M J R M E

MISSOURI JOURNAL OF RESEARCH IN MUSIC EDUCATION

Number 50
2013

Published by the
Missouri Music Educators Association

EDITOR

DANIEL HELLMAN
Missouri State University

PAST EDITOR

JOSEPH PARISI
University of Missouri-Kansas City

MANAGING EDITOR

MATTHEW UDLAND

EDITORIAL COMMITTEE

MATTHEW FREDERICKSON
Rockwood School District

CAROL MCDOWELL
St. Charles School District

CHARLES ROBINSON
University of Missouri-Kansas City

BRIAN SILVEY
University of Missouri-Columbia

WENDY SIMS, MMEA Research Chair (Ex Officio)
University of Missouri-Columbia

LINDSEY WILLIAMS
University of Missouri-Kansas City

GUEST REVIEWERS

COLLEEN CONWAY
University of Michigan

RICHARD DAMMERS
Rowan University

JUDY PALAC
Michigan State University

JOSHUA RUSSELL
University of Hartford

BUSINESS OFFICE

Missouri Music Educators Association
2170 HWY 47S
St. Clair, MO 63077

EDITORIAL OFFICE

Daniel Hellman, *MJRME*
Missouri State University
901 South National Avenue
Springfield, MO 65804

danielhellman@missouristate.edu
www.mmea.net/content/mmea-mjrme

Copyright © 2013 by the Missouri Music Educators Association, ISSN 00085-350X. The *Missouri Journal of Research in Music Education* is published annually and is a publication of the Missouri Music Educators Association. Copies can be obtained by sending $5.00 (cash, check, or money order, payable to Missouri Music Educators Association) to Joseph Parisi, University of Missouri-Kansas City, Conservatory of Music, 5228 Charlotte, Kansas City, MO 64110. Inquiries relating to the availability and cost of back issues should also be directed to parisijo@umkc.edu. The *MJRME* is being listed in the INTERNATIONAL INDEX OF MUSIC PERIODICALS, THE MUSIC INDEX, the RILM ABSTRACTS OF MUSIC LITERATURE.

Missouri Journal of Research in Music Education

CONTENTS

Number 50
2013

FEATURE ARTICLES

MISSOURI STUDENT ABSTRACTS

2014 Missouri Music Educators Association State Conference Research Poster Presentations

2015 Missouri Music Educators Association State Conference Research Poster Presentations

Missouri Journal of Research in Music Education, No. 50, 2013, 3-19
© 2013 Missouri Music Educators' Association

Changing Gender Stereotypes among Texas All-State String Players: A Four-Decade Analysis

Vicki Baker
Texas Women's University

The purpose of this study was to track the gender makeup of the string sections in Texas Music Educators Association (TMEA) All-State Orchestras from 1971 to 2010, to ascertain trends in gender participation by instrument. Data were extracted from archived All-State Rosters. Results indicate that females comprised the majority in the violin and viola sections until the past decade. Males predominated the cello section in the 1970s; females held the majority in the 1980s and 1990s, and then males regained the majority in the last decade. Approximately one-fourth of the string bass section was female in the 1970s, but over the past three decades the female average has fallen to one in five. Overall, females held the majority of the seats in the orchestras until the 2000s. Over the past decade, the number of males playing instruments with female associations in Texas All-State Orchestras has steadily increased, whereas the number of females playing male-associated instruments has decreased.

The orchestral string instruments seem to have fluctuated in their gender acceptability and association throughout Western history (Pendle, 2001a). The attribution of gender to musical instruments has largely been predicated on societal roles and stereotypes framed by various cultural institutions and particular social settings throughout history (Hallam, Rogers, & Creech, 2008). During the Middle Ages, the church rigidly restricted women's participation in sacred music. Nevertheless, women in medieval France regularly performed secular music on string instruments, including the fiddle, harp, lyre, and psaltery (Edwards, 2001; Neuls-Bates, 1982). Instrumentalists were predominantly male during the Renaissance, though women commonly played the lute as an accompaniment to their singing (Pendle, 2001b). Women musicians who lived within the confines of an all-female community were freer from the restraints of societal stereotypes. In the late 16th century, the nuns at the San Vito convent in Ferrera disregarded social dictates of that time period by playing violins, viole-bastarde (lyra-viols), lutes, double-harps, cornetti, trombones, recorders, cornamuses (bagpipes), and harpsichords (Neuls-Bates, 1982). During the 1700s, Antonio Vivaldi extended the boundaries of societal traditions by establishing an all-female orchestra at La Pietá, an orphanage in Venice. This unique group of women, largely comprised of social outcasts, were so

revered for their high level of musicianship that people traveled from all parts of Europe to hear them perform (Jackson, 2001).

Societal beliefs and conventions regarding the female body and allure have framed nearly all aspects of Western society through most of history. This has been a tremendous obstacle for women orchestral musicians, due to trepidation about their physiological strength and the view that some instruments were "unsightly for women to play, either because their presence interferes with men's enjoyment of the female face or body, or because a playing position is judged to be indecorous" (Doubleday, 2008, p. 18). Statements about the inappropriateness of female performers and the strict conditions under which they were to perform demonstrate the strength and prevalence of gendered beliefs. An 1878 reviewer questioned the appropriateness of female violinists when he protested: "A violin seems an awkward instrument for a woman, whose well-formed chin was designed by nature for other purposes than to pinch down this instrument into position" (Morin, 1946, pp. 42-43). In Victorian England, female cellists were required to play in a problematic "side-saddle" position to prevent placing their instrument between open legs (Cowling, 1983).

In the early 19th century, women were permitted to play the harp, but other string instruments were considered to be inappropriate and unfeminine because women did not look attractive while playing them. The piano, harp, and guitar were deemed to be the only suitable feminine instruments in North America during the 19th century because they could be used to accompany one's singing and "required no facial exertions or body movements that interfered with the portrait of grace the lady musician was to emanate" (Tick, 1987, p. 327). This sense of female body consciousness extended into the 20th century, with concerns that "the presence and manipulation of the instrument" would interrupt "the appearance of the woman's natural in-tuneness with and susceptibility to her body" (Green, 1993, p. 100). Green added, "the more unwieldy and loud the instrument,…the more problematic is the construction of an apparently feminine display by the performer" (p. 100).

In John Dwight's chronicle of the Madison Female College concert in 1853, he expressed astonishment that the ensemble included "13 young lady violinists(!), 1 young lady violist(!!), 4 violoncellists(!!!) and 1 young lady contrabassist (!!!!)" (Dwight, 1853, p. 142). The degree of Dwight's disapproval, as indicated by increasing number of exclamation marks, grew with the size of the instrument. The concept of size of instrument and gender suitability heralds back to Michael Praetorius, who made reference to the "violin family" in his treatise, *Syntagma Musicum* in 1619 (Boyden, 1984). *The New Grove Dictionary of Musical Instruments* contains an illustration of "the violin family" utilizing a cello, a viola, and two violins made by Antonio Stradivari (Boyden, 1984). This stereotypical concept of a family of instruments—large to small—transfers to the human family unit of father, mother, and babies, with the male automatically being associated with the largest instrument. Gender connotations are assigned to instruments based on

masculine and feminine characteristics, such as strong versus weak, low-pitched versus high, and large versus small (Clawson, 1999; Doubleday, 2008). Dahl (1984) confirmed that within the orchestral world "there is a widespread notion that the larger the instrument is, and the deeper its sound, the more masculine it is—and, as a corollary, the fewer women who play it" (p. 36).

Towards the end of the 19th century, it became increasingly acceptable for women to study violin and cello, but they were forbidden to play in professional orchestras, so women began to form their own orchestras and string quartets (Reich, 2001). During the 1920s and 1930s women orchestras began to burgeon, and in 1925 Ethel Leginska had her groundbreaking American premiere as a conductor of the all-male New York Symphony Orchestra (Macleod, 1993). The year 1938 was pivotal in the proliferation of women's involvement in orchestral music as women composers and performers began receiving support from various women's clubs and music clubs. Additionally, scholarship assistance was available for women pursuing musical training (Tick, 1987). By the late 1930s, as societal views began to change, female musicians were permitted to join some of the secondary-level orchestras and free-lance groups in major cities. The proliferation of all-female orchestras and the acceptance of mixed-gender orchestras led to the formation of groups that extended professional opportunities for women musicians. With the exodus of so many male musicians during the onset of World War II, women began to join established symphonies and orchestras in increased numbers, leading to the dissolution of most women's symphonies. In the 1950s and 1960s women continued to play in mixed-gender orchestras, and by the 1970s they began to receive more than a token acceptance (Neuls-Bates, 1982).

Macleod (1993) analyzed the membership rosters of American symphony orchestras from the 1940s to the 1980s to illustrate the percentage of women in each instrumental section by decade (see Table 1). Females in the violin, viola, and cello sections increased over the five-decade period, with the violin and cello sections becoming predominantly female in the 1970s and 1980s. In the 1940s, only 23% of the string bass section was female, and their number continued to decrease to 14% in the 1980s. Although increasing numbers of women were playing in the symphony, it was 1997 before the Vienna Philharmonic Orchestra reluctantly accepted its first female into membership — a harpist (Doubleday, 2008).

Table 1. *Percentage of female instrumental players in selected American symphony orchestras for each decade* (Macleod, 1993, p. 303)

Decade	**1940s**	**1950s**	**1960s**	**1970s**	**1980s**
Number of Orchestras	41	63	36	49	44
Violin	46	44	41	57	53
Viola	33	29	34	36	45
Cello	44	47	45	55	53
String Bass	23	14	13	16	14

Women's access to musical instruments and positions in symphony orchestras spanning many decades reflects the sex stereotypes in our masculine-dominated society. The characterization of instrumental ensembles as masculine has been a longstanding tenet of Western culture (Clawson, 1999), thus leading to the exclusion of women musicians based on gender bias (Green, 1997). The 1970s were a time of great social and political upheaval, as women sought equality with men both in the workplace and in the schools. The rise of feminism resulted in women having greater freedom to participate in sports and to enter traditionally male-dominated careers. In response to the societal trend towards greater equality and access, major American symphony orchestras refined audition processes in the 1970s and 1980s by using blind auditions to conceal candidate's identities, thereby masking gender and other types of bias from the process. Goldin and Rouse (2000) posited that the use of screens contributed to a dramatic increase in the number of female performers overall and in the most elite orchestras in the United States during the last 30 years of the 20th century. Similar trends have been evident among orchestral conductors and teachers. The Orchestra Division of TMEA, comprised of elementary, secondary, and university strings teachers, was 59% female in 2012 (Texas Music Educators Association, 2012). However, in spite of the divergent beliefs and social reforms that have developed over the past 40 years, sex-based stereotyping has persisted (Lueptow, Garovich-Szabo, & Lueptow, 2001).

