

## *Exploring music practice among sixth-grade band and orchestra students*

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**ABSTRACT** The purpose of this study was to describe the practice motivation and regulation of sixth-grade instrumentalists (11–12 years of age). A sample of 224 US band and orchestra students, representing 85 elementary schools, completed a 36-item practice inventory and produced two narratives depicting a typical practice session and a practice episode involving a difficult piece of music. Factor analysis of practice inventory responses demonstrated that motivation and self-regulation are distinct dimensions of music practice. While orchestra students reported significantly higher levels of practice motivation, there were no significant differences between band and orchestra students' self-reports for frequency of practice, amount of practice, or practice regulation. Practice motivation and regulation were associated with the quality of home environment in which students typically practice. Written narratives revealed that some students employ a range of practice and regulatory strategies, while others follow practice routines that cannot be considered strategic. Practice motivation was reflected in student comments about personal interest, effort, and emotional responses experienced while practicing.

**KEYWORDS:** *elementary school, instrumental music, motivation, practice, self-regulation*

Practice is the best of all instructors.

(Publilius Syrus, Latin writer of mimes and moral maxims, 1st century BC)

The act of *practicing* – learning through systematic experience or exercise – has long been viewed as essential to knowledge/skill acquisition and development in a range of disciplines, including music. Individual practice allows musicians to reinforce learning received from instructors, engage in self-discovery, and develop habits of mind. As evidenced by the multitude of opinion articles and books published during the past 20 years, practice is viewed as both a requisite and ritual behavior of musicians.

*sempre* :

Music instructors commonly exhort their students to practice, and often emphasize the disciplinary nature of practice (i.e. practicing regularly and extensively). Yet the common teacher directive to 'go home and practice' glosses over the complex cognitive processes and variety of behaviors used to practice effectively. Ample research has shown that simply increasing the amount of practice may not lead to improved performance skill or musicianship (Anderson, 1981; Madsen and Geringer, 1981; Santana, 1978; Wagner, 1975; Zurcher, 1972). Moreover, given the busy and complicated lives that many children lead these days, teacher demands for greater amounts of practice that do not yield commensurate and tangible benefits (including a clear sense of progress or accomplishment) may lead students to expend less effort or withdraw from practicing altogether. The enduring belief that practice is critical to musical development, coupled with the more recent realization that practice time is not an abundant commodity for all students, has prompted both practitioners and researchers to re-examine how music practice may be made more efficient and effective.

### *Review of related literature*

Much research related to music practice includes descriptive reports of practice strategies employed by musicians at various stages of development, as well as correlational and experimental studies that examine practice quantity and quality in relation to a number of factors.

#### DESCRIPTIVE REPORTS OF PRACTICE STRATEGIES

Most middle school and high school students do not employ a consistent, structured approach to practice (Barry, 1990, 1991, 1992). They often play straight through pieces or practice the same measures over and over (McPherson and Renwick, 2001). As their aural and instrument-specific skills develop, they may use increasingly effective practice strategies (Barry and Hallam, 2002; Gruson, 1988). Such strategies include goal setting, mental preparation or silent analysis, mapping (playing through the entire piece and then addressing trouble spots), marking the music, practicing and refining small sections through repetitive drill, varying the tempo, researching the piece and listening to recordings. In general, however, student musicians are not as skilled in structuring practice sessions as more experienced musicians (Gruson, 1988).

Geringer and Kostka (1984) monitored the practice room behaviors of college music majors. College-age musicians devoted approximately 70 percent of practice time to performance activities (working on technical exercises or practicing solo and ensemble music), but also engaged in several nonperformance activities ('getting music ready', 'adjusting the instrument', 'stretching', 'reviewing the score') that might be interpreted as making practice more structured or strategic. Professional musicians (Barry, 1990)

are quick to identify and work on trouble spots, perhaps because they already know pieces well enough to understand how the parts fit into the whole. They practice with a metronome more frequently than high school students and more often engage in sophisticated research about their music. Yet, professional musicians are more inclined to view practice as 'work' and are less inclined to derive positive affect from practice sessions.

The general implication of these studies is that music practice becomes more sophisticated and systematic as individuals become more experienced and expert musicians. Effective practice may contribute to musical expertise, but it is equally plausible that musical training and expertise are precursors to effective practice, or that the relationship is recursive.

Students appear to gain whatever knowledge they may possess about how to practice from private teachers, rather than school ensemble directors (Barry, 1991). Pre-college private lesson instructors and college studio instructors, for example, indicate that they frequently discuss the importance of practice and specific practice techniques with their students (Barry and McArthur, 1994). Teachers who work with college students tend to require a specific practice format or direct students to use specific practice approaches, whereas pre-college teachers function more as resource persons for students who recognize they need help and seek it.

#### FACTORS THAT INFLUENCE QUANTITY AND QUALITY OF PRACTICE

If music instructors do play a pivotal role in improving the quality of student practice, which specific strategies or approaches that they advocate are most effective? Establishing clear practice goals and/or structuring practice time is associated with increased amounts of practice (Geringer and Kostka, 1981, as cited in Geringer and Kostka, 1984; Wolfe, 1984), greater levels of technical accuracy in performance (Barry, 1990, 1992) and greater musicality in performance (Barry, 1992; Santana, 1978). Utilizing a specific practice schedule (i.e. practicing the same time each day) has been shown to increase the amount of practice (Spradling, 1981), but does not appear to impact actual performance (Kafer, 1982). Wagner (1975) found that requiring students to submit practice reports (documenting the number of hours of practice per week) had no significant effect on the actual amount of practice or quality of student performance.

