THINKING
ABOUT THINKING

METACOGNITION FOR MUSIC LEARNING

CAROL W. BENTON

T H I N K I N G
A B O U T
T H I N K I N G

Metacognition for
Music Learning

Carol W. Benton

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All photos courtesy of the author.

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FOREWORD

In her book *Thinking about Thinking: Metacognition for Music Learning*, Dr. Carol W. Benton has provided a well-researched approach to the teaching and learning of music through metacognitive instructional strategies. She introduces the book through a well-defined chapter on metacognition with an attendant discussion on its forty-year history. Dr. Benton has presented an informative overview in her purpose statement by telling her readers that the book on metacognition in music is not limited to any one type of music teaching. She makes reference to general-music teachers (at all levels), middle and high school band and orchestra directors, choral directors, and applied-music studio teachers. Throughout each chapter, Dr. Benton recommends ways in which music teachers can incorporate metacognitive instructional strategies into their teaching. She discusses the different levels of student music ability from novice to advanced in which teachers may find ways to use metacognition to assist students in becoming better musicians. According to Dr. Benton, the use of megacognition also promotes the avoidance of boredom and frustration that often leads to attrition in music-education programs.

While Dr. Benton's book is about the use of metacognition in working with music students, she has not forgotten the importance of the role of megacognition in the life of the teacher. She discusses the importance

of thinking about thinking (metacognition) as each teacher prepares assignments, procedures, activities, and behaviors that require students to think about thinking in content instruction, rehearsals, creative projects, and independent practice.

With both students and teachers involved in metacognition on a daily basis, Dr. Benton has provided an exceptional model for both students and teachers to become independent, lifelong music learners. It is with pleasure that I recommend this excellent book to music educators regardless of their assignment or teaching level.

<div style="text-align: right;">

Irma H. Collins, DMA
Founder, *Journal of Music Teacher Education*

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PREFACE

I enjoyed my years as a chorus teacher in middle and high schools. Many students participated in my ensembles, with varying degrees of talent and enthusiasm. I felt good about giving them opportunities to not only participate in choral singing but also develop a sense of themselves as people who could make a contribution to the world around them through music. Together, my students and I worked toward musical excellence, and I was conscious of teaching content standards in a comprehensive manner so that my students could acquire musical understanding as well as performance skill.

As the years went by, I had a nagging concern that I needed to find ways to help some of my students become engaged in a more mindful way during chorus classes and rehearsals. I always had a few students who, although demonstrating natural music ability (such as accurate intonation or sensitivity to rhythm), appeared to participate in a rote manner, without thinking about what they were doing. Yes, these students did eventually learn their parts and perform successfully in the concerts, but it seemed that rote repetition was the method by which they learned just enough to get by. Therefore, I continued to have the feeling that there must be some way to promote deeper and more thoughtful learning among this group of students who appeared to participate in a relatively mindless way.

Then I discovered some research reports on the topic of *metacognition*, most simply defined as *thinking about thinking*. Moreover, I discovered some instructional strategies and classroom activities that I could implement to promote metacognition among students, and I began to incorporate these activities into my chorus classes. It was not a magic potion. My students did not immediately sing with perfect blend, balance, and diction because I was requiring them to engage in metacognitive activities. But I did see them become more musically self-aware, more musically independent, and more interested in their own progress as young musicians.

I considered the metacognitive activities as tools for teaching musicianship, and I do not recall that I ever used the word *metacognition* while teaching my students. Nevertheless, the infusion of metacognitive strategies somehow created a subtle change in the classroom environment, resulting in elevating the typical dialogue of daily rehearsals. Specifically, I asked my students to participate in three metacognitive activities on a somewhat regular basis over the course of each school year: (1) self-reflective writing in response to prompts that I provided, (2) self-assessment activities where students identified their strengths and weaknesses and evaluated their own musical progress, and (3) think-aloud sessions where students shared learning strategies with partners as they worked on sight-singing or music theory assignments.

Metacognition is a term that has been defined in various ways by various researchers. Perhaps it is best to think of it as an umbrella term that covers an array of thinking and learning strategies. My personal conclusion is that metacognition is a pervasive mindset that can enrich teaching and learning. Armed with some knowledge about metacognition, a teacher can create a classroom environment where students are encouraged to plan, monitor, and evaluate their own learning, using reflection and strategizing as tools for success.

In this book, I hope that readers will find some helpful ideas to enrich their teaching, especially with regard to facilitating development of metacognitive skills among students in music classes.

ACKNOWLEDGMENTS

I would like to express my thanks to several colleagues and friends for their help in preparing this book for publication. Thanks to Beth Childress, Heather Moore, and Dr. Grace Ohlenbusch for providing feedback and suggestions. Thanks to excellent music educators Ray Ellis, Sean McBride, and Leah Nestor for allowing me into their music classrooms. Thanks to Dr. Irma Collins for her interest and support. Finally, thanks to my husband, Charlie, for his interest and support throughout the writing process.

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THINKING ABOUT THINKING: WHAT IS METACOGNITION?

The simplest way to define *metacognition* is to say that it consists of thinking about thinking. Used by learners to acquire knowledge, understanding, and skill for accomplishing educational objectives, metacognition is a transcendent and executive type of thinking that can positively affect learning outcomes. When learners use metacognition, they become aware of their own thought processes, plan and monitor their own learning, assess their own progress, and evaluate the products of their efforts. These actions result in development of progressively greater degrees of self-awareness and self-regulation. It follows, then, that practicing metacognition leads to learner independence and lifelong learning. In this chapter, several definitions of metacognition are presented along with a historical overview of some of the research on the topic.

A dictionary definition of *cognition* tells us that it is "the act or process of knowing in the broadest sense" and "an intellectual process by which knowledge is gained about perceptions or ideas."[1] Thus, when a learner uses *metacognition*, the object of the learner's thinking is the personal act of knowing or the intellectual process of gaining knowledge. Metacognition, this circular idea of thinking about thinking, is best understood as an overarching construct that encompasses numerous habits and actions used by learners. Researchers and writers define metacognition in various ways,

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so a universal definition is hard to pin down. Nevertheless, an abundance of research exists to suggest that music educators might want to apply some instructional strategies that have been shown to help students develop metacognitive skills. These skills become tools for acquiring content knowledge about music, developing performance skills, or improvising and composing music.[2]

Moreover, metacognition may be practiced for acquisition of knowledge and skill in any academic discipline. Because the metacognitive learner develops self-awareness and control of personal thought processes, it is a type of thinking that transcends learning domains and is not limited to any one academic subject area.[3] In fact, much of the research on metacognition has been carried out in areas such as reading and math education. For this reason, it is helpful to begin this book with an exploration of research from the general-education arena to gain a better understanding of what metacognition is. This can be done with assurance that productive metacognitive skills for reading, math, science, problem solving, and decision making can be adapted by informed music educators and applied to music teaching and learning.