Analyses of decade trends in gender-based stereotyping of musical instruments reveal a reduction in gender instrument association in the 1970s and 1980s followed by a period of little change over the last 20 years. Research conducted in the 1990s (Delzell & Leppla, 1992; Zervoudakes & Tanner, 1994) indicated that gender and musical instrument stereotypes reported in the 1970s and 1980s had begun to diminish among both children and adults. Zervoudakes and Tamur (1994) found that more females were playing female instruments, and that the number of females playing male-associated instruments in elementary schools increased in the 1960s, 1970s, and 1980s. Furthermore, the number of high school and college females playing "masculine" instruments also declined during this time period. Abeles (2009) compared the instrumental choice of male and female middle school students in studies conducted in 1978, 1993, and 2007 and found the gender-instrument distribution showed little change across the three decades.

Studies regarding gender stereotypes among string musicians have typically been conducted in association with other instrumental families. Harrison (2003) determined that females are more inclined to play strings or woodwinds, than males. Hassinger (1989), in her investigation of United States jazz history, found that strings and flute were firmly identified as female. Abeles and Porter (1978) discovered that the violin was labeled as being feminine, along with the flute and clarinet, whereas the cello and saxophone were considered gender-neutral. Griswold and Chroback's (1981) study of various instruments revealed that both the cello and double bass were rated masculine. Abeles (2009) found in his

study of current trends in gender instrument association that the violin and cello were predominantly played by females. Furthermore, he reported that among the 20% of males crossing instrument gender lines, more than one-half of them were playing violin.

Green (2002) examined secondary music teachers' and students' views of gender musical practices, abilities, and inclinations. Teachers stated that girls far outnumbered boys in participating in classical music and playing classical instruments, such as violin, flute, and piano. Students underscored their teachers' views, stating that girls were most likely to play the violin and cello and perform slow, classical music. Green (2002) summarized gender association with music as follows:

> For a boy to engage in vocal or orchestral music, 'slow' music, or music that is associated with the classical style in school, involves taking a risk with his symbolic masculinity. If these activities provide a suitable mantle for girls, then they are for boys rather like putting on a dress. Just as girls negotiate a feminine gender identity through music, so boys negotiate a masculine gender identity; and they are often under a great deal of pressure to appear 'macho.' (p. 5)

In addition to gender stereotypes, distinctive personality and character traits have been assigned to string musicians. In their study of high school musicians, Builione and Lipton (1983) discovered that strings and woodwind players were labeled by their peers as being "intelligent," "feminine," and "introverted." Green's (1993) study of secondary schools in England revealed that the overwhelming majority of teachers believed that girls were more successful playing classical music than boys because they tended to be "more persevering, hard-working, and committed" (p. 103). Musicians in professional orchestras ranked the strings section as being significantly different from the other three sections in terms of being more introverted, not enjoying alcohol, having an inactive sense of humor, being nonathletic, and being insensitive. String players described themselves as "sensitive," "competitive," "neurotic," and "insecure," while other sections used descriptors including "weird," "boring," "quiet," and "feminine" (Lipton, 1987, p. 89).

A considerable body of literature on the socialization factors on the gendered association of instruments reveals the influence of examples, role models, and other environmental factors. Cramer, Million, and Perrault (2002) investigated the categorization of instruments into gender types in relationship to social role theory. Social role theory was characterized in the study as the precept that "gender stereotypes are derived from exposure to differential membership by males and females in various roles, occupations, or even behaviors" (Cramer et al., 2002, p. 165). For instance, children might believe that the tuba is a masculine instrument because they have observed few, if any, female tuba players. Gender stereotypes are actuated when characteristics are ascribed to an individual on the basis of his or her social role. Conway (2000) found that gender stereotypes assigned to musical instruments were partially

attributed to societal perceptions of gender roles. One study participant stated that stereotypes come from "this ethic that women are the recessive sex and that playing like low brass would be harder for them" (Conway, 2000, p. 9). Another posited that "the stereotype just comes from society in general...you're not taught 'girls can't play trombone' but you get feelings about certain things from what you see on TV" (Conway, 2000, p. 9). O'Neill and Boulton (1996) concurred that media contributes to gender stereotypes, explaining that boys are rarely exposed to male orchestral musicians playing flute or violin, yet they frequently see male rock musicians playing guitar, drums, and brass instruments. Harrison and O'Neill (2000) explained that the influence of gender role models on a boy's or a girl's reticence or desire to play an instrument is a function of social learning theory. They added that social learning theory can be applied to how children learn gender-assigned roles from parents, peers, teachers, and the media.

A number of studies have supported the contention that society, parents, and peers are responsible for perpetuating engrained gender stereotypes that influence instrument choice (Abeles, 2009; Abeles & Porter, 1978; Conway, 2000; Delzell & Leppla, 1992; Fortney, Boyle, & DeCarbo, 1993; Green, 1993; Griswold & Chroback, 1981; Lueptow, Garovich-Szabo, & Lueptow, 2001; Sinsabaugh, 2005). Abeles and Porter (1978) found that parents are more likely to select traditionally feminine instruments (*e.g.,* violin, flute, and clarinet) for a daughter and traditionally male instruments (*e.g.*, trumpet, trombone, and drum) for a son. Furthermore, they observed that gender-instrument associations were evident in older children (grades 3 to 5), but younger children (grades Kindergarten to 2) showed no gender bias in their instrumental preference. O'Neill and Boulton (1996) asked 4th graders to name the instruments that should *not* be played by males or females and the rationale for their choices. Both genders stated males should not play flute, violin, and piano, and females should not play drums, guitar, and trumpet. The primary reasons for their selection of instruments that should *not* be played included suppositions that members of the designated gender would not like the timbre of the instrument, that the instrument was simply a boy's or girl's instrument, or they had never seen a member of that gender play the instrument.

The formation of instrument-gender association with an instrument can be impacted by the environment and the method in which instruments are demonstrated (Abeles & Porter, 1978; Bruce & Kemp, 1993; Buttu, 2008; Conway, 2000; Killian & Satrom, 2011; Sinsabaugh, 2005). Teachers play a key role in helping students set aside gender-based stereotypes when choosing an instrument (Bayley, 2000; Brophy, 1985; Conway, 2000; Fortney, et al., 1993; Green, 1993; Sinsabaugh, 2005). However, Johnson and Stewart (2004, 2005) found that the preferences and perceptions students bring to the instrument selection process are more influential than any biases imposed by educators.

A growing body of literature addresses the issues associated with confronting existing stereotypes in instrumental music. Buttu's study (2008) of a

single-sex school revealed that, although female students were aware that gender stereotypes existed, they felt freedom to break social convention and select low brass and percussion instruments (traditionally played by males) due to a safe and supportive environment. Their peers regaled them as being "courageous" and described them as having "an unwavering sense of confidence and pride for their instrument" (Buttu, 2008, p. 31). Further, students indicated that they believed it was easier for females to cross social barriers in instrument selection because they were viewed as "pioneers" and "forward thinking," whereas males playing "feminine" instruments risked ridicule, intimidation, and "social suicide" (Buttu, 2008, p. 32). Sinsabaugh (2005) supported the contention that males face greater challenges crossing gender barriers in instrumental selection, naming the flute as being the most controversial, due to concerns about teasing by peers. Other studies have reinforced the perception that males are more subject to social pressure surrounding instrument gender stereotypes (Bayley, 2004; Bazan, 2005; Cramer et al., 2002; Delzell & Leppla, 1992; Harrison, 2003).

Research has revealed that the factors associated with success on an instrument atypical for one's gender involve personal determination and achievement, in spite of an initial period of social stigma. Doubleday (2008) suggested that this can be driven by artistic motivation or a desire to experiment, change cultural mores, astonish, or draw attention. She added that regardless of the reason, "such an act has a social impact, since it sets an example that others may follow" (p. 26). Sinsabaugh (2005) found that students who crossed gender lines in instrument choice received strong parental support, were encouraged by their elementary teachers, desired to establish a distinctive identity, and were unaffected by peers' negative comments. Taylor's (2009) study of musically high-achieving male flute and piccolo players revealed that 78% were initially teased for choosing a "feminine" instrument, but 93% simply ignored the remarks or engaged their peers in friendly banter. As the male flutists became successful in chair tests and competitions, the teasing was replaced with respect, admiration, and encouragement. Green (2002) pointed out that "it is a vital aspect of the symbolic power of music, that it enables girls and boys to *cross over*...gender divides. Most particularly when pupils are regarded as exceptionally 'talented' do such cross-overs occur" (p. 9).

Regardless of how one comes to choose an instrument, identification with that instrument is critical to a student's success in performance and longevity as a musician. The factors involved in beliefs about instruments are deeply embedded in culture. High levels of success on instruments, which cross gender association lines, may require high levels of perseverance, which can be assisted through social supports. The degree to which negative stereotypes can be minimized facilitates motivation, retention, inspiration, and personal identity. Allowing students to realize their musical selves, and strive for excellence in performance is a primary goal of music instruction (Rife, Shnek, Lauby, & Lapidus, 2001).

While numerous studies have been conducted regarding gender and instrument association, this study's data provide a trend analysis by gender of high levels of success among high school string musicians in one state. The purpose of this study was to track the gender makeup of the five string sections (Violin 1, Violin 2, Viola, Cello, and String Bass) of Texas Music Educators Association (TMEA) All-State Orchestras from 1971 to 2010, to determine if any clear patterns in instrument choice by gender were evident and if trends changed in gender and instrument association over the past four decades.

Method

I extracted data from the publicly available "All-State History Rosters" located on the TMEA website (www.tmea.org) for the Symphonic and Philharmonic Orchestra members from 1971 to 2010. Data were unavailable for Symphonic Orchestra in 1971 and 1973. TMEA audition guidelines mandate that the highest-ranking players in each section be assigned to the Symphonic Orchestra and the next highest tier are placed in the Philharmonic Orchestra (originally known as the Youth Orchestra). I sorted the list of All-State members by instrument, ensemble, and year, and then categorized students by gender, based on their names.

Androgynous and unfamiliar names were analyzed via a first name gender disambiguation website (Peters, 2011), containing over 200,000 first names, organized by gender. Names not included in the website's database were gender-determined through the website's proprietary algorithms, which used interfaces to search engines to analyze the popular usage of names on the Internet. The algorithm provided a gender ratio indicating how strongly a name was associated with a particular gender, thus assigning gender-neutral names with a lower ratio. Names identified as gender-neutral (.013%) were not included in the data.

