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Effects of Analytic Practice Strategies on Undergraduate Wind and String Instrumentalists' Performance Achievement and Self-Reported Practice Efficiency: An Exploratory Study

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I investigated the effects of analytic practice training on undergraduate wind and string music majors' (N = 15, combined across two phases) performance achievement and self-reported practice efficiency. Participants were randomly assigned to either a treatment group that received instruction on analytic practice strategies or a comparison group that used only repetition. Following a recorded pretest, participants individually practiced three assigned etudes (three 15-minute practice sessions per etude, one etude per week) using assigned practice strategies for a three-week period. Expert evaluators rated participant pretest and posttest recordings using an adaptation of Miksza's (2007) Objective Performance Scale. Self-reported practice efficiency ratings were significantly different between groups, suggesting analytic strategies may increase practice efficiency. However, after the three-week period, there were no significant differences in performance achievement between groups or across time. Frequently reported analytic practice strategies included stopping to fix errors, repeating small sections, and altering the tempo.

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The importance of practice on musicians' technical and musical development cannot be overstated (Lehmann, Sloboda, & Woody, 2007). Although ensemble rehearsals and private lessons can expand students' understandings and skills, individual practice is the process by which musicians refine their mastery of such concepts and techniques. As such, music practice has been the topic of numerous investigations during the past twenty years. In an effort to determine how musicians master their craft, researchers have explored the amount of time musicians practice. Deliberate practice has been found to be a better predictor of performance achievement than talent (Ericsson, Krampe, & Tesch-Romer, 1993; Lehmann & Ericsson, 1997; O'Neill, 1997), and levels of expertise are acquired through hours of deliberate practice (Lehmann & Ericsson, 1997). However, the amount of practice does not necessarily predict performance success (Miksza, 2006, 2007; Rohwer & Polk, 2006). Rather, the use of specific practice strategies may be more effective at predicting performance quality than time alone (Duke, Simmons, & Cash, 2009; McPherson, 2005; Williamon & Valentine, 2000), particularly when musicians practice utilizing an analytic approach (Duke et al.,

2009; McPherson, 2005; Miksza, 2007; Rohwer & Polk, 2006). Examples of these specific practice strategies are presented in the following section.

Descriptive Studies of Instrumentalists' Practice Strategies by Experience Level

   Middle School and Secondary Students. During practice sessions, middle school instrumentalists have been shown to frequently alter the tempo (Austin & Berg, 2006; Miksza, Prichard, & Sorbo, 2012; Rohwer & Polk, 2006), but tempo manipulation did not exert a statistically significant effect on the performance achievement of high school instrumentalists (Henley, 2001). Short repetition is also a common practice behavior used by both middle school students (Austin & Berg, 2006; Miksza et al., 2012) and high school instrumentalists (Miksza, 2007). Similarly, additive (i.e., measure by measure) practice strategies have been noted in middle school students' practice (Austin & Berg, 2006).

   Although repetition has been an observed component of young instrumentalists' practice (e.g., Austin & Berg, 2006; da Costs, 1999; Miksza et al., 2012; Pitts et al., 2000), claims to its effectiveness have been contradictory. For example, da Costa (1999) noted that young instrumental music students believed their practice was more enjoyable and effective when they could choose from a list of provided practice strategies rather than repeatedly performing an etude. Similarly, one case study participant observed by Pitts and colleagues (2000) actually regressed in performance achievement when she continuously repeated a particular melody. In fact, in their review of Hallam's (1998) work on novice musicians' practice, the authors noted that "repetition, though, is not in itself a sufficient or necessary condition for continuing development, requiring a direction and purpose if it is to address the specific problems that face instrumental learners at different stages" (p. 46).

   After observing middle school students, Rohwer and Polk (2006) grouped instrumentalists into one of four categories on the basis of common practice technique: holistic, noncorrective, who did not stop for errors during performances; holistic, corrective, who stopped only when errors occurred; analytic, reactive, who stopped to remediate; and analytic, proactive, who moved to various areas within the music to fix errors. The students who applied analytic strategies to their practice significantly improved their performances across time. Rohwer and Polk also found that those who applied analytic strategies to their practice (as opposed to holistic strategies) significantly improved their performance across time.

   College Instrumentalists. The practice behaviors of college instrumentalists have included investigations on string players (Kim, 2008; Sikes, 2013), wind instrumentalists (Miksza, 2006; Rosenthal, Wilson, Evans, & Greenwalt, 1988; Ross, 1985), a combination of wind and strings players (Smith, 2005), and keyboardists (Coffman, 1990; Donald, 1997). Such studies may be of great importance because a majority of surveyed undergraduate and graduate music majors reported that their applied studio instructors did not discuss practice strategies during lessons (Kostka, 2002). Miksza (2006) systematically observed

the practice sessions of college music education and music performance majors. Significant relationships were found between performance achievement and three practice behaviors (i.e., repeat section, whole-part-whole, varying the pitch); these behaviors have also been observed in secondary instrumentalists (Miksza, 2007; Miksza et al., 2012). Smith (2005) found that college music majors reported using the practice strategies repeating small sections, tempo manipulation, marking the music, and counting difficult rhythms aloud—behaviors noted in secondary students' practice. Although descriptive studies of college musicians' practice have led to greater understanding of practice, investigations on the effectiveness of practice strategies still seem warranted.

Experimental Studies on Practice Strategies

Few researchers have utilized experimental designs to explore the effects of specific practice behaviors on collegiate musicians' performance achievement. To accomplish this, researchers have placed collegiate musicians in comparison groups exploring differences between two (Donald, 1997), four (Coffman, 1990; Sikes, 2013), or five (Rosenthal et al., 1988) practice conditions. These practice conditions, however, have varied greatly. Silent analysis (i.e., mental practice) of written music can improve rhythmic accuracy but may not increase melodic accuracy, phrasing, or articulation (Rosenthal et al., 1988). Combining physical and mental practice may be just as effective as using only physical practice strategies (Coffman, 1990). Additionally, free practice (i.e., the process of using any known practice strategies) may be just as effective as using silent analysis, singing, listening to models, altering the tempo, and holistic or small section repetition (Rosenthal et al., 1988; Sikes, 2013).

Donald (1997) randomly assigned 40 intermediate and advanced collegiate pianists to one of two different practice groups: Incremental Tempo Increase, or ITI, and the Alternating Tempo procedure, or AT. Results indicated that participants in the AT group needed significantly fewer trials to reach the target performance level than the participants using the ITI procedures, suggesting that alternating the tempo can improve pianists' performances. These findings differ from those of other investigators (e.g., Austin & Berg, 2006; Miksza et al., 2012; Rower & Polk, 2006) who have suggested tempo manipulation can serve as a viable practice strategy. Perhaps this is due to differences in age or between the practice approaches of wind instrumentalists and pianists.

To compare common practice strategies and their effects on performance achievement, Sikes (2013) created a pretest-posttest experimental design that placed 40 university non-major string players in one of four randomly assigned groups: free practice (i.e., using any known practice strategies), altering the tempo, repeating small sections, and playing the excerpt multiple times. Following one 10-minute practice session, all of the performance strategies resulted in significantly improved performance achievement. This is perhaps a surprising finding, as both descriptive and experimental investigators have suggested that analytic or deliberate practice strategies may improve musicians'

performances more than others (Duke et al., 2009; Ericsson, 1997; Ericsson et al., 1993; McPherson, 2005; Miksza, 2007; Rohwer & Polk, 2006). Participants' free practice behaviors, which were not examined, could have included strategies utilized by the other comparison groups (i.e., altering the tempo, small section repetition, holistic repetition), thus distorting the data. Although the effectiveness of different practice approaches is varied, researchers tend to agree that practice is an active cognitive process.

The Role of Self-Regulation in Music Practice

Self-regulation is a psychological construct that has been applied to recent music practice investigations (e.g., Kim, 2008; Miksza, 2013). Self-regulated learning, or self-regulation, can occur when musicians become "metacognitively, motivationally and behaviorally active in their own learning process" (Zimmerman, 1986, p. 308). Within music practice, components of self-regulation include goal selection and planning (Kim, 2008; Miksza, 2013), self-evaluation (Hewitt, 2001, 2011), and concentration and reflection (Miksza, 2013).

Self-regulation, a theory that encompasses self-evaluation, can serve as a framework for understanding why practicing with purposeful and specific strategies might yield benefits for developing musicians. This is demonstrated by Rohwer and Polk (2006), who found that middle school musicians who applied analytic practice strategies—a practice approach that involves identifying specific errors and applying remedial techniques—were more effective than their holistic peers, who rarely stopped or set goals. Practicers with greater self-regulation have been shown to implement a variety of practice strategies (Miksza et al., 2012). Similarly, Miksza (2013) found that collegiate musicians who received instruction on both practice strategies and self-regulation performed significantly better after practice. By applying the self-regulation framework when exploring practice, researchers gain a more thorough understanding of why and how practicing can benefit musicians. Additionally, an investigation on college instrumentalists' use of self-regulation components (i.e., goal setting, planning, self-evaluation, reflection) and specific analytic practice behaviors could further illuminate the effects of such strategies on music performance achievement.

Purpose

In prior investigations, researchers have described both practice behaviors and self-regulation theory, and their potential effects on performance achievement, but the effectiveness of a multi-week analytic practice strategy intervention on performance achievement has not been explored. Research involving undergraduate music majors may help to identify common practice habits and determine whether learning new or refining existing practice strategies may result in greater practice efficiency. Furthermore, undergraduate music majors typically are enrolled in many courses and have numerous extra-curricular obligations and may benefit from learning efficient practice strategies.

The purpose of this exploratory study was to investigate the effects of multiple-week analytic practice training on freshmen, sophomore, and junior brass, woodwind, and strings music majors' performance achievement and self-reported practice efficiency. Research questions included: (a) Does practice strategy method (analytic, repetitive) have a significant effect on undergraduate instrumentalists' performance achievement? (b) Does practice strategy method (analytic, repetitive) have a significant effect on undergraduate instrumentalists' self-reported practice efficiency? (c) Which analytic practice strategies did undergraduate instrumentalists in the treatment group (analytic practice) most commonly employ?

Method

The present study consisted of two separate data collection phases: Phase One ($n = 6$; Fall 2014) and Phase Two ($n = 9$; Spring 2015). Procedures were identical for both phases except for the music chosen for both the pretest-posttest performances and the weekly practice etudes.

Phase One

Volunteer participants in Phase One ($n = 6$; Fall 2014) included freshman ($n = 4$), sophomore ($n = 1$), and junior ($n = 1$) wind instrumentalists majoring in music at a large public research university in the Rocky Mountain region. An additional six participants began the Phase One implementation of the study but withdrew prior to the end of data collection; these participants were excluded from data analysis. The specific instruments played by Phase One Participants included oboe ($n = 2$), clarinet ($n = 2$), alto saxophone ($n = 1$), and bass trombone ($n = 1$). Participants were between 18 and 20 years of age ($M = 18.8$, $SD = 0.75$).

Two types of practice conditions were compared: repetitive practice (comparison group), a practice approach that has been found to be ineffective (e.g., da Costa, 1999; Pitts, Davidson, & McPherson, 2000), and analytic practice (treatment group), which is defined as "[breaking] the exercise down, either by stopping at a difficult section and applying remedial techniques or specifically pinpointing a difficult section for practice after [an] initial baseline performance" (Rohwer & Polk, 2006, p. 335). After an informational meeting and the collection of Institutional Review Board forms, participants were randomly assigned to either the comparison group ($n = 3$) or treatment group ($n = 3$).

Phase Two

The Phase Two version of this study included a new pretest-posttest melody (to help avoid a ceiling effect), different weekly practice etudes, a three-week data collection timeline that occurred earlier in the semester (i.e., mid-February and early March 2015), and the inclusion of string instrumentalists. These modifications were applied in anticipation of eliciting greater participation while

also resulting in lower participant dropout over time. All other procedures were identical to those utilized in Phase One.

Volunteer participants in Phase Two ($n = 9$; Spring 2015) included freshmen ($n = 4$), sophomore ($n = 1$), and junior ($n = 4$) instrumental music majors. The participants' instruments included clarinet ($n = 2$), alto saxophone ($n = 1$), trumpet ($n = 2$), violin ($n = 2$), and viola ($n = 2$). Participant ages ranged from 18 to 21 years ($M = 19.56$, $SD = 1.01$). An additional four participants began Phase Two but withdrew prior to the conclusion of data collection; as with Phase One, these participants were not included in the final analysis. After the informational meeting, participants were randomly assigned to either the comparison group ($n = 5$) or to the treatment group ($n = 4$).

