CHAPTER 12

SELF-REGULATION INTERVENTIONS AND THE DEVELOPMENT OF MUSIC EXPERTISE

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Every year, millions of children around the world begin learning a musical instrument. Very few of these learners understand the dedication needed to acquire expertise at the highest levels, with many starting their learning for the expressed purpose of just having fun with their friends or family members (McPherson & Zimmerman, 2011). Only weeks after starting, however, a number of demotivating influences start to emerge as young learners come to realize the commitments necessary to acquire sufficient skill for music performance to remain personally satisfying (McPherson, Davidson, & Faulkner, 2012).

In both formal and informal musical contexts it is self-evident that learning a musical instrument requires a great deal of effort and independent learning. Whether learners practice covering songs from an mp3-player, use YouTube to learn ukulele, or are involved in formal instrumental tuition, a number of self-regulatory tools need to be acquired to help them

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take control of their own learning and progress effectively (McPherson & Zimmerman, 2002, 2011). Whereas learners in sports can rely on their coaches to provide them with informative feedback and well-defined tasks in their training, many music learners, especially when they are practicing independently at home, must either themselves assume much of the responsibility for their own achievement or rely on peers or their parents to help shape their learning. In this situation, knowledge of how to manage this "freedom"—in terms of the quantity of time devoted to learning as well as the quality of effort invested—emerges as a principal factor influencing performance levels (Barry & Hallam, 2002; Pintrich, 1995). To understand these and various other processes involved in learning a musical instrument, researchers in music education have drawn on Barry J. Zimmerman's work on self-regulated learning to help shape their research agendas (Bartolome, 2009; Leon-Guerrero, 2008; Miksza, 2006; Nielsen, 2004; Renwick, McCormick, & McPherson, 2011), which they have used as a useful perspective from which to study the many varied aspects of music learning (cf. McPherson & Zimmerman, 2002; Schunk & Zimmerman, 1998).

The purpose of this chapter is to explain the types of interventions that we believe impact positively on music learners' self-regulation, based on research we have undertaken with beginning, intermediate and advanced level music learners. Our chapter begins with a short description of Zimmerman's (2000) triadic forms of self-regulation that Nielsen (2001) has applied to study various musical processes in intermediate and advanced level musicians. We use her model of cyclical self-regulation as a means of explaining how these processes unfold and can come under conscious control during the act of practicing and performing music. This provides the backdrop for a detailed explanation of the psychological dimensions of musical self-regulation that McPherson and Renwick (2001) have applied to frame their studies of beginning and intermediate level musicians who are learning a musical instrument. Using these dimensions of musical self-regulation allows us to document the types of interventions we have found to be most useful for helping students develop into efficient, self-regulated musicians. These include interventions that encourage learners to maintain their concentration and develop the self-motivation to persist with their learning, adapt suitable learning strategies that will facilitate their learning, plan and manage the time they have available for practicing and devoting attention to music, enhance their own behaviors as they choose, modify and react to feedback while learning, shape the physical setting in which they practice and engage in music, and connect socially with parents, teachers and peers in ways that will enhance and enrich their musical learning. Our chapter concludes by defining the main types of research issues that can be used to set a meaningful agenda for the coming decade of research on self-regulated music learning. These ideas are based on the previous

four decades of pioneering work by Barry J. Zimmerman, whose research has served as our model and will continue to do so.

SELF-ORIENTED FEEDBACK LOOPS

According to Zimmerman (2000), self-regulation from a social-cognitive perspective refers to "self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals" (p. 14). Certain actions and processes are applied by music learners to master various aspects of their music engagement, which is why Zimmerman (2000) highlights the role of personal agency in planning their use cyclically. From a social cognitive perspective the music learner's personal agency to act on his or her social setting and structures is important (Zimmerman, 1989). As such, Zimmerman (1989) links personal, behavioral, and environment self-regulated processes together (see Figure 12.1). For example, music learners need self-oriented feedback in order to (a) use strategies that are appropriate for the task and the setting (behavioral feedback loop), (b) decide how much and what kind of instruction they need or when they might choose more challenging tasks (environmental feedback loop), and (c) "keep on track" both cognitively and affectively during learning and performance (covert feedback loop; cf. Lehmann, Sloboda & Woody, 2007).

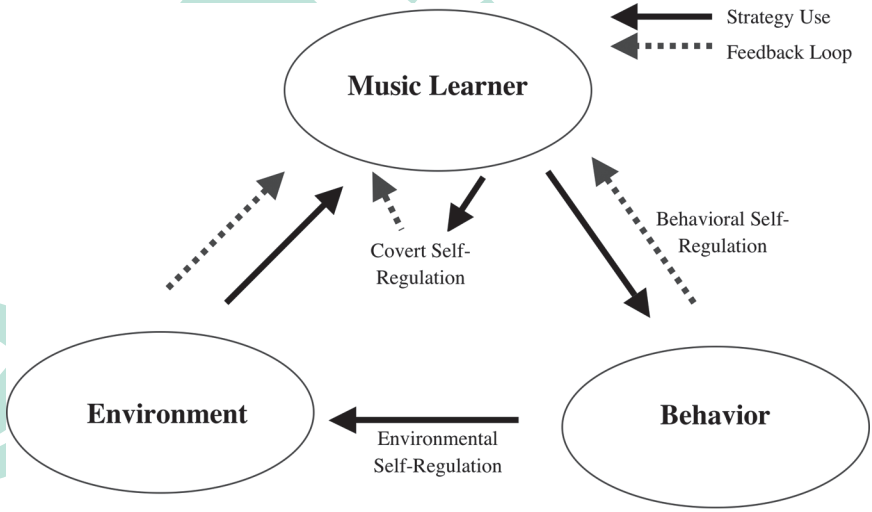

Figure 12.1 Triadic forms of musical self-regulation. Adapted from: B. J. Zimmerman (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology, 81*, p. 330.

Applying this work to studying music processes, Nielsen (2001) has proposed a model of cyclical self-regulation in music that is based on her analyses of the learning strategies of advanced music students. The value of this model is that it demonstrates the extensive self-regulatory skills that advanced students are able to apply as they strive to optimize their learning of specific musical challenges.

