regulated piano practice behaviors of group piano students enrolled in a third semester piano class were generally not related to the performance gains obtained after six practice sessions. The one exception to this was time management. The higher a student scored on the time managements scale, the greater the gain the student tended to have over the six practice sessions. In addition, relatively few relationships existed between self-regulation piano practice behaviors and demographic variables. The exceptions is that those students with three or more years of piano experience tended to have a higher self-efficacy than students with no piano experience. Also, students who sang or who played a woodwind/brass instrument tended to score higher on the behavior scale than students who played stringed instruments.

CHAPTER 5

DISCUSSION

The primary aim of this study was to investigate the effects of teacher-guided versus self-regulated practice routines on third-semester piano class students' success in learning to play four-part chordal music. Findings indicated that teacher-directed and self-regulated practice routines were equally effective under the conditions of the study. Also examined were self-regulated piano practice behaviors of class piano students. It was found that self-regulation sub-scales such as time management had a significant impact on performance gain, and that significant relationships existed between self-efficacy and years of piano experience and between behavior and primary instrument.

Teacher-Directed Piano Practice

In this study, teacher-directed practice focused on a sequential 12-step process adapted from a study conducted by DeNicola (1990). DeNicola's study sought to develop an instructional process for teaching sight-reading skills to students in class piano. DeNicola (1990) found no significant difference between the pre-test/post-test scores of the treatment group being instructed under the 12-step process. The present study differs from DeNicola's in that the 12-step sequence was adapted for independent practice. Table 26 summarizes the differences between the two processes. DeNicola's 12-step process was guided by a classroom instructor and did not give specific instructions for playing a certain voice, as does the individual practice

routine used in this study. Reasons for this deviation were to control for variables within the research process and to test the effectiveness of a definite sequential practice routine.

Table 26. Comparison of Two Practice Routines

Research Practice Routine	Comparison	DeNicola (1990) Instructional Process
Sing and play top voice	Not the same	Sing one voice
Sing and play alto voice	Same	Sing and play one voice
Play soprano and alto voices together	Same	Sing one voice and play two voices
Sing and play bass voice	Similar to subsequent step	Play two voices
Play soprano and bass voices together	Similar to subsequent step	Play one voice
Sing and play tenor voice	Not the same	Play two voices
Play bass and tenor voices together	Same	Play two voices
Play alto, tenor, and bass voices	Same	Play three voices
	Steps 9-12 are the same	

Given that music practice is ultimately an individual endeavor, can teachers guide students in developing practice skills that positively influence performance achievement? Findings of this study indicate that a teacher-directed practice routine does not negatively affect students' learning to perform four-part chordal music. In addition, no significant differences were found in boredom ratings between a self-regulated practice routine and a teacher-directed routine. Further, students who indicated they were "rarely" or "never" bored with teacher-directed routines commented that such practice "kept me thinking" and "helped me to practice more efficiently." Students using a teacher-directed routine reported being "rarely" bored at least 45% of the time. In this study, participants using a teacher-directed guide appeared to be less bored than those who were given no instructions on what or how to practice.

The fact that most (62%) of the study population had less than three years of piano experience may suggest that skill level could have influenced perceptions of boredom and need for instruction. Teacher-directed practice routines, then, could be helpful, especially for students who have less piano experience.

Self-Regulation and Piano Practice

Self-regulated practice is an established necessity for highly proficient musicians. While this study found no significant difference in performance gain between students using teacher-guided practice and those using self-regulation, both groups achieved significant performance gain from pretest to posttest. This finding suggests that self-regulated practice is as effective as that which is teacher-guided. However, it should be noted that although the control group's practice routine was self-regulated, the members were required to practice the specified chorale for a total of 15 minutes, a parameter that could have ensured longer focus and consequent performance gain. Contrary to this speculation is the fact that all participants were college music majors accustomed to diligent practice, as confirmed by their preference for one-hand and slow practice, score analysis, and marking the score. In fact, mindful repetition or thought-provoking practice was not highly ranked. This result might be attributed to statements from the control group indicating that the music was "too easy" and that the homophonic structure of the chorale did not present adequate challenge. Also to be considered is the fact that 37.5% of the control group had more than three years of piano experience.

All participants in the study responded to a questionnaire, validated by Miksza (2013) probing self-regulation tendencies in relation to piano practice. The instrument was divided into five sub-scales analyzing five primary dimensions of musical self-regulation (motive, method, behavior, time, and social influence) as displayed in Table 1. The only dimension not covered by the questionnaire was physical environment—irrelevant because participants did not have a choice of practice venue. Each sub-scale queried the why, how, what, when, where, and with whom music practicing was taking place. It can be noted that social influence was included on the questionnaire to provide a complete and intact survey. Since the study examined students

practicing individually, no significance was reported between social influence and performance gain.

A significant relationship was found between time management and performance gain. Time management questions centered on ability to focus or concentrate during practice. Students scoring high in this category understandably rated themselves as being distracted very easily. Those who reported a high level of concentration while practicing also experienced higher performance gains. Ability to concentrate on the task at hand is fundamental to practicing. However, when students are practicing the piano as their secondary instrument, instructional strategies, such as a practice checklist (Cremaschi, 2012) can prove useful for retaining focus.

The self-regulation questionnaire was also used to establish the relationship of each sub-scale with four demographics: gender, major, primary instrument, and years of piano experience. As might be expected, a significant relationship was found between self-efficacy and years of piano experience. In determining self-efficacy, students were presented such statements as "No musical task is too difficult for me" for affirmation. Within the questionnaire, students responded to each statement with regard to playing the piano, not their primary instrument. The higher the rating within the sub-scale of self-efficacy, the more confidence the student had in playing the piano. For those teaching group piano, the challenge is to provide ample opportunities for success to students with limited experience, while adequately challenging the more experienced players.