A BRIEF HISTORY OF THE RESEARCH ON METACOGNITION

The term *metacognition* has been in the vocabulary of educators for almost forty years. John Flavell brought groundbreaking research to the education community in the 1970s through his writings about *metamemory* and *metacognition*. "Metacognition," according to Flavell,

> refers to one's own knowledge concerning one's own cognitive processes and products or anything related to them (e.g., the learning-relevant properties of information or data). For example, I am engaging in meta-cognition (metamemory, metalearning, metaattention, metalanguage, or whatever) if I notice that I am having more trouble learning A than B, if it strikes me that I should double-check C before accepting it as a fact, if it occurs to me that I had better scrutinize each and every alternative in any multiple-choice-type task situation before deciding which is the best one, if I become aware that I am not sure what the experimenter really wants me to do, if I sense that I had better make a note of D because I may

forget it, if I think to ask someone about E to see if I have it right. Such examples could be multiplied endlessly. In any kind of cognitive transaction with the human or nonhuman environment, a variety of information-processing activities may go on. Metacognition refers, among other things, to the active monitoring and consequent regulation and orchestration of these processes in relation to the cognitive objects or data on which they bear, usually in the service of some concrete goal or objective.[4]

The idea of identifying and promoting this type of thinking resonated with educators. For many, it was an attractive premise that metacognition helps learners to gain knowledge and skill. Following Flavell's initial research, other educational researchers put forth their own definitions and analyses of metacognition. Three examples are offered here.

1. In 1984, Arthur Costa defined metacognition as "our ability to know what we know and what we don't know. It occurs in the cerebral cortex and is thought by some neurologists to be uniquely human. Metacognition is our ability to plan a strategy for producing what information is needed, to be conscious of our own steps and strategies during the act of problem solving, and to reflect on and evaluate the productivity of our own thinking."[5]
2. In 1991, John Barell offered the following on metacognition. "Usually," he said, "we consider metacognition in terms of our awareness of how we think about a certain task or problem. . . . So metacognition focuses upon the mental processes we use within a specific situation. . . . Another aspect of metacognitive awareness and control is not always mentioned: knowledge of, awareness of, and control of the feelings that accompany certain situations."[6]
3. In 2006, Michael Martinez said that "metacognition is the monitoring and control of thought. . . . The toolbox is an equally apt metaphor for metacognition."[7]

Metacognition and the Thinking-Skills Movement

Metacognition involves thinking skills that are sometimes classified as being of a *higher order*. Since the 1980s, educators have been aware of the need to teach thinking skills that are labeled as *critical*, *creative*, and *higher order*. Teachers who emphasize higher-order thinking skills

know that simply covering content does not ensure that students will learn to think effectively and independently. In 1986, Presseisen defined metacognition in light of the thinking-skills movement, stating that it encompasses "the learning to learn skills aimed at making thinking more conscious and the student more aware of the ways one can go about problem solving or decision making."[8] She went on to suggest that "perhaps the most striking aspect of teaching thinking in the current movement is the emphasis on metacognitive ways of thinking."[9]

In 1998 Halpern proposed metacognition as one component of a four-part model for teaching critical thinking, stating that metacognitive monitoring of thought processes enables the learner to guide the use of critical-thinking skills. Specifically, Halpern emphasized the importance of metacognitive actions such as goal setting, checking for accuracy, and monitoring the expenditure of time and mental energy in pursuit of a learning goal.[10] Kuhn, another researcher who places metacognition in the realm of critical-thinking skills, proposed that metacognition is implicit in all models of critical thinking as a second-order thinking skill that builds on first-order declarative knowledge and allows the learner to exert control over thought processes. According to Kuhn, central metacognitive questions for any learner are, "What do I know, and how do I know it?"[11]

METACOGNITION: CONTENT SPECIFIC AND DISCIPLINE TRANSCENDENT

Learners do not practice metacognition in isolation from the content of their studies. It is not like weight lifting as an isolated activity that helps football players to prepare for the game. Instead, metacognition is a type of thinking that helps students while they are engaged in learning tasks that are directly embedded in a specific discipline. For this reason we say that metacognition is content specific.

Richard Colwell asserted that critical thinking is inextricably linked with content knowledge in a specific domain or discipline. He explained that "what we do know about thinking is that it is subject matter–specific. Scholars think in a discipline: one thinks like a historian or like a musician. The process of thinking is intertwined with the content of

thought—domain knowledge."[12] Similarly, Chiu and Kuo stated that basic metacognitive training begins with domain-specific language and tasks. According to them, metacognitive training within a discipline helps students to recognize prior knowledge, learn how to find new information, assimilate new learning with prior knowledge, and recognize errors that are common to the discipline.[13]

Let us consider an example of learners using metacognition within the music discipline. Music students learn how to count rhythm patterns within specific meters. With practice, they develop the ability to monitor their rhythmic accuracy, recognize rhythm mistakes, and apply strategies to correct those mistakes. Knowledge of the time values of notes within the contexts of various meters is classified as declarative knowledge or content knowledge within the music discipline and, therefore, requires cognition. But when music learners become aware that they have made rhythm mistakes—and they take action to make corrections—they are applying metacognition. Specifically, the learners are using the metacognitive skills of self-awareness, self-monitoring, and strategy use to accomplish the goal of rhythmic accuracy. Music learners are thinking like musicians when they apply metacognition to achieve musical goals.