Gender bias was controlled during the selection process through the use of blind auditions. Audition entrees were screened and submitted by the student's orchestra director, who was required to be a TMEA member. Students were assigned randomly-generated numbers, thus ensuring complete anonymity. A panel of three to five judges listened to each student's audition and then ranked them in chair order. An equal number of string players in each section of the All-State Orchestra were selected from the state's seven geographical areas, as defined by TMEA.

In 1971, there were two All-State Orchestras — Youth Orchestra (later known as Philharmonic) and Symphony Orchestra. The String Orchestra was added in 1999, due to the increasing number of students auditioning, but is not included in this longitudinal study. A comparison of the number of students who initially audition for the Texas All-State Orchestra each year with the number

of student who ultimately are successful illustrates the highly competitive nature of the Texas All-State Orchestra audition process. Data are only available for the last four years of the study, 2007 to 2010. During that time period, in both the Philharmonic and Symphony Orchestra, there were 92 string players—20 in the violin 1, violin 2, viola, and cello sections and 12 in the string bass section, for a total of 184 All-State Orchestra members. The String Orchestra, which was not included in the study, consisted of 60 members—16 violin 1s and violin 2s, 10 violas and cellos, and 8 string basses. The percentage of students who began the audition process and ultimately gained membership in one of the three All-State Orchestras was 3% in 2007, 2008, and 2010 and 4% in 2009.

Data were disaggregated into four decades — 1971–1980, 1981–1990, 1991–2000, 2001–2010. Decades were used as the units of analysis in that they represent a period of time in which "developments that seem to have some relationship to each other and as a group contrast with earlier or later sequences" (Maier, 2000, p. 809). Reporting instrument-gender association data by decade is based on the model used in Macleod's (1993) study of gender and instrumental musicians in America, 1853 – 1990. Results were reported in terms of frequency and tabulated in percentages.

Results

The violin 1 and 2 sections in both orchestras from 1971–2000 were heavily female, averaging 64%/36% in the Symphony Orchestra and 65%/35% in the Philharmonic Orchestra (see Table 2). However, in the last decade, 2001 – 2010, males held a majority of the seats (52%) in the violin 1 and 2 sections of the Symphony Orchestra, and in the Philharmonic Orchestra male violinists had a marked increase in number (48%). The difference in percentage distribution between the two genders in the Symphonic Orchestra was 36 points in the 1970s, 24 points in the 1980s, 30 points in the 1990s, and in the 2000s it dropped substantially to 4 points. Likewise, in the Philharmonic Orchestra the percentage differential was noticeably larger in the first three decades — 1970s–52 points, 1980s–26 points, and 1990s–14 points — compared to the 4-point difference in the 2000s. Male violinists in the All-State Orchestras moved from an average of 28% in the 1970s to a 51% average majority during the 2000s, representing a 23% increase over the span of four decades.

Table 2. *Gender distribution ofvViolin 1 and II sections of Texas All-State Orchestras by decade*

Decade	Symphonic Orchestra		Philharmonic Orchestra		Total	
	M	F	M	F	M	F
1970s	90 (32%)	188 (68%)	80 (24%)	258(76%)	170 (28%)	446 (72%)
1980s	151 (38%)	242 (62%)	146 (37%)	250 (63%)	297 (38%)	492 (62%)
1990s	145 (37%)	252 (63%)	172 (43%)	226 (57%)	317 (40%)	458 (60%)
2000s	221 (52%)	200 (48%)	191 (48%)	207 (52%)	422 (51%)	407 (49%)
Total	617 (41%)	882 (59%)	589 (38%)	941 (62%)	1209 (40%)	1813 (60%)

Note. Based on data available from tmea.org. Frequencies and percentages reflect totals and proportions for each decade.

During the period from 1971 to 2000, the gender distribution of viola players remained consistent in Symphony Orchestra, with females maintaining a 58% majority (see Table 3). From 2001 to 2010 males constituted a 51% majority. Over the past four decades the majority of violists in the Philharmonic Orchestra have been female, although the percentages have ranged from 72% in the 1980s to 51% in the last decade. Only two percentage points separated the distribution of males and females in the viola sections of both the Symphony and Philharmonic Orchestras in the 2000s.

Table 3. *Gender distribution of viola section of Texas All-State Orchestras by decade*

Decade	Symphonic Orchestra		Philharmonic Orchestra		Total	
	M	F	M	F	M	F
1970s	43 (39%)	67 (61%)	69 (43%)	91 (57%)	112 (41%)	158 (59%)
1980s	67 (42%)	92 (58%)	45 (28%)	114 (72%)	112 (35%)	206 (65%)
1990s	67 (43%)	88 (57%)	56 (35%)	113 (65%)	123 (39%)	201 (61%)
2000s	82 (51%)	79 (49%)	79 (49%)	81 (51%)	161 (50%)	160 (50%)
Total	259 (44%)	326 (56%)	249 (39%)	399 (61%)	508 (42%)	725 (58%)

Note. Based on data available from tmea.org. Frequencies and percentages reflect totals and proportions for each decade.

The cello section of the Symphony Orchestra began with a preponderance of males in the 1970s (61%/39%); the 1980s was an exact 50%/50% split between the two genders; in the 1990s, females were in the majority (57%/43%), and in the last decade those percentages were reversed, with males holding the 57% majority (see Table 4). Likewise, the majority (51%) of cellists in the Philharmonic Orchestra in the 1970s were male. Females gained a 55% majority in the 1980s and 1990s, but from 2001 – 2010 the average of males grew to 49%.

Table 4. *Gender distribution of cello section of Texas All-State Orchestras by decade*

Decade	Symphonic Orchestra		Philharmonic Orchestra		Total	
	M	F	M	F	M	F
1970s	68 (61%)	44 (39%)	80 (51%)	77 (49%)	148 (56%)	121 (44%)
1980s	79 (50%)	79 (50%)	72 (45%)	87 (55%)	151 (48%)	166 (52%)
1990s	68 (43%)	91 (57%)	71 (44%)	89 (56%)	139 (44%)	180 (56%)
2000s	100 (57%)	74(43%)	80 (49%)	82 (51%)	180 (53%)	156 (47%)
Total	315 (52%)	288 (48%)	303 (47%)	355 (53%)	618 (50%)	623 (50%)

Note. Based on data available from tmea.org. Frequencies and percentages reflect totals and proportions for each decade.

In the string bass section of the Symphony Orchestra, females began with their highest percentage of membership (22%) in the 1970s (see Table 5). During the next three decades the percentage of female string bass players declined to an average of 12%. Females maintained a higher percentage in the string bass section in the Philharmonic Orchestra, averaging 29% in the 1970s, 21% in the 1980s and 1990s, then rising slightly to 24% in the last decade.

Table 5. *Gender distribution of string bass section of Texas All-State Orchestras by decade*

Decade	Symphonic Orchestra		Philharmonic Orchestra		Total	
	M	F	M	F	M	F
1970s	63 (78%)	18 (22%)	82 (71%)	33 (29%)	145 (75%)	51 (25%)
1980s	102 (88%)	14 (12%)	95 (79%)	25 (21%)	197 (84%)	39 (16%)
1990s	106 (89%)	13 (11%)	94 (79%)	25 (21%)	200 (84%)	38 (16%)
2000s	115 (87%)	17 (13%)	91 (76%)	29 (24%)	206 (81%)	46 (19%)
Total	386 (86%)	62 (14%)	362 (76%)	112 (24%)	748 (81%)	174 (19%)

Note. Based on data available from tmea.org. Frequencies and percentages reflect totals and proportions for each decade.

Discussion

This study indicates that over the past four decades gender and instrument association in the Texas All-State Orchestras has changed in some areas and remained consistent in others. The Violin sections of both the Symphonic and Philharmonic Orchestras demonstrated the greatest amount of change, moving from a clear female majority for a span of three decades to an average male majority in the most recent decade. Although the average of male violinists exceeded that of females by a margin of two percentage points, it is noteworthy that during the previous decades the percentage difference between the two genders ranged from 20 to 44 points.

This dramatic shift in gender balance of the violin sections of the Texas All-State Orchestras is contrary to previous research, which has found that females have predominated since the mid-20th century, leading researchers to refer to the violin as a “feminine” instrument (Abeles, 2009; Abeles & Porter, 1978; Green, 2002). However, the increase in male violinists underscores

research indicating that violin may be the instrument played by the majority of males crossing instrument gender lines (Abeles, 2009). According to social role theory (Cramer, et al., 2002), same-gender role models are powerful, especially when instruments are traditionally viewed as gender-inappropriate. Perhaps listening and/or viewing performances by famous male violinists, such as Isaac Stern, Itzhak Perlman, Joshua Bell, and David Garrett, has provided inspiration for aspiring male string players.

Analogous to the violin, the viola section was primarily female during the first three decades, yet the margin between males and females diminished to 2 points during the last decade. Research on instrument and gender association rarely focuses on the viola, yet due to its size and timbre, it is archetypally categorized as the "feminine" portion of the string family (Doubleday, 2008; Kemp, 1996). Classified as upper string instruments, the violin and viola are tuned at different pitches, yet are similar in appearance and playing technique. Because timbre is one of the primary factors in instrument selection (Delzell & Leppla, 1992), perhaps some males prefer the viola over the violin because of its lower pitch.

The cello has shifted from having a male majority in the 1970s to a female majority in the 1980s and 1990s, and then back to a male majority this past decade. The vacillation in male/female majority in the cello section reflects a similar variability in existing research. Abeles and Porter (1978) reported that the cello was considered gender neutral; Griswold and Chroback (1981) revealed that the cello was rated masculine; and Green (2002) and Abeles (2009) both found that the cello was predominantly played by females. The overall average gender distribution of cellists in this study was 49% male and 51% female, which seems to support the gender neutrality of the cello. Macleod's (1993) study of gender-instrument association in American symphony orchestras from the 1940s to the 1980s indicated that the average percentage of female cellists in symphony orchestras from the 1940s to the 1980s was 50%, indicating a further trend of neutrality.