An extensive amount of research has examined the effect of using recorded performance models as a practice tool. Studies conducted by Folts (1973), Henley (2001), Hewitt (2001), Puopolo (1970), Rosenthal (1984), and Zurcher (1972) have demonstrated that recorded performance models may enhance performance, though there is no consistent pattern with respect to the facets of performance that do or do not improve. Other researchers (Anderson, 1981; Brooks, 1995; Linklater, 1997; Rosenthal et al., 1988) have found no evidence of improved performance as a result of students practicing with recorded models.

Psychologists propose that successful learners are more cognitively engaged when practicing (Ericsson et al., 1993). Mental practice in combination with physical practice, for example, does typically yield superior performance results (Brooks, 1995; Coffman, 1990; Ross, 1985). Research on self-evaluation is less conclusive. While self-evaluation of practice sessions may lead to more frequent home practice (Sparks, 1990), students do not appear to realize improved performance (above and beyond the influence of recorded models) unless they are able to identify specific strengths and weaknesses as well as alternative practice strategies (Hewitt, 2001).

Davidson et al. (1996) note that parental involvement is a key element in children's willingness to persist with practice. Supervised practice tends to be more effective than unsupervised practice and results in a higher level of technical and musical performance achievement (Brokaw, 1983; Sperti, 1970). By assuming a supervisory role, parents may assist students in exerting volitional control and focusing their practice time. Research has shown that monitoring and documenting practice distractions reduces off-task behavior and improves performance (Madsen and Geringer, 1981).

To summarize, this body of research suggests that the quality of practice and musical performance may be enhanced if students establish specific practice goals, structure practice sessions, combine mental and physical activity and are able to draw upon parents for supervision and support. Results associated with maintaining a specific practice schedule, submitting practice reports, practicing with recorded models and engaging in self-evaluation are inconclusive.

### *Theoretical framework*

A major limitation of much of the research on student practice is the absence of any overarching theoretical framework. Researchers tend to focus on specific facets of practice or manipulate isolated practice strategies without regard for the complex regulatory and motivational processes that often underlie and govern student practice behavior.

Self-Regulation Theory provides one framework for understanding why and how music students practice. Pintrich (2000) describes self-regulated learning as 'an active, constructive process whereby learners set goals for themselves and then attempt to monitor, regulate, and control their cognition, motivation, and behavior in the service of those goals'. Self-regulation is guided and constrained by both personal characteristics and the contextual features of the environment.

Schunk and Zimmerman (1997) observe that research on self-regulation has grown at an exponential rate over the past 15 years. Key characteristics of self-regulation include: (1) forethought, planning and activation of both knowledge and motivation; (2) awareness, monitoring and self-judgments of personal effort/behavior, context conditions and learning; (3) adaptation and

control of learning strategies; and (4) constructive interpretations of and affective reactions to learning outcomes. Students engaged in self-regulated learning set goals, plan or prepare, use effective learning strategies, monitor progress toward goals, assess the results of their work, and optimize the physical and social environment (Ormrod, 1999; Winne, 1995; Zimmerman, 1989, 1995, 2000; Zimmerman and Bandura, 1994).

#### SELF-REGULATION AND MUSIC PRACTICE

Recently, there has been increased interest in studying self-regulated learning in conjunction with individual music practice (McPherson and Renwick, 2001; McPherson and Zimmerman, 2002; Nielsen, 2001). Practice planning includes structuring or organizing the order of events as well as using time effectively to reach goals (Zimmerman and Risemberg, 1997). McPherson and Renwick (2001) found that over a period of 3 years, as students became more self-regulating in their practice, a higher percentage of practice time was focused on improving performance with less time spent responding to distractions, talking to others, daydreaming or expressing frustration. In addition, high achieving students tend to strike a balance between formal or required practice tasks and informal, creative or motivating activities such as playing a favorite piece or improvising (McPherson and McCormick, 1999; Sloboda and Davidson, 1996).

Self-regulated learners often manage their physical practice environment, which includes the practice setting and use of physical tools (e.g. metronome, CD recording, music stand, appropriate chair, books) so that maximum learning can occur (Barry and McArthur, 1994; McPherson and Zimmerman, 2002). While there is some evidence that developing instrumentalists are equipped with the necessary physical tools for effective practice, less is known about how students select or structure their practice environment (McPherson and Zimmerman, 2002). McPherson and Renwick (2001), for example, found that beginning band students utilize a wide range of practice environments, and, in turn, these environments impact practice regulation and effectiveness.

Social factors also contribute to self-regulated music practice. As students become more independent in their practicing, they may seek help from significant others (e.g. parent, sibling, teacher, peer musician), provided these sources are readily available (Davidson et al., 1997; Hallam, 2001; McPherson and Zimmerman, 2002). Parental support and supervision, in particular, has a positive impact on student awareness, practice approach and musical achievement (Corno, 1994; McPherson and Davidson, 2002; McPherson and Renwick, 2001; Zdzinski, 1996).