In Figure 12.2, the solid black arrows depict the problem to be solved, the musician's strategy use, the performance of the piece, and the level of self-evaluation of the performance. In her work, Nielsen has shown that when the musicians evaluate the success of their performance in terms of making progress, they tend to focus on a new problem (the full grey arrows in the model). At other times when they evaluate their performance as unsuccessful but believe in the value of the chosen strategy for solving the musical problem, they increase their effort and continue using the same strategy (the light grey dotted arrows). In situations where the musicians

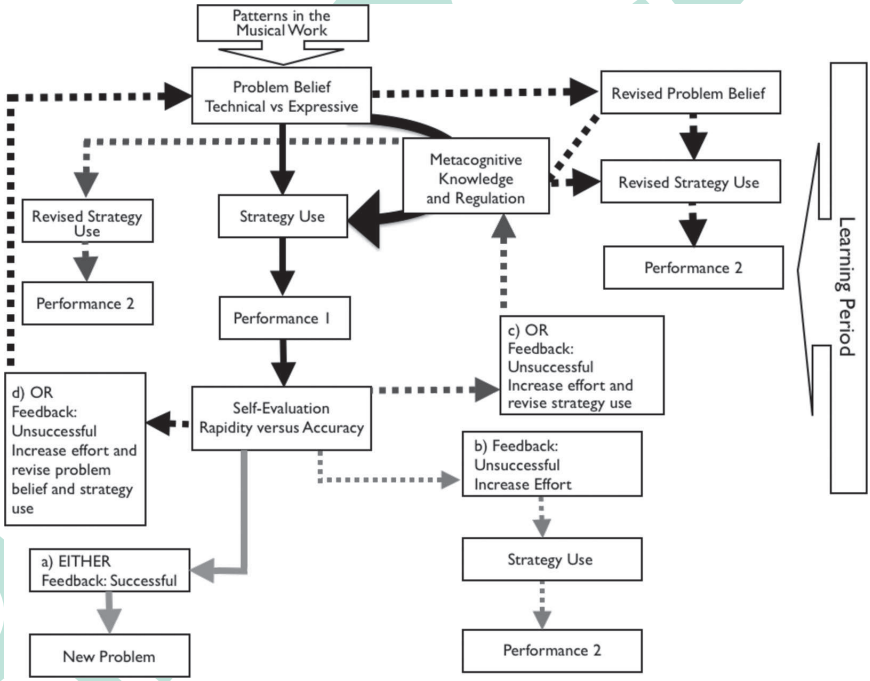

Figure 12.2 Cyclic self-regulation of learning strategies during practice, showing the basic first step and all four alternative problem-solving activities to follow it. From "Self-Regulating Learning Strategies in Instrumental Music Practice," by S. G. Nielsen, 2001, *Music Education Research, 3*, p. 155. Copyright 2001 by Taylor & Francis Ltd. Reprinted with permission.

evaluate their performance as unsuccessful and do not feel that the strategy being used is appropriate to the identified problem, they again search their metacognitive knowledge, revise the strategy and continue problem solving (the darker grey dotted arrows). A fourth option (shown with black dotted arrows) occurs when they evaluate an unsuccessful performance and realize that the nature of the original problem they have been trying to correct is not improving. In such situations they need to revise their strategy. An example would be when a technically secure performance plan is chosen for a difficult section because it is considered safer for an upcoming performance than a less reliable one that unduly extends the musician musically or expressively. In optimal practice conditions each of these ways of working are mediated through sophisticated metacognitive knowledge and self-regulation.

A FRAMEWORK FOR STUDYING SELF-REGULATED LEARNING IN MUSIC

Zimmerman (1998a, 1998b) does not view self-regulation as a fixed characteristic, such as a personality trait, ability or stage of development, but rather as a context-specific set of processes that students draw upon as they promote their own learning. McPherson and Zimmerman (2002, 2011) have described these processes as affecting one or more of six dimensions of musical self-regulation (see Table 12.1). Each dimension derives from a scientific question that can be used to underpin research on the socializing

TABLE 12.1 Dimensions of Musical Self-Regulation

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

Note: Table adapted from McPherson, G. E. & Zimmerman, B. J. (2011). Self-regulation of musical learning: A social cognitive perspective on developing performance skills (pp. 130–175). In R. Colwell & P. Webster (Eds.), *MENC handbook of research on music learning. Volume 2: Applications.* New York: Oxford University Press.

processes that facilitate the development of the self-regulatory processes. By providing the basis for studying key processes involved in efficient musical learning as well as identifying strategies that help optimize music learning, Table 12.1 has proven invaluable for defining our research over the past decade and especially McPherson's 14-year longitudinal study involving 157 young Australian music learners (McPherson et al., 2012).

Motive

To learn a musical instrument, a child must be able to concentrate and move through different tasks in the face of many potential distractions (McPherson & Zimmerman, 2002, 2011). On any normal day, music learners can be distracted by a noisy work environment, intrusions by others and a host of personal factors, such as inappropriate practice strategies, confusion and changing interests and goals. Maintaining concentration requires a great deal of volition and personal self-motivation. As shown in Table 12.1, vicarious or direct reinforcement by others enables music learners to develop the types of self-regulatory processes needed for them to develop the self-motivation to persist under various conditions.

Children bring to their music learning clear expectations about how hard they are prepared to work based on their initial interests and motivation to commence learning (McPherson et al., 2012). This is why we encourage the music educators we train to understand the role of children's motivational beliefs, to be able to assess their presence, and to know how they might facilitate them. Understanding why some children are sufficiently self-motivated to take charge of their own learning while others lack the determination and commitment to achieve at even a mediocre level is therefore of special interest to us as music education researchers, particularly given the nature of music learning, which is often valued for leisure and recreation rather than seen as indispensable for daily life and beneficial for future employment (McPherson & Zimmerman, 2011; Robinson, 2011).

In many Western countries, one widespread system of providing an incentive to practice a musical instrument is observed when parents or teachers provide extrinsic rewards, such as stickers or pocket money, to a child for undertaking a set number of minutes' work on his or her instrument. Extensive research (Deci, Koestner, & Ryan, 1999) has shown that such rewards can undermine children's motivation to engage in musical behavior for its own intrinsic rewards, such as enjoying their increasing mastery of a skill, or feeling the emerging pulse of a dance piece as their performance becomes more fluent. Hence, interventions need to carefully control for the influence of such motivational climates both at school and at home.