In this study the relationship between primary instrument and behavior was also found to be significant. Students who sang or played a woodwind or brass instrument scored higher on the behavior sub-scale, which queried such habits as practicing music in sections, reviewing previously learned music, listening to one's own playing, mental rehearsal, practice motives, and

metacognitive activities, including practice reflection. Students who score higher on the behavior sub-scale are judged to be highly self-regulated in practice. In this study, a relationship was found between singers and wind players and their piano practice behaviors. Although teaching implications based on students' primary major do not merit serious attention in most group piano settings, students' instrumental or vocal background may inform how that person self-regulates when practicing the piano.

Limitations and Further Research

Practicing a musical instrument is a personal endeavor; therefore, a practice method that yields positive results for one student may not yield the same results for another. This study was conducted to provide situated evidence on the effects of guided versus self-regulated practice routines on third-semester piano class students' learning to play four-part chordal music. It is not the intent to generalize the results of the study beyond the designated population of third-semester group piano students.

Given the number of participants taking part in this study and the proximity ($p = 0.07$) to a significant difference between those using self-regulated practice routines versus those using teacher-directed routines, it is strongly suggested that the research be replicated on a larger scale. Increasing the number of subjects may result in a significant difference ($p = 0.05$) between the control and experimental groups.

Other related areas showing a sparse amount of research include the developmental stages of self-regulation and the social aspects of learning within the context of group instruction in piano.

Finally, while results of this study inform how students practice the piano as a secondary instrument, more research on practice routines used in the study of all secondary instruments is needed. As example, such information would be especially helpful for those who teach secondary winds to undergraduate music education majors.

With the above observations in mind, suggested questions for further study related to this research include:

- Would a larger number of subjects in a replication of this study yield a significant difference between the gain of those using self-regulated versus teacher-directed practice?
- What instructional techniques impact group piano students' practicing of four-part chordal music?
- What voice part or combination of parts do group piano students choose to practice first? Does the choice affect performance gain?
- Can eye-tracking software inform the instructional process for teaching four-part chordal piano music?
- What instructional strategies improve self-efficacy in group-piano students with fewer than two years of experience?
- Does instruction on practice-time-management skills improve the performance gain of group piano students?
- Does the primary instrument indicate the self-regulation routines chosen for practicing a secondary instrument?
- Can adherence to the developmental stages of self-regulation improve class piano instruction?

- What is the impact of Bandara's (1986) social cognitive theory on group piano instruction?
- What instructional insights might be gained by using a self-regulated questionnaire in group-piano instruction?

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APPENDIX A

Performance Achievement Rating Sheet

Instructions: Use the following scale criteria to rate each of the eight measures of the four-part chordal piano piece being performed. In addition, check the musical elements (pitch, rhythm, and tempo) that are the primary contributors to any mistakes in each of the eight measures.

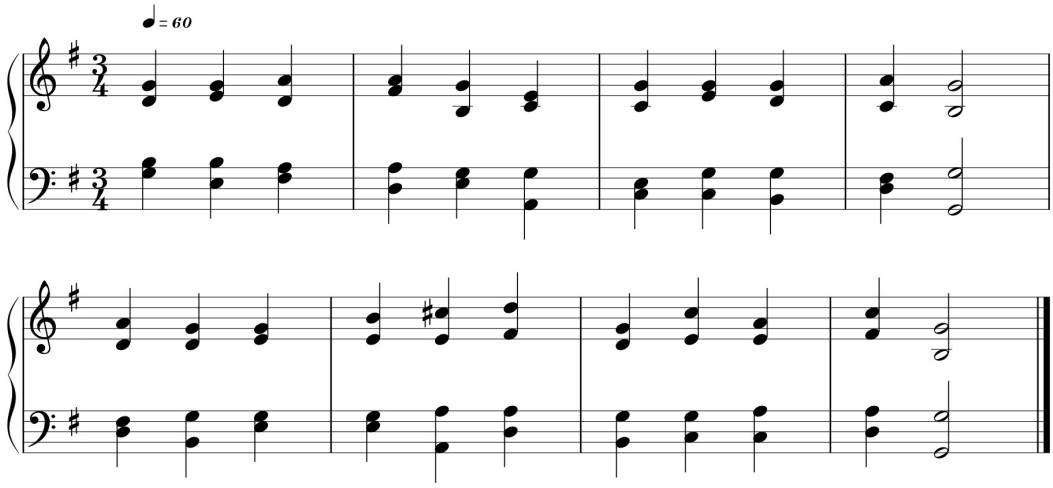
1 Point	2 Points	3 Points	4 Points	5 Points
Many noticeable mistakes are present	A few noticeable mistakes are present	Accuracy of elements is achieved most of the time	Accuracy of elements is proficient and well established	Precise demonstration of musical elements