Two participants were in both implementations of the study (i.e., in both Phase One and Phase Two), but through randomization were placed in the opposite group for Phase Two. (These two participants were explicitly instructed to complete all Phase Two procedures as provided—in contrast to how they participated during Phase One.)

Pretest Performances

Prior to implementation of the treatment and comparison conditions, all participants completed a pretest recording, which was used to evaluate participants' performance achievement. To accomplish this during Phase One, all participants were recorded performing Etude 14 from the Watkins-Farnum (1954) Performance Scale Form A book. This 36-measure etude, written in concert B-flat, consists of an arpeggiated melody based on tonic, contrasting phrases and dynamics, an idiomatic range, and a fast tempo (MM = 180). Participants in Phase Two were recorded performing Etude 16 from the *Develop Sightreading* book (Dufresne, 1972) as their pretest. Following analysis of the Phase One data, the presence of a ceiling effect in pretest-posttest scores seemed likely; to help prevent scale attenuation during Phase Two, a more challenging pretest-posttest melody was selected. This 24-measure melody is in the key of A and features rhythmic syncopation and contrast, chromaticism, and a wide tessitura.

Similar to the procedures used by Miksza (2007), participants were escorted to a practice room, provided with a copy of the respective pretest etude, and then instructed to silently review (without singing or fingering) the music for one minute. Following this, participants had two minutes to practice the performance etude in any manner they desired. The researcher then re-entered the room, provided a starting tempo, turned off the metronome, started the *Zoom H4N* recording device, and exited the room. After the recording was completed, the researcher re-entered the practice room and collected the music.

Weekly Practice Sessions

The procedures used in this investigation were similar to those employed in a previous study investigating high school band students' practice behaviors

(Miksza, 2007). Participants independently practiced assigned etudes during 15-minute practice session segments three times per week, for three weeks (nine total practice sessions). This length of time for the practice session segments was chosen based on experimental conditions utilized in existing studies and due to practical concerns (i.e., to minimize a commitment burden for participants). Previous experimental investigations have used controlled practice sessions that lasted fewer than 10 minutes (e.g., Coffman, 1990; Henley, 2001), exactly 10 minutes (Sikes, 2013), 23 minutes (Miksza, 2006), and 35 minutes (Miksza, 2007). Although it has previously been suggested that a longer practice timing metric may foster greater performance achievement (Miksza, 2007), others contend that factors other than time may aid performance (e.g., Duke et al., 2009; Sikes, 2013). Secondly, each weekly practice etude lasted no more than 90 seconds, which allowed for an anticipated 7 to 10 repetitions by comparison group participants. (Since participants in the comparison group were instructed to simply repeat each weekly etude in its entirety, selecting a shorter etude ensured multiple repetitions would occur within one 15-minute session.)

The etudes (one etude per week) were the same for all participants, regardless of group assignment. Phase One Participants (*n* = 6) practiced etudes from Watkins-Farnum Form A: Etude 9 during Week 1, Etude 11 during Week 2, and Etude 12 during Week 3. These etudes were specifically chosen due to their progressive difficulty (Watkins, 1942; Watkins & Farnum, 1954) and their similar compositional attributes to the pretest/posttest melody. Similarly, Phase Two Participants (*n* = 9) practiced Dufresne's (1972) Etude 10 during Week 1; Etude 13 during Week 2; and Etude 4 during Week 3. A panel of nine expert evaluators analyzed the etudes to determine their appropriateness for collegiate musicians (i.e., face validity), then ranked all etudes in order of difficulty. An intraclass correlation coefficient indicated that the expert evaluators' rank orders exhibited very high levels of agreement (.93 in Phase One, .98 in Phase Two), confirming my thinking that the etudes increased in difficulty and were appropriate for participants.

Practice procedures. During each practice session segment for both phases, participants in the comparison group were instructed to engage in "repetitive practice," which required the musicians to play the etude several times in its entirety, without stopping to correct errors. Those in the analytic practice treatment group received weekly instructions and materials via email. To guide treatment group participants' analytic practice, I created and provided participants with the Practice Tool Kit, a document that contained a list of specific analytic practice strategies based upon practice habits found in previous research studies (e.g., Austin & Berg, 2006; Miksza, 2006, 2007; Miksza et al., 2012; Smith, 2005). This resource guided the treatment group participants on how to visually identify problematic areas within the assigned etudes, as well as determining which strategy to apply to their practice. The Practice Tool Kit was provided to treatment group participants at the beginning of Weeks 1, 2, and 3. Additionally, I provided treatment group participants with an instructional YouTube video at the start of Week 3. This brief video reinforced how to use the Practice Tool Kit

by providing visual examples and verbal explanations. After each practice session segment (nine total for each phase), treatment group participants completed an online Practice Summary Form. Through this form, treatment group participants also indicated the types of analytic practice strategies they used during each practice session segment.

Following each 15-minute practice session segment on the assigned practice etudes, all participants completed an online Project Practice Log and Questionnaire, which collected participants' self-reported practice efficiency ratings after each project practice session segment. (This also served as a veracity check.) *Practice efficiency* refers to practicing in a manner that minimizes wasted time and/or effort. This 10-point measure, adapted from Miksza's (2007) Background Survey, allowed participants to rate each session's practice efficiency using a scale ranging from *extremely inefficient* (1) to *extremely efficient* (10).

Posttest Performances

Upon completion of the three-week treatment and comparison period, all participants again performed the same pretest etude (as a posttest) to assess the effect of practice approach on performance achievement.

Performance Achievement Evaluations

Prior to evaluating the Phase One recordings, three expert instrumental music educators (with an average wind band teaching experience of 8.67 years) met with the researcher for a 30-minute training session. During this session, these evaluators learned the OPS scoring procedures, practiced evaluating by using four mock recordings and were asked if they had any remaining questions. An average measure intraclass correlation coefficient indicated an inter-rater reliability rating of .81 after four training recording evaluations, reflecting confidence in proceeding with the Phase One recording evaluations.

The expert educators later independently scored pretest and posttest performance recordings using procedures from Miksza's (2007) objective performance scale (OPS), a performance achievement measure adapted from the Watkins-Farnum Performance Scale (WFPS; Watkins & Farnum, 1954). The OPS scoring procedures consist of counting the frequency of pitch, rhythmic, articulation, and dynamic errors for each beat (rather than each measure, which is used for the WFPS) to score the objective aspects of the music. The maximum possible score for Etude 14 (Phase One) was 106 and was 96 for Etude 16 (Phase Two); minimum scores of 0 were possible for both etudes.

To prevent order effects associated with evaluation fatigue and presentation bias, the expert evaluators were sent a website hyperlink (www.qualtrics.com) containing a randomized presentation order of the pretest and posttest recordings. The presentation order was such that there were no instances of consecutive performances by the same participant. The expert evaluators were blind to order of performance (i.e., pretest or posttest) and experimental condition. When

listening to recordings, each judge independently scored performances by using a dry erase marker to indicate incorrect beats on a laminated copy of the performance etude. Evaluators were instructed to subtract the number of beats with errors from the maximum score of the etude and then enter that number online.

To determine inter-rater reliability for the three expert judges' Phase One pretest and posttest ratings, an average measure intraclass correlation coefficient was calculated. Inter-rater reliability for the three judges was $\rho_I = .66$. It was determined that Judge 3 was not as consistent in his Phase One evaluations as the other two judges; thus, Judge 3's ratings were excluded from subsequent analyses. The inter-rater reliability for the two remaining judges resulted in a reliability coefficient of $\rho_I = .96$, which indicated a high level of agreement. Following another training session, these same two judges evaluated all Phase Two recordings resulting in an inter-rater reliability coefficient of $\rho_I = .95$. Total ratings were averaged for the two evaluators to calculate a composite score for each participant.

Results

Because the sample sizes were small in both phases ($n = 6$ in Phase One, and $n = 9$ in Phase Two), nonparametric statistical tests were used for data analysis. A Wilcoxon signed-rank test showed that after the three-week study duration, Phase One Participants did not demonstrate a statistically significant change in performance achievement ratings across time ($Z = -.84$, $p = .40$). In fact, four of the six Phase One Participants received lower posttest ratings than their initial pretest ratings. Median pretest and posttest ratings were 100.5 and 100, respectively. Similarly, a Wilcoxon signed-rank test revealed that Phase Two Participants also did not demonstrate a statistically significant difference in their performance achievement ratings ($Z = -1.61$, $p = .11$), despite a median pretest score of 73 and a median posttest score of 80.

Table 1. Mean pretest and posttest performance achievement ratings by condition for Phase One and Two.

	Treatment Group		Comparison Group	
Phase One ($N = 6$)	$n = 3$		$n = 3$	
(score out of 106)	*M*	*SD*	*M*	*SD*
Pretest	102	3.97	98.83	5.8
Posttest	101.17	2.25	97.33	7.25
Change in Score	-0.83		-1.5	
Phase Two ($N = 9$)	$n = 4$		$n = 5$	
(score out of 96)	*M*	*SD*	*M*	*SD*
Pretest	66.83	6.64	79.7	4.71
Posttest	67.67	6.5	84.7	2.78
Change in Scores	0.83		5	

Mann-Whitney U tests were conducted to compare the changes in pretest to posttest performance achievement ratings by condition. To calculate the change score, I subtracted the average posttest score (as determined by Judges 1 and 2) from the average pretest score. Change score medians for the Phase One treatment and comparison groups were -1.5 and -1, respectively, and were 1 and 8 for the respective Phase Two treatment and comparison groups. (Medians are reported here because this particular test compares the differences of median values between groups, not the group means.) Results revealed no significant difference between the Phase One treatment group (mean rank = 3.67) and the comparison group (mean rank = 3), $U = 4$, $p = .83$. The results of the Phase Two Mann-Whitney U test also revealed no significant difference between the treatment group (mean rank = 3.75) and the comparison group (mean rank = 6), $U = 5$, $p = .22$. Table 1 shows mean treatment group and comparison group pretest and posttest performance achievement ratings.

Following each project practice session segment, all participants completed the Project Practice Log and Questionnaire to indicate their perceived practice efficiency. This 10-point measure was anchored by *extremely inefficient* (1) and *extremely efficient* (10). In Figure 1, mean self-reported practice efficiency ratings for each week (average for three practice segments per week) are depicted for both Phase One and Phase Two. To compare the grand mean of the self-reported practice efficiency ratings by condition type for both phases, two Mann-Whitney U tests were conducted. Results revealed that Phase One Participants' overall practice efficiency ratings were not significantly different between the treatment group (mean rank = 4.67) and the control group (mean rank = 2.33), $U = 1$, $p = .13$. Examination of weekly practice efficiency ratings by condition type (using Mann-Whitney U tests with a Bonferroni correction of $p < .017$ due to multiple comparisons) revealed no statistically significant differences for Week 1 ($U = 0$, $p = .04$), Week 2 ($U = 3$, $p = .51$), or Week 3 ($U = 1$, $p = .13$).
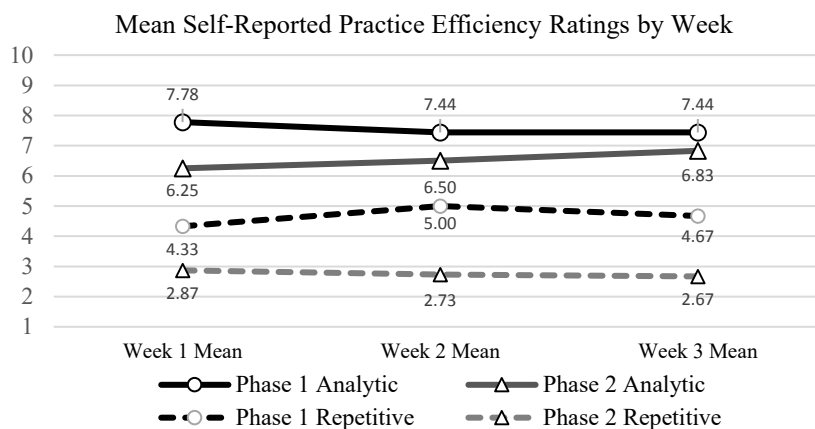

Figure 1. Mean self-reported practice efficiency ratings across time, by week, for Phases One and Two. *Note*: 1 = extremely inefficient; 10 = extremely efficient.