The quality of novice instrumentalists' thinking during practice, including the amount of attention given to the task and strategy formulation, may be affected by their motivation (Dweck, 1986; Ormrod, 1999). During music practice, motivation often is manifested through expressed interest in the activity, effort and affect. O'Neill (1999) discovered that students who value

music are more inclined to practice extensively, regardless of beliefs about their musical competence. McPherson (2000–01) found that student commitment level mediated the effect of weekly practice quantity on performance achievement over a 9-month period. Ability to respond constructively to setbacks or failures (O'Neill, 1997) also appears to be an important motivational component of practice (see O'Neill and McPherson, 2002; Maehr et al., 2002 for a comprehensive review of motivation research).

Clearly, self-regulation and motivation are both necessary for effective practice to occur. Because self-regulation requires a high degree of investment and effort expenditure, students must bring a motivated mindset to their practice, while also deriving motivation from successful and productive practice sessions that exemplify self-regulation principles. Simply knowing about effective practice strategies or recognizing the importance of self-regulation may not enhance practice/performance quality unless students are motivated to be self-regulated learners.

#### STUDY RATIONALE

Although practice is an activity integrally linked with learning to play an instrument, practice research has tended to focus on college students and professional musicians with a significant amount of skill (Barry, 1990; Barry and McArthur, 1994; Brooks, 1995; Coffman, 1990; Davidson et al., 1996; Ericsson, 1997; Hallam, 1995; Hamann et al., 1998; Henley, 2001; Rosenthal, 1984; Rosenthal et al., 1988; McPherson and McCormick, 1999; Ross, 1985, Zurcher, 1975). When novice musicians are studied, practice behaviors tend to be interpreted in relation to expert models, rather than as unique developmental phenomena (Gruson, 1988; Sloboda and Davidson, 1996). Studying strategic approaches to practice used by advanced musicians may yield useful models for acquiring expertise, but does not necessarily increase our understanding of the processes by which typical young musicians acquire or develop effective practice strategies.

A vast majority of the research has centered on band students (Fortney, 1992), with few studies of orchestral beginners (Hallam, 1997, 2001) or pianists (Gruson, 1988). To the best of our knowledge, no researcher has directly compared practice behaviors of beginning band and orchestra students. Therefore, it is unclear whether all instrumentalists develop practice routines in the same exact manner, or whether such routines are unique to the contexts in which instrumentalists study and perform.

Existing research seldom draws on self-regulation theory or does so in a limited fashion (Barry, 1992; Brokaw, 1983; Hewitt, 2001; O'Neill, 1997; Pitts et al., 2000) by focusing on only one aspect of self-regulated practice and/or ignoring the motivational facets of practice. In addition, researchers have just recently begun to employ qualitative or mixed methods of data analysis (Hallam, 1995; McPherson and Renwick, 2001; Pitts et al., 2000) in an effort to understand why and how young musicians practice.

To obtain a more comprehensive picture of beginning instrumentalists' beliefs and behaviors related to practice, we designed a study that would include both band and orchestra students, draw extensively on self-regulation theory, and utilize mixed methods of data analysis.

#### STUDY PURPOSE

The purpose of this study was to examine self-report data concerning why, how, and when sixth-grade instrumentalists (11–12 years of age) practice. The following research questions framed the study:

1. Are there distinct motivational and self-regulatory dimensions to music practice, and can those dimensions be reliably assessed via a self-report inventory?
2. Do band and orchestra students possess similar practice profiles?
3. How are practice motivation and practice regulation related to instrument experience, practice environment, practice frequency, and amount of practice?
4. To what extent are young instrumentalists able to reflect upon and describe typical practice sessions or practice episodes?

### *Method*

#### STUDY PARTICIPANTS

Approximately 250 US sixth-grade students who were participating in an all-county elementary instrumental music festival constituted the purposive sample for this study. Students were nominated by their band or orchestra instructor for participation in the festival. Each of the 85 elementary schools in the county (representing a mix of urban, suburban, and rural mountain schools), however, had at least one student participating in the festival. This requirement, along with specific instrumentation limits, ensured that there was a reasonably broad range of musical skills, attitude, and background present among student participants.

#### DATA COLLECTION INSTRUMENT

A researcher-developed questionnaire (the Music Practice Inventory or MPI) was the primary tool for data collection. The MPI, which was utilized in a previous investigation (Austin, 1997), is organized into three sections. Section 1 includes 36 statements that address various aspects of practice motivation (effort, interest, affect, parental support, challenge seeking) and practice regulation (preparation, goal setting, use of practice resources, structuring of practice sessions, teacher guidance). In Section 2, study participants are asked to provide two brief narratives. The first narrative is guided by the prompt 'Imagine that an invisible person is observing you during one of your typical practice sessions. Describe what that person would

hear and see.' For the second narrative, participants are instructed to: 'Pretend that you are practicing a difficult piece of music. Describe what you would do to make the piece sound better.' Section 3 consists of 12 items that address various background factors, including student and parent instrument experience, private lesson experience, average number of days and hours of practice per week, typical practice time and home practice environment.