Rating Scale for Piano Performance

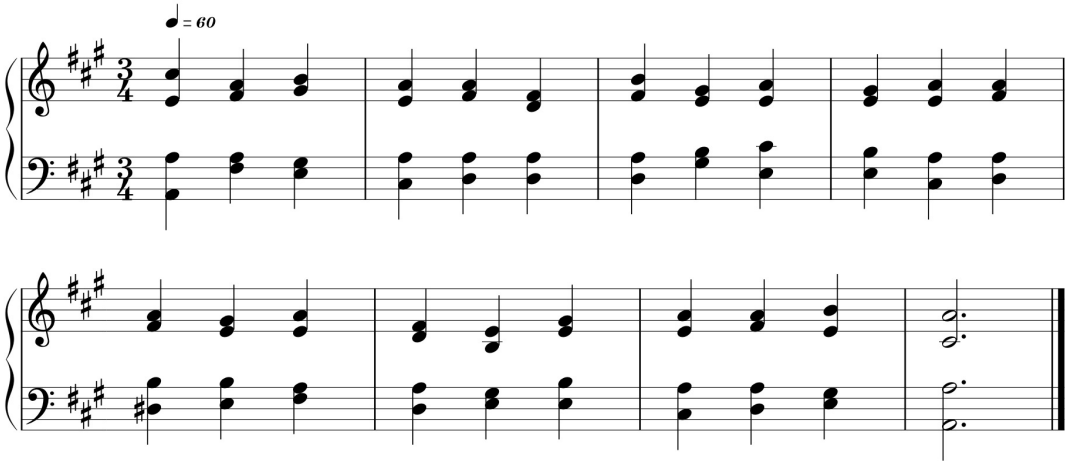
M. 1	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]	Pitch [ ]	Rhythm [ ]	Tempo [ ]
M. 2	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]	Pitch [ ]	Rhythm [ ]	Tempo [ ]
M. 3	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]	Pitch [ ]	Rhythm [ ]	Tempo [ ]
M. 4	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]	Pitch [ ]	Rhythm [ ]	Tempo [ ]
M. 5	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]	Pitch [ ]	Rhythm [ ]	Tempo [ ]
M. 6	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]	Pitch [ ]	Rhythm [ ]	Tempo [ ]
M. 7	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]	Pitch [ ]	Rhythm [ ]	Tempo [ ]
M. 8	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]	Pitch [ ]	Rhythm [ ]	Tempo [ ]

*Note: The performance achievement rating scale has been used and validated in research studies by Miksza (2013) and Ciorba and Smith (2009).

Practice Trial Chorale:



Pre-Test/Post-Test Chorale:



APPENDIX B

Self-Regulation Questionnaire

Self-Efficacy items (‘1-Strongly Disagree, ‘ 2-Disagree,’ ‘3-Neither,’ ‘4-Agree,’ ‘5-Strongly Agree’)

- SelfEff1 No musical task is too difficult for me
- SelfEff2 Compared with others in group piano class, I think I am a good musician
- SelfEff3 I believe I can become unusually good at playing the piano
- SelfEff4 When I set musical goals for myself, I am sure I can achieve them
- SelfEff5 I expect to be known as a good musician
- SelfEff6 I feel I can solve any musical problem I encounter
- SelfEff7 I expect to do well in music in the future
- SelfEff8 I am confident in my ability to improve on my instrument
- SelfEff9 Compared with other group piano students, I expect to do well

Method items (‘1-never,’ ‘2-rarely,’ ‘3-sometimes,’ ‘4-Often,’ ‘5-Always’)

- METH1 Mark trouble spots in music when practicing
- METH2 Carefully look through a new piece before practicing
- METH3 Spend practice time on things I cannot do very well
- METH4 Come well prepared to group piano class
- METH5 Practice difficult spots very slowly
- METH6 Begin each practice session with warm-ups
- METH7 Practice the day after a group piano class
- METH8 Work to improve whenever practicing
- METH9 Set specific practice goals
- METH10 Practice at least a little bit every day
- METH11 Practice challenging music
- METH12 Spend some practice time sight-reading new music
- METH13 Work hard when practicing
- METH14 Practice with a metronome

Behavior items (‘1-never,’ ‘2-rarely,’ ‘3-sometimes,’ ‘4-Often,’ ‘5-Always’)

- BEH1 Try to get one section of music perfect before practicing the next
- BEH2 Spend time in each practice session reviewing music
- BEH3 I listen to my own playing while I practice to make sure I am not reinforcing bad habits
- BEH4 I think about pieces I’m practicing by singing them through in my mind
- BEH5 If I can’t play a piece correctly I stop to think about how it should sound
- BEH6 I practice to see how much better I can actually get at music
- BEH7 When I’m practicing I stop playing and try to think about the best way to work out a problem

Time Management items (‘1-never,’ ‘2-rarely,’ ‘3-sometimes,’ ‘4-Often,’ ‘5-Always’; ‘R’ = reverse score)

- TIME1 I can only concentrate for short periods of time when practicing
- TIME2 I have difficulty concentrating when practicing for extended periods of time
- TIME3 I am easily distracted when practicing
- TIME4 Thoughts about non-musical things run through my head while I practice
- TIME5 I daydream when practicing alone
- TIME6 It is easy for me to remain focused on my music when practicing alone

Social Influence items (‘1-never,’ ‘2-rarely,’ ‘3-sometimes,’ ‘4-Often,’ ‘5-Always’)

- SOC1 Think about things I learn in piano class when practicing
- SOC2 Ask piano class teacher for help practicing difficult music
- SOC3 Listen carefully to piano class teacher’s practice advice
- SOC4 Use piano class teacher’s advice when practicing
- SOC5 Talk to piano class teacher about how to practice
- SOC6 Look up definitions for unfamiliar terms and symbols when practicing
- SOC7 Ask for feedback from piano class teacher
- SOC8 Listen to musical recordings to help me learn
- SOC9 Look to books for musical information that helps me learn

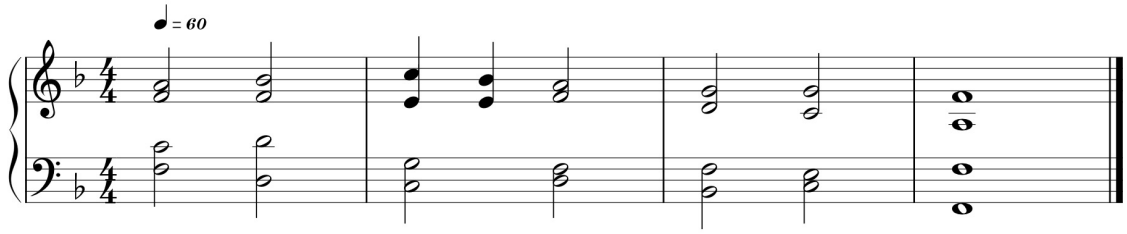
*Note: The questionnaire has been validated in a research study conducted by Miksza (2012).