Unlike the results of the Phase One analysis, participants in Phase Two had statistically significant overall practice efficiency ratings between the treatment group (mean rank = 7) and the control group (mean rank = 3.4), $U = 2$, $p = .050$. Although the *p*-value was not less than .05, it equaled .050 and was deemed sufficient in rejecting the null hypothesis (Privitera, 2015). Additional Mann-Whitney U (with a Bonferroni correction) tests examined the three weekly efficiency ratings by condition type, but there were no statistically significant differences for Week 1 ($U = 3$, $p = .08$), Week 2 ($U = 3$, $p = .09$), or for Week 3 ($U = 1$, $p = .03$).

Following each practice session segment, treatment participants were provided a list of eight practice strategies and asked to indicate all strategies they used within the session. Analysis of the frequency of analytic practice strategies used by treatment group participants in both phases suggests similarity between phases among the most commonly employed strategies. Phase One treatment participants ($n = 3$) self-reported using the eight practice strategies (115 instances) ($M = 4.26$ per session) during the nine project practice segment sessions, while Phase Two treatment participants ($n = 4$) self-reported using the eight practice strategies (125 instances) ($M = 3.47$ per session). In both Phase One and Phase Two, the most commonly reported practice strategies included stopping to fix errors while playing, repeating small sections, and playing slowly and gradually speeding up. Table 2 shows treatment participants' self-reported practice strategy usage across all sessions. During both phases, treatment participants reported an increase of practice strategy usage during Weeks 2 and 3 on the "repeating individual measures multiple times" practice strategy. The usage of the other practice strategies remained relatively stable across the three weeks.

Table 2. Treatment participants' total self-reported practice strategies across nine sessions.

Analytic Practice Strategy	Phase One ($n = 3$)		Phase Two ($n = 4$)	
Stopped to fix errors as I played through the exercise	21	(18.3%)	24	(19.2%)
Repeated small chunks/sections (several measures)	20	(17.4%)	21	(16.8%)
Played slowly and then gradually sped the tempo up	18	(15.7%)	21	(16.8%)
Repeated individual measures multiple times	14	(12.2%)	12	(9.6%)
Silent study	11	(9.6%)	15	(12%)
Psychomotor (fingering) practice	12	(10.4%)	10	(8%)
Changed the rhythms	12	(10.4%)	10	(8%)
Changed the articulations	7	(6.1%)	12	(9.6%)
Totals	115		125	

Discussion

The purpose of this study was to investigate the effects of analytic practice training on undergraduate instrumental music majors' performance achievement and self-reported practice efficiency. However, due to the small sample sizes in both phases, these results should be interpreted cautiously. Participants who received training on specific analytic practice strategies did not perform better

than participants who practiced only with repetition. Pretest-to-posttest changes in ratings were not significantly different between groups. This finding aligns with previous experimental investigations showing equal gains in performance achievement, regardless of practice condition (e.g., Rosenthal et al., 1988; Sikes, 2013).

Performance Achievement

Beyond the fact that there was no between-group difference, mean performance achievement ratings changed little within each group during Phase One; four participants actually scored lower on the posttest. These results may reflect the fact that three weeks (nine practice sessions) simply did not allow enough time for the analytic practice training to take effect, or the timing of the study (Phase One preceded Thanksgiving during the Fall 2014 semester) may have inhibited the application of analytic practice strategies by treatment group participants. A ceiling effect could also have been present in Phase One, as mean pretest performance achievement ratings were 98.83 and 102 (out of 106) for both the comparison and treatment groups, respectively. Pretest ratings that represented 93% and 96% of the maximum performance achievement values could have prevented treatment group participants from realizing meaningful gains, thereby confounding statistical comparisons. While this form of scale attenuation was unanticipated, it could nonetheless have impacted the study's internal validity.

Following the analysis and interpretation of the Phase One data, I concluded that a new pretest-posttest etude (i.e., to avoid possible scale attenuation) and a more viable timeline (i.e., not before a break from classes) were both necessary. Unfortunately, only nine participants volunteered for the Phase Two implementation of the study, and an additional four began but later withdrew their participation, thus preventing data normality and population representativeness. Future experimental investigations on analytic practice strategies in college instrumentalists would benefit from a larger sample size, which could be accomplished through promotion by ensemble directors and applied professors.

In alignment with the results of Phase One, the mean changes in performance achievement during Phase Two were not significantly different between the analytic and comparison groups. Unlike Phase One, in which the group performance achievement scores decreased from pretest to posttest, both groups in Phase Two had larger posttest scores, but these gains were not significant. Interestingly, the Phase Two comparison group participants had a larger mean change in score (+5), even though the treatment group participants received the practice intervention. Participants were not observed while practicing, however, so the degree to which they adhered to assigned practice approaches is unknown. In future investigations, researchers may wish to videotape or observe participants' practice sessions to confirm practice group integrity.

Practice Efficiency

I also examined differences in self-reported practice efficiency ratings. Although there were no overall differences for practice efficiency as reported by Phase One Participants, there was a statistically significant difference between Phase Two treatment and control participants' efficiency ratings. Follow-up analysis of Phase Two data, however, did not reveal any group differences for any of the weeks. This may suggest that the practice efficiency self-reports were not dependable. Participants were not provided a definition of "efficiency"; rather, they were asked to "provide an assessment of your practice efficiency" between 1 (*highly inefficient*) and 10 (*highly efficient*). Repetitive practice (i.e., the control group condition) may have been perceived as "efficient" if improvements were gained during practice sessions, thus presenting a potential confounding variable. It is possible that at least some of the repetition employed by the comparison group participants (i.e., repeatedly playing etudes in their entirety) was of a similar nature to the use of repetition by the analytic treatment group (i.e., repeating small sections or individual measures). Because I was concerned that using free practice as a control may have allowed participants to use previously-known analytic practice strategies in their weekly project practice sessions, I limited their practice approach to repetition. (As noted above, participants' practice sessions were not observed or videotaped, thereby limiting integrity.) Additionally, practice efficiency reports with greater validity control could have been possible with a more adequate definition of efficiency or by asking participants to report their perceived efficiency.

Frequency of Analytic Practice Strategies

Another purpose of this investigation was to explore the frequency of specific analytic practice strategies implemented each week as self-reported by the Phase One (*n* = 3) and Phase Two (*n* = 4) treatment group participants. The following strategies (in order of highest overall frequency) were applied most by the treatment participants: stopping to fix errors while playing, repeating small sections, altering the tempo, repeating individual measures, silently studying the music, psychomotor (fingering) practice, changing rhythms, and changing articulations. Based on the frequencies of self-reported strategy usage, the treatment participants in the present study might be considered analytic, reactive practicers (Rohwer & Polk, 2006), as proactive strategies were used less frequently. Nonetheless, information was collected only on which types of analytic strategies were used while practicing, not how often each strategy was applied during practice sessions. Future investigations could descriptively explore (e.g., through videotape analysis) how frequently college instrumentalists utilize these types of practice strategies.

Treatment group participants were assumed to enact self-control and self-awareness (i.e., self-regulation; McPherson & Zimmerman, 2011) during their project practice sessions and, therefore, use the provided analytic strategies during

their practice sessions. Despite this assumption, the results of the present study do not affirm the presence of self-regulation during practice. The Practice Tool Kit and instructional video prompted treatment group participants to begin their sessions by (a) visually determining the most difficult sections of the etude, and (b) deciding "which of these [analytic] strategies you will apply to your practice to accomplish your goals." Participants may have generated goals after examination of the etude, but this assumption cannot be confirmed. Future researchers could explore the presence of self-regulated practice behaviors by utilizing self-report measures (Miksza, 2011). Additionally, researchers could qualitatively examine musicians' practice diaries (e.g., Kim, 2008) or use mixed methods techniques to explore perceived practice behavior usage and frequency with those that are observed. A more novel data collection approach might consist of utilizing a smartphone to collect practice session video while also periodically prompting participants to either implement a specific practice strategy or to direct participants to engage in elements of self-regulation. Such procedures may allow for a greater understanding of self-regulation and practice.

Music educators and researchers should interpret the findings of this exploratory experimental investigation with caution, particularly due to the small sample sizes. In this study, the collegiate musician participants, regardless of comparison group and predominant practice approach, did not demonstrate statistically significant differences in performance achievement ratings. Although this finding has previously been reported (Rosenthal et al., 1988; Sikes, 2013), other empirical and descriptive findings have indicated that musicians who employ analytic practice strategies can improve more than those who did not use such strategies (Duke et al., 2009; McPherson, 2005; Miksza, 2007; Rohwer & Polk, 2006). Perhaps these conflicting findings are a result of intervention duration. For example, Rosenthal et. al. (1988) instructed their college wind instrumentalist participants to practice the assigned etude using their assigned strategy during a one-time, 3-minute session. Similarly, Sikes (2013) required his college orchestra music non-majors to practice an etude using only their assigned practice approach for one 10-minute session. Given these conflicting findings regarding practice strategies and their potential effects on performance achievement, more research seems necessary, particularly in examining performance gains after both short- and long-term interventions. Researchers engaging in a similar investigation may also benefit from selecting performance achievement etudes (i.e., pretest, posttest) that will minimize any scale attenuation issues. Learning how practice can best aid musicians in further developing their technique and artistry remains an area of pedagogical and scholarly importance.

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A Description of Sight-singing Practices in Arkansas Secondary Choral Programs

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Sight-singing continues to be an essential skill used in the choral education setting as evidenced by the inclusion of reading notation in the original National Standards for Music Education (1994) and the new National Core Arts Standards (2014). The purpose of this study was to describe current sight-reading practices of middle school, junior high, and high school choral directors currently teaching in urban, suburban, and rural districts in Arkansas. Participants (N=131) completed a survey through SurveyMonkey, which investigated the participants' school demographics, the amount of time spent each day in sight-singing, and the methods used to teach students to sight-sing. Findings revealed that 66.7% of choir directors had students use moveable-do solfege to sight-sing and 26% used the number system while sight-singing. The most frequently reported rhythm reading system used by participants was traditional beat-based counting (67.2%). The majority of participants reported spending 3-4 days a week sight-singing. The mean percentage of class time spent sight-singing per rehearsal was 15.89% (SD = 9.01).

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Sight-singing is an important skill that should be developed in the choral classroom as evidenced by its inclusion in the National Standards for Music Education (MENC, 1994) and National Core Arts Standards (NCCAS, 2014). Many state choral festivals also include group sight-singing as part of adjudicated competitions (Norris, 2004). Henry (2001) defined sight-reading as "…the singing of pitches indicated by notation upon initial presentation" (p. 24).

Numerous researchers have explored means of impacting sight-reading accuracy: the effect of piano or other instrumental lessons (Alexander & Henry, 2012; Henry, 2011; Henry & Demorest, 1994; Killian & Henry, 2005), current practices in specific states or regions of the country (Goss, 2010; Johnson, 1987; Kuehn, 2003; Kuehne, 2007; McClung, 2001; Potts, 2009), and the effect of various sight-singing systems (Kuehne, 2007; McClung, 2008). However, results reporting the impact of sight-singing systems on sight-reading achievement have been inconclusive.

To develop sight-singing skills in choral students, educators can choose from among several sight-singing syllable systems, such as moveable *do* solfege, fixed *do* solfege, numbers, or neutral syllables (Killian & Henry, 2005). Modern solfege

systems consist of seven syllables in the scale that allow for accidentals by simply changing the vowel sound of the syllable; within the number system, some argue there is no easy way to designate chromatic notes (Brown, 1974; Taggart & Taggart, 1994). However, some scholars have developed number syllables (e.g., sayx would denote a raised six) associated with chromatic pitches (Short, 1971). In a moveable *do* solfege or number system, the tonic note of a scale is designated with the syllable *do* or number 1, and in a fixed *do* system, *do* is always the note "C" regardless of the key signature (Demorest & May, 1995). Though some educators prefer the solfege system because it uses monosyllabic phonemes, pure vowels, and has no ending consonants (Smith, 1991; Taggart & Taggart, 1994), the number system has the benefit of emphasizing scale degrees (Brown, 1974; Taggart & Taggart, 1994). The use of hand movements to help teach sight-singing is present today in the Curwen hand signs (Martin, 1991). Some choral directors have students sight-sing on a neutral syllable (e.g., "lah", "loo"). In the neutral syllable sight-singing method, no specific syllable is assigned to different pitches; however, Cassidy (1993) found the use of neutral syllables to be less effective than the use of solfege.