Scale items for Section 1 of the MPI were created by reviewing opinion articles on music practice, research related to music practice (Barry, 1991; Barry and McArthur, 1994), and other measures of general learning/study strategies (e.g. Learning and Study Strategies Inventory by Weinstein et al., 1987; Motivated Strategies for Learning Questionnaire by Pintrich et al., 1991). The initial pool of 65 items was reviewed by a panel of experienced instrumental music teachers and reduced to a total of 36 items (10 practice motivation items and 26 practice regulation items). The MPI questionnaire was created by randomly ordering practice motivation and practice regulation items, and then pairing them with five-point response scales (5 = always, 4 = often, 3 = sometimes, 2 = rarely, and 1 = never). Students check the box/descriptor that most accurately depicts the frequency with which they experience a certain type of practice motivation or implement a specific practice regulation strategy. Band and orchestra versions of the MPI are identical, except for item stem references to the music teacher (e.g. 'My band/orchestra teacher and I talk about how to practice') or ensemble (e.g. 'I think about things I learn in band/orchestra when I practice').

The MPI does not provide for direct observation and assessment of practice behaviors. Self-report instruments such as this, however, are considered appropriate for initial investigations of psychological constructs (e.g. motivation) in novel research settings (Assor and Connell, 1992). Researchers who utilize self-report methodologies must have confidence that the data provided by students accurately depict, within reason, actual behavior. Greater confidence is justified when (1) student responses are anonymous and free of evaluative consequences; (2) students reflect on context-specific behaviors or events in which they are presently engaged; (3) efforts are made to minimize response bias through item/scale development and refinement; and (4) evidence of psychometric quality is provided. While students may over-report or under-report the specifics of a particular practice session (Geringer and Kostka, 1984), general recollections of practice time and behavior tend to be quite trustworthy. Madsen and Geringer (1981), for example, found that reported and observed amounts of practice corresponded 97 percent of the time.

#### PROCEDURES

The MPI was administered to students during an afternoon break in one of their festival rehearsals. A total of 224 students returned useable question-

naires, most of them completing their responses in 15 minutes or less. Quantitative data were subsequently keypunched and analyzed using the Statistical Packages for the Social Sciences (SPSS, Macintosh Version 10.0, 1999, available from SPSS Inc.).

Student narratives were coded using low-level descriptors (e.g. descriptors that use subjects' rather than the researcher's wording) based on the narrative prompts (Goetz and LeCompte, 1984). Data were coded and organized separately for band and orchestra students in order to ascertain if responses were distinct based on ensemble experience. For the first narrative ('describe what an invisible person observing you during a typical practice session would hear and see'), responses were coded and organized into action categories (see and hear). Responses to the second narrative prompt ('describe what you would do to make a difficult piece of band/orchestra music sound better') were truncated into a list of twenty-three practice activities (e.g. focus on difficult parts, play slowly, mark the music). Frequency of common responses for both narratives was noted.

Using a process of analytic induction (Glaser and Strauss, 1967), the two lists of data for the first narrative were reread several times. Data were recoded using additional inferential codes (LeCompte and Schensul, 1999; Strauss, 1987) that emerged from student descriptions of how practice sessions were structured, affect experienced while practicing, use of or lack of effort, and features of the practice environment. Data for the second narrative were then analyzed using pattern codes, a procedure similar to factor analysis, where the researcher groups variables into a smaller number of sets or themes (Miles and Huberman, 1994). In this case, codes were grouped into self-regulation behavior categories (planning, strategies, monitoring progress, and use of the physical and social environment). A checklist matrix (Miles and Huberman, 1994) was then constructed to display each student's regulation/motivation profile, to compare and contrast similarly rated narratives, and to determine if patterns existed for regulation and motivation ratings.

Low-level descriptor codes, peer debriefing, checking for representativeness and negative case analysis were used to increase the reliability and validity of the findings (Lincoln and Guba, 1985; Miles and Huberman, 1994). Peer debriefing, during each phase of data analysis, served to increase the dependability of the codes and coding procedures. For instance, during the initial phase of data analysis as well during subsequent pattern coding analysis, the researchers met to check the consistency of coding and to clarify code descriptions.

### *Results: quantitative analysis*

#### DESCRIPTIVE RESULTS FOR BACKGROUND AND PRACTICE VARIABLES

Approximately 54 percent of respondents were in a band (30% woodwinds, 22% brass, 2% percussion) and 46 percent of respondents were in an

orchestra (23% violin, 9% viola, 12% cello, 2% bass). A majority (55%) of students indicated that they had some experience playing another instrument, with piano and recorder being the most commonly cited instruments. Less than one-third (29%) of the students, however, had private lesson experience on their band or orchestra instrument. Just over one-half of the students (57%) reported that one or both of their parents played a musical instrument. Most students indicated that they typically practice during late afternoons (43%) or early evenings (38%), with fewer students opting to practice during school (23%), late in the evening (19%) or early in the morning (7%). A vast majority of students (91%) reported having a comfortable and quiet place to practice at home.