APPENDIX C

Teacher-Directed Practice Routines

Practice Session 2

Practice Instructions: For the next 10 minutes, please strictly follow the prescribed sequence for practicing the following four-part chordal piano piece. Note: This designated practice time is completely individual and any questions need to be held until the end of the practice session. There is no talking during this time.



- Sing and play soprano voice
- Sing and play alto voice
- Play soprano and alto voices together
- Sing and play bass voice
- Play soprano and bass voices together
- Sing and play tenor voice
- Play bass and tenor voices together
- Play alto, tenor, and bass voices together
- Arpeggiate each chord from bottom to top, giving each note an equivalent rate of speed
- Reverse the direction of the arpeggiation
- Play all four voices, giving each chord 2 beats
- Play all four voices in rhythm, slowly

Questions:

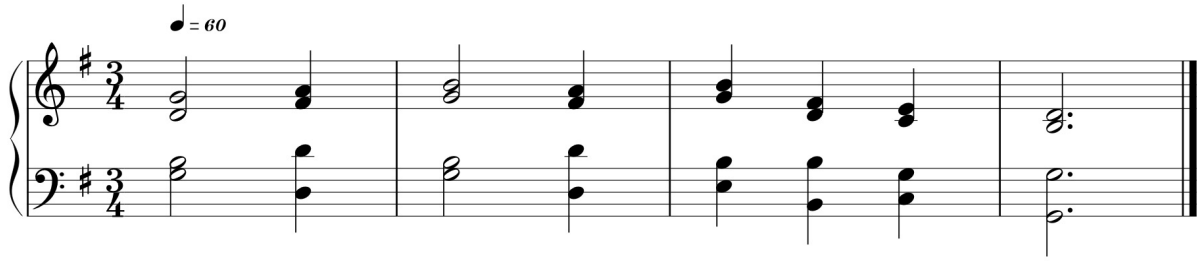
- Did you find this practice session to be boring? Please circle one of the following.

Never Rarely Sometimes Almost Always Always

- In one sentence, further explain the reason you chose this answer?

Teacher-Directed Practice Session 3

Practice Instructions: For the next 10 minutes, please strictly follow the prescribed sequence for practicing the following four-part chordal piano piece. Note: This designated practice time is completely individual and any questions need to be held until the end of the practice session. There is no talking during this time.



- Sing and play soprano voice
- Sing and play alto voice
- Play soprano and alto voices together
- Sing and play bass voice
- Play soprano and bass voices together
- Sing and play tenor voice
- Play bass and tenor voices together
- Play alto, tenor, and bass voices together
- Arpeggiate each chord from bottom to top, giving each note an equivalent rate of speed
- Reverse the direction of the arpeggiation
- Play all four voices, giving each chord 2 beats
- Play all four voices in rhythm, slowly

Questions:

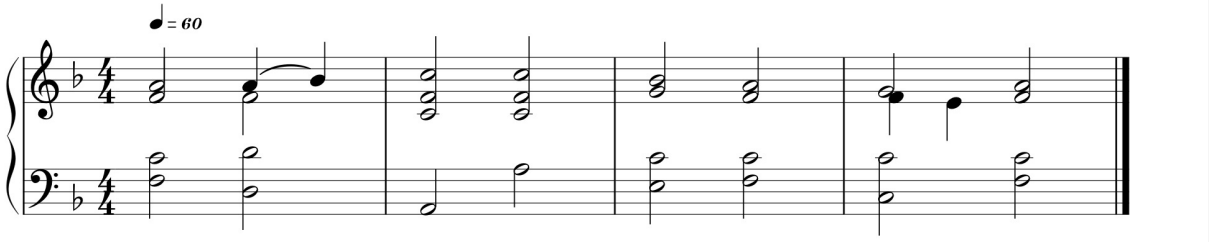
- Did you find this practice session to be boring? Please circle one of the following.

Never Rarely Sometimes Almost Always Always

- In one sentence, further explain the reason you chose this answer?

Teacher-Directed Practice Session 4

Practice Instructions: For the next 10 minutes, please strictly follow the prescribed sequence for practicing the following four-part chordal piano piece. Note: This designated practice time is completely individual and any questions need to be held until the end of the practice session. There is no talking during this time.



- Sing and play soprano voice
- Sing and play alto voice
- Play soprano and alto voices together
- Sing and play bass voice
- Play soprano and bass voices together
- Sing and play tenor voice
- Play bass and tenor voices together
- Play alto, tenor, and bass voices together
- Arpeggiate each chord from bottom to top, giving each note an equivalent rate of speed
- Reverse the direction of the arpeggiation
- Play all four voices, giving each chord 2 beats
- Play all four voices in rhythm, slowly

Questions:

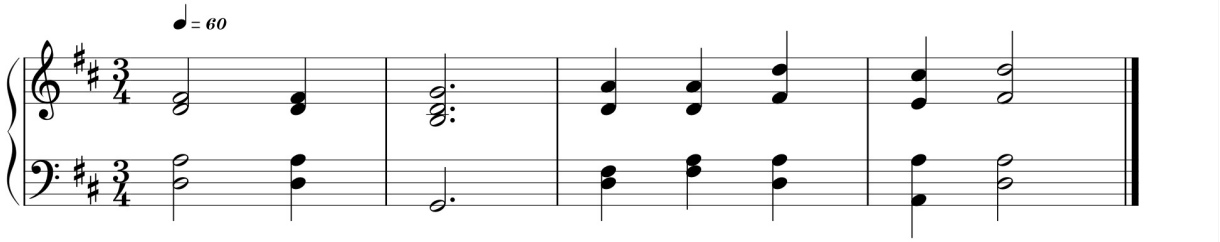
- Did you find this practice session to be boring? Please circle one of the following.