Another prevalent characteristic of music learning in traditional, expertise-oriented music training is the high level of control over curricular material that the teacher imposes on the learning situation. While children learning to read their native tongue will typically be given carefully sequenced learning material in the early stages, as skill develops and personal interests emerge, teachers may be likely to encourage students to read books they choose themselves. In most formal musical training, however, teachers typically base their teaching on the view that the development of a "correct" technique requires a high level of teacher-centered repertoire choice. Our case study (Renwick & McPherson, 2002) of an adolescent clarinetist involved with a school wind ensemble showed a twelvefold increase in persistence and the spontaneous adoption of far more sophisticated learning strategies when the young player was practicing music she had chosen herself out of an emerging personal interest, compared with far less self-regulated behavior when practicing teacher-assigned tasks.

Such issues related to the undermining effect of controlling socializer behavior prompt wider considerations of how parents and teachers can foster self-motivation through a more autonomy-supportive approach (Renwick & Reeve, in press). For instance, one technique that has been found to enhance students' effort and engagement is the provision of a rationale to a child for why he or she should undertake an uninteresting activity. As an example, a teacher might help a student to see how practicing scales will be useful to learning how to improvise in a range of musical keys. Direct interventions of this type help learners of all abilities understand how the more mundane parts of practice can lead to opportunities to apply newly emerging skills in interesting and creative ways.

Method

The dimension of method allows us to contextualize the types of skills, knowledge and understandings that allow music learners to choose or adapt one approach over another. This dimension focuses on the "how" of practicing and performing music, and seeks to clarify the task specific strategies that musicians use to enhance their own musical abilities. As depicted in Table 12.1, task strategies related to rehearsing and performing music are often modeled or guided socially, and with exposure to quality teaching and increasing experience become increasingly self-initiated (McPherson & Zimmerman, 2011). In terms of the efficiency and effectiveness of these processes during musical practice, we know that at their highest level self-regulated musicians are methodical in the way they approach their learning and ability to "spontaneously invent increasingly advanced strategies to improve their performance" (Nielsen, 1999, p. 275).

Various studies in music have attempted to map out the sophistication of students' skills as they acquire musical abilities. These studies show that distinct changes occur as expertise develops (Barry & Hallam, 2002; Gruson, 1988; Hallam, 1994; Miksza, 2007) but that over 90% of the practice time of young learners is spent simply playing through a piece from beginning to end, without adopting a specific strategy to improve performance (McPherson & Renwick, 2001). Many beginners seem unaware of where they are going wrong because they have not developed their abilities to monitor and identify errors in ways that would allow them to compare the performance they are seeking to achieve with the unfolding "live" performance (Barry & Hallam, 2002). Slowly, as their skills develop, they begin to respond to errors using a musical "stutter" as they stumble over and correct individual notes (Williamon & Valentine, 2000). Then, as their growing awareness of larger structures develops, they begin to repeat slightly larger units of note patterns until they are able to focus their attention on identifying and improving difficult sections (Gruson, 1988). Young musicians tend, therefore, to focus on getting the notes correct before paying more attention to rhythm, other technical aspects of their playing, and finally to the expressive dimensions of musical performance (Barry & Hallam, 2002).

In contrast, advanced musicians are more likely to use a range of different learning strategies during their music practice as opposed to one particular type (Nielsen, 2002). The most important of these include rehearsal strategies where students focus their effort on sections of the music that have not yet been mastered, elaboration strategies where they vary their interpretation or the speed of a passage so that it can be performed under different conditions, organization strategies such as keeping track of what is to be learned in a practice diary or ordering practice to focus on mastering challenges first before playing for pleasure, and critical thinking strategies that involve experimenting with different technical or musical ways of performing a work in order to form a more sophisticated interpretation. Of these four categories of learning strategies, Nielsen (2002, 2004) has found that students tend to use rehearsal strategies (e.g., "I select important technical and musical parts and repeat these over and over again"), elaboration strategies (e.g., "I try to develop musical ideas by making connections between alternative interpretations from listening to music and from lessons"), and critical thinking strategies (e.g., "I often find myself questioning technical solutions and interpretations on my main instrument to decide if they work"), more often than organization strategies (e.g., "When I practice, I go through the music and try to find the most important musical ideas").

Some interesting instrument-specific differences have also been found. For example, singers tend to use elaboration strategies to a greater degree than instrumentalists, probably because their practice typically involves memorizing both lyrics and music (Ginsborg, 2002). Certain instrumental-

ists, such as string players, employ rehearsal and elaboration strategies to a lesser extent than other instrumentalists. Such results indicate that the demands inherent in playing different instruments may also affect what strategies advanced students use in their learning, in addition to time on task (Jørgensen, 1997). A number of other studies have addressed the individual diversity in the use of learning strategies by advanced students and musicians (e.g., Chaffin, Imreh, & Crawford, 2002; Ginsborg, 2002; Hallam, 2001; Miklaszewski, 1989).

Intervention processes for developing more self-regulated approaches to practice are many and varied. Over the past decade and a half, much has been achieved in understanding the cognitive strategies that young learners apply when performing music visually (sight-reading, performing rehearsed repertoire), aurally (playing from memory and by ear), and creatively (improvising). Because young learners do not always understand how to think in sound, they need to be exposed to interventions that encourage them to think musically. For example, when sight-reading music notation for the first time, we believe that students benefit from explicit, teacher-led instruction in mental strategies so that they learn to think and reflect on their own performance. As an example, during the first year of learning McPherson (2005) found that only 25% of students examined the first measure before commencing to play, only 23% and 45% respectively took note of the key signature and time signature, only 17% established a correct tempo for their performance, and only an alarming 5% took time to scan the music to identify obstacles before commencing to perform examples drawn from a standardized measure of sight-reading ability. Similar results were evident for the other measures. For example, students who maintained a practice diary in which they made notes about what and how to practice performed significantly better than their peers on rehearsed repertoire at the end of the first, second and third year of learning. Likewise, students who focused on repertoire that had to be learned before finishing their practice with pieces they could already play (as compared to the other way around) also performed significantly better across each of the first three years of their learning (McPherson, 2005).