Means for MPI scale items reveal that the most frequently employed practice strategies involve practice preparation and planning ('I come well prepared to music rehearsals and lessons'), time allocation within practice sessions ('I spend some practice time on things that I cannot do very well'), and using the band/orchestra teacher as a strategy resource ('I listen carefully to my teacher's advice about practicing'). Least common practice strategies centered around practice distribution ('I practice a least at little bit everyday') and resource tools ('I practice with a metronome'; 'I tape record myself when I practice'). Students indicated that they exhibit volitional control when practicing (i.e. rarely or never practiced while engaged in competing activities such as listening to the radio or watching television) and were motivated to practice.

#### FACTOR ANALYSIS OF MUSIC PRACTICE INVENTORY RESPONSES

Exploratory factor analysis techniques were used to examine student responses to practice motivation and practice regulation items in Section 1 of the MPI, and to identify the most parsimonious set of factors and items underlying those responses. Initially, data were analyzed using a principal component analysis with orthogonal (varimax) rotation. While two components were extracted that seemed to represent groupings of practice motivation and practice regulation items, over one-third of the items cross-loaded on both components (i.e. loadings of .30 or higher) and the components were highly correlated ( $r = .71$ ).

In an effort to obtain more clear and interpretable results, a series of common factor analyses with maximum-likelihood extraction and oblique (promax) rotation were run. Between runs, factor loadings and loading plots were examined in an effort to identify and discard items that continued to cross-load or that loaded insufficiently. Practice regulation items related to practice resources (e.g. use of a music stand, cassette recorder or model recordings) and practice motivation items related to parental support were among the 10 discarded items. Table 1 shows the results of the final common factor analysis. The two-factor solution, extracted after three iterations, accounted for approximately 35 percent of the total variance. Items in Factor

TABLE 1 *Rotated factor pattern matrix for final common factor analysis*

Item	Factor 1	Factor 2
Think about things I learn in band/orchestra when practicing	.635	
Try to get one section of music perfect before practicing the next	.591	
Mark trouble spots in music when practicing	.574	
Carefully look through a new piece before practicing	.572	
Spend practice time on things I cannot do very well	.564	
Come well prepared to music rehearsals and lessons	.543	
Practice difficult spots very slowly	.535	
Begin each practice session with warm-ups	.531	-.116
Always practice the day after a rehearsal or lesson	.494	
Work to improve whenever practicing	.474	.205
Set specific practice goals	.471	.165
Practice at least a little bit every day	.465	
Ask band/orchestra teacher for help practicing difficult music	.453	
Listen carefully to band/orchestra teacher's practice advice	.451	.132
Look up definitions for unfamiliar terms and symbols when practicing	.431	
Spend time in each practice session reviewing music	.428	.129
Practice challenging music	.403	
Spend some practice time sight-reading new music	.401	
Use band/orchestra teacher's advice when practicing	.389	.211
Talk to band/orchestra teacher about how to practice	.357	
Work hard when practicing	.353	.235
Practice with a metronome	.347	
Time passes quickly when practicing	-.166	.981
Time passes slowly when practicing	-.114	.905
I get bored when I practice	.131	.426
I enjoy practicing	.109	.387

*Note:* Eigenvalues = 7.288 for Factor 1 and 1.752 for Factor 2. Factor 1 accounted for 28.03% of the total variance, while Factor 2 accounted for 6.74% of the total variance. Interfactor correlation = .550. Factor loadings below .10 are suppressed.

1 represent various facets of practice regulation, while items in Factor 2 represent aspects of practice motivation.

Subscale scores for practice motivation and practice regulation were computed by reversing the scoring of all negatively phrased items and then summing scores across all items that loaded sufficiently on each factor. Coefficient alpha was computed to determine the reliability (internal consistency) of each subscale. Reliability coefficients for both the practice motivation (4 items,  $r = .79$ ) and practice regulation (22 items,  $r = .87$ ) subscales were adequate.

TABLE 2 Means, SDs and *t*-test results for instrumental experience, practice behaviors, and practice motivation and regulation subscales

Variable	BAND		ORCHESTRA		<i>t</i>	<i>p</i>
	Mean	SD	Mean	SD		
Band/orchestra experience (years)	2.31	0.52	2.58	1.30	1.896	.060
Other instrument experience (years)	1.54	1.99	1.60	2.26	0.208	.835
Lesson experience (years)	0.39	0.88	0.99	1.85	3.154	.003
Practice frequency (days per week)	4.11	1.63	4.41	1.63	1.291	.198
Practice amount (hours per week)	2.75	2.02	2.74	1.72	0.051	.960
Practice motivation subscale	14.28	3.28	15.18	2.94	2.103	.037
Practice regulation subscale	75.99	11.84	77.56	12.75	0.953	.342

Note: Equal variances were not assumed for lesson experience.

#### BAND AND ORCHESTRA STUDENT COMPARISONS

Means, standard deviations (SDs), and independent *t*-test results for instrumental experience and practice behavior variables, as well as the practice regulation and motivation subscales, appear in Table 2. On average, both band and orchestra students had played their instruments for slightly longer than 2 years, though the experience of orchestra students was much more variable – likely reflecting the fact that several orchestra students begin playing their instruments in Suzuki programs prior to fourth grade (9–10 years of age). Orchestra students had significantly more experience taking lessons on their ensemble instrument and also reported higher levels of practice motivation. There were no significant differences between band and orchestra students, however, with respect their experience playing other instruments, the frequency (number of days) or amount (number of hours) of their weekly practice, or the degree to which they were engaged in practice regulation.