Never Rarely Sometimes Almost Always Always

- In one sentence, further explain the reason you chose this answer?

Teacher-Directed Practice Session 5

Practice Instructions: For the next 10 minutes, please strictly follow the prescribed sequence for practicing the following four-part chordal piano piece. Note: This designated practice time is completely individual and any questions need to be held until the end of the practice session. There is no talking during this time.



- Sing and play soprano voice
- Sing and play alto voice
- Play soprano and alto voices together
- Sing and play bass voice
- Play soprano and bass voices together
- Sing and play tenor voice
- Play bass and tenor voices together
- Play alto, tenor, and bass voices together
- Arpeggiate each chord from bottom to top, giving each note an equivalent rate of speed
- Reverse the direction of the arpeggiation
- Play all four voices, giving each chord 2 beats
- Play all four voices in rhythm, slowly

Questions:

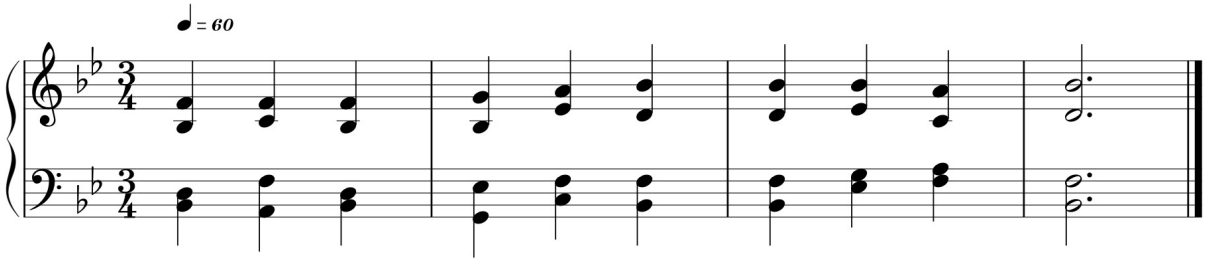
- Did you find this practice session to be boring? Please circle one of the following.

Never Rarely Sometimes Almost Always Always

- In one sentence, further explain the reason you chose this answer?

Teacher-Directed Practice Session 6

Practice Instructions: For the next 10 minutes, please strictly follow the prescribed sequence for practicing the following four-part chordal piano piece. Note: This designated practice time is completely individual and any questions need to be held until the end of the practice session. There is no talking during this time.



- Sing and play soprano voice
- Sing and play alto voice
- Play soprano and alto voices together
- Sing and play bass voice
- Play soprano and bass voices together
- Sing and play tenor voice
- Play bass and tenor voices together
- Play alto, tenor, and bass voices together
- Arpeggiate each chord from bottom to top, giving each note an equivalent rate of speed
- Reverse the direction of the arpeggiation
- Play all four voices, giving each chord 2 beats
- Play all four voices in rhythm, slowly

Questions:

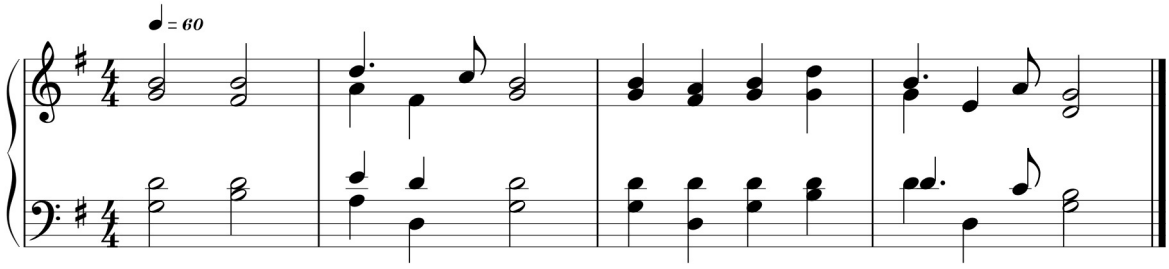
- Did you find this practice session to be boring? Please circle one of the following.

Never Rarely Sometimes Almost Always Always

- In one sentence, further explain the reason you chose this answer?

Teacher-Directed Practice Session 7

Practice Instructions: For the next 10 minutes, please strictly follow the prescribed sequence for practicing the following four-part chordal piano piece. Note: This designated practice time is completely individual and any questions need to be held until the end of the practice session. There is no talking during this time.



- Sing and play soprano voice
- Sing and play alto voice
- Play soprano and alto voices together
- Sing and play bass voice
- Play soprano and bass voices together
- Sing and play tenor voice
- Play bass and tenor voices together
- Play alto, tenor, and bass voices together
- Arpeggiate each chord from bottom to top, giving each note an equivalent rate of speed
- Reverse the direction of the arpeggiation
- Play all four voices, giving each chord 2 beats
- Play all four voices in rhythm, slowly

Questions:

- Did you find this practice session to be boring? Please circle one of the following.