When the cello was introduced at the turn of the century, it was deemed a man's solo instrument. However, it was not long before female cellists grew in number, as they overcame the challenge of positioning their bodies in a socially-acceptable manner to play an instrument designed to be placed between the legs (Macleod, 1993). The fact that the cello was not associated with a gender at the turn of the century, may account for contemporary perceptions of its gender neutrality. In accordance with social learning theory, as students observe peers of both genders playing the cello, as well as professional musicians, they and their parents are less likely to assign a gender designation to the instrument (Harrison & O'Neill, 2000). Further, the eminent musician, Yo-Yo Ma has likely served as an inspiration for aspiring cellists due to his high visibility as a performer and as a recording artist who crosses musical genres. His involvement in non-Western music and improvisation has enabled him to reach a broader audience, particularly males who are disinclined to participate to

classical music due to its feminine association. An application of the social role theory would suggest that Yo-Yo Ma has been an outstanding role model for young male cellists. Additionally, the renowned cellist has potentially influenced both males and females through his appearances on children's television shows, including *Sesame Street* and *Arthur*, which are typically viewed by younger children who have not formed gender-instrument biases (Abeles & Porter, 1978).

The percentage of female string bass players was at its height in the 1970s in both the Symphony Orchestra (22%) and the Philharmonic Orchestra (29%) and has declined during the last three decades. Male dominance of the string bass section not only confirms the results of the study conducted by Griswold and Chroback (1981), but also substantiates the contention that the string bass is perceived as the "father" or male in the string family (Boyden, 1984; Doubleday, 2008) and the larger the size of the instrument and the deeper its timbre, the less likely females are to play it (Dahl, 1984). The results of this study mirror the infrequency of female string bass players in American symphony orchestras (Macleod, 1993). Given the rarity of female role models, combined with other factors, including the weight, size, and timbre of the instrument, it is not surprising that the number of female string bass players continues to be low. The large number of male bassists in popular and jazz music also serves to reinforce the societal perception that the string bass is associated with the male gender.

Data from this study indicated that increasing numbers of males have gained membership in the Texas All-State Orchestras in recent years. Further, males held a minority of the positions (45%) in the Symphony Orchestra in the 1970s, but have steadily increased to a 59% majority during the last decade. Likewise, males in the Philharmonic Orchestra moved from a 43% minority in the 1970s to a 53% majority over the past decade. The number of males in Texas All-State Orchestras in the 21st century fails to align with earlier studies indicating that strings are more closely associated with the female gender (Builione & Lipton, 1983; Green, 2002). Moreover, the majority of the string music educators in Texas in 2012 were women, thus possibly a wider feminine influence of role models and instrument selection, may even have moderated the effect of gendered associations (Texas Music Educators Association, 2012). The shift towards a male majority in the All-State Orchestras could be attributed to a number of factors, including an increasing number of professional male musicians serving as role models by playing traditionally feminine instruments, a greater societal acceptance of males playing the violin and viola, growing parental support for their sons who cross gender lines in instrument choice, and the tendency of highly-successful musicians to ignore negative comments from peers.

Gender distribution among the violin, viola, and cello sections of the Texas All-State Orchestras has changed over the past four decades, yet the string bass section has remained consistently male. The results of this study seem to dispute

a number of the gender stereotypes surrounding string musicians set forth by previous studies. This may be the result of broader changing attitudes in society about gender-instrument association (Abeles, 2009). Perhaps an increase of males in the All-State audition process has led to diminished success rates of the female participants. Perhaps males who select instruments with gendered associations feel a greater need to achieve a high level of performance in order to justify their membership in a traditionally female section. Music educators may have become increasingly cautious about recommending an instrument based on gender, thus removing potential barriers to males' instrumental choices. The media's portrayal of males playing violin, viola, and cello could influence both parents and students to be more open-minded when selecting instruments. Further, classical male musicians, who perform a variety of genres, including non-Western and popular music, may serve as role models for males who deem classical music as being feminine. Male string players who have successfully crossed gender barriers could potentially begin a movement away from societal stereotypes attached to string instruments. Likewise, perhaps the trend towards more women bassists in alternative rock bands will eventually alter gender ideologies and eventually lead to an increase of female string bass players (Clawson, 1999).

Findings of this investigation should be viewed with caution in that the participants in this study represent only the most successful high school string players in Texas. Due to the elite musicianship and limited scope of the participants, the demographics of high school orchestras in various regions across the United States should be examined to determine if similar trends in gender and instrument association are evident. Further research is required to determine if highly successful, motivated musicians are less susceptible to societal pressures and gender stereotypes. A limitation of this study was the lack of access to data regarding the gender of the students entering the initial phase of the auditioning process. Additional studies could provide data regarding audition entries and success rate by gender for each section of the All-State Orchestras. Future studies might also address gender and self-efficacy issues associated with the drive, confidence, and motivation to audition and explore how the motivation to learn and play gender-associated instruments transfers to musical achievement. The use of this information is an important goal for the field, in order to attempt to serve all students well. The collection and dissemination of data on the effects of sex-stereotyping can potentially influence and assist music educators in recognizing and working to diminish the role that gender bias plays in orchestral instrument selection, continuation, and achievement.

References

Abeles, H. (2009). Are musical instrument gender associations changing? *Journal of Research in Music Education,* 57(2), 127-139. doi: 10.1177/0022429409335878

Abeles, H., & Porter, S. (1978). Sex-stereotyping of musical instruments. *Journal of Research in Music Education, 26*(2), 65-75. doi: 10.2307/3344880

Bayley, J. G. (2000). An investigation of the process by which elementary and junior high teachers prepare students to choose a music instrument. *Dissertation Abstracts International, 61,* 08A. (University Microfilms No. 9982524).

Bazan, D. E. (2005). An investigation of the instrument selection processes used by directors of beginning band. *Contributions to Music Education, 32,* 9-31.

Bruce, R., & Kemp, A. (1993). Sex-stereotyping in children's preferences for musical instruments. *British Journal of Music Education, 10*, 213-217. doi: 10.1017/S0265051700001777.

Boyden, D. D. (1984). Violin (I). In S. Sadie (Ed.) *The new Grove dictionary of musical instruments,* Vol. 3. (pp. 765 – 767). London: Macmillan.

Brophy, J. (1985). Interactions of male and female students with male and female teachers. In L. C. Wilkinson & C. B. Merrett (Eds.), *Gender influences in class interaction* (pp. 115-142). New York: Academic Press.

Builione, R. S., & Lipton, J. P. (1983). Stereotypes and personality of classical musicians. *Psychomusicology, 3,* 36-43. doi: 10.1037/h0094257

Buttu, S. (2008). Perceptions of female students in a same-sex school: Gender stereotypes and musical instruments. *Canadian Music Educator, 50*(2), 30-33.

Clawson, M. A. (1999). When women play the bass: Instrument specialization and gender interpretation in alternative rock music. *Gender and Society, 13*, 193-210. doi:10.1177/089124399013002003

Conway, C. (2000). Gender and music instrument choice: A phenomenological investigation. *Bulletin of the Council for Research in Music Education, 146,* 1-17. Retrieved from http://www.jstor.org/stable/40319030

Cowling, M. (1983). *The cello* (2nd ed.). London: Batsford Press.

Cramer, K. M., Million, E., & Perrault, L. A. (2002). Perceptions of musicians: Stereotypes and social role theory. *Psychology of Music, 30*, 164-174. doi: 10.1177/0305735602302003

Dahl, L. (1984). *Stormy weather: The music and lives of a century of jazzwomen.* New York: Pantheon.

Delzell, J. K., & Leppla, D. A. (1992). Gender association of musical instruments and preferences of fourth-grade students for selected instruments. *Journal of Research in Music Education, 40*, 93-103. doi: 10.2307/3345559

Doubleday, V. (2008). Sounds of power: An overview of musical instruments and gender. *Ethnomusicology Forum, 17*, 3-39. doi**:** 10.1080/17411910801972909

Dwight, J. (1853). A monster concert by young ladies. *Dwight's Journal of Music, 3,* 142.

Edwards, J. M. (2001). Women in music to ca. 1450. In K. Pendle (Ed.) *Women and music: A history* (2nd ed.) (pp. 26-53). Bloomington, IN: Indiana University Press.

Fortney, P. M., Boyle, J. D., & DeCarbo, N. J. (1993). A study of middle school band students' instrument choices. *Journal of Research in Music Education, 41*, 28-39. doi: 10.2307/3345477

Goldin, C., & Rouse, C. (2000). Orchestrating impartiality: The impact of "blind" auditions on female musicians. *The American Economic Review, 90*, 715-741. doi: 10.1257/aer.90.4.715

Graham, B. J. (2005). Relationships among instrument choice, instrument transfer, subject sex, and gender stereotypes in instrumental music. *Dissertation Abstracts International, 69,* 01. (University Microfilms No. 3298144)

Green, L. (1993). Music, gender and education: A report on some exploratory research. *British Journal of Music Education, 10*, 219-253. doi: 10.1017/S0265051700001789

Green, L. (1997). *Music, gender, education.* London: Cambridge University Press.

Green, L. (2002). Exposing the gendered discourse of music education. *Feminism and Psychology*, *12*, 137-144. doi: 10.1177/0959353502012002003

Griswold, P. A., & Chroback, D. A. (1981). Sex-role associations of music instruments and occupations by gender and major. *Journal of Research in Music Education, 29*(1), 57-62. doi: 10.2307/3344680

Hallam, S., Rogers, L., & Creech, A. (2008). Gender differences in musical instrument choice. *International Journal of Music Education*, *26*, 7-19. doi:10.1177 /0255761407085646

Harrison, S. D. (2003). Musical participation by boys: The role of gender in the choice of musical activities by males in Australian schools. Unpublished doctoral dissertation, Griffith University, Queensland, Australia. Retrieved from https://www120.secure.griffith.edu.au/rch/file/4cae7113-c0f2-154b-3a50-2e11854c8c76/1/02Whole.pdf.

Harrison, A. C., & O'Neill, S. A. (2000). Children's gender-typed preferences for musical instruments: An intervention study. *Psychology of Music, 28,* 81-97. doi: 10.1177/0305735600281006

Hassinger, J. (1989). Close harmony: Early jazz styles in the music of the New Orleans Boswell Sisters. In E. Koskoff (Ed.) *Women and music in cross-cultural perspective* (pp. 195-201). Urbana and Chicago: Illinois University Press.

Jackson, B. G. (2001). Musical women of the seventeenth and eighteenth centuries. In K. Pendle (Ed.) *Women and music: A history* (2nd ed.) (pp. 97-144). Bloomington, IN: Indiana University Press.

Johnson, C. M., & Stewart, E. E. (2004). Effect of sex and identification on instrument assignment by band directors. *Journal of Research in Music Education, 52,* 130-140. doi: 10.2307/3345435

Johnson, C. M., & Stewart, E. E. (2005). Effect of sex and race identification on instrument assignment by music educators. *Journal of Research in Music Education, 53,* 348-357. doi: 10.1177/002242940505300406

Kemp, A. E. (1996). *The musical temperament: Psychology and personality of musicians*. New York, NY: Oxford University Press.