For the aural and creative skills of performing from memory, by ear and by improvising, there was a clear positive relationship between the quality of the cognitive strategy used to prepare for a performance and actual performance (cf. McPherson & Renwick, 2011). Coding responses according to whether the cognitive strategy represented either a conceptual (independent of the instrument), kinesthetic (some physical connection to the instrument) or musical (connection between instrument and sound) approach proved a powerful means of understanding why some students struggled with their learning while others thrived. For example, the types of conceptual strategies the children employed when studying the musical

notation before it was then covered and they were asked to perform it from memory were typically independent of the instrument they were playing and how the melody would sound. These involved thinking about the contour of the melody and whether it went up or down, or the letter names of individual notes (e.g., "I was trying to say it and get it stuck in my mind"; "I kept looking at it and saying the names of the notes over and over").

Kinesthetic strategies involved chanting the rhythm or pitch with rough contour while fingering the melody through on the instrument, either in sections or from beginning to end. Student in this category most often chanted the rhythm of the musical example they were trying to memorize without any sense of pitch while trying to think about how it would be fingered on their instrument.

Musical strategies were demonstrated by children who were able to link the sound of the melody to instrumental fingerings by mentally rehearsing as they studied the example in addition to processing the notation holistically by working from the beginning to the end of the piece in the same way the piece would eventually be performed. These students displayed the most highly developed capacity to coordinate their eyes, ears and hands (e.g., "I was singing it through while I was playing it on my instrument"). Most often, students who were categorized as adopting a musical strategy mentally rehearsed the music by singing the melody inwardly or out aloud while fingering it through on their instrument. They often kept doing this over and over until the music was covered and were asked to perform the melody back, exactly as it had been notated in the example.

Understanding musical progress involves much more than simply examining the relationship between the amount of practice time and levels of expertise. As we watched the children develop across their first three years of learning and analyzed their responses, we saw ample evidence that better players possessed more sophisticated strategies for playing their instrument very early in their development and that these players were the ones who went on to achieve at the highest level (McPherson, 2005). Importantly, these were the players who knew when and how to apply their strategies (especially when asked to complete the more challenging musical tasks), possessed the general understanding that their performance was tied to the quality of their effort (particularly effort expended in employing appropriate strategies to complete individual tasks), and were able to coordinate these actions to control their own playing (McPherson et al., 2012). In this sense the high achievers on each of the five aspects of performing music were those children who were in the beginning stages of developing their abilities to monitor and control their playing in the manner suggested by the *deliberate practice* literature (Ericsson, Krampe, & Tesch-Römer, 1993) where the emphasis is on continually stretching oneself to take on more challenging levels in order to master increasingly difficult skills.

One of the clear implications of our research is that music teachers need to recognize the importance of reacting perceptively to their students' performance errors by analyzing why they might occur and trying to understand what the student is thinking, especially when introducing a new skill. In our view, helping children to adopt regulatory strategies that encourage them to reflect on what they are doing, how they are doing it, and to consider alternative approaches to performing would go a long way to improving various forms of music instruction.

Also relevant is the devising of appropriate interventions for more developed players. One aspect of this line of research seeks to encourage learners to reduce a task to its essential parts so that the parts can be reorganized meaningfully. This has been the focus of Nielsen's (1999, 2001) research where learning strategies have been explored with two advanced organists to determine how to acquire the competence necessary to select relevant problem areas through visual examination of the score and by playing through larger parts of the piece or the entire piece at a tempo close to the final tempo. These problem areas were defined as "working areas" by the students and were given separate attention in their practice. With the aim of joining parts of the piece as a whole, the students played parts in different segments, played segments in different tempi and interspersed short and long segments, all according to the segments' complexity. This research shows that advanced music students often subdivide the more complex parts of a piece into smaller units that are repeated separately, and more often, and in more different segments, than less complex parts (Chaffin et al., 2002; Miklaszewski, 1989). Both musicians also developed exercises based on difficult parts of the piece and tested out different solutions to a problem when the chosen solution no longer worked as a whole (Nielsen, 1999).

Similar strategies have been found in a case study of two advanced jazz students (Nielsen, 2010). The students practiced jazz tunes by prominent jazz players, and in their first learning period of solo formulation on these tunes, they chose to learn pre-played solos on these tunes. With this task in mind, the jazz students selected a repertoire of appropriate strategies that included strategies to spot technically advanced passages in the pre-played solo and strategies that joined these passages of the pre-played solo together as a whole. For example, learning the solo by ear, one student used an mp3-player to explore very small details of the solo in a repetitive manner, and to move between listening to and practicing very short segments of the solo, before she tried to play increasingly longer segments in tempo. Although both students in a very intensive and detailed manner used these kinds of strategies in learning their pre-played solos, they also used other strategies such as making small improvisations over technically advanced passages in the solos.

A means of framing all of the above comments is to consider Zimmerman's view, which asserts that self-regulation has social origins and shifts to self sources in a developmental sequence involving four distinct dimensions: observation, emulation, self-control, and self-regulation (Zimmerman, 2000; Schunk & Zimmerman, 1997, 2003). This view proposes that learners who follow the sequence will learn more effectively and in a more self-regulated way. Reinterpreted for music, this would mean that a novice learner would acquire skill most efficiently when exposed to effective teaching, social modeling, task structuring, and encouragement (Schunk & Zimmerman, 2003). At this observational level, young musicians might be able to induce features of learning strategies from observing models—such as their teacher or other students. They will need to practice, however, in order to fully integrate the skills they are learning into their behavioral repertoires. Improvements during practice occur when learners have opportunities to observe models that provide guidance, feedback, and social reinforcement and that respond to the students' needs to refine aspects of the skill they are attempting to master. During this process, strategies and feedback are based on the learner's efforts to imitate a desired model. This means that skills (such as a hand coordination problem on piano) should be initially acquired cognitively through observing (including listening to) a model.