Never Rarely Sometimes Almost Always Always

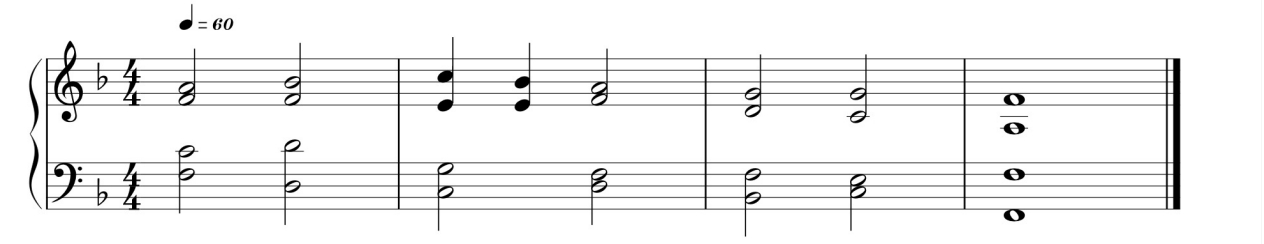
- In one sentence, further explain the reason you chose this answer?

APPENDIX D

Self-Regulated Practice Routines

Practice Session 2

Practice Instructions: For the next 10 minutes please practice the following four part chorale



Questions:

- In the following space please provide a list in order of the practice procedures taken during your 10-minute practice session.

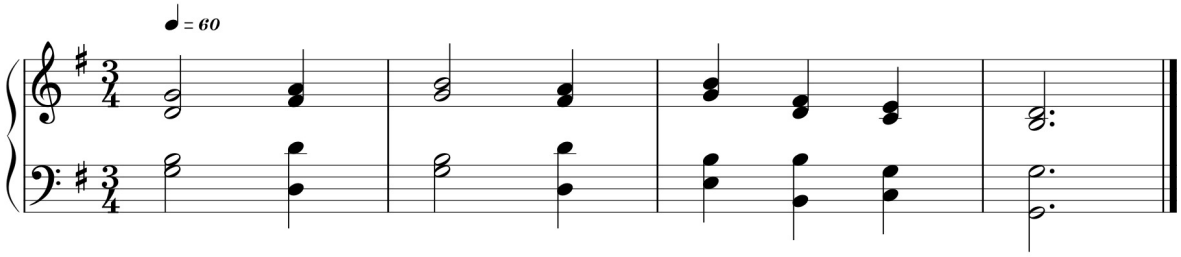
- Did you find this practice session to be boring? Please circle one of the following.

Never Rarely Sometimes Almost Always Always

- In one sentence, further explain the reason you chose this answer?

Self-Regulated Practice Session 3

Practice Instructions: For the next 10 minutes please practice the following four-part chordal piece. Note: This designated practice time is completely individual and any questions need to be held until the end of the practice session. There is no talking during this time.



Questions:

- In the following space please provide a list in order of the practice procedures taken during your 10-minute practice session.

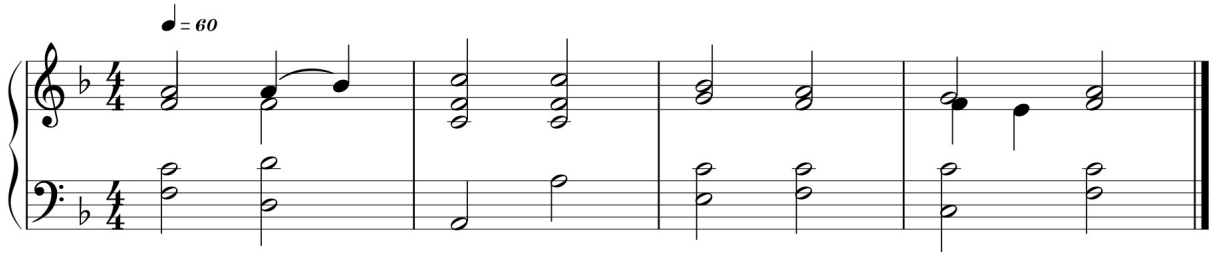
- Did you find this practice session to be boring? Please circle one of the following.

Never Rarely Sometimes Almost Always Always

- In one sentence, further explain the reason you chose this answer?

Self-Regulated Practice Session 4

Practice Instructions: For the next 10 minutes please practice the following four-part chordal piece. Note: This designated practice time is completely individual and any questions need to be held until the end of the practice session. There is no talking during this time.



Questions:

- In the following space please provide a list in order of the practice procedures taken during your 10-minute practice session.

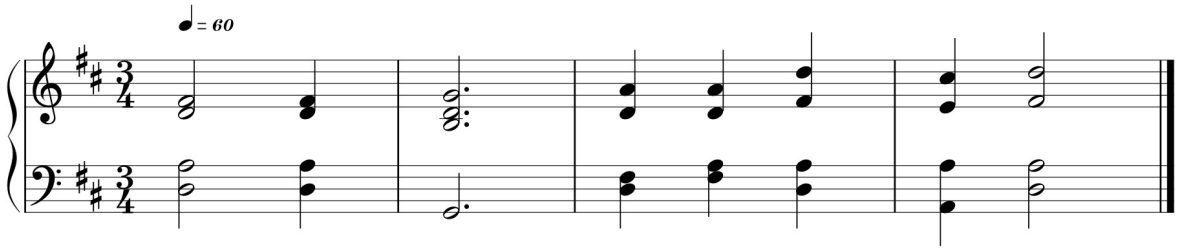
- Did you find this practice session to be boring? Please circle one of the following.

Never Rarely Sometimes Almost Always Always

- In one sentence, further explain the reason you chose this answer?

Self-Regulated Practice Session 5

Practice Instructions: For the next 10 minutes please practice the following four-part chordal piece. Note: This designated practice time is completely individual and any questions need to be held until the end of the practice session. There is no talking during this time.