Killian, J. N., & Satrom, S. L. (2011). The effect of demonstrator gender on wind instrument references of kindergarten, third-grade, and fifth-grade students. *UPDATE: Applications of Research in Music Education*, *29*(2), 13-19. doi: 10.1177/8755123310396985

Lipton, J. P. (1987). Stereotypes concerning musicians within symphony orchestras. *Journal of Psychology, 121*, 85-93. doi: 10.1080/00223980.1987.9712647

Lueptow, L. B., Garovich-Szabo, L., & Lueptow, M. B. (2001). Social change and the persistence of sex typing: 1974-1997. *Social Forces, 80,* 1-36. doi: 10.1353/sof.2001.0077

Macleod, B. A. (1993). "Whence comes the lady timpanist?" Gender and instrumental musicians in America, 1853 – 1990. *Journal of Social History, 27*, 291-308. doi: 10.1353/jsh/27.2.291

Maier, C. S. (2000). Consigning the Twentieth Century to history: Alternative narratives for the modern era. *American Historical Review*, *105*, 807-831. doi: 10.1086/ahr/105.3.807

Morin, R. (1946). *Worcester Music Festival, its background and history, 1844 -1945.* Worcester, MA: Worcester County Musical Association.

Neul-Bates, Carol. (1982). *Women in music: An anthology of source readings from the Middle Ages to the present.* New York: Harper and Row Publishers.

O'Neill, S. A., & Boulton, M. J. (1996). Boys' and girls' preferences for musical instruments: A function of gender? *Psychology of Music, 24,* 171-183. doi: 10.1177/0305735696242009

Pendle, K. (Ed.). (2001a). *Women and music: A history* (2nd ed.). Bloomington, IN: Indiana University Press.

Pendle, K. (2001b). Musical women in early modern Europe. In K. Pendle (Ed.) *Women and music: A history* (2nd ed.) (pp. 57-96). Bloomington, IN: Indiana University Press.

Peters, G. (2011). First name gender disambiguation. Retreived from http://www.gpeters.com/name-gender.

Reich, N. B. (2001). European composers and musicians, ca. 1800-1890. In K. Pendle (Ed.) *Women and music: A history* (2nd ed.) (pp. 147-174). Bloomington, IN: Indiana University Press.

Rife, N. A., Shnek, Z. M., Lauby, J. L., & Lapidus, L. B. (2001). Children's satisfaction with private music lessons. *Journal of Research in Music Education, 49*, 21-32. doi: 10.2307/3345807

Sinsabaugh, K. (2005). *Understanding students who cross over gender stereotypes in musical instrument selection.* Unpublished doctoral dissertation, Teachers College, Columbia University, New York.

Taylor, D. M. (2009). Support structures contributing to instrument choice and achievement among Texas All-State male flutists. *Bulletin of the Council for Research in Music Education, 179,* 45-60. Retrieved from http://www.jstor.org/stable/40319329

Tick, J. (1987). Passed away is the piano girl: Changes in American musical life, 1870-1900. In J. Bowers & J. Tick (Eds.) *Women making music: The Western art tradition, 1150-1950* (pp. 325-348). Urbana and Chicago: University of Illinois Press.

Texas Music Educators Association. (2012). Membership directory. Retrieved from http://www.tmea.org/membership/directory.

Zervoudakes, J., & Tanur, J. M. (1994). Gender and musical instruments: Winds of change? *Journal of Research in Music Education, 42,* 58-67. doi: 10.2307/3345337

Missouri Journal of Research in Music Education, No. 50, 2013, 20-32
© 2013 Missouri Music Educators' Association

Missouri High School Band Directors' Reports of Tuning Procedures, Warm-Up Materials, and Rehearsal Time

Brian Silvey
University of Missouri-Columbia

This study was designed to investigate Missouri high school band directors' rehearsal approaches. Data gathered from band directors included (a) preferred tuning procedures, (b) type of warm-up materials, and (c) rehearsal time spent in warm-up, rehearsal, and sightreading activities. Respondents (N = 161, 36.8% response rate) indicated tuning ensembles primarily to the tuba or with electronic tuning devices, and having their students sing the tuning pitches. Foundations for Superior Performance: Warm-Ups and Techniques for Band *by Richard Williams and Jeff King was the most frequently used warm-up book. Tone quality, intonation, and balance and blend were the three most frequently addressed music skills during warm-ups. Average percentages reported of time spent for rehearsal activities were "rehearsing music selections" (63.01%), "ensemble warm-up activities" (19.21%), and "sightreading new music" (10.41%).*

Over the course of several semesters, undergraduate instrumental music education students are required to enroll in a variety of courses and fieldwork intended to prepare them for the rigors of leading their own instrumental music program (NASM, 2012). Instructors of courses such as advanced conducting, rehearsal techniques, and secondary instrumental materials and methods often provide specific organizational and pedagogical information intended for use in the daily rehearsal. Once students transition from preservice to inservice teaching, they begin making decisions about issues relevant to their own rehearsals – tuning materials and procedures, the warm-up activities, and how they will allocate their rehearsal time. Interestingly, research findings have indicated that students did not believe their undergraduate music education coursework was particularly influential in developing their pedagogical content knowledge or rehearsal skills (Bauer & Berg, 2001; Chaffin, 2009; Conway, 2002). To ensure that course materials are as relevant and realistic as possible, university faculty may wish to draw on knowledge of current band directors' rehearsal planning strategies and incorporate this into their conducting and rehearsal methods courses.

Tuning—which typically begins the daily rehearsal—can be one of the most frustrating and misunderstood events (Reynolds, 1998). The ability to play "in tune" means "knowing your instrument, its pitch tendencies, and the relationship of certain notes to each other to be able to play them in tune"

(Rush, 2006, p. 80). Intonation is often the biggest area of concern for evaluators when adjudicating concert band performances (Johnson & Geringer, 2007; Price, 2006), highlighting the importance of good intonation in ensemble preparation and performance.

Not surprisingly, directors' approaches to tuning both individual instruments and ensembles vary dramatically. Strategies such as listening for and eliminating beats or waves in the sound (Lisk, 1991; Miles, 1972), learning specific pitch tendencies for each instrument (Rachleff, 1993), and "getting inside" the sound of another performer (McMurray, 1998) are frequently used by band directors in an effort to achieve better individual and ensemble intonation. Results of a recent investigation by Byo, Schlegel, and Clark (2011) indicated that individuals were significantly more accurate in their tuning to the oboe, clarinet, and flute than to the tuba, even though approximately 80% of the participants reported that tuning to the tuba was the strategy employed by their high school band directors. Furthermore, tuning to a variety of pitches (e.g., B-flat, A, F) and instruments (e.g., clarinet, oboe, tuba, flute) has been cited as part of band directors' full ensemble tuning procedures (Chandler, 1981). Knowing which tuning procedures and strategies other band directors are employing could be useful for improving student and ensemble intonation.

The warm-up period is viewed by many as one of the most important times in the rehearsal, critical toward building individual and ensemble musicianship (Ward, 2002). Depending upon the amount and frequency of total rehearsal time, directors most likely regulate their warm-up activities based upon the music skills they want their students to develop and refine such as listening, matching articulation, tuning, and rhythm reading. Although ensemble warm-up seems paramount toward developing key aspects of musicianship (e.g., physical, emotional, and mental skills), little empirical information exists concerning band directors' warm-up activities, the materials they use, or how long they dedicate to the process.

In addition to tuning and the warm-up period, "it is assumed that effective teachers have a plan for how rehearsal time is to be organized" (Napoles, 2006, p. 35). Along with having a rehearsal plan, teachers must also possess a variety of conducting and rehearsal skills. Research findings have indicated, among many variables, that expert directors demonstrated frequent modeling, provided quick pacing and short instances of teacher talk, high levels of eye contact, and gave their ensembles many performance opportunities during rehearsals (e.g., Byo & Price, 2002; Duke, 1999/2000). Even though codifying experts' rehearsal behavior is important for establishing models of best practice for all band directors, there is much less known about how directors choose to allocate rehearsal time among sightreading, refining existing music, or performing "run-throughs" of easy or already-learned music. Understanding how band directors spend their music rehearsal time may prove instructive for others when considering how they structure their own rehearsals.

Although there is a preponderance of anecdotal information found in music education textbooks regarding approaches to warm-up, tuning, and ensemble rehearsal techniques (e.g., Casey, 1993, Colwell & Goolsby, 2002; Harris, 2001), little evidence exists about these practices within defined populations. Gathering and disseminating data about how Missouri high school band directors organize and structure their rehearsals, as well as information about the sources they rely on for their decision-making in these areas, will increase our knowledge of the types of materials and rehearsal procedures. These data could be useful for preservice teachers just entering the profession who are looking to develop their own rehearsal structure, and inservice teachers looking for new or additional materials to expand or diversify their rehearsals. Furthermore, university faculty who teach instrumental teacher preparation courses may find this information helpful for students in their classes.

The main purpose of this study was to investigate Missouri high school band directors' approaches to rehearsal. Specifically, respondents were surveyed regarding (a) their preferred tuning procedures, (b) the type of warm-up materials used in their rehearsals, and (c) the amount of rehearsal time they spent engaged in warm-up, rehearsal, and sightreading activities. A secondary purpose was to ascertain the source of Missouri band directors' most frequently employed rehearsal techniques.

Method

All public high school band directors in the state of Missouri were targeted for participation in this study. I consulted the *Missouri State High School Activities Association* website (MSHSAA, 2013) to obtain the names of those high schools who were listed as participating in 2012–2013 and 2013–2014 *MSHSAA*-sanctioned music events. This search resulted in a total of 554 high schools. Using this information, student workers at the university where the study took place searched Internet websites, existing university databases, and placed telephone calls to ascertain the electronic mail addresses of directors at each of these high schools. In cases of school websites that listed multiple band directors, only the primary director's (e.g., director of bands, head band director) information was collected. A total of 528 electronic mail addresses were located for use in this study.

The survey was divided into three sections: (1) tuning procedures, (2) warm-up materials and procedures, and (3) use of rehearsal time. Within each section, participants were asked several types of questions (e.g., yes/no, open response) designed to elicit basic descriptive statistics about the procedures and materials they employed in their rehearsals and the amount of time they spent engaged in specific rehearsal activities.

A web-based survey instrument was used to create the survey (Qualtrics, 2013). High school band directors ($N = 5$) from neighboring states first piloted the study so that I could gather feedback about the survey's content, clarity, ease

of use, and approximate completion time. Based upon this feedback, questions were added and revised for clarity within each of the survey's three sections (e.g., additional demographic information, number of years teaching, *MSHSAA* school size classification, gender). Pilot participants reported that the survey took approximately 10 minutes to complete. After revision, the final version of the survey contained 18 questions.