Although metacognition is applied in discipline-specific learning situations, it does possess a transcendent, executive quality. It is the type of thinking whereby learners guide their intellectual efforts in any content area; and it is, therefore, domain general.[14] Gagné and Driscoll identified several executive (metacognitive) strategies of critical thinking, including "goal-setting, concentration, management, and self-monitoring."[15] Halpern stated that metacognition is the "boss" function that enables learners to plan, monitor, and carry out cognitive actions.[16] Brown labeled metacognition as the "central processor" or "overseer" of learners' thoughts.[17]

In a 2001 revision of Bloom's taxonomy of educational objectives, Anderson et al. included metacognition as one of four major types of knowledge in the "knowledge dimension" of the taxonomy. Defining metacognitive knowledge as "knowledge of cognition in general as well as awareness and knowledge of one's own cognition," taxonomy revisionists asserted that metacognition includes "strategic knowledge; knowledge about cognitive tasks, including appropriate contextual and

conditional knowledge; and self-knowledge."[18] As such, metacognition takes its place as an important component of the twenty-first-century version of Bloom's taxonomy. Regarding their choice to include meta-cognition in the revised taxonomy, the authors stated that "our inclusion of *metacognitive knowledge* is predicated on our belief that it is extremely important in understanding and facilitating learning, a belief that is consistent with the basic precepts of cognitive psychology and supported by empirical research."[19]

METACOGNITION AND CHILD DEVELOPMENT

A review of the literature yields conflicting opinions regarding when children develop the ability to engage in metacognitive thought. Some researchers suggest that metacognition begins in early childhood, while others assert that it is not until adolescence that children become capable of metacognition. Researchers generally agree that adolescents in middle school and high school years are thoroughly able to exercise metacognitive skills. Some researchers point to early childhood experiences that lay the foundation for metacognitive skill building.

For example, Dawson and Guare stated that the roots of metacognition are seen in infancy when children first begin to sort and classify objects and when they first begin to perceive cause-effect relationships. Further, they asserted that when toddlers and young children learn to observe daily rituals and routines, they are beginning to use metacognition.[20] On the other hand, Kuhn suggested that the foundation of metacognitive thinking is laid somewhere around ages three to five and that metacognition does not fully develop until adolescence.[21] Waters and Kunnmann found that first graders could engage in metacognition when trained and prompted by their teachers and that first graders were able to transfer metacognitive skills from one context to another as they moved from first to second grade.[22]

It is apparent that researchers have different opinions regarding precise developmental patterns for metacognition. In general, it appears safe to say that teachers may guide children in primary grades to begin building basic metacognitive skills and that teachers might expect stu-

dents from upper elementary grades through high school and college to use metacognition in increasingly independent ways.

COMPONENTS OF METACOGNITION

In a review of the literature, several components of metacognition emerge as recurrent themes, summarized in the list below. When a learner practices metacognition,

- The learner is increasingly self-aware.
- The learner exerts control over personal thought processes.
- The learner engages in self-regulation.
- The learner becomes increasingly independent in learning tasks.
- The learner selects and applies learning strategies.
- The learner monitors personal progress through a learning task.
- The learner modifies learning strategies and seeks resources or assistance when needed.
- The learner reflects on learning.
- The learner engages in self-evaluation (self-assessment).

Photo 1.1.   Elementary Choir and Ensemble

METACOGNITIVE SKILLS

Metacognition involves the monitoring and control of thought processes.[23] As such, it requires heightened self-awareness and development of metacognitive thinking skills. Researchers delineate metacognitive skills in three broad categories that encompass (1) planning for a learning task, (2) monitoring thought processes during a learning task, and (3) evaluating the product(s) of a completed learning task.[24] Marzano and Kendall use different terminology when they observe that the "metacognitive system has four functions: (1) specifying goals, (2) process monitoring, (3) monitoring clarity, and (4) monitoring accuracy."[25]

Despite slight differences in wording, it is apparent that researchers see metacognitive skills as specific activities requiring learners to demonstrate mindfulness in a sequential manner throughout a learning task. Moreover, researchers agree that learners should engage in planning and goal setting in beginning stages of a learning task with self-monitoring applied to ongoing activities through the progression of a learning task. When learners engage in metacognition, they develop the ability to distinguish between what they know and what they do not know. This important skill is labeled *knowledge monitoring*. Researchers have found a positive correlation between learners' knowledge-monitoring ability and their scholastic aptitude. Learners who exhibit the ability to monitor their learning also exhibit higher levels of scholastic achievement.[26]

Planning for Learning: A Metacognitive Skill

Metacognitive learners define their learning tasks, decide what they are supposed to do, and gain an understanding from the teacher of what a successful outcome will be. These learners then set personal goals and select strategies for accomplishing their goals. In this process, the learners consider their available resources of time, materials, equipment, and previous knowledge and skill.

Let us consider a scenario depicting a fourth grade general-music student who is assigned to work with a partner to create a two-measure rhythmic ostinato in 4/4 meter. He gains an understanding from his

teacher that he and his partner may choose their rhythm instruments and that they have ten minutes to complete the task before performing their ostinato as accompaniment to a rhythmic chant performed by other students. As the learner checks his understanding of the task, he asks his teacher about specific parameters, such as how many beats he and his partner should have in their ostinato pattern. He assesses his own prior knowledge of ostinati and rhythm patterns in 4/4 meter, as well as his partner's knowledge about the task. They remember that they have played patterns in music class on previous occasions. Together, the learner and his partner select two wood blocks and set about the task. They decide that each boy will create a one-measure rhythm pattern and that they will put their patterns together for a two-measure ostinato.

Monitoring Learning: A Metacognitive Skill

Metacognitive learners engage in self-assessment throughout learning tasks. They pose internal questions such as "How am I doing?" "Do I think I am on the right track?" "Have I completed the necessary steps for this assignment?" The learners compare their ongoing products of learning with preconceived models or standards of excellence and accuracy. If they run into obstacles, metacognitive learners revise their strategies. Monitoring learning requires learners to keep their original goals in mind and to continually check their progress toward achievement of those goals.

Returning to our scenario—the fourth-grade general-music student begins to experiment with sounds on the wood block that he selected for his task. He improvises several rhythm patterns and decides which pattern he likes best. As he listens, he checks to see whether he can count four beats in his rhythmic pattern. He realizes that he probably has too many beats in his pattern, so he revises it to more closely approximate the original goal of creating one measure of an ostinato in 4/4 meter. Satisfied that he has created a one-measure rhythm pattern in 4/4 meter, the student turns to his partner and suggests that they put their patterns together for the two-measure finished product. He suggests that his partner play the first measure,

allowing him to add his pattern for the second measure. Their first attempts are rhythmically unsteady; but after several practice runs the partners decide that they have a steady and rhythmically interesting two-measure ostinato pattern in 4/4 meter.

Evaluating Learning: A Metacognitive Skill

Metacognitive learners engage in self-evaluation of a summative nature at the completion of learning tasks. They pose internal questions such as "How did I do?" "Was my finished product successful?" "Could I have done something differently or better?" "How can I use this new learning in the future?" This step allows learners to plan for future learning. Will they need to revisit current tasks to achieve success? Or are they ready to go on to more challenging tasks? As they evaluate the products of their efforts and plan for future learning, the learners begin the metacognition cycle anew.