Each sight-singing method has different strengths and weaknesses, making it difficult to say that any one method is conclusively better than another (McClung, 2001). Cassidy (1993) found that when elementary education undergraduate students worked to improve their sight-singing using solmization methods (solfege, solfege plus Curwen hand signs, letter names, and neutral syllables), there was improvement between pre- and post-test sight-singing accuracy. Research findings indicate that, regardless of the system used, secondary students were most successful in sight-singing when one method was taught consistently (Kuehne, 2010).

Rhythm reading is an important component of sight-reading that requires development (Boyle, 1970; Elliot, 1982). McPherson (1994) found that the majority of beginning instrumental students' sight-reading errors tended to be rhythmic in nature. Similarly, Henry (2011) found choral students, when sight-singing, tended to sacrifice rhythmic accuracy when faced with a tonal challenge, which may indicate that choral directors focus more on tonal rather than rhythm instruction. Music educators use various rhythmic syllable systems to aid in sight-reading performance: Chevé (Kodály) rhythm syllables, traditional beat-based counting, Froseth/Gordon syllables, and word syllables as used in Orff-Schulwerk. There is scant research on the use of rhythm syllables in the choral classroom.

Due to the importance of including sight-singing instruction in choral rehearsals, it may prove instructive to examine music educators' common sight-singing instruction practices. Aural theory professors, methods teachers, and music professional development workshops impact choral educators' preferred sightreading method (Kuehne, 2003; Kuehne, 2007). In fact, Floyd and Bradley (2006) found that professional development had a greater impact on 29.17% of choral educators' choice of sight-singing methods than music education methods classes or music theory classes. A survey of Arizona choral educators indicated

that college classes did not adequately prepare them to teach sight-singing (Farenga, 2013). Kuehne (2003) found that choral teachers in at-risk schools were more likely to consider their aural theory professors to be more influential than choral teachers in schools not at risk. Kuehne (2007) reported that 49.39% of choral educators in Florida practiced sight-singing every rehearsal, although for 19% of choral educators, the purpose of sight-singing instruction was primarily for contest preparation. Additionally, 92.76% of those directors taught sight-singing to all of their choirs, not just high school students (Kuehne, 2007). Kuehne's results are congruent with Demorest's findings that choral directors teach sight-singing to all grade levels of choral ensembles (Demorest, 2004). Farenga (2013) found that 52% of respondents to a survey of Arizona choral educators' sight-singing practices taught sight-singing four or five days a week; respondents' mean number of rehearsals in which sight-singing was taught each week was 3.52. The mean number of minutes per week Arizona choral educators reported devoting to sight-singing was 34.02 minutes (Farenga, 2013).

Research findings have also shown that the percentage of class time that choral educators devote to sight-singing per day varies. May (1993) and Smith (1998) found that most of their participants spent 5-15 minutes per rehearsal on sight-singing, whereas Demorest (2004) indicated that participants spent over 9 minutes sight-singing per rehearsal. Daniels (1988) and Floyd and Bradley (2006) both found participants spent over 15% of their rehearsal time on sight-singing activities. Kuehne (2007) reported that 42.76% of the 152 choral educator participants from Florida spent 5-10 minutes on sightreading, 33.55% spent 10-15 minutes, and 13.81% spent 15-20 minutes. Brendell (1996) discovered choral directors spent an average of 22.23% of class time on sight-singing.

Several studies have been conducted on the sight-singing methods preferred by choral directors of various states and regions. A majority of Florida choral educators participating in a survey of sight-singing practices strongly believed that the moveable *do* sight-singing system should be used and that Curwen hand signs are valuable in teaching sight-singing (Kuehne, 2007). Kuehne (2003) found that one-third of the 152 Florida choral educators surveyed tended to use Kodály teaching techniques. Survey findings of twenty-four experienced Kentucky choral educators indicated that 75% of respondents preferred moveable *do*, 8.33% used numbers, 4.17% combined moveable *do* and numbers, and 12.50% used a combination of moveable *do*, numbers, and letter names (Floyd & Bradley, 2006). Approximately 82% of Texas choral educators participating in a sight-singing survey used moveable *do*, 8.85% used numbers, and 5.73% used fixed *do* (May, 1993). Farenga (2013) also found that 80% of surveyed Arizona choral educators reported using moveable. Of respondents using moveable *do*, 66% used *la*-based minor, and 34% used *do*-based minor (Farenga, 2013). McClung (2001) studied the preferred sight-singing method utilized by choral educators in six southeastern states (including Arkansas). The results indicated that 58% of the respondents used the number system, 19% used moveable *do*, 13% used neutral syllables, 4% used fixed *do*, and 6% used a different sight-singing method. Isolating the practices of choral educators in Arkansas, 80% of the participants

reported using numbers, 9% used moveable *do*, 8% used neutral syllables, 1% used fixed *do*, and 3% used a different system (McClung, 2001). However, McClung's sample was drawn from students who were participating in All-State choirs. This sample may not have provided an accurate view of sight-singing methods used in routine settings since many schools have little or no representation in All-State choruses. Additionally, there may have been changes in the way that choral educators approach sight-singing since 2001. The purpose of this study was to describe current sight-singing practices in Arkansas secondary choral programs.

Method

Sample

Participants ($N = 131$) were choir directors of middle school or junior high choirs ($n = 35$), high school choirs ($n = 39$), and middle school/junior high plus high school choirs ($n = 57$) currently teaching in urban ($n = 33$), suburban ($n = 40$), and rural ($n = 59$) districts in Arkansas. 139 participants began the survey, but 8 did not complete the full survey. Grade levels taught ranged from sixth grade to twelfth grade. The participants had an average of 15.05 years ($SD = 10.49$) of teaching experience and ranged from first year teachers to teachers with 40 years of experience. The list of teacher email addresses was retrieved from a state choral director association directory. Out of 382 emails sent to choral directors listed in the directory, 131 choir directors responded to all questions in the survey (34% response rate). Because of the low response rate, findings should not be generalized and may not be a true indication of the sight-singing practices of all choir directors in the state.

Procedure

Participants were sent an email invitation to participate in an 11 question online survey via SurveyMonkey. After three weeks, a second email was sent to the participants who had not yet responded to remind them of the survey. A final notice was sent after an additional three weeks, asking participants who still had not responded to do so by the end of the following week.

The survey included demographic questions such as grades taught and number of years of teaching experience. The second set of questions asked participants how much time they devoted to sight-singing in each class, and the methods that they typically used. Questions were asked about rhythmic (e.g., traditional beat-based, Chevé method, Gordon method) and melodic reading systems (i.e., solfege syllables, numbers for pitches, or using neutral syllables). Respondents could select from various choices or enter "other" in which they could type in the unlisted method they used. Teachers were also asked to type any additional comments they wished to make about teaching sight-singing.

Data Analysis

The data were compiled based on the responses to the survey. The mean and standard deviation was calculated for the days spent teaching sight-singing per week. Percentages were calculated for sight-singing method, the use of hand signs, and rhythm reading method used. Content analysis was used to code responses of the open-ended prompt in which participants could type in their comments regarding sight-singing in choir, similar to the process used by Silvey and Fisher (2015). The comments were grouped into six categories based on the content of the comments: sight-singing importance, sight-singing materials, sight-singing system, competition, professional development, and miscellaneous. Two of the researchers independently coded the responses to ensure accuracy, yielding 95% agreement.

Results

Responses to the question "How many days a week do you typically have your choir students sight-sing?" revealed that 29.8% of teachers included sight-singing activities 3 days a week, 25.2% 4 days a week, 21.4% 2 days a week, 16.8% 5 days a week, and 6.1% 1 day a week. On average, participants reported spending 15.81% (*SD* = 8.94) of rehearsal time on sight-singing per day. Responses ranged from 0 – 50% of rehearsal time devoted to sight-singing activities. As Figure 1 shows, participants reported spending the following percentage of rehearsal time on sight-singing: 0-10% (45% of respondents), 11-25% (48% of respondents), 26-40% (5% of respondents), and more than 41% (2% of respondents). More than 40% of participants reported spending 20% or greater of class time on sight-singing activities. Approximately 40% of participants reported spending between 5-10% of rehearsal on sight-singing activities.
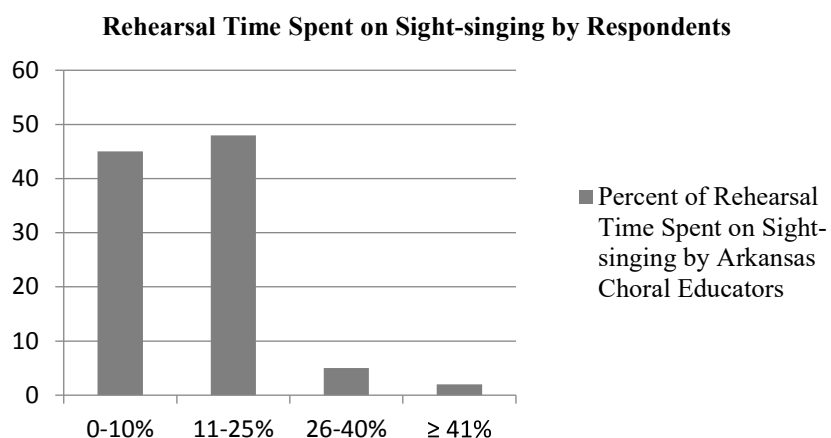

Figure 1. Self-reported percent of rehearsal time spent on sight-singing.

In response to which tonal system participants had students use when sight-singing, more than 60% reported the use of moveable *do*. Approximately 26% reported using numbers, 5% fixed *do*, 1% neutral syllable, and 6% used two or more systems (primarily moveable *do* and numbers). Of those who reported using fixed or moveable *do*, 81% reported including Curwen hand signs.

The most frequently reported rhythm reading system used by participants was traditional beat-based counting (67.2%). Approximately 27% of participants reported using Chevé (Kodály) rhythm syllables and 6% used no counting system. Fourteen participants selected "other" with the majority of responses referencing the use of multiple systems (i.e., starting with Chevé syllables with middle school students and shifting to traditional beat-based counting) or rhythm systems not provided as options (e.g., Eastman School system, Johnstone system, or modifications of traditional beat-based counting). One respondent reported using "down, up" in place of numbers.

Participants were allowed to write comments about teaching sight-singing at the end of the survey, and 42 of the participants responded. These comments were analyzed and grouped into six categories based on the content of the comments: sight-singing importance, sight-singing materials, sight-singing system, competition, professional development, and miscellaneous. Sixteen of the respondents' comments referenced the importance of incorporating sight-singing into their lessons on a regular basis. One of the respondents wrote that "Sight-reading is very important in training children to sing. Solfege requires the student to listen, learn intervals, and helps the singer to tune more accurately. Strong sight-readers make for stronger choirs!" Another teacher indicated that "…to teach sight-reading is to grow a musician. Anything else is rote teaching." Nine respondents discussed the types of materials and resources they used for teaching sight-singing. For example, some respondents composed their own sight-singing materials, or used hymns. One of these teachers wrote, "I would like to have practice sight-reading pieces (prior CPA [Choral Performance Assessment] pieces) to use with my choirs (kind of like "released items" for sight-reading)…. It is the fear of the unknown that gets to both me and my students." Seven respondents' comments focused on the sight-singing system they used. One respondent wrote, "Pick a plan and stay with it so that the students expect to do it every day." Two respondents articulated the need for professional development in sight-singing, whether for themselves or for new teachers in the profession. Two respondents mentioned that they only sight-sing to prepare their students for regional and state competitions in the spring semester.

In addition to the responses that appeared multiple times, there were six miscellaneous comments regarding the nature of teaching sight-singing in very different schools. One participant wrote "I only have one student in my choir class. She has some issues with authority. Every time I try to do sight reading with her, she shuts down (she won't sing the rest of the class, won't talk, or do anything)…" and requested advice for the situation. The impact of teachers' experiences as young choral students was mentioned: "I didn't sight read with solfedge (sic) when I was growing up....we learned the actual notes."