#### CORRELATIONAL ANALYSIS

Pearson product–moment correlations were calculated to determine how practice motivation and practice regulation subscale scores were related to instrument experience, frequency of practice, and amount of practice. A summary of those results appears in Table 3. Overall, the magnitude of the correlations was relatively weak. A small but significant negative correlation (–.16) emerged between practice motivation and band/orchestra instrument experience; students who had been playing their instrument for a greater length of time tended to express less motivation for practice. Practice motivation was positively correlated with both practice frequency and the amount of practice, but practice regulation correlations were stronger for both practice frequency ( $r = .34$ ) and amount of practice ( $r = .21$ ).

TABLE 3 *Simple correlation summary for practice motivation, practice regulation, instrument experience and practice behavior variables*

Variable	Practice motivation	Practice regulation
Ensemble experience	-.16	-.06
Other instrument experience	.10	.07
Lesson experience	-.05	.07
Practice frequency	.21**	.34**
Practice amount	.17*	.21**

Note: Two-tailed tests based on  $N = 200$ . \*  $p < .05$ ; \*\*  $p < .01$ .

#### ANALYSIS OF VARIANCE FOR PRACTICE SCHEDULE AND ENVIRONMENT

Analysis of variance (ANOVA) procedures were used to determine whether practice motivation or practice regulation subscale scores were impacted by student practice schedule (preferred time of day to practice) and practice environment (whether the environment was quiet and comfortable). Results showed that while practice schedule had no significant effect on practice motivation or practice regulation (motivation and regulation were only marginally higher for students who typically practiced in early morning or early evening), home practice environment did have a significant effect. Students who reported having a quiet and comfortable place to practice at home had significantly higher levels of practice motivation ( $F = 8.069$ ,  $p = .005$ ) and practice regulation ( $F = 20.124$ ,  $p < .001$ ) than students lacking such an environment.

#### *Results: qualitative analysis of practice narrative*

Analysis of the two narratives revealed distinct regulatory and motivational dimensions to music practice, although all features of self-regulated practice were not evident. Most of these findings stem from richer narratives produced by orchestra students. A summary of self-regulation and practice strategies found in student narratives appears in Table 4.

One aspect of self-regulation commonly mentioned was planning. Some students 'look(ed) over the music before practicing' to frame the practice session or described a systematic approach to practice that included playing a warm-up, easy piece, spots in a difficult piece, sections in the piece that included the spots, and a favorite piece. Other students seemed to approach practice as 'passing the time' by playing a piece 'over and over,' thus not seeming to plan for the events or order the events that occurred during a practice session.

There also was some evidence of students using various practice resources (metronome, music dictionary, aural models) and creating/managing their practice environment ('I go to a quiet room so I can hear myself play' or 'I ask

TABLE 4 *Summary of self-regulation and practice strategies found in student narratives*

Strategy	Frequency of band subject response	Frequency of orchestra subject response
Planning		
Look over the music before practicing	1	4
Systematic approach	2	4
Focus on difficult parts	7	11
Strategies		
Repetition of difficult measure(s) until correct or a specified number of times correctly	25	42
Slow (with gradual tempo increase)	29	25
Additive (measure by measure)	23	23
Simplification (count/clap; finger notes, pizzicato; name the notes; air bow)	10	9
Mental rehearsal	1	3
Whole-part-whole approach	7	8
Monitor progress		
Mark the music	4	6
Technique	23	12
Self-evaluation	1	1
Use of physical/social environment		
Music dictionary	2	0
Ask for help (family, teacher, friend)	11	7
Metronome	2	4
Aural model (keyboard, family member)	0	3

my Mom for help'), though a few students reported distractions in the practice environment ('you'd see my cat jumping at my bow').

Student narratives included text describing the use of some monitoring behaviors including marking the music ('I may circle or write in things to help me'), noting aspects of technique they consider while practicing (posture, embouchure, fingerings and left-hand shape) and limited self-evaluation. While evaluative comments (e.g. 'I say to myself no that's not right, do it again' or 'I imagine my music teacher and what she would say if she was there') focused on a particular problem rather than a global assessment of the practice session, these comments indicated that a few students assumed a teacher role or used private speech (Vygotsky, 1962) when monitoring progress.

When asked to describe what they would do to make a difficult piece of music sound better, students identified several strategies. Responses indicated that students use repetition (play a spot either until it is correct or a specified number of times correctly); slow practice, often followed by a gradual increase in tempo; simplification (clap, count, name the notes, finger the notes, air bow, pizzicato), mental rehearsal ('I think about how it should sound') and additive (practice measure by measure) strategies. Furthermore, some students described the use of a 'whole-part-whole' approach to practice, whereby they played a section of a piece, isolated difficult parts and then played the section again. Overall, repetition, slow practice and use of an additive approach were mentioned more frequently than the other strategies.