In the final stage of our scenario—the fourth-grade general-music student and his partner play their two-measure ostinato pattern repetitively while a group of their classmates performs a rhythmic chant. They are able to maintain a steady beat, and their rhythm pattern is interesting and complimentary to the chant. As the teacher congratulates the group on their performance, the learner and his partner decide that they are pleased with the outcome of their efforts. The learner concludes that he understands 4/4 meter and that he is competent in creating a rhythmic ostinato. He looks forward to future opportunities to engage in creative-music activities. He and his partner decide that during their next music class they will expand their ostinato and invite two friends to join them on hand drums.

THREE TYPES OF METACOGNITIVE KNOWLEDGE

In much the same way that researchers define three distinct metacognitive skills (planning, self-monitoring, and self-evaluation), Schraw delineates three types of metacognitive knowledge. Learners use *declarative*, *procedural*, and *conditional* metacognitive knowledge as they work through learning tasks.[27] The teacher who endeavors to help students use metacognition for positive learning outcomes will encourage them to build knowledge in these three areas.

1. Declarative knowledge is knowledge *about* something. When learners know about themselves as learners (their strengths, weaknesses, and preferences), they possesses declarative metacognitive knowledge about themselves.
2. Procedural knowledge is knowledge about *how to do* something. When learners devise and apply personal learning strategies that help them to succeed in learning situations, they are developing procedural metacognitive knowledge.
3. Conditional knowledge refers to knowing *when and why* (under what circumstances) to apply strategies. When learners apply appropriate strategies in a timely fashion to achieve positive learning outcomes, they are using conditional metacognitive knowledge.[28]

All three types of knowledge are components of metacognition. It is important to note that the three types of metacognitive knowledge are personal and unique for each learner and might vary from one learning situation to another. Ideally, learners apply declarative, procedural, and conditional types of metacognitive knowledge that pertain to specific learning situations and that help them to achieve positive learning outcomes.

TEACHABLE SKILLS

John Dewey, eminent educational philosopher of the early twentieth century, asserted that "learning is learning to think."[29] At a glance, the list of skills and components of metacognition appears to be a commonsense list of thinking habits used by excellent students in any

educational setting. Educators recognize that good students engage in these behaviors on a regular basis. At the same time, educators also recognize that not all students use metacognitive skills naturally or routinely. Many students learn by rote, expecting their teachers to spoon-feed information to them every step along the way. Although physically present in a classroom, these students do not cognitively engage in learning tasks in an active and independent way. This phenomenon can occur in music classes as well as in academic classes. Pogonowski observed that "it is possible for students to sit through years of general-music classes and never be asked to reflect upon a musical problem. . . . It is possible for students to sit through an entire rehearsal and only be aware of their own parts. In a performance setting in general-music class, or in chorus, orchestra, and band rehearsals, students can learn to think more effectively about and beyond their particular parts."[30]

The good news is that metacognitive skills can be taught.[31] Educators have devised many effective teaching strategies and classroom activities that promote metacognition among learners. For example, to help young children develop the executive skills of planning and prioritizing, teachers can break down large assignments into smaller, sequential steps. By the time students reach middle school, they will be expected to function in this way independently.[32]

Caution Regarding Overemphasis on Metacognition

Having extolled the virtues of metacognition, it is wise to insert a caveat regarding its overemphasis in teaching and learning. For example, in music education, the acts of listening to, creating, and performing music remain at the core of the curriculum. Metacognitive skills may serve as tools for students as they pursue music-learning objectives; however, metacognition is not the end product of instruction. In *The Schools We Need and Why We Don't Have Them*, Hirsch admonished educators regarding an overemphasis on metacognition, especially if it is taught as an abstract concept outside of domain-specific content learning.[33] He asserted that an overemphasis on metacognition can overload learners' working memories and interfere with development of problem-solving capacity and procedural competency. Moreover,

Hirsch stated that these negative effects might be most apparent among disadvantaged children and slow learners.[34]

It is prudent, therefore, for teachers to consider an emphasis on meta-cognition to be a complement to regular music instruction. As music educators plan and deliver instruction on a daily basis, they can incorporate teaching strategies and classroom activities that require students to use metacognitive skills. Teachers might find that metacognitive skills facilitate music learning and help students develop independence.

THE PURPOSE OF THIS BOOK

While investigating metacognition as a transcendent, domain-general, and beneficial habit for learners in all disciplines, this book will focus primarily on the usefulness of metacognition in music learning. Throughout the book, we will explore research on metacognition in music education and see how metacognitive instructional strategies might be applied in music-teaching and -learning scenarios. For this reason, the contents of this book are not limited to any one type of music teaching. General-music teachers, middle and high school band and orchestra directors, choral directors, and applied-music studio teachers will find ideas that might be applied to their particular teaching circumstances. The purpose of the book is to present information acquired through research along with practical suggestions for music educators who want to elevate the level of cognitive engagement among their students by promoting metacognition. The overarching goal is to provide students with cognitive tools to become independent, lifelong music learners.

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2

METACOGNITION FOR MUSIC LEARNING

Music education shares many elements in common with education in academic disciplines such as language, math, and science. Music educators know, however, that music teaching and learning are unique processes that cannot mimic other academic disciplines too closely without losing some of the core elements that make music teaching and learning most valid and meaningful. Music learning involves acquisition of knowledge and skill in cognitive, psychomotor, and affective domains of learning.

- *The cognitive domain.* Music learners must acquire content knowledge, deep understanding, and the ability to carry out analysis and synthesis in relation to their musical activities. These components of the music-learning process exist in the cognitive-learning domain. Knowledge, understanding, analysis, and synthesis are not enough, however, for music learners to develop the ability to perform music.
- *The psychomotor domain.* Music performance requires skills that are built in the psychomotor-learning domain. Depending on the performing medium, every music learner must acquire a myriad of motor skills along a continuum of increasingly complex and refined

abilities, all focused toward an end product of playing or singing excellently. Musical knowledge, skill, and ability would be pointless, however, without acquisition of deep understanding in the affective-learning domain.

- *The affective domain.* Because music is an art, many of the reasons for learning music lie within the affective domain of spirit, emotion, and desire to communicate with an audience. Music learning in the affective domain includes knowledge of appropriate performance practice, as well as understanding of musical expression and ability to shape sound in performance for artistically meaningful communication.