One respondent wrote about how difficult it was to accomplish all of the things in rehearsals because of shortened class times due to the introduction of Common Core State Standards.

Discussion

The purpose of this study was to describe the current sight-singing practices of secondary choral directors in Arkansas. We found that moveable *do* was the most prevalent tonal system used by Arkansas choral directors (60%). Most of those participants also used Curwen hand signs when sight-singing. This result aligns with Demorest (2004) who found 64% of choral directors throughout the U.S. used moveable *do* and 21% used numbers. States in which choral directors predominantly used moveable *do* included Florida (Kuehne, 2007), Kentucky (Floyd & Bradley, 2006), Louisiana (McClung, 2001), and Texas (May, 1993). In contrast, choral directors predominantly used the number system in Alabama, Arkansas, and Georgia (McClung, 2001).

McClung (2001) found that 80% of the choral participants in Arkansas used the number system, whereas results from the current study found moveable *do* to be the most frequently used system. It should be noted that McClung surveyed students in the Arkansas All State choirs, whereas our survey respondents were choir directors. This result raises the following question: "What may have contributed to a possible shift in the method of sight-singing instruction in Arkansas choirs?" Very little is known about the proliferation of the tonal number system and its reported decline in Arkansas choral programs. While it is easy to find information about the origins of solfege (Mark, 2008), research regarding the derivation and proliferation of the tonal number system is limited. Future research might be necessary to examine the history of the tonal number system and how it gained popularity in Arkansas and other southern states that used the number system at one time. Similarly, research may be needed to examine why more choir directors are adopting the use of solfege. Although research findings have not clearly shown significant benefits of one particular system over another (Kuehne, 2010; McClung, 2001), many directors are currently choosing to use moveable *do*.

Results from this study also revealed that the majority of choir directors surveyed have their students use the traditional beat-based system to sight-read rhythms. Though little research has been found that specifically investigates rhythm systems used in choral classrooms, some music theory textbooks used by secondary music educators to enhance students' music literacy skills incorporate the traditional beat-based system (e.g., Surmani, Surmani, & Manus, 1998). Conversely, several elementary music method books promote other rhythm systems such as Chevé or Gordon syllables (e.g., Campbell & Scott-Kassner, 2006). Several participants in this study reported the use of multiple rhythm systems, shifting from one system (typically Chevé system) to the beat-based system in the middle school choral setting. More research may be needed to

examine the impact this shift in rhythm reading systems may have on the musical development of young choral students.

Though many choral directors are in agreement that sight-singing should be incorporated in a choral rehearsal, there appears to be wide disparity in frequency and length of sight-singing activities within the rehearsal as reported by this sample, which is congruent with past research findings (Demorest, 2004; Floyd & Bradley, 2006; Kuehne, 2007; May, 1993; McClung, 2001). Results from this study revealed that more than 50% of participants typically included sight-singing activities in their rehearsal 3-4 days a week, which aligns with the results from a survey of Florida middle school choral directors (Kuehne, 2007). Surprisingly, more than 25% devoted only 1-2 days a week to sight-singing activities. It could be that many choir directors meet only 2-3 days a week due to block scheduling, which could account for the discrepancy.

Respondents differed greatly in their responses to the percentage of time they devoted to sight-singing activities in each rehearsal. Responses ranged from 0 – 50% of class time spent sight-singing, with choir directors spending a mean percentage of 15.81% sight-singing. This result aligns with Daniels (1988), Floyd and Bradley (2006), Kuehne (2007), May (1993), and Smith (1998), but is slightly less than Demorest (2004), who reported respondents spending approximately 28% of class time in sight-singing. More than 40% of our participants spent greater than 20% of class time sight-singing. Some participants devoted over half of each choral rehearsal to sight-singing. Research that examines the relationship between time spent sight-singing and sight-singing accuracy may better inform music educators as to how much time should be devoted to sight-singing in the choral classroom.

Based on the comments participants shared at the end of the survey, there continue to be mixed opinions on the purpose and usefulness of sight-singing in choral ensembles (Norris, 2004). As several of the participants' comments indicated, many choir directors still perceive the development of sight-singing skills to primarily be used for assessment at competition or festival even though Demorest (1998) found individual sight-singing assessment and feedback improved sight-singing performance.

We found that a shift may have occurred in the preferred tonal sight-singing system used in Arkansas over the past 15 years. A majority of our respondents reported using moveable *do* and the count-based number system for rhythmic reading. Though most participants regularly devoted class time to sight-singing, the amount of time and purpose for sight-singing varies. Survey results from this study of current sight-singing instructional practices seems to show that sight-singing is an important component of secondary choral programs in Arkansas and that many choir directors believe in the value and development of choristers' music literacy. As several respondents commented in our survey, sight-singing is an important skill that should be developed in choral ensembles. Choir directors are encouraged to utilize a tonal and rhythm reading system in order to aid in the development of their students' music reading skills. Though it remains unclear how much time devoted to sight-singing development is optimal,

we recommend that choir directors devote a portion of every rehearsal to music literacy development so that these developing skills are sharpened consistently.

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K–12 Music Educators' Use of Technology and Social Media Platforms as Tools for Communication with Students and Parents

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The purpose of this study was to investigate K–12 music educators' use of technology and social media platforms to communicate with students and parents about their school music programs. Three research questions guided this investigation: (1) How do K–12 music educators communicate and disseminate information that pertains specifically to their school music program with students and parents outside of the classroom? (2) What technology and social media platforms do K–12 music educators use to communicate with students and parents outside of the classroom? (3) If K–12 music educators use social media platforms for communication, why do they communicate with students and parents in this way? A researcher-designed 16-item questionnaire was distributed to members of a state music association email listserv. Respondents (N = 246) were K–12 certified music teachers who specialized in general music, band, choir, and orchestra from a large southeastern state. Results indicated that music teachers preferred email and the social media platform Facebook as a means of communication with both students and parents. Respondents indicated that social media platforms allowed them to disseminate information quickly and easily. Implications for further research are also discussed.

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Introduction

Over the past fifteen years, technological platforms used for communication have changed dramatically and are ever-evolving (DuBravac, 2015). With the invention of the smartphone, numerous mobile apps have been developed and their use has grown exponentially over a short period of time (Anthes, 2011). There has been a similar rapid development of social media platforms, with over 1.2 billion users worldwide as of December 2011 (van Dijck, 2013). Social media has influenced how people conduct business (Hendricks, 2014) and communicate (Tardanico, 2012). How and why people communicate has changed substantially (DuBravac, 2015).

Teachers are increasingly turning to "social media as a platform and a tool for meeting educational objectives" (Tuten, Wetsch, & Munoz, 2010, p. 371). Teachers who use social media to connect with students view it more favorably than teachers who do not, and students who connect with their teachers via social media feel closer to their teachers than students who do not (Forkosh-Baruch, Hershkovitz, & Ang, 2015). Parent-teacher communications have also evolved

from email to texting or social media due to new communication technologies (Thompson, Mazer, & Grady, 2015).

For music teachers, communication is essential. Music teachers work with students from the entire school. Unlike other "specials" teachers at the elementary level (e.g., gym, art, computer, librarians), music teachers have rehearsals and performances that must be coordinated between colleagues, administrators, parents, and students. Similar to coaches and activity sponsors at the secondary level, music teachers are some of the most highly visible teachers in the school district; therefore, effective communication skills are essential. Understanding how music teachers communicate with parents and students, and how that communication may be evolving, is a new area of research to be explored.

Literature Review

Researchers have investigated the role of technology in education in a variety of ways over the past twenty years (Ertmer & Ottenbreit-Leftwich, 2010; Harris, Mishra, & Koehler, 2009; Mumtaz, 2006; Ropp, 1999; Vannatta & Nancy, 2004; Willis, Price, McNeil, Robin, & Willis, 1997; Woodrow, 1992). In the late 1990s, researchers investigated a variety of topics: (a) how technology is used (the use and evaluation of educational software; telecommunications systems and services; multimedia portfolios; new media; computer simulations); (b) teacher education and professional development (preservice, inservice, and graduate teacher education; preservice and inservice training issues; diversity and international perspectives; the educational computing course; educational leadership; faculty development; instructional design; distance education); (c) integration into specific subject areas (reading, language arts, and literacy; mathematics; technology applications in research; science; social studies); (d) use in specific contexts/situations (technology-assisted instruction for special needs students; technology diffusion in elementary, secondary, and postsecondary institutions; graduate, preservice, inservice, and faculty use of telecommunications; and technology use with young children); and (e) educational theory (Ropp, 1999; Willis et al., 1997; Woodrow, 1992). More recently, researchers investigated factors that influence technology integration, suggesting that successful technology integration must begin with a consideration of the educational context, teachers' knowledge and attitudes, professional development, and the support of schools and policy makers (Ertmer & Ottenbreit-Leftwich, 2010; Harris, Mishra, & Koehler, 2009; Mumtaz, 2006; Vannatta & Nancy, 2004).

In music education, researchers have mostly investigated K-12 students' technology-assisted compositions (Airy & Parr, 2011; McDaniel, 2000; Mellor, 2008; Nilsson & Folkstead, 2005; Ward, 2009). The media through which music teachers communicate has changed drastically over the past fifteen years; music teachers' use of the Internet to communicate with others has increased over time and changed along with technological innovations (Bauer, 1999, 2010; Bauer & Moehle, 2008; Brewer and Rickels, 2014). Bauer's (1999) study was one of the earliest to examine music teachers' use of the Internet for communication.

Respondents were specifically asked about their use of Internet resources such as email, telnet, file transfer protocol (FTP), email-based discussion lists (listservs), newsgroups, gopher, and the World Wide Web when communicating with administrators and colleagues, for teaching students, conducting research and advocacy, and participating in professional development. Results showed that teachers regularly used email, the World Wide Web, and listservs to communicate privately and publicly with colleagues, music educators, and musicians, and to network with other music educators. Researchers have argued that technology and media will transform music education in the 21st century (Burnard, 2007; Savage, 2005; Thibeault, 2014). Music teachers rarely used the Internet to communicate privately with parents and students, to engage in public discussions with students, or to share information about their music programs.

Music teachers' use of the Internet for communication quickly evolved as they increasingly logged online to collaborate and have discussions with colleagues in an attempt to improve instructional practices (Bauer & Moehle, 2008). In a 2008 study, Bauer and Moehle examined an online discussion forum for music teachers for the academic year of 2005–2006. Results indicated that while the forum facilitated some discussions, such as the selection of repertoire, it did not work as well for other discussions, such as developing improvisational skills. The researchers suggested that certain topics might be better discussed in face-to-face conversations. Similarly, Brewer and Rickels (2014) examined music teachers' interactions on a social media platform, the Facebook Band Directors Group. They discovered that the most common topic of discussion was the location and selection of repertoire, and that the platform was effective in assisting teachers to form a community of practice with each other. Bauer (2010) further suggested that teachers go beyond discussion forums and use technology-assisted Personal Learning Networks (PLN) (e.g., an RSS reader connected to wikis, blogs/news, podcasts, and folksonomies) to learn, communicate, and collaborate with colleagues. PLNs are a collection of diverse, readily accessible resources that come from experts, peer-reviewed sources, and web pages.

As social media platforms gained prominence from 2006–2008 (Giebelhausen, 2015) and continued to grow, researchers urged teachers to consider social media platforms for instructional purposes. Albert (2015) and Giebelhausen (2015) recommended that music teachers use social media to form communities of practice with students using social media platforms such as Facebook, Edmodo, Google Classroom, YouTube, Pinterest, and Twitter. Albert (2015) suggested that social networks can facilitate learning experiences that may not happen in a face-to-face classroom and can provide a platform for sharing resources outside of the classroom and support activities that would be too time-consuming to complete in school. Giebelhausen (2015) recommended that teachers use social media to communicate with students, parents, and others who are devoted to the music program, suggesting that Facebook pages are particularly useful for communicating because anyone can receive information by simply "liking" a page.