Learners move to the emulative level once they are able to perform at an approximate level to the model they are trying to imitate. To follow our example, at this stage the hand coordination skill a pianist was trying to master would not be at the same level as his or her teacher's demonstrations, but would nonetheless exhibit the basics of the skill, though the hand coordination and speed of performance may not yet be fully automatic or consistent. At the observational and emulative stages, learning is primarily social. Self-control emerges at the third stage when learners start to adopt strategies independently while performing transfer tasks, even though their use of these strategies, though internalized, is affected by representational standards that they attempt to duplicate (Schunk & Zimmerman, 2003). To expand our example further, the pianist would now be able to perform the musical passage independently, having mastered the basic physical skills required to perform this technique on the piano, but would still rely on aural images of modeled performances and other internalized representations plus self-reinforcement processes. Self-controlled efforts at this level involve practicing the skill in solitary but structured contexts, such as working through similar examples in other repertoire. When the skill becomes automatized, the learner can practice varying it (e.g., for speed and dynamics) according to changing contexts (e.g., an etude or sonata). At this point the learner shifts to personal outcomes as the criterion to modulate the skill, such as one's personal reaction or an audience's reactions. Self-regulated learning at this fourth level occurs when learners respond to differing

personal and situational conditions by modifying learning and performing strategies and making adjustments depending on differing situations. Running in parallel, self-set goals and perceptions of self-efficacy motivate students to achieve.

Time

Self-regulated students are able to plan and manage their time more efficiently than unregulated learners (Zimmerman, 1994, 1998a), so understanding how a learner's use of time moves from being socially planned and managed to self-planned and managed has also been of interest to us as music researchers.

It is self-evident that young musicians' practice becomes increasingly more efficient as they develop their skills on an instrument. We saw this in our studies of young learners where 73% (range 57–82%) of the first year students' videotaped home practice, measured from the first to the last note of each practice session, was spent playing their instrument. This rose to 84% (range 76–90%) by year three, suggesting that these learners were beginning to use their time more efficiently. However, there were also large differences between students. The majority of the students' playing time was spent on learning musical *repertoire* (Year 1: 84%; Year 3: 93%). *Technical work* (scales and arpeggios) took up the remainder. Interestingly, the rest of these musicians' practice time (Year 1: 27%; Year 3: 16%) was spent on non-playing activities such as looking for printed music, talking or being spoken to, daydreaming, responding to distractions and expressing frustration. Less than 6% of non-practicing time was spent resting (McPherson & Renwick, 2001).

Research on academic subjects shows that many poorly self-regulating children actively avoid studying or use less time than allocated (Zimmerman, Greenberg, & Weinstein, 1994). This was also true in our analysis of beginners' practice (McPherson & Renwick, 2001). The least efficient learner spent around 21% of his total practice sessions talking with his mother about his practice tasks and expressing displeasure at his repeated failure to perform correctly, while others were seen to call out to a parent to ask when they would be allowed to stop practicing.

This line of research is in line with other work dealing with "formal" and "informal" aspects of home practice (Sloboda & Davidson, 1996). In these studies, drawn from various levels of music training, high achieving musicians have been shown to undertake significantly greater amounts of "formal" practice, such as scales, pieces and technical exercises, than their less successful peers. However, they also report more "informal" practice, such as playing their favorite pieces by ear or improvising. These "infor-

mal" ways of practicing are theorized to contribute to musical success because highest achieving students are able to find the right balance between freedom and discipline in their practice. When considered with other findings (e.g., McPherson & McCormick, 1999), results such as these suggest that students who are more cognitively engaged while practicing not only tend to do more practice, but enjoy learning their instrument more and are also more efficient with their learning. Consequently, helping students to achieve a balance between practicing to improve (or to please their teacher) as compared to practicing for pleasure is an important means of helping young musicians develop the motivational resources needed for them to develop into self-regulated learners and satisfied musicians.

Musicians also need to be able to pace and manage the use of their time, and it is not unusual to find that even young musicians will increase the quantity and quality of the time they spend practicing in the weeks leading up to a significant performance such as a music recital or examination (Hallam, 2001; Sloboda & Davidson, 1996). Hence, the intervention techniques we recommend focus on developing in learners a closer understanding of their use of time in the practice session. While research in the behaviorist tradition (Madsen & Geringer, 1981) has explored the use of devices to monitor distraction and attentiveness, we believe the modern social-cognitive emphasis on self-regulation is a more powerful means for helping teachers understand how, for instance, self-monitoring of time use can help their learners understand the close connection between time on particular tasks and the proximal development of fluency. For example, in our own teaching practice we have found that it is more effective to maintain an emphasis on mastery by asking beginning instrumentalists to practice difficult sections of a work they are learning until they can play it accurately three times in a row, and to spend time in lessons asking students when they think a predetermined criterion of mastery has been reached. This crucial element of self-monitoring and self-assessment in musical self-regulation where the emphasis is on encouraging students to monitor the process and master skills is for us far more effective than the tendency of many music teachers, including those in our studies (McPherson, Davidson & Faulkner, 2012), who typically recommend to their students that they practice for a set period of time each day.

Behavior

Self-regulated learners notice when they do not understand something or when they are having difficulty learning a particular skill (Thomas, Strage, & Curley, 1988). Consequently, the ability to choose, modify and react to feedback is central to the process of self-regulation (Zimmerman, 2000).

As inferred in other sections of this chapter, students' performance can be socially monitored and evaluated by knowledgeable others (e.g., teachers and parents) but needs to become self-monitored and evaluated to be truly self-regulating (McPherson & Zimmerman, 2011).

The principal means by which students monitor and control their performance is via the thoughts they have about what they know and do not know, and the thoughts they have about regulating their own learning (Shuell, 1988). Self-regulated learners develop along both dimensions by becoming more aware of their abilities to remember, learn and solve problems, and by developing more strategic efforts to manage their cognitive activities when learning, thinking, and problem-solving (Bruning, Schraw, Norby, & Ronning, 2004). Accordingly, we believe that interventions should aim to help musicians become more aware of how much time they will need to learn a new piece, different strategies that will help them perform correctly, and what they need to do in order to improve their playing (Barry & Hallam, 2002). But awareness of this type is not sufficient; unless students also learn to monitor and control their own cognitive processes they are unlikely to become effective learners (Bruning et al., 2004; see also Miksza, 2006, 2007). Good teaching practice therefore encourages students to describe what goes on in their minds, using probing questions that seek to encourage them to make themselves aware of how they want a particular musical phase to sound, and how they can monitor and control their own thinking to make their performance sound the way they feel makes most musical sense (Pogonowski, 1989).