An electronic mail message was sent to the 528 Missouri high school band directors whose school e-mail addresses had been located, inviting them to participate in this study. The message explained the purpose of the study, Institutional Review Board information, instructions for completion, and offered respondents the possibility of receiving a $50 cash prize for completing the survey. The use of token monetary incentives has been found to increase survey participation (Blair, Czaja, & Blair, 2013; Hopkins & Gullickson, 1992). Seventy-one messages were returned as undeliverable, and 20 individuals responded to the initial e-mail message stating there was not a band program at their school, or that they did not represent the intended survey population. This resulted in a revised potential sample size of 437.

After two weeks of data collection, a follow-up electronic notification was sent to all participants reiterating "the purpose and importance of the study and an explanation of the need for adequate response rate" (Miksza, Roeder, & Biggs, 2010, p. 370). Online data collection continued for an additional two weeks after the reminder message was sent. A total of 161 Missouri band directors completed the survey, which resulted in a total response rate of 36.8%.

Results

Demographic information indicated that respondents (98 males; 59 females; 10 non-respondents) had an average of 13.67 years (SD = 9.46) of teaching experience, ranging from 1 to 36 years. The *MSHSAA* classification for participating directors by school size was class 1 (130 students or below; n = 32, 20.51%), class 2 (131 – 269 students; n = 46, 29.49%), class 3 (270 – 477 students; n = 26, 16.67%), class 4 (478 – 1020 students; n = 26, 16.67%), and class 5 (more than 1021 students; n = 26, 16.67%).

Reliability

For all open response questions, I read respondents' answers, assigned codes to them, and combined codes into larger themes (Creswell, 2007). To establish reliability, a public school music teacher with a research background, who was also familiar with the project, was given the list of themes that was used to organize these data. This person then assigned participants' responses to one of the provided themes. Our reliability was calculated by dividing the number of agreements by agreements plus disagreements for each

question, resulting in interrater reliability of 87% for Question 6, 90% for Question 10, and 85% for Question 16.

Survey Section 1 – Tuning Procedures

The first section of the survey (Questions 1 – 6) was designed to answer questions related to respondents' tuning procedures and materials. In response to Question 1, "Does the band tune before each rehearsal?" (yes/no response), 118 respondents (73.0%) reported that their band did so, with 43 respondents (27.0%) indicating their bands did not tune before each rehearsal. Question 2 asked "How many times do you tune during each rehearsal?" and provided 4 choices (zero, once, twice, more than twice). Most respondents (n = 95, 59.0%) reported their bands tuned once per rehearsal, while others indicated tuning more frequently (2 times, n = 25, 16.0%; more than 2 times, n = 28, 17.0%). The remaining respondents (n = 13, 8.0%) indicated that they did not tune during the rehearsal.

For Question 3, teachers provided an open-response to "What pitches do you use in the tuning sequence?" B-flat (n = 127), F (n = 97), and A (n = 55) were the three most frequently indicated pitches and comprised nearly 90% of respondents' answers. Some respondents indicated that they varied pitches depending upon the specific instrument (n = 9) and encouraged students to share individual tuners before and during the rehearsal. One respondent wrote, "Tuning is not a singular event in our rehearsals, but an ongoing expectation." See Table 1 for a complete description of tuning pitch selection. With regard to Question 4, participants were asked to write their response to "What instrument (or device) provides the tuning pitch(es)?," tuba (n = 71, 31.98%) was the most frequent response (see Table 2). The use of an electronic tuning device (n = 57, 25.68%) was reported nearly as often, with respondents indicating brand name products including *Dr. Beat*, *McAdams*, and *SmartMusic* software, as well as more generic responses such as tuner and cell phone application. To answer "Does the group ever sing the tuning pitch(es)?" (Question 5), 64% of respondents (n = 103) chose yes, whereas 36 percent (n = 57) selected no.

Analyses of the sixth and final question in this section of the survey ("Briefly describe the tuning sequence for your band") resulted in 9 themes derived from 239 total comments (see Table 3). The most common written responses included having the ensemble play scales and chords (21.76%); tuning from the lowest instrument in the band, or "bottom up" tuning (19.67%); letting principal players provide the tuning pitches for the entire band (17.15%); and tuning individuals with electronic tuners (16.32%).

Table 1. Frequencies and Percentages for Responses to "What instrument (or device) provides the tuning pitch(es)?"

Instrument	*n*	%
Tuba	71	32.00
Electronic Tuning Device	57	25.70
Clarinet	50	22.50
Piano	9	4.05
Oboe	7	3.15
Baritone	6	2.70
Bass Clarinet	5	2.25
Trumpet	5	2.25
Mallet Instrument	4	1.80
Flute	4	1.80
Trombone	2	0.90
Alto Saxophone	1	0.45
No Instrument or Device	1	0.45
Total	222	100.00

Table 2. Frequencies and Percentages for Responses to "What pitches do you use in the tuning sequence?"

Specific Pitch	*n*	%
B-flat	127	39.44
F	97	30.12
A	55	17.08
Unnamed instrument specific pitches	9	2.80
E-flat	7	2.17
Unnamed chords	6	1.86
G	5	1.55
C	5	1.55
D	3	0.93
A-flat	2	0.62
E	2	0.62
Unnamed scales	2	0.62
Unnamed chorales	1	0.31
F-sharp	1	0.31
Total	322	100.00

Table 3. Categorization of Topics and Reported Frequencies for "Briefly describe the tuning sequence for your band"

Category	*n*	%
Scales and chords	52	21.76
"Bottom Up" tuning	47	19.67
Principal player tuning	41	17.15
Electronic tuning of individuals	39	16.32
Hum or sing tuning pitches	24	10.04
Nonspecific mass band tuning	16	6.69
Section tuning	13	5.44
"As needed" tuning	6	2.51
No tuning	1	0.42
Total	239	100.00

Survey Section 2 – Warm-Up Procedures and Materials

Survey items 7 through 10 were designed to gather information about respondents' warm-up procedures and materials. In response to Question 7, nearly all band directors indicated that they allowed their students to warm-up individually prior to the start of each rehearsal (Yes, *n* = 146, 92%; No, *n* = 12, 8%). Question 8 asked, "What specific books (if any) do you use during the warm-up?" *Foundations for Superior Performance: Warm-Ups and Techniques for Band* by Richard Williams and Jeff King (16.39%), Bach chorales (10.93%), and *Symphonic Warm-Ups for Band* by Claude T. Smith (9.29%) were the most frequently reported warm-up materials. Table 4 includes a complete list of books used during the warm-up period, with frequencies and percentages for each. In response to Question 9, "Do you create your own warm-ups for use with your band?," 102 respondents (65.0%) indicated yes, whereas 56 respondents reported no (35.0%). The final question in this section asked respondents to write the three music skills most frequently addressed during their warm-up period. The five most frequently listed skills among all directors were tone quality (*n* = 91, 18.46%), intonation (*n* = 80, 16.23%), balance and blend (*n* = 39, 14.0%), articulation (*n* = 39, 7.91%), and scales (*n* = 36, 7.30%). See Table 5 for a complete listing.

Table 4. Frequency and Percentages for Responses to "What specific books (if any) do you use during the warm-up?"

Text	Author	n	%
Foundations for Superior Performance: Warm-Ups and Techniques for Band	Richard Williams and Jeff King	30	16.39
Bach Chorales	Various	20	10.93
Symphonic Warm-Ups for Band	Claude T. Smith	17	9.29
No text	N/A	15	8.20
Fussell Exercises for Ensemble Drill	Raymond C. Fussell	11	6.01
Lip Benders	Ray Cramer	10	5.46
Self-created exercises	Various	10	5.46
I Recommend	James D. Ployhar	6	3.28
Standard of Excellence	Bruce Pearson	6	3.28
Five Minutes a Day	Andy Clark	5	2.73
Scales (unspecified)	N/A	5	2.73
TEX	Dennis Meyer	5	2.73
Symphonic Band Technique	Tom C. Rhodes and Donald Bierschenk	4	2.19
3D Band Book	Ployhar and Zepp	4	2.19
101 Rhythmic Rest Patterns	Grover C. Yaus	4	2.19
Function Chorales	Steven Melillo	3	1.64
Superior Bands in 16 Weeks	Quincy C. Hilliard	3	1.64
66 Festive and Famous Chorales	Frank Erikson	3	1.64
Bach and Before Band	David Newell	2	1.09
Treasury of Scales	Leonard B. Smith	2	1.09
Texts listed only once	Various	18	9.84
Total		183	100.00

Table 5. Categorization of Topics and Reported Frequencies for "What three music skills do you address most frequently during the warm-up?"

Category	*n*	%
Tone quality	91	18.50
Intonation	80	16.20
Balance and blend	69	14.00
Articulation	39	7.91
Scales	36	7.30
Breathing/air support	33	6.69
Rhythm	26	5.27
Flexibility	22	4.46
Listening	21	4.26
Technique	17	3.45
Accuracy	16	3.25
Dynamics	15	3.04
Chorales	7	1.42
Posture	6	1.22
Sightreading	6	1.22
Phrasing	4	0.81
Following the conductor	2	0.41
Timbre	2	0.41
Tempo	1	0.20
Total	493	100.00

Survey Section 3 – Use of Rehearsal Time

The final section of the survey (Questions 11 – 15) was designed to determine use of rehearsal time. Question 11 asked, "On average, how many rehearsals do you have per week?" and provided 5 choices (one, two, three, four, or five). Five rehearsals was the most common response (n = 110, 70%), followed by three (n = 24, 15%), two (n = 16, 10%), four (n = 6, 4%), and one (n = 1, 1%). Although data were generated for Question 12, "On average, how many minutes does each band rehearsal last?," I decided not to report this information given my lack of knowledge of the type of schedule (e.g., traditional, block, modified block) and corresponding number of rehearsals per week.

Question 13 asked, "On average, what percentage of time do you use in each rehearsal for the following activities?" For this question, respondents had to select percentages that summed to 100%. "Rehearsing music selections" received the highest percentage of time use (M = 63.01, SD = 8.63), followed by "Ensemble warm-up activities" (M = 19.21, SD = 8.63), "Sightreading new music" (M = 10.41, SD = 6.36), and "Other" (M = 6.50, SD = 6.36). To help determine what other activities took place during respondents' rehearsals, Question 14 asked, "Please list any additional activities that take place during your rehearsals." A total of 163 comments, resulting in 11 themes, were provided with music theory (n = 65, 39.88%), music history (n = 40, 24.54%),

and rhythm reading (n = 14, 8.59%) as the three most frequently reported "other" activities (see Table 6).