Questions:

- In the following space please provide a list in order of the practice procedures taken during your 10-minute practice session.

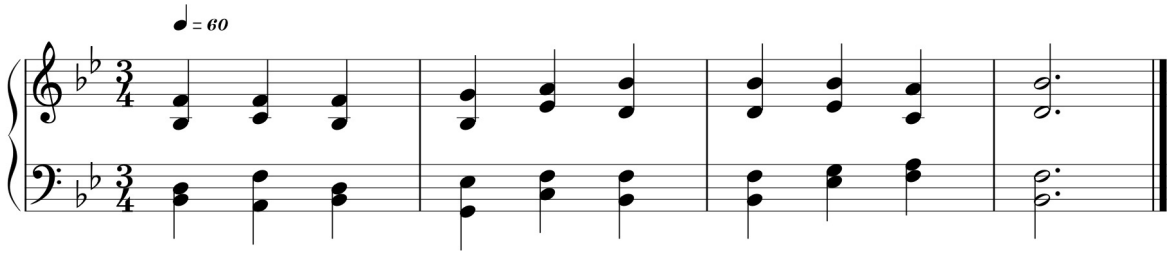
- Did you find this practice session to be boring? Please circle one of the following.

Never Rarely Sometimes Almost Always Always

- In one sentence, further explain the reason you chose this answer?

Self-Regulated Practice Session 6

Practice Instructions: For the next 10 minutes please practice the following four-part chordal piece. Note: This designated practice time is completely individual and any questions need to be held until the end of the practice session. There is no talking during this time.



Questions:

- In the following space please provide a list in order of the practice procedures taken during your 10-minute practice session.

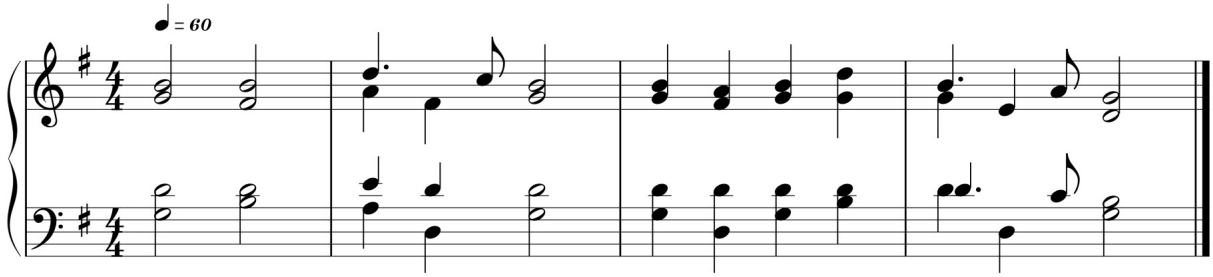
- Did you find this practice session to be boring? Please circle one of the following.

Never Rarely Sometimes Almost Always Always

- In one sentence, further explain the reason you chose this answer?

Self-Regulated Practice Session 7

Practice Instructions: For the next 10 minutes please practice the following four-part chordal piece. Note: This designated practice time is completely individual and any questions need to be held until the end of the practice session. There is no talking during this time.



Questions:

- Practice Strategies
  - Check all corresponding practice strategies used during your practice session
    - Slow Practice
    - Different Tempos
    - One Hand at a Time
    - Sectional Practice
    - Mindful Repetition
    - Fingering Check
    - Other
  - In the following space please provide a list in order of the practice procedures taken during your 10-minute practice session.

- Did you find this practice session to be boring? Please circle one of the following.

Never Rarely Sometimes Almost Always Always

- In one sentence, further explain the reason you chose this answer

APPENDIX E

Trial Study Data

Research Study Content	Least Time	Longest Time	Average Time
Consent Form			2 min.
Pre-test			27 min.
Questionnaire	3 min. 54 sec.	5 min. 3 sec.	4 min. 29 sec.
8-Bar Practice Routine	13 min.	18 min.	15 min. 50 sec.
4-Bar Practice Routine	9 min.	23 min.	16 min.
8-Bar Practice with 12-Step Sequence*			10 min.
4-Bar Practice with 12-Step Sequence*			6 min.

*The average time for the 12-step sequence to be completed was extracted from the Teacher-Directed 8-bar and 4-bar practice routines.

APPENDIX F

Procedures for Piano Lab Research Study

Consent and Pre-Study Garageband Trial Recording

1) Recruitment Statement: Read Verbatim

   Greetings! As part of research for my doctoral degree in music education, I (Terrell Hooper) am conducting a study investigating the use of various practice routines on the performance achievement of four-part chordal piano music. The study will be conducted over four sequential weeks within the piano class semester and will not include any outside of class obligations. The material used in the study is consistent with the curriculum for this class and does not disrupt the flow of the course, however, you may choose not to participate in the study and similar material will be assigned to you to work on during class time when the study is taking place. The procedures and detailed information about the study is outlined in the consent form. Once having read and reviewed the entire consent form, please submit the online form. Thank you for your time and consideration.

2) Have all students go to http://bit.ly/pianoresearchconsent and follow the on screen directions inside the Google Form.
3) Have all students go to http://bit.ly/practicetrial and have students login and follow the link in Safari on their individual computer at their piano station.
4) The Google Form will guide the students through the appropriate steps to record in Garageband and will provide steps to send the zipped Garageband file in an email.
5) Make sure each student's headphones is connected so they can hear the piano and sound coming from their individual computers.
6) Once students have submitted the Google Form they are done.