Our own use of retrospective think-aloud protocols with students practicing (Nielsen, 1997; Renwick, McPherson, & McCormick, 2008) are ways of helping teachers and the students gain insight into such cognitive and metacognitive processes (Woody, 1999/2000). Perhaps the most important metacognitive skill, however, is the ability to make accurate assessments of one's own strengths and weaknesses (Hallam, 1997, 2001), in order to respond to different performance situations and to draw on a range of strategies that can be used to overcome the various technical and expressive problems encountered when playing music. Although there seems to be considerable variability among musicians, experts seem more able to construct a viable interpretation of a work while at the same time mastering the notes and planning ahead. In contrast, young learners often show little evidence of specific performance preparation and are often too reliant on their teachers to evaluate how effectively they are learning. Consequently, they often need to be guided on how to focus their concentration and attention on the music rather than their feelings about how they are doing (Hallam, 2001). The use of self-guiding speech can be particularly effective in developing fluency to perform, particularly as accuracy increases (Hallam, 1997).

To frame all of the above, we have used Zimmerman's (2000) comments about the four general criteria that people use to evaluate themselves: mastery, previous performance, normative, and collaborative. Mastery criteria involve the use of a graduated sequence from easy to hard. We see this type of mastery orientation in graded music examinations or instrumental method books that are carefully structured and sequenced according to increasing difficulty. The use of such process goal hierarchies predisposes a learner to adopt mastery criteria when self-evaluating because the sequential order of the sub-goals provides a ready index of mastery. A young musician will know, for example, that repertoire at the front of a book is easier than pieces toward the back of the book, and also that book one is easier than book two. Previous performance or self-criteria involves comparing one's current level of achievement with earlier levels. The benefit of this type of evaluation is that it highlights learning progress resulting from repeated practice.

Whereas mastery and previous performance evaluations involve judging changes in one's own performance, normative criteria involve comparing one's own progression with the progress of others. We see this in music in various ways, and especially when we make comparisons of our own playing with other members of an ensemble. The main drawback of this type of self-evaluation is that it focuses learners' attention on social factors such as how well they are doing in comparison with their peers. Normative criteria also tend to emphasize negative aspects of functioning, such as when an ensemble loses a music competition despite having improved in comparison with their previous efforts. Finally, collaborative criteria are relevant to group activities. In some ways the role of a trumpet player in an ensemble is distinctly different from that of a flutist because each instrument fulfills a different function in the ensemble. The criteria of success for trumpet performance are different than those used for other sections of an ensemble, and how well a flute player can work cooperatively with the rest of the ensemble becomes the ultimate criterion of success. Reviews on these four evaluative standards (Covington & Roberts, 1994; Zimmerman, 2000) suggest that mastery criteria enhance motivation and achievement more than normative criteria.

Physical Environment

Self-regulated learners understand how the physical environment can affect their learning and will actively seek to structure and control the setting where their learning takes place (Zimmerman, 1998a). Children come to realize the importance of these skills every time a teacher demonstrates good posture or a mother turns off the television so that her son or daughter is not distracted during practice.

Some students have little control over the setting where they can practice, especially in situations where an instrument is large or unable to be moved. For example, placing a piano in a family room close to a television can cause tension, especially if one child wishes to practice at the same time that another wants to relax in front of the television. From analyzing practice videos (McPherson & Renwick, 2001) we have become aware that many instrumentalists choose a wide variety of locations when practicing. Some of the students we studied appeared in different rooms on different days, suggesting that they were consciously choosing an appropriate place to practice depending on the family situation for that particular day. While this might enable them to obtain help from other family members whenever needed, it also meant that they were more likely to be distracted by others members of the family, pets or even the television. Additional data obtained from child and parent interviews supported our conclusion that the physical environment was mostly well equipped with a music stand and an appropriate chair. However, even from the initial stages of learning an instrument distinct differences between children were noticeable. Some displayed clearly desirable behaviors by holding their instrument correctly while seated or standing with a straight back and appropriate playing position, in contrast to others who were much less consistent with their posture. In one practice video, a young learner even sat cross-legged on his pillow with the bell of his instrument resting on his bed. From the first day they took their instruments home to practice, the children differed markedly in the way they structured their environments (see further, Austin & Berg, 2006; Pitts, Davidson, & McPherson, 2000), with the result that many students displayed clear maladaptive behaviors in the way they structured their physical environment and held their instrument.

Social Factors

Understanding the social factors that impact on learning involves examining the subtle distinction between help that is provided by others, in contrast to help that is sought personally. Obviously, parental support is vital, especially in the early months of learning when young learners often need to be reminded to practice.

McPherson and Davidson (2002) reported a large drop in reminders from parents of the 157 grades three and four beginning band students who were involved in their longitudinal study. Importantly, they concluded that very early in their learning the mothers made an assessment of their child's ability to cope with practice, as well as their own capacity to devote energy into regulating their child's practice through continual reminders and encouragement to practice. This variability in parental involvement resulted

in wide differences in the children's motivation to continue learning their instruments (McPherson & Davidson, 2002, 2006; Pitts et al., 2000; see also, Zdzinski, 1996). Based on the mothers' comments and reports of practice reminders, we have even gone so far as suggesting that some mothers gave up on their children as potential musicians much earlier than the children came to feel the same way (McPherson & Davidson, 2002). Results such as these show how the socializing processes of direct reinforcement can act positively or negatively on a young learner's ability to develop the self-confidence needed to sustain musical involvement, and parallel work by other researchers showed that highly successful learners often have parents who display intense interest in their child's learning and systematically supervise their practice (Lehmann, 1997; Sosniak, 1985). Such intense interest helps young music learners to gradually build the confidence, motivation and persistence that eventually distinguish them as performers (Sosniak, 1987, 1990).