Let us consider an example of music learning in all three domains. Students in a high school band must have content knowledge related to techniques for playing their various instruments, including fingerings, breath control, and embouchure. Additionally, they must have content knowledge about reading music notation, such as pitch and rhythm reading, along with knowledge of key and meter signatures and marks of articulation and expression. While learning content knowledge, the band students are operating in the cognitive domain of learning. Psychomotor skills, related to playing their instruments, allow students to demonstrate their content knowledge in real music making. Hours of practice are spent on learning in the psychomotor domain as band members build performance skills for playing their instruments. But for many students it is the learning in the affective domain that cements their commitment to membership in the school band. The students'

Photo 2.1.   High School Band, French Horns

affective understanding of the spirit and emotion of the music, as well as a feeling of camaraderie with their peers and pride in their band, all culminate in meaningful communication with their audience through performance.

In this chapter, we will explore research on metacognition applied specifically to music learning and find that all three domains will be represented. Further, we will imagine some typical scenarios in which students apply metacognitive skills for music learning in the cognitive, psychomotor, and affective domains.

OVERVIEW OF RESEARCH ON METACOGNITION IN MUSIC EDUCATION

Because most of the research on metacognition has been conducted in academic subject areas, music educators might feel that they must translate conclusions from academic disciplines into meaningful conclusions for teaching and learning the art of music. The problem with translating research findings from other disciplines into the context of music teaching and learning is that academic disciplines lack the complexity of interaction among cognitive knowledge, psychomotor skill, and expression of emotion that is crucial to music making. Thankfully, some music education researchers have addressed the topic of metacognition as a phenomenon specifically situated in music-learning contexts. The following overview provides a chronological sampling of some of the research on metacognition in music education, as presented in writings from the past three decades. Additionally, summaries of many more music education research studies are offered in subsequent chapters of this book.

1989—MENC Published *Dimensions of Musical Thinking,* in Which Metacognition was Recognized as One of the Dimensions of Musical Thinking.

Lenore Pogonowski contributed the chapter on metacognition, stating that learners might benefit from using metacognitive skills while performing, creating, and listening to music. She asserted that music learners can use metacognition to control their own learning processes,

thereby achieving greater success than if they simply go about their music activities in a less aware, rote manner.[1]

1995—College Students in Musicianship Classes Benefitted from Using the Metacognitive Skills of Self-Awareness and Self-Reflection.

In an empirical study of university music students, Marilyn Egan investigated the effects of metacognition on student achievement in musicianship classes. Learners received instruction in how to apply metacognitive skills for maximizing their learning. Specifically, they learned to monitor and regulate their own learning processes by recognizing their perceptual learning-style preferences. Egan instructed participants to think about their own thinking and to understand if they were visual, aural, or kinesthetic learners. Then, using the metacognitive skills of self-monitoring and self-questioning, learners adapted their learning-style preferences to the learning tasks in musicianship classes. They were encouraged to plan their own learning and to develop personal learning strategies.[2] Egan provided questions as prompts for students' self-reflections regarding their learning tasks in musicianship classes. Participants in the study made significant gains in musicianship skills, leading Egan to conclude that metacognition had a positive effect on acquisition of knowledge and skill in musicianship classes.

1997—In an Empirical Study, Elementary School Music Students Used the Metacognitive Skill of Self-Assessment as a Tool for Developing Vocal Pitch-Matching Ability.

Sandra Mathias found that self-assessment led to significant gains in vocal-pitch accuracy among children who were initially inaccurate singers. Through playing matching games and then having children assess their own pitch-matching accuracy, Mathias found that 42 percent of first graders self-assessed accurately and that 63 percent of third through fifth graders self-assessed accurately. She concluded that the metacognitive skill of self-assessment had a positive effect on acquisition of vocal pitch–matching ability among elementary school children.[3]

1997—Metacognition, as a Self-Regulatory Skill, Was Encouraged Among At-Risk Male Students in a Choral-Music Program.

In a study designed to explore ways to help at-risk adolescent males develop increased self-efficacy, Darolyne Nelson encouraged participants to use metacognition in choral-music classes. Learners made gains in vocal-performance self-efficacy. Choral directors who implemented the study used metacognitive activities among students as a strategy to teach and reinforce higher-order thinking skills. They found that using higher-order thinking skills contributed to self-regulation, mental-preparation, and verbal-expression skills among their choral singers. Directors promoted metacognition through questioning techniques. They required learners to respond to questions such as "How do you know that?" and then to describe a personal plan of action for solving musical problems or correcting mistakes. According to Nelson, "questioning strategies consistently provided the learners with active engagement of cognitive skills. The boys were challenged not to simply sing but to think before and while they were singing . . . metacognition was often included in the [teaching] strategies."[4] Nelson concluded that metacognition had a positive effect on development of self-efficacy among at-risk teenage boys in the choral-music program.

2001—In an Investigative Study, Susan Hallam Compared the Habits of Novice and Expert Musicians and Found that Professional Musicians Routinely Used Metacognition to a Greater Degree than Their Novice Counterparts.

Musicians must use metacognitive skills for a variety of music-learning tasks. This is true of expert musicians as well as students. In fact, Hallam found that a defining characteristic of expert musicians, as compared to novices, was the degree to which they used metacognition in their approaches to practicing and performing. Hallam stated the following:

> A musician requires considerable metacognitive skills in order to be able to recognize the nature and requirements of a particular task; to identify particular difficulties; to have knowledge of a range of strategies for dealing with these problems; to know which strategy is appropriate for

tackling each task; to monitor progress towards the goal and, if progress is unsatisfactory, acknowledge this and draw on alternative strategies; [and] to evaluate learning outcomes in performance contexts and take action as necessary to improve performance in the future.[5]

Further, Hallam concluded that well-developed metacognitive skills allowed professional musicians to "learn to learn." Specifically, the professionals used metacognition to (1) identify personal strengths and weaknesses, (2) assess the difficulty of music to be learned, and (3) devise and apply strategies for optimal performance.[6]

2002—MENC Published *Dimensions of Musical Learning and Teaching: A Different Kind of Classroom*, a Follow-Up to the 1989 Book. Once Again, Metacognition was Cited as an Essential Type of Thinking for Music Learning.