Although Albert (2015) and Giebelhausen (2015) suggested that Facebook is helpful for teachers in communicating with students, Hew's (2011) findings indicated that it has little educational value for the students. In a meta-analysis of research studies on students' use of Facebook, Hew discovered that students use Facebook mainly to keep in touch with known individuals rather than for learning. Another challenge to using social media for communication in education is that students may open themselves up to invasion of privacy issues, such as data mining and the release of information to third parties because they tend to disclose more personal information about themselves on Facebook (Albert, 2015; Hew, 2011). Other challenges include cyberbullying and the use of technology without educational outcomes in mind (Albert, 2015).

These studies reveal that music teachers' use of the Internet to communicate with others has risen since 1999 and that music teachers have increasingly turned to the use of the Internet to create personal learning networks (PLNs) in addition to communities of practice with colleagues (Bauer, 2010; Brewer & Rickels, 2014). Researchers have advocated for the use of social media for communication amongst music teachers, parents, and students, including the use of Facebook for promoting music programs in particular (Albert, 2015; Giebelhausen, 2015). However, few studies have examined how music teachers communicate with students or parents, or why music teachers choose their means of communication. The suggestions that researchers have made for using social media are no guarantee that music teachers are actually adopting these practices. Therefore, there is a need to examine if and how music teachers communicate with students and parents through technology and social media and why they communicate in this way.

The purpose of this study was to investigate K–12 music educators' use of technology and social media platforms to communicate with students and parents about their school music programs. The present study was guided by the following three research questions:

1. How do K–12 music educators communicate and disseminate information that pertains specifically to their school music program to students and parents outside of the classroom?
2. What technology and social media platforms do K–12 music educators use to communicate with students and parents outside of the classroom?
3. If K–12 music educators use social media platforms for communication, why do they communicate with students and parents in this way?

Method

This descriptive study used a survey methodology with both quantitative data and open-ended response opportunities. IRB approval was granted by the authors' home institution.

Survey Instrument

A 16-item question survey was created by the researchers. The survey included questions about music teachers' use of technology and social media as a communication tool with students and parents (see Figure 1). Demographic information pertaining to the respondents' areas of teaching specialization, grade level of students, and years of teaching experience was also collected.

Prior to distribution of the survey, a pilot survey was distributed and returned within a two-week time frame. The survey was sent to K–12 music educators ($N = 20$) from a medium-sized school district in the southeastern United States representing general music, band, choir, and orchestra. Respondents provided positive feedback on the pilot survey and did not report any issues regarding the clarity of the questions.

Q1: What level of students do you teach? (Select all that apply)
    Elementary K-5
    Middle School 6-8
    High School 9-12
    K-12
    Other (Please Indicate)

Q2: How many years have you been teaching?

Q3: What is your area of specialization? (Check all that apply)
    General Music
    Choral
    Band
    Orchestra
    Other (Please Indicate)

Q4: Does your school or district provide you with a computer?
Q5: Does your school or district provide you with access to the internet?
Q6: How often do you use a computer?
Q7: How often do you use email?
Q8: How often do you use social media?
Q9: Which social media platform are you most active on?
Q10: Please rank in order your preference for communicating general information about your school music program with your students and parents.
Q11: Does your school music program use social media to communicate information to student and parents?

Q12: What type of social media platform do you use to communicate information to students and parents about your school music program? (Select all that apply)
    Facebook
    Twitter
    Other (Please Indicate)
    I do not use social media as a communication tool with my students and parents

Q13: If you use Facebook to communicate information to students and parents about your school music program, who is the administrator of the page? (Select all that apply)
    You, the teacher
    Another teacher in your school
    Parent of the program
    Student of the program
    School administrator

Q14: If you use Twitter to communicate information to students and parents about your school music program, who is the administrator of the account? (Select all that apply)
    You, the teacher
    Another teacher in your school
    Parent of the program
    Student of the program
    School administrator

Q15: Please rank in order the response below that best describes why you use social media as a communication tool with students and parents.
Q16: Please briefly describe your experience with using social media as a tool for communicating information with students and parents of your school music program.

Figure 1. Survey questions.

Procedures

The researchers requested permission from our state music educators association to distribute the survey via the state association's email listserv. Permission was granted and the survey was distributed to 2,670 K–12 music educators specializing in general music, choral, band, and orchestra. The survey was made available to the respondents for a two-week time period with an email reminder sent after the first week. An additional reminder email was sent two days prior to the close of the survey. At the close of the survey, a total of 246 completed surveys were returned, which yielded a 9.2% response rate.

Results

Demographic Information

Respondents ($N = 246$) in this study were K–12 music educators in the public schools of a large state in the southeastern United States (47.6% middle school; 38.1% high school; 37.4% elementary; 9.4% "other"; and 4.7% K–12). Respondents were asked to indicate all grade levels that they taught because many music educators serve as itinerant teachers at various grade levels, especially within small school districts and rural areas; this kind of reporting resulted in a total statistic higher than 100%. For this investigation, K-12 music educators were defined as state-certified practitioners who taught general/elementary music, band, choir, and orchestra. Most respondents taught for over 20 years, with an equal number of respondents teaching for 1-5 years and 10-15 years (27.7% for 20+ years; 20.2% for 1-5 years, 20.2% for 10-15 years; 17.0% for 6-10 years; and

14.6% for 15-20 years). For areas of teaching specialization, most specialized in band, general music, or choir (46.8% band; 46.0% general music, 37.4% chorus, 11.4% orchestra; 7.9% "other," such as guitar and piano).

Findings

In regard to school districts supplying technology, 97.6% of teachers responded that they were supplied a computer by their school district and 2.3% indicated that they were not supplied a computer. When asked about whether the respondents had access to the Internet from their school district, 99.6% indicated that they were provided Internet access and .4% were not. All of the respondents (100%) reported that they used a computer and email on a daily basis. When asked how often they accessed social media, 80.6% of the respondents indicated that they accessed some form of social media on a daily basis, 8.3% weekly, 5.9% never, 3.9%, rarely, and 1.1% monthly. 90.3% of respondents reported using Facebook, while 9.7% used Twitter.

Music teachers were also asked to rank their seven methods of communication for disseminating information about their music programs (1 being most preferred and 7 being least preferred). Most music teachers preferred the use of email ($M = 2.39$, $SD = 1.40$), a letter home ($M = 3.27$, $SD = 1.94$), a website ($M = 4.03$, $SD = 1.81$), and social media ($M = 4.27$, $SD = 2.05$). See Table 1 for complete results.

Table 1. Music Teachers' Ranking of Preferred Methods of Communication to Disseminate Information about Their Music Programs.

Communication Method	*M*	*SD*
(1) Email	2.4	1.4
(2) Letter Home	3.3	1.9
(3) Website	4	1.8
(4) Social Media	4.3	2.1
(5) Apps	4.4	2.3
(6) Phone Call	4.5	1.5
(7) Face to Face Meeting	5.5	1.4

Note: 1 = most preferred, 7 = least preferred.

Many respondents used social media when communicating with students and parents (62.5%). Only 32.4% reported that they do not use social media as a tool for communication and very few music teachers have strict policies forbidding the use of social media in their schools (5.1%).

Respondents were asked to indicate all applicable social media platforms they used to communicate with students and parents. Facebook was selected by a majority of respondents (49.6%) with Twitter (22.0%) and other platforms (25.6%). Other platforms included the school newsletter, Google classroom, Remind, and Charms. Respondents also indicated that they did not use social media as a communication tool with students and parents (36.4%).

The next survey questions asked music teachers about their administration of Facebook and Twitter for communication. For music teachers who used Facebook, 81% reported that they were the sole administrators of the page; 17.6% had a parent administrator and 12.7% left it to their school. For a minority of respondents, either another teacher (8.5%) or a student (5.6%) administered the page. For Twitter, a majority of teachers administered the account (83.5%). Few parents, administrators, other teachers, or students administered the account (9.4%, 9.4%, 5.9%, and 4.7%, respectively).

Music teachers were asked to rank the reasons for using social media as a tool for communication with students and parents, from a scale of 1–4, 1 being the first reason and 4 being the last reason. Most teachers reported that they used social media because it allowed them to disseminate information quickly ($M = 1.79$, $SD = 0.74$), people were more willing to use social media to learn about their music program ($M = 2.15$, $SD = 0.94$), and it was easier to disseminate information ($M = 2.21$, $SD = 0.78$), and "other" ($M = 3.84$, $SD = 0.65$).

Finally, respondents were asked to describe their experiences with using social media as a tool for communication. Although 246 music teachers completed the survey for this study, only 151 completed the open-ended survey responses. The content of the descriptive responses was analyzed using Creswell's (2013) data analysis spiral - the two researchers read through the text, made margin notes, and formed initial codes, then read through the text again to establish broader themes that emerged from the data. Reliability was improved with both researchers analyzing the data independently, comparing codes, then coming to agreement that the data revealed four themes: (a) types of communication used (traditional versus new); (b) reasons why social media is used for communication; (c) the kind of information that is disseminated through social media; and (d) problems using social media for communication.

Teachers referred to four kinds of communication that may be considered traditional because these forms of communication were used prior to the rise of social media (2006–2008): email, letters home, phone calls, and face-to-face communication. Email was mentioned most frequently ($n = 18$), with letters home ($n = 8$), phone calls ($n = 4$), and face-to-face communication ($n = 1$) mentioned less frequently. Newer modes of communication included Internet, social media, and texting platforms. Internet platforms included the school/music program website ($n = 5$), blogs ($n = 1$), Edmodo ($n = 1$), Google classroom ($n = 1$), Periscope ($n = 1$), and Schoology ($n = 1$). Social media platforms were Facebook pages and groups ($n = 44$), Twitter ($n = 9$), Instagram ($n = 4$), and various apps ($n = 2$). Texting was done via the mobile application Remind ($n = 19$) or a cell phone ($n = 6$).

Out of the social media platforms discussed, Facebook was referenced the most, with 44 respondents describing their use of it. Of the 44 who referenced Facebook, about half ($n = 26$) described how they used it; most used either the school's Facebook page, a page they created specifically for their music program, or a closed group for their music program ($n = 19$). Others used Facebook Messenger to communicate with parents and students ($n = 5$), and only two used

their personal Facebook page to communicate. Overall, music teachers preferred using newer modes of communication (e.g., Internet platforms, texting, and social media); these newer modes of communication were discussed 100 times, whereas traditional modes of communication were only mentioned 32 times.

Social media was used for communication because it was fast ($n = 14$), easy to use ($n = 11$), reached a large amount of people ($n = 9$), built community ($n = 3$), reliable ($n = 2$), reinforced other means of communication ($n = 1$), and was "a way to spread fun and cheer" ($n = 1$). Respondents mentioned that parents and students responded faster to social media than email and other traditional modes of communication. One respondent wrote that "Students get the information much quicker when sent through social media and I have a better response from that." Some respondents mentioned that they liked being able to respond to questions quickly through social media and have noticed that parents were more involved. For example, "I have seen an increase in parent involvement in my booster organization since implementing the use of social media." One participant enjoyed being able to edit the information that was being disseminated:

> The fact that most people are on their social media page an average of 3 times a day, not only can I get information out quickly, but should that information need to be edited or modified, it can happen almost instantly. Wish I had had it when I was waiting for hours for parents to pick up kids at school when we were delayed at a contest or some unforseen [*sic*] delay. Communication is so much easier now than in the 80's.

Music teachers communicated information about their music programs to students, parents, and others involved in the music program. They used social media to send reminders (e.g., about deadlines, lessons, musical events in the community, and the music program's performances); advertised events; promoted their music programs; raised money; shared videos and pictures; disseminated schedules; facilitated public relations; posted assignments; shared educational materials (articles and listening samples); shared forms; shared information about trips; increased parent involvement; educated the school community about the music program; sent out schedules, concert dates, deadlines, and general resource information; and encouraged and built up the students in the music program (a total of 19 responses). Teachers also used social media to respond to student and parent questions ($n = 3$), gain feedback on their music programs ($n = 2$), and reinforce other means of communication ($n = 1$).