Another study (Davidson, Sloboda, & Howe, 1995/1996; Sloboda & Davidson, 1996) of 257 English students (aged eight to 18) varying widely in musical achievement and commitment shows that high achieving student musicians tend to have parents who actively support their child's practice, especially during the initial stages. They supported their child's practice with verbal reminders to practice, encouragement, moral support, and in some cases direct supervision, and their involvement was most evident in the early stages of development when their child's ability to self-regulate his or her own learning was least evident. Then, as each child's developing self-motivation started to increase and he or she became increasingly autonomous in lessons and practice, the parents, many of whom did not have a musical background themselves, started to withdraw their direct involvement even though they still maintained a high level of moral support for their child's increasing involvement with music. In contrast, low achieving student musicians tended to receive little parental support during their early years, but during their teenage years, parental pressure to motivate practice and attend lessons increased markedly (Davidson, Howe, Moore, & Sloboda, 1996; see also Davidson, Howe, & Sloboda, 1997; Davidson et al., 1995/1996; Sloboda & Davidson, 1996).

Because decisions on when and for how long to practice (or even what instrument to learn and how to become involved in music learning) are often negotiated within the home environment, it is of paramount importance that educators understand the subtle dynamics of the home environment and how this can promote or undermine children's motivation to learn an instrument. The model shown in Figure 12.3, influenced by the research of Pomerantz, Grolnick and Price (2005), helps us to frame such parent–child dynamics for the music educators we train. Using this model, we devise discussions and intervention exercises that encourage our trainees to first focus on what they might do to shape the goals (i.e., values, beliefs, attitudes, as-

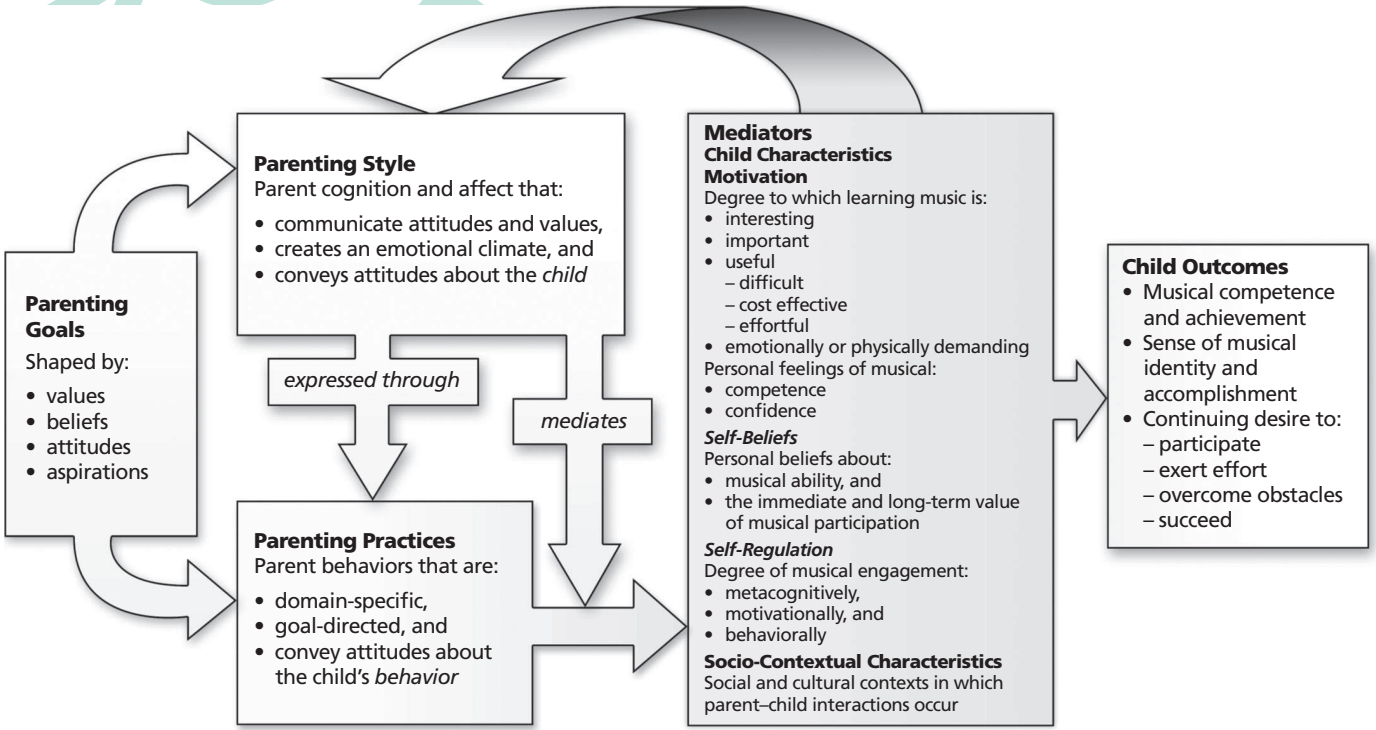

Figure 12.3 Parent–child interactions in children's musical learning. From G. E. McPherson (2009), *Psychology of Music*, p. 4. Copyright 2009 by Sage Publishing. Reprinted with permission.

pirations) of their students' parents so that they will understand the important role parents play in their children's learning. We spend time discussing the importance of how parents communicate attitudes and values to their children about how music is valued, and create the type of emotional climate that helps define the domain-specific and goal-directed behaviors and attitudes that help their offspring maintain their motivation, believe in their own abilities as they develop musical competence, gain a sense of their own musical identity, and maintain their desire to continue learning. As these same dimensions are relevant for understanding teaching, we have found this approach to be particularly useful also as a precursor for then focusing our music education trainees on discussions surrounding appropriate teacher–child interactions. Substituting "parenting" with "teaching" and "parent" with "teacher" in each of the three boxes on the left hand side of Figure 12.3 reconceptualizes the figure for dimensions that we believe are also appropriate for defining some of the more important teacher–child interactions.

The relationship between student and teacher can be intense, thereby affecting the developing musicians' conceptualization of themselves and their musical goals. As students mature and become more competent players, they start to differentiate more and more between the professional and personal qualities of their teachers, such that they may feel, for example, that their teacher is condescending and strict, but also a brilliant player (Sloboda & Davidson, 1996). It appears from various strands of research that the most important quality of a child's first teacher is to be able to communicate well and to pass on a love of music (McPherson & Davidson, 2006). Teachers who display these qualities are more likely to increase motivation because their students perceive learning as something that is fun and enjoyable. Later, after the child has started to develop skill on the instrument, the externally reinforced support received from parents and teacher develops into an intrinsic desire to learn that is focused more on improving and extended skills. Self-motivation of this sort means that students perceive learning as something that they can control themselves, with subsequently less need to rely on the external reinforcement provided by either their parents or teacher (Sloboda & Davidson, 1996).