Profiles emerged with respect to practice motivation. Students commented on their level of interest ('[During practice] I play a favorite piece'), their investment of effort (through the use of such descriptors as 'hard work', 'I'd keep trying even though I made mistakes', 'concentration', 'persistence'), and the presence of parental support ('you would hear my Mom encouraging me'). Some students indicated they actively seek help from a parent or teacher to solve problems.

Other students indicated less interest in practice (you would see and hear a 'bored student' or 'a lot of complaining'), less parental support ('you would hear my Mom asking me to go somewhere else'), and the experience of negative emotions (frustration through 'slapping my stand', 'confusion', or 'struggling') when practicing. Interestingly, some students seemed to expend effort during practice but were unsure about how to practice effectively ('I try my best and if I mess up I try harder').

#### COMPARISON OF QUANTITATIVE AND QUALITATIVE DATA

Median splits were calculated for practice regulation and motivation subscale scores to identify individuals who possessed differing practice profiles (e.g. low regulation, low motivation; low regulation, high motivation; high regulation, low motivation; high motivation, high regulation). Students who ranked low for both regulation and motivation either did not provide written responses or provided less detailed descriptions of their practice ('I would practice as hard as I could to make it sound better') while indicating a lack of interest ('I take breaks to complain, rarely improve, and sometimes it takes an hour to practice forty minutes'). On the other hand, all students except one who ranked high for both practice regulation and motivation listed two or more distinct practice strategies they would use when working on a difficult piece of music. Also, these students indicated an interest in practice ('[you would see] me concentrating very hard') with a goal toward improvement ('you would hear mistakes but you'd hear them improve').

Patterns for students with disjunct profiles (low regulation, high motivation; high regulation, low motivation) were less easy to interpret because narrative content did not always correspond perfectly with categorizations

based on numerical data. For instance, the narratives of nine individuals categorized as low regulation/high motivation indicated these students used only one strategy to practice a difficult section of a piece or used an ineffective strategy (e.g. 'play it over and over') – which is indicative of poor practice regulation. Many of these same individuals, however, did not produce narratives that reflected a reasonable or high amount of motivation to practice – which calls into question their motivational status. A disconnect also was evident for a majority of students categorized as 'high regulation, low motivation'. While some individuals described the use of multiple practice strategies despite seeming unmotivated to practice, a few 'high regulation, low motivation' students indicated they did practice strategically and also had a moderate to high degree of practice motivation (e.g. 'working hard' and 'trying to be the best I can be').

The poor fit between narrative content and motivation subscale scores for individuals with disjunct profiles might be due to the narrative prompts that were provided, student inability to clearly articulate practice behaviors using a written format, or the fact that students provided numerical responses first and then viewed the narratives as a redundant task. Nonetheless, there was a high degree of correspondence between most students' numerical profiles and narrative content. Any disparity that exists may simply highlight the potential that gathering both numerical and verbal data holds for providing a more complete, as well as complex, portrait of student practice.

### *Discussion*

Factor analyses of questionnaire data suggest that regulation and motivation do represent separate, though moderately related, facets of practice. Qualitative analyses of narrative responses support and illustrate trends in numerical data, but also reveal additional motivation (e.g. challenge-seeking behavior and affective experience) and social resource issues that impact practice. In practical terms, it is possible for a student to be highly motivated to practice, but not necessarily exhibit a high degree of practice regulation. Conversely, some individuals may regulate their practice to a fair degree, but not necessarily derive motivational benefits from practice – perhaps because they do not view the development of musical skill as an important goal. While describing the nature of the relationship between practice regulation and motivation is beyond the scope of this study, direct observations of music practice may help us better understand differences between more and less regulatory/motivated instrumentalists, as well as the relative impact of school/home environment and teacher/parental support.

Mean responses for questionnaire items suggest that instrumentalists did derive some regulatory guidance from their school instructors (though this may reflect an element of self-report bias), did structure practice time to a certain extent (e.g. devoting some practice time to things they cannot do

well), and did avoid many of the common distracters that might negatively impact practice quality (e.g. watching television while practicing). Yet, student responses suggest that they did not typically use practice tools (metronome, recordings, tape recorder) and were not inclined to practice daily (students typically practiced 4 days a week for approximately 40 minutes a day). These results raise an important question about the degree to which any elementary-age instrumentalist might be expected to manifest all characteristics of self-regulated practice. It may be that certain elements of self-regulation (teacher guidance, parental support, establishing environment and structured routine) are prerequisite to other regulatory behaviors (tool implementation, strategizing, monitoring and evaluating).

While there was no clear relationship between band/orchestra experience and practice regulation, more experienced students tended to report being motivated to practice less frequently. This finding is somewhat perplexing because one would expect that as students gain experience playing in school ensembles, they will realize greater motivational and/or educational benefits from practice. We also were somewhat surprised to discover no clear relationship between private lesson experience and practice regulation. Most prior research (Barry and McArthur, 1994; Hamann and Frost; 2000) suggests that many students learn how to practice from their private teachers, and not their school ensemble instructors. The fact that our sample was restricted to younger instrumentalists, that strategies learned in private lessons may not always transfer to ensemble contexts and that we considered the actual amount of private lesson experience (rather than treating private lesson experience as a discrete variable) may account for our results.