Table 6. Categorization of Topics and Reported Frequencies for "Please list any additional activities that take place during your rehearsals"

Category	*n*	%
Music theory	65	39.88
Music history	40	24.54
Rhythm reading	14	8.59
None	13	7.98
Listening activities	12	7.36
Composition/Arranging	8	4.91
Breathing Gym	3	1.84
Improvisation	3	1.84
Sectional rehearsals	3	1.84
Singing	1	0.61
Written quizzes	1	0.61
Total	163	100.00

The final question of the survey asked respondents, "Which of the following has been the source of the most frequently used rehearsal techniques throughout your career?" A slight majority of respondents (n = 92, 59.0%) indicated "observation of other directors' techniques" (e.g., student teaching, watching honor band conductors), followed by 47 respondents' (30.0%) selection of "attending workshops/conference presentations" (e.g., state music education conference, inservice workshops). The least-selected response was "collegiate instrumental techniques courses" (18 respondents, 11.0%).

Discussion

The main purpose of this study was to investigate Missouri high school band directors' approaches to rehearsal through responses regarding (a) their preferred tuning procedures, (b) the type of warm-up materials used in their rehearsals, and (c) the amount of rehearsal time they spent engaged in warm-up, rehearsal, and sightreading activities. Although band directors are able to access books and practitioner articles, and talk informally about these topics with their colleagues, it seems reasonable that Missouri band directors may benefit from learning about the current practices of their colleagues across the state through an investigation such as this.

In the first section of the survey regarding ensemble tuning, respondents indicated that the tuba was the instrument most frequently used to give the tuning pitch. In addition, the idea of "bottom up" tuning (i.e., tuning to the lowest sounding instruments in the band) was listed by 20% of respondents as one of their steps in the tuning sequence. Although these results are consonant with pedagogical literature supporting the idea of listening down for pitch in ensemble settings (Hovey, 1976; McBeth, 1972), they contradict those of a recent research study that indicated tuning to the oboe, clarinet, or flute resulted

in similar or significantly more accurate responses than tuning to the tuba (Byo et al., 2011). Given that students appear to tune more accurately to instruments that sound closer to their actual pitch, band directors might benefit from using multiple instruments in their tuning sequence.

Another finding with regard to respondents' tuning procedures was the prevalent use of an electronic device. Fifty-seven respondents indicated using an electronic tuning device to provide the tuning pitch(es) for their ensembles, and 39 respondents wrote that tuning individuals with electronic tuners was part of their tuning sequence. Despite the seemingly common use of tuners during the rehearsal (at least from this small sample of band directors), many pedagogues caution against using tuners extensively because tuning specific notes does not account for the complexity of tuning chords or developing students' skill in listening and matching others within the ensemble (Casey, 1993; DeStefano, 2008). Many respondents indicated other tuning strategies such as playing scales and chords, having the principal players provide the tuning pitch, and singing and humming during the rehearsal. Tuning and rehearsal sequences that allow students to experiment with making their own adjustments would help facilitate the development of listening skills, particularly for young musicians. Directors should consider identifying for students (through in-class demonstrations or handouts) which individual notes are inherently out of tune on their instrument, and demonstrating how to make specific tuning adjustments. Perhaps the goal of tuning was best put by a respondent in this study who wrote, "Each student provides two tuners…one on each side of their head!"

Respondents listed 35 different texts used as part of their ensemble warm-ups, indicating the diversity and ubiquity of such publications for school bands. Although having multiple options seems beneficial for band directors, novice directors may need assistance in determining which warm-up texts are most appropriate for their ensembles' ability level. District or State-level workshops and conference sessions related to the warm-up period would likely prove valuable for preservice and inservice directors alike. Sixty-five percent of respondents indicated that they created their own warm-ups, suggesting that band directors feel comfortable in assessing their students' fundamental skills and in designing curricular material that best suits the needs of their students. Furthermore, the three most frequently addressed music skills during respondents' warm-ups were tone quality, intonation, and balance and blend. Interestingly, expert conductors have been found to address these skills most frequently during their rehearsals (Goolsby, 1997, 1999). Whether or not the band directors in this study address these skills during their music rehearsals (not just the warm-up period) remains to be determined and is an interesting topic for future exploration.

Respondents reported, on average, spending approximately 63% of their rehearsals engaged in rehearsing music selections. Given the importance placed upon statewide music festivals and the need to prepare for what may seem like continuous performances, this percentage does not appear to be disproportionate

when compared to respondents' other reported rehearsal activities (warm-up, 19%; sightreading, 10%; other, 6.5%). These remaining percentages, however, may obscure important individual data for particular schools and their directors regarding specific portions of their rehearsal. For example, one respondent wrote, "Who has time for history, theory, or composition?" Another indicated incorporating "very little additional activities" (other than the rehearsal of music). "We have too many performances that we are constantly having to prepare for."

The difficulty in balancing the performance demands of a high school music program versus the need to also teach comprehensive music skills such as theory, history, improvisation, and composition will be a continuous challenge for all directors, regardless of their focus (e.g., choral, band, orchestra). Nonetheless, many respondents indicated incorporating several activities other than performance in their ensemble rehearsals. Although music theory and music history were the most frequently cited additional activities (n = 65 and n = 40, respectively), composition/arranging (n = 8) and improvisation (n = 3) were scarcely mentioned. This finding may allude to the perceived lack of rehearsal time, directors' beliefs about the relative unimportance of these activities as compared to others, or perhaps a lack of knowledge about how to incorporate these skills into the ensemble setting. Giving secondary music teachers the opportunity to attend workshops in which pedagogues give practical advice about how to incorporate comprehensive music teaching activities in their classroom—as described in the National Standards for Arts Education (1994)—would be helpful for directors who might feel insecure about integrating skills other than performance into their curricula.

A secondary purpose of this study was to ascertain the source of Missouri band directors' most frequently employed rehearsal techniques. The least-selected response was "collegiate instrumental techniques courses" (11.0%). This finding was similar to previous studies indicating that inservice teachers' university coursework played only a small role in their development as rehearsal technicians (Bauer & Berg, 2001; Chaffin, 2009; Conway, 2002). A majority of respondents (59.0%) indicated that observation of other directors' rehearsals was the primary source of their own rehearsal techniques. Faculty charged with teaching conducting and rehearsal clinic courses should consider incorporating the observation of conductors' rehearsals (at all levels) into their curricula. In addition, inviting guest conductors to the school to clinic ensembles would also expose students to new rehearsal strategies.

The findings of this study provided information designed to reveal Missouri high school band directors' current tuning, warm-up, and rehearsal practices. Although the response rate (36.8%) was not robust, this information is valuable for (1) preservice and inservice Missouri high school band directors searching for additional strategies and/or materials for their rehearsals; (2) university faculty who may wish to discuss these results with students in their materials and methods courses; and (3) individuals around the state who design or help

secure individuals to present instrumental music inservice workshops. The more information that is known about band directors' instructional strategies and curricular selections, the greater the potential benefit to students' music learning.

References

Bauer, W. I., & Berg, M. H. (2001). Influences on instrumental music teaching. *Bulletin of the Council for Research in Music Education, 150,* 53-66.

Blair, J. E., Czaja, R. F., & Blair, E. A. (2013). *Designing surveys: A guide to decisions and procedures*. Thousand Oaks, CA: Sage Publications, Inc.

Byo, J. L., & Price, H. E. (2002). Rehearsing and conducting. In R. Parncutt and G.E. McPherson (Eds.), *The science and psychology of music performance: creative strategies for teaching and learning.* (pp. 335 – 351). New York: Oxford University Press.

Byo, J. L, Schlegel, A. L, & Clark, N. A. (2011). Effects of stimulus octave and timbre on the tuning accuracy of secondary school instrumentalists. *Journal of Research in Music Education*, 58, 316-328. doi: 10.1177/0022429410386230

Casey, J. L. (1993). *Teaching techniques and insights for instrumental music educators*. Chicago: GIA Publications.

Chandler, J. H. (1981). *Intonation: A source of information for the university wind ensemble conductor.* (Doctoral dissertation, Ball State University, 1981).

Chaffin, C. R. (2009). Perceptions of instrumental music teachers regarding the development of effective rehearsal techniques. *Bulletin of the Council for Research in Music Education, 181,* 21-36.

Colwell, T. W., & Goolsby, R.J. (2002). *The teaching of instrumental music* (3rd ed.). Upper Saddle River, NJ: Prentice Hall.

Conway, C. M. (2002). Perceptions of beginning teachers, their mentors, and administrators regarding preservice music teacher preparation. *Journal of Research in Music Education, 47,* 343–356. doi: 10.2307/3345690

Creswell, J. W. (2007*). Qualitative inquiry & research design: Choosing among five approaches* (2nd ed.). Thousand Oaks, CA: Sage.

DeStefano, C. (2008). Beyond their years: Intonation and the young band. Retrieved from http://banddirector.com/article/pg-concert-band/playing-in-tune

Duke, R. A. (1999/2000). Measures of instructional effectiveness in music research. *Bulletin for the Council of Research in Music Education, 143,* 1-48.

Goolsby, T. W. (1999). A comparison of expert and novice music teachers' preparing identical band compositions: An operational replication. *Journal of Research in Music Education, 47,* 174-187. doi: 10.2307/3345722

Goolsby, T. W. (1997). Verbal instruction in instrumental rehearsals: A comparison of three career levels and preservice teachers. *Journal of Research in Music Education*, *45*, 21-40. doi: 10.2307/3345463

Harris, F., Jr. (2001). *Conducting with feeling.* Galesville, MD: Meredith Music.

Hopkins, K. D., & Gullickson, A. (1992). Response rates in survey research: A meta-analysis of the effects of monetary gratuities. *The Journal of Experimental Education, 61 (1),* 52–62. doi: 10.1080/00220973.1992.9943849

Hovey, N. (1976). *Efficient procedures for school bands*. Elkhart, IN: The Selmer Company.

Johnson, C. M., & Geringer, J. M. (2007). Predicting music majors' overall ratings of wind band performances: Elements of music. *Bulletin of the Council for Research in Music Education, 46,* 112-127.

Lisk, E. (1991). *The creative director: Alternate rehearsal techniques*. Ft. Lauderdale, FL: Meredith Music Publications.

McBeth, F. (1972). *Effective performance of band music*. San Antonio, TX: Southern Music.