Session #1 [20 minutes]

1) Handout the pre-test chorale to all students in the class. Please keep the music face down so the students cannot see the piece until you tell them to do so.
2) Instruct all students to go to http://bit.ly/practicequestionnaire and complete the questionnaire inside the Google Form. Note: the students should answer the questionnaire in regard to practicing the piano, not their primary instrument.
3) After all students have completed the questionnaire, have students to go to http://bit.ly/pianopracticetest and turn the sheet over so students have a reference for the music that is situated inside the Google Form.
   Note: all students need to be practicing the chorale at the same time, as this is a timed event. Only allow students to practice the chorale for ten minutes.
4) After the students have practiced the chorale for ten minutes, prompt students to go to the next screen and follow the on screen directions to record themselves performing the chorale inside Garageband and then sending the file via their UGA email.

Sessions #2-#7 Consecutive Class Periods [15 minutes for each session]

1) Each student will log in to their individual computers at their piano stations and open their UGA email in Safari and follow the link sent to their email with the following heading: Group Piano Practice Chorale #___ (the number will be according to the appropriate session)
2) Students will be handed a hard copy of the appropriate chorale for that practice session. See the attached form below (pg. 2) for reference.
3) Monitor the students practicing but do not provide any feedback/advice or any help during the practice session.
4) Students will complete the entire practice session within the Google form and will record themselves in Garageband and send the file via their UGA email at the end of each practice session.

Session #8 [15 Minutes]

1. Handout post-test chorale face down and ask students to go to http://bit.ly/pianopracticetest2 in Safari on their computers at their individual piano stations.
2. Tell students they have a total of ten minutes to practice the following chorale. Following the practice session, students will record themselves in Garageband and send the zipped file via their UGA email.
3. Once students have completed the post-test, ask all students to go to http://bit.ly/practicequestionnaire and complete the questionnaire. Again, make sure students answer the questions in regards to practicing the piano not their primary instrument.

APPENDIX G

UNIVERSITY OF GEORGIA
CONSENT FORM

Title
The effect of teacher-directed versus self-selected practice routines on piano performance

Researcher's Statement
Researchers (Mary Leglar and Terrell Hooper) are asking you to take part in a research study. Before you decide to participate in this study, it is important that you understand why the research is being done and what it will involve. This form is designed to give you the information about the study so you can decide whether to be in the study or not. Please take the time to read the following information carefully. Please ask the researcher if there is anything that is not clear or if you need more information. When all your questions have been answered, you can decide if you want to be in the study or not. This process is called "informed consent." A copy of this form will be given to you.

Principal Investigator: Mary Leglar| Music Education Department | mleglar@uga.edu

Purpose of the Study
The primary objective of the study is to explore the effects of a sequential practice plan on performance achievement of four-part chordal piano music. You are being asked to participate in the study because you are enrolled in a third-semester group piano class (MUSI 2520) and four-part chordal piano music is being introduced within the designated curriculum for this class.

Study Procedures
If you agree to participate, you will be asked to …

- Answer a questionnaire, participate in a pre-test/post-test performance of four-part chordal piano music, and participate in six 15-minute in-class practice sessions. The total amount of time for the entire research study will be approximately 2 hours of your time.
- The questionnaire asks questions concerning your level of piano experience, age, and learning style
- Record yourself on your designated keyboard in a pre-test/post-test performance of four-part chordal piano music

Risks and discomforts
The researchers do not anticipate any risks from participating in this research.

Benefits
Probable benefits for participation in the research study include having class time to practice four-part chordal piano music. Time spent on this material will allow students to gain familiarity with course content.

Incentives for participation
The research subject will receive no incentive for participating in the study.

Audio/Video Recording
Research participants are required to record themselves performing during the pre-test and post-test. Recordings of pre-test and post-test performances will be recorded using a Clavinova keyboard connected to an iMac computer. The recordings will be saved to a USB drive and will kept under a password protected folder for 2 years.

Privacy/Confidentiality
The data collected in the research study will be identified indirectly through the use of codes and directly through the use of email. Each research participant will be asked his or her UGA email will be assigned to a specific code. However, the UGA email will only be used in case a student forgets his or her code. The collected data on the questionnaire, practice sheets, and the pre-test and post-test will be identified using a coded system and will be protected under secure files. Questionnaire data will be collected using a Google form and will be sent directly to the researchers. The practice sheets will be collected after each practice session and will be secured in a locked file cabinet kept by the researcher. The data collected from pre-test and post-test will be recorded on a USB drive that will be secured through the use of password protected files. The Researchers will not release identifiable results of the study to anyone other than individuals working on the project without your written consent unless required by law.

Taking part is voluntary
Taking part in the study is voluntary, and you may choose not to participate or to stop at any time without penalty or loss of benefits to which you are otherwise entitled. Your decision about participation will have no effect on your progress or academic standing in MUSI 2520. If a research subjects decides to withdraw from the study, the information that can be identified as yours will be kept as part of the study and may continue to be analyzed, unless you make a written request to remove, return, or destroy the information.

If you have questions
The main researchers conducting this study are Mary Leglar (Professor in Music Education) and Terrell Hooper (Graduate Assistant in Music Education) at the University of Georgia. Please ask any questions you have now. If you have questions later, you may contact Mary Leglar at mleglar@uga.edu or at 706-542-2755. If you have any questions or concerns regarding your rights as a research participant in this study, you may contact the Institutional Review Board (IRB) Chairperson at 706-542-3199 or irb@uga.edu.

Research Subject's Consent to Participate in Research:
To voluntarily agree to take part in this study, you must sign on the line below. Your signature below indicates that you have read or had read to you this entire consent form, and have had all of your questions answered.

_____	_____	_____
Name of Participant	Signature	Date