Practice strategies and regulatory behaviors reported in narratives (representing the more regulatory and motivated students in our sample) are similar to those identified in previous research (Barry and Hallam, 2002; Barry and McArthur, 1994; Gruson, 1988; Hallam, 1997; McPherson and Renwick, 2001; Nielsen, 2001). Students reported a wide range of practice strategies (repetition, simplification, mental rehearsal, marking music, consulting aural models, self-evaluation). There also was evidence, though to a lesser extent, that students made deliberate efforts to plan or structure their practice sessions. Our findings would seem to corroborate those of other researchers (Barry, 1990, 1991, 1992; Gruson, 1988; McPherson, 2000–01; McPherson and Renwick, 2001), who suggest that while inexperienced instrumentalists generally do not use a strategic approach to practice, certain individuals may begin to do so after only a limited amount of study.

Orchestra and band students were more similar than not with respect to practice frequency, amount of practice, and practice regulation. While a significant difference emerged for practice motivation (favoring orchestra students), the practical significance of this difference is debatable (effect size represented only 2% of the variance). The positive correlation found between practice regulation, frequency and amount of practice adds to a growing

body of research (Geringer and Kostka, 1984; Wolfe, 1984) that indicates strategic practice can lead to increased practice and therefore more rapid skill development. Also, the positive correlation between practice motivation and frequency suggests that distributed practice impacts not only skill development but also may reflect motivation to engage in 'effortful' practice.

Similar to other research (Barry and McArthur, 1994; Corno, 1994; Hallam, 2001; McPherson and Renwick, 2001), our results indicate that students who establish a productive environment, and who utilize physical and social resources, tend to exhibit more regulatory behaviors. These students appear able to meet the challenge beginners often face of identifying errors (Barry and Hallam, 2002; Brokaw, 1983), perhaps because they are able to draw upon available resources (e.g. the piano or a sibling) to create an aural model with which to compare their performance. It should be noted, however, that while seeking help can be an effective learning strategy, seeking help too often or prior to independent practice may actually impede student development of regulatory behaviors.

Finally, our research demonstrates that there is an affective component to practice that is linked with effort expenditure. Narratives revealed that certain students experience intense negative emotions while practicing (boredom, frustration, anger) while others reported behaviors indicative of more positive affect (playing favorite pieces, concentrating, persisting).

#### RECOMMENDATIONS FOR FUTURE RESEARCH

Further research is needed to determine if student frustration with practice is a result of lack of skill to meet a given challenge (Csikszentmihalyi, 1991), attribution of challenge to lack of ability or effort (Austin and Vispoel, 1998; Stipek, 1998), motive for learning (McPherson, 2000–01), or overall approach to challenge (Dweck, 1986; O'Neill, 1997). While subjects in this study tended to engage in either mastery-oriented or helpless behavior, more research is needed to better understand the relationship between student motivation and practice approach. Results from this research can provide strategies for teachers to use with students that avoid challenge and adopt maladaptive practice behaviors.

Modifications of the self-report measure are needed to more fully understand beginning instrumentalists' music practice. Additional item refinement may clarify the relationship between practice resources, parental support, and other sources of practice motivation and practice regulation. While overall student response to the two narratives was positive, more rich and varied responses might be obtained by modifying the administration format. Because 12 percent of the subjects did not provide any response to narrative prompts, it might be advisable to provide more time for respondents to reflect on experiences or collect numerical inventory and narrative responses in separate data collection periods. The prompt 'imagine that an invisible person is observing you' seemed to distract some students from the intent of the

narrative to have students describe a typical practice session. Omitting this phrase and asking students to describe a practice session from 'start to finish' might result in more thorough descriptions of a typical practice session.

Additional methodologies would help researchers to ascertain the degree to which practice effectiveness might be enhanced. Controlled experiments in which practice data are gathered through direct observation and situated recall might be used to explore the effects of various practice interventions (providing students with a metronome and playback recorder, directing band/orchestra instructors to regularly discuss or model practice strategies, and showing parents how to establish productive practice schedules and environments at home) on the frequency, quantity, and quality of practice. While descriptive studies that highlight individual differences in practice among instrumentalists are abundant and informative, there is a dearth of studies that actually assess the viability of various practice training or intervention programs.

#### IMPLICATIONS FOR PRACTITIONERS

The results of this study suggest that it is crucial for public school teachers to explicitly teach students how to engage in strategic practice as well as how to use a greater variety of practice strategies. For example, a teacher can discuss with students how to structure a practice session and model how to practice a difficult piece, including how to monitor progress and set goals for subsequent practice. Teachers should periodically assess the quality of student practice in order to assist students who are less efficient and to motivate more skilled students to improve the quality of practice, which may lead to increased practice and greater success. Also, in order to mitigate the impact of different support networks, teachers should discuss with parents and students how to establish a supportive physical and social environment that will promote and sustain motivation. Parents can be instructed to provide such tools as a tape recorder, CD player, and metronome, and to assist their child with structuring and monitoring practice sessions. As a result of this instruction, practice can become a vehicle for, rather than a roadblock to, more productive and fulfilling musical experiences.

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