Editor Eunice Boardman asserted that metacognition plays a "crucial role" in music learning. She advised music educators to regularly share information about thinking processes with their students. According to Boardman, students may use critical thinking, creative thinking, decision making, and problem solving in pursuit of music-learning goals. Metacognitive processes will emerge in music learners to the extent to which teachers make them aware of available types of thinking for music learning.[7]

2002—Metacognition was Promoted as a Beneficial Type of Thinking for Students in a High School Band Class.

In performance ensembles, such as choirs and bands, it is most often the case that directors maintain control of all aspects of rehearsals and performances at all times. There is good reason for this approach, as directors must ensure that performance quality is of the highest standard for their ensembles. Richard Kennell, however, suggested that high school band directors can promote metacognition among their players by sharing with them some of the directorial-control processes that are crucial to the success of the ensemble.

Directors can provide opportunities for band students to share in strategy planning and problem solving related to musical tasks and challenges. Thus, players can glimpse the planning processes of their

directors. Additionally, they can begin to solve musical problems for themselves when the director challenges them to do so.[8] Kennell proposed that developing metacognition among band members might have a positive effect on the music-making ability of the ensemble.

2002—Researchers Warned Against Too Much Emphasis on Metacognition Among Music Students with Special Needs.

Welsbacher and Bernstorf encouraged music teachers of students with disabilities or cultural disadvantages to provide opportunities for their students to develop metacognition, but they warned that metacognitive awareness and self-monitoring might be out of reach for this population of students. Although the researchers acknowledged the importance and usefulness of metacognition, they suggested that students with special needs might be incapable of this type of thinking. Further, the researchers suggested that emphasis on metacognition might overload the cognitive-processing abilities of students with particular special needs.[9]

2006—Lisk Proposed Metacognition as a Central Aspect of His New Approach to Instrumental Ensemble–Rehearsal Procedures.

In his book *The Creative Director: Conductor, Teacher, Leader*, Edward Lisk espoused his A.R.T. system (alternative rehearsal techniques). Lisk stated that: "*A.R.T. is a new dimension in teaching, thinking, practicing, and playing an instrument*. It is a departure from traditional instrumental techniques—a new paradigm for musical learning that recognizes the importance of metacognition."[10] Lisk encouraged directors to teach their instrumentalists how to use metacognition in rehearsals. He explained that "by actively engaging their musical minds, we develop their performance skills and teach them to make intelligent musical decisions through which they will more fully experience the entire world of musical masterworks."[11]

2006—Metacognitive Skills Were Promoted as Part of a Constructivist Approach to Teaching Music.

Focusing on the relationship between constructivist learning theories and music teaching and learning, Sheila Scott proposed that metacognition is an integral part of a constructivist view of music education. Scott observed that metacognition plays an essential part in students' ability to construct knowledge and meaning from musical experiences.[12] As music learners use metacognitive skills to construct musical understanding, they engage in reflective thinking and work toward solving their own musical problems. For this reason, Scott asserted that metacognitive skills and the child-centered activities of a constructivist music classroom go hand in hand.[13]

2007—Metacognition Emerged as an Important Factor when Hanna Examined the Revised Bloom's Taxonomy and Proposed Its Implications for Music Education.

Since the 1950s, educators in music and other academic areas have used Bloom's taxonomy of educational objectives to plan curricula, deliver instruction, and assess learning. In 2001, a revised version of Bloom's taxonomy was published. Most notably, the revised taxonomy features metacognition as one of four major *types of knowledge*. Applying the revised taxonomy to music education, Hanna affirmed the benefits of metacognition to music learners:

> In music learning, a key aspect of metacognition is strategic knowledge, which is vital to musical refinement. The ability to skillfully interpret music demands a high degree of self-knowledge. For example, many strategies that are formed during the development of musicianship are idiosyncratic and private; only the individual musician is privy to which strategies work for him or her. . . . Developing metacognition can help music learners to become more objective about their overall musicianship. If learners lack metacognition—that is, if learners are not able "to think about musical thinking"—their musicianship will plateau and fail to progress.[14]

2010—In an Investigative Study, Metacognition Emerged as a Beneficial Type of Thinking for Students in One-To-One Violin Lessons.

Graham McPhail conducted a study in which he promoted meta-cognition among students in one-to-one violin lessons. McPhail found that music teaching and learning were enriched when he consciously employed teaching strategies that helped students to develop meta-cognition. Specifically, McPhail required his violin students to monitor their own learning processes, recognize errors, identify problems, and create their own strategies to overcome difficulties. Teaching strategies included having students engage in self-reflection, self-evaluation, and awareness of personal strengths and weaknesses. As a result, the violin students became more self-regulated in their approach to learning and playing music. McPhail concluded that the use of metacognitive skills related to violin playing had a positive effect on students' progress in one-to-one lessons.[15]

2010—Scott Emphasized Metacognitive Activities as Part of a "Minds-On" Approach to Music Teaching.

Describing a "minds-on" approach to learning in the general-music classroom, Sheila Scott advised teachers that music learners should engage in several activities requiring metacognition: (1) self-reflection through journal writing, (2) self-assessment, (3) self-strategizing for learning, and (4) interaction with learning partners.

Without specifically using the term *metacognition*, Scott detailed a number of metacognitive teaching and learning strategies for the music classroom. She defined *minds-on learning* in this way: "Students actively construct musical knowledge for themselves by thinking about what they are currently doing in relation to what they already know."[16] This requires that students are self-aware and that they reflect on previous learning, and it precludes at least a modicum of self-assessment on the part of students. Self-awareness, reflection, and self-assessment are components of metacognition.

By contrast, Scott stated that *minds-off learning* occurs when "students complete tasks without thinking about what they are doing; they passively accept information provided by others."[17] Music educators

might observe this type of minds-off learning among some of their students and endeavor to use teaching strategies that produce a learning environment where richer and deeper learning takes place.

MANIFESTATIONS OF METACOGNITION IN MUSIC LEARNING

Because it is a thinking skill, metacognition is naturally a rather covert activity. In any music class, various students will use metacognition to greater or lesser degrees. On the surface, at any given moment, it might not be apparent that some students are using metacognition while others are not. It is noted, however, that with regard to self-awareness and self-regulatory behavior, students who use metacognition in their music learning are likely to progress more successfully than those who engage in music activities by rote, with little or no deep understanding of themselves as musicians. Metacognitive music learners develop self-awareness and begin to acknowledge their ability to construct musical meaning for themselves rather than always looking to a teacher or textbook for step-by-step directions.[18]

Four Levels of Metacognition

It is likely that anyone reading this book uses metacognition at various times to accomplish learning goals. To be aware of one's thought processes and exert control over those processes in pursuit of learning is to use metacognition. It is likely, too, that readers sometimes engage in self-reflection and self-evaluation regarding the products of their efforts to learn new information, to solve problems, or to acquire and refine desired skills. Readers who are teachers might be reminded of students who appear to use metacognition on a regular basis to achieve learning goals and other students who appear to engage in metacognition to a lesser degree. Swartz and Perkins delineated four levels of metacognition, as follows:

1. *Tacit use.* The individual does a kind of thinking—say, decision making—without thinking about it.