The influence of siblings and peers is possibly just as important as that of teachers, given Davidson, Howe and Sloboda's (1997) comments that older siblings often take on the role of a teacher for their younger brother or sister, although rivalry and personality conflict between siblings can also hinder or stimulate a young child's musical development. Likewise, the influence of peers and older role models whom a student may strive to emulate have received virtually no attention from music researchers, although it is highly likely in certain instances that their impact might be profound. Even asking advice from another player in the ensemble can indicate a readiness to seek information that can benefit one's performance.

FUTURE MUSIC INTERVENTION RESEARCH

We have shown in this chapter how music research that has enthusiastically adopted Zimmerman's conceptualization of self-regulated learning has made a significant impact on our understanding of musical development. Nevertheless, research that applies self-regulated learning theory in music has been limited by a few key factors: (a) it is predominantly descriptive or correlational, (b) because of the complexity of reliably analyzing musical behavior it is based on very small samples, and (c) it has most often focused on highly teacher-centered learning situations and/or highly well-structured problem-solving tasks involving the "correct" performance of a notated score.

Building on the work of Barry J. Zimmerman and those who have been influenced by his scholarship, there is ample reason to feel confident that the next decade of research into self-regulated music learning will extend on this foundation. Among the most important lines of enquiry is research into the relative importance of motivational and behavioral components of self-regulated learning (e.g., Pintrich & De Groot, 1990; Renwick et al., 2011). This research would need to clarify the necessary duration of interventions, as early intervention music studies (e.g., Kenny, 1993) that have failed to create performance improvements may have been too brief. Studies would also profitably investigate the most effective level of instrument-specificity in an intervention intended to enhance self-regulatory skills. For instance, would violinists most usefully work in a group with their specialist teacher, or might they learn more by comparing learning strategies with players of non-string instruments? To what extent could generic skills in self-regulated musical learning transfer to the intense dynamic of the one-to-one lesson that characterizes much advanced music training?

Readers of this chapter who are experts in domains other than music may recognize many of the learning strategies we describe (e.g., planning, self-recording, and self-consequating; Zimmerman & Martinez-Pons, 1990). Many students are taught such generic self-regulatory skills at school and may or may not generalize what they have learned to their music-learning behavior. Future intervention studies in musical self-regulated learning therefore need to look at when strategies that young people learn at school in domains outside of music are effective, and when strategies that are inherently musical are necessary.

We are not aware of large sample research studies investigating the motivating effect of student choice and personal interest in music literature being taught or learned, but clearly the power of the case study we examined earlier in this chapter suggests this is an area that would clearly benefit from further attention (Cordova & Lepper, 1996). A related area that awaits self-regulated learning researchers is the emerging area of "informal" learn-

ing, which is the spontaneous learning approach typical of many popular musicians and is increasingly being trialed in school settings (Green, 2008). Here, students are given minimal guidance from the teacher, working on solving ill-structured musical problems cooperatively in groups of friends, and have considerable freedom in their choice of learning material.

Finally, very little research attention in music has focused on the ways in which some children and not others will structure their environment to ensure more effective learning. Based on our research, it appears that the physical environment is more important than previously imagined in children's musical development and that much more work is needed to tease out the types of interventions that would enable learners to become more self-regulated in the ways they assist their learning through structuring their physical environment.

Possessing highly refined self-regulatory skills is one thing, but it is an entirely different matter to "apply them persistently in the face of difficulties, stressors, or competing distractions" (Zimmerman, 1995, p. 219). In music, an area of learning that is particularly challenging for learners of all ages, difficulties, stressors and competing distractions are among the main reasons why so very few music learners continue active participation as instrumentalists and vocalists well into their adult lives. Consequently, as music research evolves and music pedagogy follows, researchers will find ample material beyond the areas highlighted here from which to study the self-regulated development of the musical mind.

CONCLUSIONS

This chapter has used self-regulation theory as a means of contextualizing some of the specific interventions that we have found to facilitate the development of school age learners – especially those in the beginning and intermediate stages of musical development. Among the most important interventions our research has uncovered are teacher-led instruction in mental strategies that prompt learners to use task-appropriate strategies when performing music and help scaffold learners to higher levels of functioning. Such procedures are especially needed in music because many instrumental lessons tend to be dominated by teacher statement-oriented behavior in which interactions consist largely of comments by the teacher about how a task should be accomplished with very few questions asked of the student (Hepler, 1986; Weerts, 1992). For example, Rostvall and West (2003) show that instrumental teachers tended to talk to their students in short utterances related to the previous or upcoming action about how the music should be performed in preference to performing and demonstrating it to them. In doing so, these teachers provided their students with "few

opportunities to listen and form mental representations of the melodies they were going to learn" (p. 218). A variety of evidence in both individual and group lessons shows that this type of direct instruction results in a decrease in student attentiveness at all age levels (Kostka, 1984; Price, 1989; Spradling, 1985; Witt, 1986).

Given this evidence, we encourage the music teachers we train to recognize the importance of helping their students react perceptively to performance errors so that they are able to analyze why they might occur. Understanding what students are thinking is especially important when they are introduced to a new skill. Asking pupils to reflect on what they are doing, how they are doing it, and to consider alternative approaches to performing would in our opinion go a long way to improving music instruction, especially for children who find their learning frustrating and difficult and who typically fall behind or do not survive the first few months or years of learning.

In closing, all three authors pay homage to Barry J. Zimmerman for his insightful research over the past four decades. His work has shaped our thinking and others in music in ways that he could never have imagined possible. We are deeply indebted for his contribution to scholarship in expanding conceptions of what it means and implies to be a self-regulated learner. Barry's wisdom will continue to shape our thinking and our understandings of how young people and adults learn music all around the world.

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Author Queries:

1 – Please add the college and town for the Hepler, 1986 dissertation in your references.

2 – Please add the college and town for the Kenny, 1993 dissertation in your references.

3 – Table 12.1 is adapted from McPherson & Zimmerman, 2011. Is it adapted from a specific table or chart on a specific page, or is it compiled from the whole chapter? If this is based on material from a specific page, please give that page number instead of the whole page range.