Although there were many positive responses to using social media, respondents raised concerns and problems with using social media as a tool for communication with parents and students. Respondents discussed equally the problem with students and parents not having access to social media outside of school ($n = 13$) and school policies against or discouraging the use of social media in school ($n = 12$). Some parents simply did not have or did not want social media accounts, while others lived in poverty and had no access to the Internet or smartphones. One respondent wrote "This is a high poverty school. Not all parents have access to internet/social media." Respondents also mentioned issues with privacy, both their own and students' ($n = 9$). As one participant shared:

> I prefer to keep my social media private. I don't like using it for school. My school does use it. But I feel it mixes personal with private lives. I feel pressure to be "friends" with my administrator and colleagues on social media which then causes stress to me. I'd rather have my social media to myself and use more traditional ways to communicate. I have a personal policy to not "friend" any of my student's parents but I feel I'm the only one who has that policy. A lot of teachers are friends with their student's parents which I think is inappropriate.

Student privacy concerns included real names being shared, photos and videos shared without permission, and students under the age of 14 using social media to communicate. One participant wrote:

> The reason I do not use Facebook is that I prefer to give my parents lots of videos and pictures from music class. Using FB will not work because there is no way to approve all of the requests and I prefer more privacy for my students. I think that many parents would want to be able to give me permission to put their child's image on FB and it is too time consuming.

Several respondents highlighted changes in students' use of specific social media platforms. Five respondents mentioned how fewer students use Facebook, perhaps because there is an overall decline in the use of Facebook in relationship to other social media platforms such as Pinterest and Tumblr, according to the Global Web Index (Olson, 2015). For three teachers, fast changes in technology made it hard for them to keep up-to-date on new social media platforms. As one participant shared, "[It's] hard to stay current." Finally, one participant mentioned that keeping up with social media was too time consuming, while two described how parents used social media to complain about the music program or used information found on Facebook against a teacher.

Discussion

The findings of this study revealed that music teachers used a mix of traditional modes of communication (e.g., letters home, phone calls, face-to-face conversation, and emails) and newer modes of communication (e.g., Internet platforms, texting, and social media). Our findings suggest that teachers will continue using more Internet-based communication than in the past (Bauer, 1999, 2010; Brewer & Rickels, 2014). Respondents' prominent use of Facebook in our study aligned with the findings of Brewer and Rickels (2014), who stated that there appeared to be an increase in the use of Facebook for discussions.

Many teachers in this study used social media to communicate, with Facebook and Twitter being used most frequently. This supports suggestions that teachers use social media for communication, particularly Facebook (Albert, 2015; Giebelhausen, 2015). The majority of teachers were administrators of their Facebook and Twitter pages. This has implications for music teacher education, as there are a myriad of privacy concerns and issues that may arise from using Facebook as a tool for communication with parents and students.

Teachers in this study brought to light valid concerns about privacy and social media. Data mining and the over-sharing of private information can cause problems in terms of blackmail, harassment, and the violation of transparency laws. Further, teachers who share their private cellular phone numbers run the risk of potential inappropriate communication with minors, perhaps risking their careers and professional status. School district policies concerning technology and social media seem to be quite mixed.

Teachers who used social media to communicate did so because it allowed them to disseminate information quickly and easily and they found that people were more willing to use social media to learn about their music program. The benefits of using social media to communicate are not practical for all teachers. Some teachers work in districts where parents have little to no access to the Internet, and therefore cannot use Internet platforms and social media to communicate.

Limitations of This Study

There were several limitations to this study. Results of the study must be interpreted with caution because the response rate was low (9.2%). It is possible that the response rate was low because music teachers have a very demanding teaching schedule and are continuously inundated with emails throughout the school day. Responding to the survey may have not been a priority. However, the results of this study do provide important information to inform future researchers on how some music teachers communicate with administration, parents, and students. Due to the scope of the present study and the low response rate, we were unable to aggregate the data to determine if the use of social media for communication differed among different levels of teaching (elementary, middle, high school), or years of teaching experience. It would be interesting to investigate the cross-section of these variables to determine how they interact with music teachers' methods of communication. Previous research by Charness and Boot (2009) has shown that older adults are less comfortable using advanced technology for communication as technology advances at such a rapid pace. It would be interesting to investigate whether those who have more advanced years of experience in the field are more averse to using social media platforms as communication tools than teachers who are new to the field.

Implications and Future Research

Understanding the benefits and drawbacks of social media platforms as tools for communication may help in-service and pre-service music teachers make better decisions about which communication tools are best for their current teaching contexts. It is important to consider the socio-economic status (SES) of students and parents in order to determine if electronic communication is possible, as most students with low SES backgrounds are less likely to have computer and Internet access at home (Vekiri, 2010). If SES is not an issue, teachers must

consider the potential benefits to using social media platforms for communication (speed and ease) versus the potential drawbacks (privacy issues and abusive behavior).

Teachers shared a variety of social media platforms they used for communication and described how and why they used them. Sharing this knowledge may help in-service music teachers adjust to changes in technology, while helping equip pre-service teachers with ideas and tools to communicate efficiently with parents and students when they enter the field. Teachers in this study never indicated that professional development opportunities helped them gain tools for communicating via social media. Further research on how teachers learn to use social media platforms for communication and whether teachers are gaining useful information about technological tools for communication from professional development opportunities is needed.

In the present study, teachers rarely reported using face-to-face communication. This may be because teachers rely on email and social media platforms to avoid direct confrontations with parents and students. It is also possible that teachers rarely use face-to-face communication because of time constraints. Further research into why teachers use (or do not use) other forms of communication is warranted.

Finally, the limitations of this study prevented researchers from determining if teachers communicate differently according to age, grade level, or area of teaching. Aggregating data according to these areas may reveal interesting findings. For example, teachers may communicate differently with large ensembles than for general music programs, and for different reasons. Additional data collection in future studies could reveal interesting findings in the generational difference in technology preference and usage based on years of teaching. This may have implications for preparing pre-service music teachers and helping in-service music teachers communicate more effectively, thus adding more current and relevant content to music education methods courses in music teacher professional development and pre-service preparation courses.

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Perceived Stress Among Public School Music Educators: Stress Over Time, Demographic Differences, Common Self-Identified Factors of Stress, and Relationships Between Demographic Differences and Emergent Stress Themes

Justin A. Doss
University of Missouri-Kansas City
May 2016
Committee Chairperson: Dr. Joseph Parisi

Dissertation Abstract:

Teaching frequently has been identified as a stressful occupation, warranting numerous studies of teacher burnout, attrition, and stress. Levels of professional burnout and attrition among educators have been shown to correlate with general levels of stress across all aspects of life. As rates of such issues continue to function as a source of concern within the profession, efforts to help educators manage stress and maintain balance are of critical importance. Additionally, music educators tend to face unique occupational stressors when compared with teachers in other content areas. Using Cohen and Williamson's (1988) 10-item Perceived Stress Scale (PSS), combined with open-ended questions based on the PSS, this mixed method study was designed to track music educators' perceived stress across a three-month period, identify significant differences in perceived stress as a function of selected demographic factors, and explore emergent themes of increased and eased stress. Additionally, relationships between emergent stress themes and significant differences in overall perceived stress based on demographic factors were examined. Participants (N = 770) consisted of current K-12 public school music educators in the United States who were employed on at least a half-time basis. A series of three anonymous online surveys, administered at one-month intervals across three consecutive months during a fall academic term, served as the data collection instruments. Results showed that overall PSS scores decreased significantly across three months of data collection. Significant differences in PSS scores were found relative to participant age, parenthood status, grade/school levels taught, and years of teaching experience. Additionally, differences in PSS scores closely approached significance based on participant gender. Emergent themes of increased and eased stress were identified within 4,620 participant responses to open-ended questions. Each response was coded using a two-part, researcher-developed qualitative codebook developed during the data interpretation process. Comparisons were made between significantly different demographic factors and emergent stress themes, and results were compared to related research studies. Suggestions for future research are included. Implications for current K-12 public school music teachers, preservice music teachers, administrators, cooperating mentor teachers, and music teacher trainers and training programs are discussed.

Cooperating Music Teachers' Opinions Regarding the Importance of Selected Traits as Predictors of Successful Student Teaching Experiences

Philip B. Edelman
University of Missouri-Kansas City
May 2016
Committee Chairperson: Dr. Charles Robinson

Dissertation Abstract:

The purpose of the study was to determine the perceptions of cooperating mentor teachers regarding the importance of certain teacher traits as predictors of a successful student teaching experience. The data collection tool used in this study was an online survey which participants could complete online in approximately 10-15 minutes. The entire survey included 91 total questions; however, participants were presented with 54 questions to answer based on their responses to previous questions. The 54 questions included a consent statement, 40 four-point Likert-type scale responses, three multiple-selection questions, three open-ended responses, and seven demographic questions. The population targeted for this study was cooperating mentor teachers for preservice music education majors throughout the United States. Recruitment methods for this study included a combination of snowball sampling and an email soliciting participation that was sent nation-wide to music educators across the United States through the National Association for Music Education (NAfME). The snowball sampling method resulted in approximately 100 participants and the rest were recruited through the solicitation sent email by NAfME. Surveys from participants who either did not complete the survey fully, or who did not fit the inclusion criteria were discarded, resulting in a total of 519 surveys analyzed for this study. A combination of descriptive and inferential statistics was used to analyze participant data. Descriptive data were utilized to construct ranked lists of teacher traits based on the mean importance ratings of each respondent group. Inferential statistics used in this study included Analysis of Variance (ANOVA) tests and post-hoc protected t-tests. Cooperating teachers assigned highest importance ratings to the following teacher traits: demonstrating appropriate social behavior, stress management, fostering appropriate student behavior, establishing a positive rapport with others, and enthusiasm. Comparisons among band, orchestra, choral and general music teachers yielded the most variability when examining teacher traits as ordered lists based on the mean ratings of cooperating teachers. All participant groups rated personal traits as most important, followed by teaching traits, then musical traits. Content analyses of open-ended questions revealed that no teacher traits had a universal meaning or description among participants in this study.

The Influence of Bands of America on One High School Marching Band: A Single Case Study

Stephen C. Eubanks
University of Missouri
May 2016
Committee Chairperson: Dr. Brian Silvey

Dissertation Abstract:

The purpose of this research study was to examine the influence of participation in Bands of America competitions (hereafter referred to as BOA) on one central Missouri high school marching band program. I chose to study a Missouri high school marching band that had been involved with BOA for a minimum of five years. Participants in this study were marching band members plus staff of the Camdenton High School marching band ($N = 22$).

My goal was to produce a study that was descriptive of the influence, if any, that participation in BOA had on the Camdenton High School marching band. I sought to discover this through observations of their rehearsals and performances at their marching band contests. I chose to conduct a qualitative, single case study. Data were collected through structured and open-ended interviews, observations, field notes, and my participant researcher journal.

To date, there has been limited research on BOA participation by high school marching bands. BOA claims to be the largest and most prestigious national marching competition available to high school marching bands in the United States. BOA has grown nationally from eight contests in 1985 to 20 contests in 2015. When BOA expanded in 1997 to include the St. Louis, Missouri regional championship, only five Missouri bands participated in the event. The number had grown in 2015 to include 25 Missouri bands.

During my research, I assumed the role of an active participant and observed the band's music and marching drill preparation, and attended their competitions in order to observe their BOA performances. My research questions focused on the following areas: (a) the key motivators for a high school marching band to participate in BOA, (b) how BOA influences the practices of a high school marching band, and (c) what barriers a rural marching band faces in order to participate in BOA.

Through my investigation, I discovered that there were several motivators for the Camdenton High School marching band staff to elect to participate in BOA. The standard of excellence that exists at BOA marching contests is consistent from state to state, and provides the staff and students with an adjudication rubric that serves as a guide for them to rehearse and perform at a higher musical level. Participation in BOA has led the staff to change the design practices of their marching show design. In addition to the planning of the show, the staff has improved their teaching process. This, in turn, has affected the students' attitude

and approach toward their rehearsals. They have an increased work ethic and feel responsible for each other. All of these factors exist despite certain obstacles the band faces, including limited resources and an increased cost factor.

Other high school band directors who are considering BOA participation might consider the Camdenton High School marching band program as a model. By looking into the reasons why Camdenton chose to participate in BOA and some of the resultant influences, directors might be able to apply them to their own school marching band programs.