2. *Aware use.* The individual does that kind of thinking conscious *that* and *when* he is doing so.
3. *Strategic use.* The individual organizes his or her thinking by way of particular conscious strategies that enhance its efficacy.
4. *Reflective use.* The individual reflects on his or her thinking before and after—or even in the middle of—the process, pondering how to proceed and how to improve.[19]

It is the premise of this book that many music educators will want to raise the levels of metacognition among their students from tacit use to aware, strategic, and reflective use.

Metacognition and the National Standards for Music Education

The National Association for Music Education has developed the following national standards for music education[20]:

1. Singing, alone and with others, a varied repertoire of music
2. Performing on instruments, alone and with others, a varied repertoire of music

Photo 2.2.   High School–Choir Rehearsal

3. Improvising melodies, variations, and accompaniments
4. Composing and arranging music within specified guidelines
5. Reading and notating music
6. Listening to, analyzing, and describing music
7. Evaluating music and music performances
8. Understanding relationships between music, the other arts, and disciplines outside the arts
9. Understanding music in relation to history and culture

Music teachers can encourage students to use metacognitive skills as they pursue achievement of objectives related to all nine standards. While planning and delivering instruction, teachers can incorporate instructional strategies that promote metacognition in standards-based music curricula. Throughout this book, we will explore some of those instructional strategies along with the research that provides a foundation for understanding this type of instructional approach.

SCENARIOS: METACOGNITION IN MUSIC TEACHING AND LEARNING

Some questions come to mind regarding metacognition among students in music classes. What does it look like? In what ways do music learners use metacognition? What are the overt actions of music learners when they are using metacognition? It may be helpful for music educators to consider the following scenarios in which music learners engage in metacognition.

Metacognition in Independent Practice

Metacognition is manifested in personal goal setting, situated in either long-term or short-term contexts. For example, let us imagine a piano student who sits down to begin a one-hour practice session. He mentally scans his goals for the week. Currently, he is working on three pieces of repertoire, and his teacher has assigned several scales, cadences, and arpeggios. Assessing his current strengths and weaknesses related to technique and repertoire, the student thinks of specific places in his music that need attention. Knowing that he has only an hour to devote to piano practice at this time, he decides that he will spend ten minutes on fingering, technique, and speed for one of his four-octave scales, working in both parallel and contrary motion. Then, he will turn his attention to the *B* section of a piece where he needs to count out some tricky rhythms, followed by some slow practice to solidify a technically difficult arpeggio section in another piece. Having made these decisions, the student begins practicing, knowing that he will be able to accomplish his goals within the allotted hour of practice time.

Along with goal setting, the piano student exhibits metacognition through self-awareness. He is aware of the amount of work he needs to do to accomplish his goals. Additionally, the piano student displays the ability to assess his own strengths and weaknesses regarding his current technique and repertoire. Armed with self-assessment, the student is able to focus on passages of music where he needs the most practice and not waste his time playing through passages that do not need his attention at this time. Awareness of time limitations in planning the one-hour practice session is further evidence of metacognition in that the metacognitive learner typically assesses available time and resources for accomplishing learning goals.

Metacognition in a Choral-Music Rehearsal

Metacognition is manifested in devising and applying strategies for learning. When learners devise their own strategies for solving problems, they become less dependent on their teachers.

Let us imagine that an alto in a high school madrigal group realizes that she has trouble finding her pitch at a particular entrance in an a

cappella piece. Frequently, in rehearsals, she misses her pitch at that entrance and becomes disoriented. She then notices that the basses sing her pitch in a lower octave just two beats before her entrance. Thereafter, just before her entrance she consciously tells herself to listen for the basses' note. Her strategy pays off, and she is able to accurately sing her pitch at the alto entrance. In subsequent rehearsals and performances, as long as she applies her strategy, the singer never again has a pitch problem at that point in the music.

In addition to devising and applying an appropriate strategy to solve a problem, this student exhibits the metacognitive skill of self-assessment. In order to know that she has a problem and needs to apply a strategy to solve it, the learner must first use self-assessment to be aware of her weakness in finding the correct pitch.

Metacognition in a Music-Theory Class

Metacognition is manifested in awareness of personal strengths and weaknesses, related to music-learning tasks. Imagine a student in a beginning music theory class who is being introduced to ear training. She finds that her aural analysis of triads is very good. She is almost always accurate in identifying major, minor, diminished, and augmented triads via aural perception. She realizes, however, that she is much less accurate when trying to identify intervals. Acknowledging that aural interval identification is a weakness, she determines to spend more time and practice on developing this skill.

The student's self-awareness of strengths and weaknesses in aural skills is most likely based on feedback from her teacher as well as her own self-assessment. Because of self-awareness, she then determines to actively take steps to solve the problem of her weakness in aural interval identification.

Metacognition in the Band

Metacognition is manifested in self-reflection. Consider an example of members of a middle school band engaging in self-reflection. First, they spend months learning and polishing repertoire for performance

in an adjudicated festival. Following the important performance event, their director assigns a journal-writing project in which students are asked to write responses to several questions posed by the director:

1. In what ways are you a better musician because of practicing, rehearsing, and performing for the festival?
2. Describe your personal strengths and weaknesses in performing for the festival.
3. Describe the strengths and weaknesses of the whole band in performing for the festival.
4. In what ways did your experiences of practicing, rehearsing, and performing for the festival add to your feelings of pride in our band?

As students work on the journal-writing assignment, they remember their efforts and preparations over the past several months as well as the excitement of the final performance. The reflection project allows them to assign meaning to their experiences. By creating the journaling project, the band director implies that students are responsible for constructing their own growing musicianship and placing their own values on band membership and activities.

After the journal entries have been submitted, the band director reads the student reflections, writes brief messages in the margins, and returns journals to the band members. This small gesture of recognition and communication from director to students is a valuable tool for developing positive rapport and morale in the performing ensemble.