Real Time Video Mentoring Investigating Synchronous Video Technology as a Mentoring Tool for New Music Teachers in Rural School Districts

Kenneth C. Jeffs
University of Missouri
May 2016
Committee Chairperson: Dr. Wendy Sims

Dissertation Abstract:

The purpose of this study was to determine if computer based real-time video mentoring (RVM) is a possible tool for effective mentoring of music teachers in small or geographically isolated school districts. Each year a number of new teachers leave the classroom. To support new teachers and help them be successful, new teacher mentoring programs have been implemented in many states and school districts. Research has shown that good mentoring programs are effective in reducing new teacher attrition. One characteristic of successful mentoring programs is an appropriate match between a master teacher (mentor) and beginning teacher (mentee). In small or isolated school districts, where there may be only one music teacher, there is no one who shares the unique experiences of the music classroom to serve as the mentor. The growth of Internet accessibility in public schools has broadened the scope of the traditional mentor/mentee model, by permitting mentoring to occur by a teacher with appropriate experiences but in a different physical location.

This case study examined the mentoring exchanges of two mentor/mentee pairs who were remotely located and only communicated through the use of the online and real-time video/audio software program, Skype. Information was collected during the new teachers' first semester of the school year, and comprised individual interviews and video recordings of all online mentoring sessions.

Analysis of the RVM interactions revealed that discussions related to 7 of 12 challenges faced by new teachers, which had been identified in previous research, were present in the conversations of the mentor pairs. The time spent on the specific issues varied between the two cases, but both spent the most time and greatest number of interactions in conversations related to Emotional Support. The participants reacted positively to this type of mentoring example. The findings indicate that RVM can be an effective tool for providing mentoring to new music teachers in small or geographically isolated school districts.

Missouri Music Educators Association State Conference Research Poster Presentations
January 2016
Osage Beach, MO

Faculty Research

An Examination of University Conducting Faculty Members' Score Study Attitudes and Practices
> Brian Silvey, University of Missouri-Columbia, Greg Springer, University of South Carolina, & Stephen C. Eubanks, University of Missouri-Columbia

Relationships Between Mindfulness Disposition, Perfectionism, Anxiety, and Self-Reported Meditation Practice among Collegiate Level Musicians
> Frank M. Diaz, University of Missouri-Kansas City

The Impact of Instrumental Music Instruction on the Academic Achievement of Students
> Matthew L. Frederickson, Grand Center Arts Academy

A Content Analysis of the Beatles Music 1957-1970
> Robert Groene, University of Missouri-Kansas City

Responses of Music Educators to Teacher Preparation Regulations
> Daniel S. Hellman, Missouri State University

Real Men Sing: Understanding Male Self-efficacy and the Choice to Participate in Vocal Music
> Andrew Homburg, Missouri State University & Mark Lucas, Bethany College, KS

Successful Research Collaboration with Internet Based Tools
> Andrew Paney, University of Mississippi

State of Missouri Music Education: A Profile of Public K-12 Music Education in Missouri
> Jocelyn Stevens Prendergast, Truman State University

Analysis of Publication Decisions for Journal of Research in Music Education Manuscripts (2009-2014)
> Wendy L. Sims, University of Missouri-Columbia, Jackie Lordo, Central Methodist University & Columbia College, & Cynthia W. Phelps, University of Missouri-Columbia

Graduate Degree Research

Fostering Musical and Personal Agency in Beginning Conductors
      Daniel Abrahams, University of Arkansas-Fayetteville (doctoral dissertation, Oakland University, Rochester, MI)

Characteristics and Accessibility of Loaner Programs Used by Missouri String Teachers
      Juliana M. Georgiades (master's thesis, Missouri State University)

Developing Expertise in Music: An Investigation of Deliberate Play, Deliberate Practice and the Developmental Model of Sport Participation
      Jackie Lordo, Central Methodist University & Columbia College (doctoral dissertation, University of Missouri-Columbia)

Puppetry as an Effective Teaching Tool in the Elementary Music Classroom
      Elisabeth R. Schoenecke (master's thesis, Missouri State University)

An Examination of Music Education Majors' Perceptions of Lesson Planning
      Aaron T. Wacker (doctoral dissertation, University of Missouri-Columbia)

Student Projects

Frequencies and Durations of Different Modeling Techniques of Three Middle School Band Directors: An Exploratory Study
      D. J. Culp, Jr., University of Mississippi

How Competition Shapes the Identity of Pre-Service Choral Teachers: A Pilot Study
      Laura Kitchel, University of Missouri-Columbia

The iPad as a Musical Instrument in Community Music Contexts
      Jonathan Kladder, University of South Florida

A Study on the Utilization of Color Accent Marks in Music Notation Among High School Wind Players
      Eric Malone, University of Mississippi

Developing Emotional Intelligence in Undergraduate Music Education Majors: An Exploratory Study Using Bradberry and Greaves' (2009) Emotional Intelligence 2.0
      Emily J. McGinnis, University of Missouri-Kansas City

The Effects of Years in Band On Music Preference
      Benny Ratliff, University of Mississippi

A History of the Nauvoo Brass Band
      Stephen C. Eubanks, University of Missouri-Columbia

Informal Learning and Music Performance: How Does the Untrained Musician Learn?
      Kevin L. Tharp, University of Mississippi

Missouri Music Educators Association State Conference Research Poster Presentations
January 2017
Osage Beach, MO

Faculty Research

Classroom Management in Music Education
>   James L. Byo, University of Louisiana, & Wendy L Sims, University of Missouri-Columbia

Tradition, Camaraderie, Respect, Passion, and Performance: The Impact of Community Bands on Italian and American Musicians
>   Deborah Confredo, Temple University; Joseph Parisi & Justin Doss, University of Missouri-Kansas City

A Selected Content Analysis of the Music of John Denver 1969-1983
>   Robert Groene, University of Missouri-Kansas City

Student Teaching Policies and Practices in the United States
>   Daniel Hellman, Missouri State University; Dale Bazan, Amy Fraser, Polly Yukevich, University of Nebraska

Teaching Secondary General Music: A Multiple Case Study
>   Jocelyn Stevens Prendergast, Truman State University

Effects of Pre-Tuning Vocalization Behaviors on the Tuning Accuracy of College Instrumentalists
>   Brian A Silvey, University of Missouri-Columbia

Graduate Degree Research

Expertise Development in Musicians: The Roles of Deliberate Play and Deliberate Practice
>   Jackie Lordo, Cottey College (doctoral dissertation, University of Missouri-Columbia)

Impact of a Music Program on Students' Standardized Test Scores
>   Joan Murray, Phelps County R-3, Drury University (doctoral dissertation, Walden University)

The Influence of Bands of America on One High School Marching Band: A Single Case Study
>   Stephen C. Eubanks, University of Nevada, Reno (doctoral dissertation, University of Missouri-Columbia)

The Effectiveness of the Changing Education Through the Arts Professional Development Course for Arts Specialists
>   Gayla D. Kobialka, Northwest Missouri State University (doctoral dissertation, Shenendoah University)

Effects of Knowledge Type on Perceptions of Novices' Rehearsal Effectiveness: An Exploratory Study
    Aaron T. Wacker, University of Missouri-Columbia (doctoral dissertation, University of Missouri-Columbia)

Student Projects

Interviews on the Resegregation of High School Choral Music Programs in the Jackson Public School District
    Alona Alexander, University of Mississippi

The Effect of Listening Maps of Various Modalities on Non-Music Major's Ability to Interpret Sound
    Alicia Canterbury, University of Mississippi

The Impact of Audio, Visual, and Audiovisual Information on the Perception of Marching Bands' Attire
    Byron Chatman, University of Mississippi

The Effects of Choristers' Score Study on Rehearsal Engagement and Musical Preference L. Bruce Jones: The Little Rock High School Years (1928-1945)
     Brice Evans, University of Mississippi

Does the Scoring Rubric Affect the Score of the Competing Show Choir?
    Christopher Kindle, University of Missouri-Columbia

Effects of Performance Formats, Memorized and Non-Memorized, and Gender on Piano Students' Stage Performance Anxiety
    Li Li, University of Missouri-Columbia

Comparing Teaching Methods to Measure Children's Singing Accuracy
    Joy Martin, University of Missouri-Columbia

One-to-One Devices in University Group Piano: Effect of Interactive and Static Technology on Student Perceptions of Motivation and Achievement
    Rachel D. Menscher, University of Missouri-Columbia

Before the Singing: The Journey of an Artistic Director
    Cynthia W. Phelps, University of Missouri-Columbia

The Effects of Video and Article Mediations on Preservice Conductors' Pacing Beliefs
    Bradley J. Regier, University of Missouri-Columbia

The Effects of Teacher Gender on Undergraduate Music Education Students' Perceptions of Teacher Appropriateness
    Jared R. Smith, University of Missouri-Columbia

Call for Papers
2018 Missouri Music Educators Association
State Conference Research Poster Presentations

Missouri has one of the most successful research sessions of any state conference. The poster format allows for a number of researchers to present their work in an informal setting, where participants can engage in conversation with the researcher. Researchers whose reports are chosen for presentation will prepare a poster describing their research and be available during the presentation session to discuss their work. Participants will bring 30 copies of their abstract for distribution at the session, and respond to inquiries about their work that could include requests for the complete paper, or information about how to obtain it in the case of theses and dissertations.

Those who wish to submit a report for consideration should comply with the following guidelines:

1) There will be three kinds of research accepted for presentation: a) completed master's theses or doctoral dissertations; b) reports of original research studies, and c) student non-degree projects.

2) a) To submit completed master's or doctoral research, it only is necessary to submit a copy of the abstract, a copy of the document's title page, and a copy of the signature page which indicates that the paper was accepted in partial fulfillment of degree requirements. The name of the degree-granting institution should appear on one of these pages, or must be included with the submission, as well as the author's full name and e-mail. If all of the above-mentioned items are included, the completed thesis or dissertation will be guaranteed acceptance for presentation. These may be sent by e-mail to the address on the next page.

b) To submit a report of an original research project, e-mail a copy of the complete paper, including an abstract, in Word document format. The project should demonstrate sound research practices and writing style and should be complete. Small scale studies, including action research, are appropriate for this forum. The author's name, address, e-mail, and current school affiliation should appear only on a separate page/file from the abstract and/or manuscript.

c) Students may present non-degree projects that are submitted by faculty at Missouri colleges and Universities. Faculty members should contact Wendy Sims at the address below for further information.

3) Papers presented at conferences other than previous MMEA state conferences will be permitted as long as this is clearly indicated in a statement included with the submission.

4)   Authors will be apprised of the results of the selection process by e-mail. A hard copy of acceptance letters will be provided upon request.

5)   Submissions must arrive at the address below by December 12, 2017. Authors will receive notification of acceptance by the end of December. Address submissions (or questions) to:

Wendy Sims, University of Missouri-Columbia
SimsW@missouri.edu

We will look forward to a large number of submissions and to another interesting and lively research session.

Missouri Journal of Research in Music Education

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INFORMATION TO CONTRIBUTORS

The *Missouri Journal of Music Education* is a publication devoted to the needs and interests of the school and college music teachers of Missouri and of the nation. The editorial committee of the journal encourages submissions of original research pertinent to instruction in music of a philosophical, historical, quantitative or qualitative nature. In addition, reviews of literature that include a rationale/purpose, as well as conclusions and/or implications for research and/or practice, and suggestions for future research, will be considered.

Submission Procedures. Authors are invited to submit an abstract of 150 – 200 words and manuscript in a single .doc attachment to the editor via silveyba@missouri.edu. Authors are requested to remove all identifying personal data from submitted articles. Manuscripts submitted for review must not be previously published or under consideration for publication elsewhere.

Style. Manuscripts should conform to the most recent style requirements set forth in the *Publication Manual of the American Psychological Association* (APA, Sixth edition). Authors of non-quantitative papers may alternatively choose to adhere to *The Chicago Manual of Style*, or *A Manual for Writers of Term Papers, Theses, and Dissertations* (K. L. Turabian). Styles should not be mixed within the submission. The text should be double-spaced and use a 12-point font. All figures and tables should be submitted camera ready within the manuscript and designed so that they will fit with the page space of the journal (approximately 4.5 inches wide by 7.5 inches high) and use an 8-point or larger font size. To assure anonymity during the review process, no identifying information should be included in the submission.

Review Procedures. Three editorial committee members review submissions in a blind review process. Authors will normally be notified of the status of the review within two months. The editorial committee adheres to the Research Publication/Presentation Code of Ethics of the Music Education Research Council of NAfME: National Association for Music Education and the National Research Committee of the American Music Therapy Association.