The band director accomplishes several goals through this assignment. He or she provides writing prompts that require his students to (1) increase awareness of themselves as musicians, (2) assess their personal strengths and weaknesses as well as those of the ensemble, and (3) reflect on matters in the affective domain, including feelings of pride in their accomplishments. Due to variety in the writing prompts provided by their director, students are able to exercise metacognitive skills, including self-awareness and self-assessment. Additionally, it is likely that students' good feelings about belonging to the band are reinforced when their director responds by writing messages in the margins of their journals.

SUGGESTIONS FOR MUSIC TEACHERS

Based on evidence from music education research, subsequent chapters in this book will present ideas for music educators to incorporate into their teaching some instructional strategies for promoting metacognition among their students. An attempt is made to include information that will be useful for music teachers on a variety of grade levels and in a variety of types of music instruction. The intention is to inspire creative music educators to create their own innovative teaching strategies that expand on what is offered here.

NOTES

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2. Marilyn M. Egan, "Effects of Metacognition on Music Achievement of University Students" (Ph.D. diss., Kent State University, ProQuest, UMI Dissertations Publishing, 1995, 9536648), 4.

3. Sandra L. Mathias, "A Teaching Technique to Aid the Development of Vocal Accuracy in Elementary School Students" (Ph.D. diss., Ohio State University, UMI Dissertations Publishing, 1997, 9735675), 65.

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8. Richard Kennell, "Musical Thinking in the Instrumental Rehearsal," in *Dimensions of Musical Thinking*, edited by Eunice Boardman (Reston, Va.: MENC, 2002), 189–91.

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18. Pogonowski, "Metacognition," 9.

19. Robert J. Swartz and D. N. Perkins, *Teaching Thinking: Issues and Approaches* (Pacific Grove, Calif.: Midwest Publications, 1990), 52.

20. National Association for Music Education, "National Standards for Music Education," http://musiced.nafme.org/resources/national-standards-for-music-education/ (accessed August 4, 2013).

3

METACOGNITION AND SELF-REGULATION FOR MUSIC LEARNING

The success of music learners on all levels from beginner through professional is built on self-regulation. Metacognition is necessary for self-monitoring, leading to self-regulation, and this ability appears to develop commensurately with expertise. Being self-aware of strengths and weaknesses, recognizing problems, and knowing how to apply strategies to solve problems and correct errors are abilities that are noticeably greater among expert musicians than novices.[1] Of course, music educators generally spend their time and energy working with novice musicians rather than experts. Although they recognize that students are not experts, it is a goal of music educators to facilitate their students' progress along a continuum of achievement from the novice to the expert level.

Self-regulation involves control of self. Metacognition provides a basis for self-regulation in that it involves awareness of oneself as a learner. Using that awareness, metacognitive learners exert self-regulation to control their thought processes along with their learning activities.[2] According to Zimmerman, "self-regulation refers to self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals."[3] Furthermore, self-regulation involves personal, behavioral, and environmental processes. Self-regulating learners observe their own learning processes, adjust their learning behaviors,

and assess environmental conditions or outcomes.[4] In music, this trans-
lates to awareness of one's own musical thought processes, adjustment
of one's own music-practice or -performance behaviors, and assessment
of one's own music-performance outcomes.

The abilities to self-monitor and then to correct one's own errors
are metacognitive skills that result in self-regulation.[5] Welsbacher and
Bernstorf proposed that artists da Vinci and Matisse became "world-
changers," in part because they possessed the metacognitive qualities of
self-awareness and self-monitoring.[6] Music educators are probably not
concerned with whether their students will become world-changers;
however, they are most definitely concerned with student success in
music learning. In the early years of metacognition research, Flavell
stated his belief that metacognitive self-monitoring aids students in
pursuit of learning: "I find it hard to believe that children who do more
cognitive monitoring would not learn better both in and out of school
than children who do less. I also think that increasing the quantity and
quality of children's metacognitive knowledge and monitoring skills
through systematic training may be feasible as well as desirable."[7]

Self-regulation involves metacognition, motivation, behavioral pro-
cesses, and a sense of self-efficacy.[8] When music educators encourage
their students to use metacognitive skills for self-regulation, they set
the stage for lifelong learning by increasing student autonomy.[9] Thus
learners begin to make progress when working independently and do
not wait to be directed by their teachers regarding every little step in
the learning process.

Self-regulation is inherent in higher-order thinking skills. Presseisen
stated that "higher-order thinking means self-regulation of the thinking
process. We do not recognize higher-order thinking in an individual
when someone else 'calls the plays' at every step."[10] Self-regulated learn-
ers do not need to wait for their teachers to "call the plays" when they
use metacognition to plan, monitor, and evaluate their own learning.

It may be argued that self-regulation is even more important in music
learning than in other academic areas. Self-regulation is vital to success,
as participation in music activities is frequently a voluntary choice on the
part of the learner. Music classes, one-to-one lessons, and participation
in performance ensembles are often elective courses or extracurricular
activities, requiring students to take initiative and independent action in

pursuit of musical goals.[11] Furthermore, self-regulated music practice away from the classroom is critical for development of basic musicianship among beginning and intermediate music students, such as those in middle and high school bands; and success in the initial, formative phases is crucial for retention of students in performing ensembles.[12] Consequently, self-regulation is not only important in initial phases of music participation but also crucial for retaining competent young musicians who continue to make progress toward musical excellence in performing ensembles.

METACOGNITION FOR SELF-REGULATION

The concepts of metacognition and self-regulation are inextricably intertwined. Metacognition is a necessary component of self-regulation, and it is through metacognition that self-regulation becomes possible. At the same time, it can be said that self-regulation is a component of metacognition, particularly with regard to controlling thought processes.

Metacognitive Knowledge: Declarative, Procedural, and Conditional

The ability to self-regulate in a learning situation is dependent on several factors, as follows:

- *Self-awareness*. Metacognitive learners are able to step back and look at themselves, considering what they are thinking and doing.
- *Metacognitive declarative knowledge*. Learners know about their own thought processes and are, therefore, aware of their strengths and weaknesses related to learning tasks. They are aware of what they know from previous experience and what they do not know but need to know. This basic knowledge about themselves as learners provides a foundation from which metacognitive learners can effectively work on learning tasks.
- *Metacognitive procedural knowledge*. Because they are aware of their thinking processes, metacognitive learners understand what they will need to do in order to accomplish learning tasks. They