McMurray, A. (1998). Allen McMurray. In J.E. Williamson (Author) & K.L. Neidig (Ed.), *Rehearsing the band* (pp. 55-62). Galesville, MD: Meredith Music.

Miksza, P., Roeder, M., & Biggs, D. (2010). Surveying Colorado band directors' opinions of skills and characteristics important to successful music teaching. *Journal of Research in Music Education, 57,* 364–381. doi: 10.1177/0022429409351655

MSHSAA (2014). Missouri State High School Activities Association. Retrieved from http://www.mshsaa.org/

Miles, E. M. (1972). Beat elimination as a means of teaching intonation to beginning wind instrumentalists. *Journal of Research in Music Education, 20,* 496-500. doi: 10.2307/3343809

Napoles, J. (2006). *The effect of duration of teacher talk on the attitude attentiveness, and performance achievement of high school choral students*. PhD dissertation, Florida State University, Tallahassee.

National Association of Schools of Music (2012). *NASM Handbook: 2012-2013*. Reston, VA: National Association of Schools of Music.

Price, H. E. (2006). Relationships among conducting quality, ensemble performance quality, and state festival ratings. *Journal of Research in Music Education, 54,* 203–214. doi: 10.1177/002242940605400304

Qualtrics Labs, Inc. (2013). http://www.qualrics.com. Provo, UT: Qualtrics Labs, Inc.

Rachleff, L. (1993). Larry Rachleff. In J. L. Casey (Ed.), *Teaching techniques and insights for instrumental music educators* (p. 325). Chicago: GIA Publications.

Reynolds, H. R. (1998). H. Robert Reynolds. In J. E. Williamson (Author) & K. L. Neidig (Ed.), *Rehearsing the band* (pp. 63-74). Galesville, MD: Meredith Music.

Rush, S. (2006). *Habits of a successful band director: Pitfalls and solutions*. Chicago: GIA Publications.

Ward, B. (2002). Teaching fundamentals, not just scales. *Teaching Music, 9*, 46-50.

Missouri Journal of Research in Music Education, No. 50, 2013, 33-50
© 2013 Missouri Music Educators' Association

Student-Centered Technology Use Among Missouri K-12 Music Students within Music Classrooms

Daniel J. Keown, Charles R. Robinson, and Rita Barger
University of Missouri-Kansas City

The purpose of this study was to examine the function and frequency of technology used among students in Missouri K-12 music classrooms. In addition, the study investigated whether the teacher's years of teaching experience, grade level, or pre-service technology training had an influence on how music students used technology during music classes. One-hundred and nineteen volunteer Missouri K-12 music educators reported student-centered knowledge-based technology practices occurring more frequently than creative-based practices, $Z = -7.68$, $p < .0001$. Results and implications are discussed in terms of pre-service teacher technology preparation.

Introduction

Recent interest for integrating new technologies within K-12 schools has been a primary focus inside and outside of academia (Cuban, 2001). Although instructional technology can enhance teacher preparation and delivery, increased learning productivity through engagement may be a stronger benefit of technology within the classroom (Mann, Shakeshaft, Becker, & Kottkamp, 1998; Sivin-Kachala & Bialo, 2000). However, the question has been raised on whether technology improves learning (Bell, Schrum, Thompson, & Bull, 2008). While policy makers and school districts search for ways to reduce the limitations of students' education due to lack of technology within classrooms (Littrel, Zagumny, & Zagumny, 2005), Means and Haertel (2004) suggest that in addition to understanding the mechanics of technology, schools and teachers should focus attention toward the pedagogical approaches and integration of technology in classrooms. By using technology to assist in traditional teaching practices as a teacher-delivery or instructional tool, schools and teachers can discover ways for students to interact with technology in an innovative manner when working to meet curricular goals and objectives (Rudolph, 2004; Sandholtz, Ringstaff, & Dwyer, 1997).

Types of Music Technology

In order for music technology to assist teachers and students in meeting the National Standards in Music Education (Music Educators National Conference, 1994), the Technology Institute for Music Educators (TI-ME) formed six areas of competency in music technology that music educators should understand

when using and implementing technology within a music curriculum (Mash, 2005). These six categories include: (a) Electronic Musical Instruments, (b) Music Production, (c) Music Notation Software, (d) Technology-Assisted Learning, (e) Multimedia, and (f) Productivity Tools, Classroom and Lab Management. Within these six areas of competency, music teachers can expose students to student-centered learning with technology for knowledge and skill acquisition and assessment, or for creating and designing purposes. Ultimately, how the technology is implemented has more impact on educational experiences than particular hardware and software applications (Cuban, 2001).

Teacher and Student Use of Technology in Education

Research findings suggest that educators tend to use technology for personal, preparation, and communicative purposes more often than they do for pedagogical purposes in delivering information or assigning students technological activities (Dorfman, 2008; Russell, Bebell, O'Dwyer, & O'Connor, 2003). A standardized survey called *The Use, Support, and Effect of Instructional Technology* (USEIT) was designed to gather and report data on how teachers and students were using technology in education, what factors influenced the use of technology in education, and how these uses affected students' understanding of educational objectives (Bebell, Russell, & O'Dwyer, 2004). Through administration of the USEIT survey, one study investigated the ways teachers were using instructional technology inside and outside of the classroom (Russell, et al., 2003). Investigators discovered that preparation and email use were the two primary purposes for using technology among teachers, while the facilitation of student-centered technology activities occurred less frequently. Similarly, studies have discovered a higher frequency of technology being used for instructional purposes than student-centered purposes (Dorfman, 2008; Jassmann, 2004; Sorah, 2012). Based on these few studies, more research is needed in determining how teachers are facilitating technology among students and teachers in the classroom.

Students' Learning Experience Through Music Technology

Students use acquired knowledge and skills in order to create through music. As technology can be used as a tool for students to attain knowledge and develop skills, it can also act as a medium for learning to create and design musical works. In determining how students learn through technology, Sharpe and Beetham (2010) devised the "Developmental Model of Effective E-learning" pyramid model. Within this pyramid, learners could develop skills, practices, and creative abilities through technology. These objectives could be transferred into how music students use technology in the music classroom. For example, the development of functional access, skills, and practices could be attained through computer-assisted-instructed music (CAI) software, Internet or

television use and listening/playing/burning CDs. The use of arranging music with notation software, composing with sequencing software, recording with digital audio workstations, and designing with multimedia hardware and software could be considered creative uses of technology within the music classroom. In addition to understanding the mechanics of technology, the pedagogical approaches for using these forms of technology can be integrated into student-centered technology curricula.

In a recent study, Dorfman (2008) examined how K-12 Ohio music teachers used technology in their classroom. Using a questionnaire, the investigator determined that the most frequent use of student-centered technology among music students occurred using computer-assisted instruction software (7%), notation software (4%), and CD burning hardware (4%). Based on the learning pyramid model devised by Sharpe and Beetham (2010), Dorfman concluded that Ohio music students spent more time using knowledge-based technology for the purpose of gaining knowledge and simulating learning through CAI software use, compared to creative-based purposes such as creating music through notation software. Similar to Dorfman's (2008) results, Reese and Rimington (2000) found that K-12 Illinois music educators reported students using computer-assisted instruction music software (24%) as the most frequent form of technology. Other reported forms of technology used by students in the music classroom were notation software (10%), technology for accompaniment (5%), sequencing software and hardware (3%), and multimedia technology (1%). Within this study, student-centered technology used for creating, programming, and designing will be considered creative-based technology use. Those student-centered technologies used to acquire, practice, and test knowledge and skills, such as the use of CAI software programs, the Internet, and burning/downloading previously recorded song files, will be considered knowledge-based technology use (Webster, 2002).

The Impact of Teacher Training, Experience, and Technology Availability on Students' Exposure and Application to Music Technology

Factors such as teacher training, experience, technology availability, school size, socioeconomic school status, and comfort level to use and teach with technology can influence the level of technology integration a teacher employs in teaching (Dorfman, 2008; Ertmer, Addison, Lane, Ross, & Woods, 1999; Jassmann, 2004; Van Braak, 2001). Due to a lack of confidence in teachers' abilities to integrate technology into their lessons (Cremata, 2010; Taylor, 2003; Teclehaimanot, Mentzer, & Hickman, 2011), guided student-centered technology practices can be non-existent in many schools. Bauer, Reese, and McAllister (2003) suggested that this reluctance could be reduced through technology-inclusion training. Technology training specific to music impacts music teachers' comfort with integrating technology in the music classroom (Reese & Rimington, 2000). Similarly, incoming college freshman have indicated that

although they have experience using non-music applications such word processing and email, they have considerably less experience using music-related forms of software technology (Meltzer, 2001). Furthermore, while pre-service teachers are trained on the mechanics of technology, the lack of integration in practical teaching settings can be traced to the absence of pedagogical practice and modeling by university instructors (Cremata, 2010; Teclehaimanot, Mentzer, & Hickman, 2011).

In addition to teachers' technology preparation and exposure, teaching experience can also be another variable to consider when exploring students' classroom experiences using technology. Younger teachers have been found to use computer technology more often in their occupation compared to older and more experienced teachers (Chu, 2000; Coleman, 2004). However, investigators have questioned use of technology as an all-encompassing term and the role of teacher experience (Bebell, et al., 2004). As suggested, further research needs to explore these various uses in the context of comparing factors such as teaching experience. Nevertheless, Veenman (1984) hypothesizes that experienced teachers have the ability to build on the understanding of how to work with and connect with diverse learners and students at multiple intelligence levels. However, Russell et al (2003) found that teachers with 6-15 years teaching experience reported higher levels of student-centered technology classroom use compared to younger (0-5 years experience) and older teachers (more than 15 years experience). The availability of computer technology on school premises may be a worthy variable for future research (Norton, McRobbie, & Cooper, 2000; Russell & Bradley, 1997).

Music and Technology Instruction for the 21st Century

Overall, multiple variables can impact the access, use, and types of technology in the classroom. These reluctances and access limitations can affect the types of technology experiences that K-12 students have in the classroom. Serving as a "catalyst to position 21st century readiness" for all students, the *21st Century Skills* organization advocates an educational system that enhances the skills needed to be a productive member of society during all phases of life (Partnership for 21st Century Skills, 2014). As part of their goals, literacy in information, media, and technology skills are described as important skills for all students during formal education. Aligning with The International Society for Technology in Education (ISTE, 2007) and its revised National Education Technology Standards (NETS), involves guiding toward digital citizenship through a system that focuses on critical thinking, problem solving, communication, collaboration, and creativity - all part of the "4 C's" under the *21st Century Skills* model. Through student-centered creative-based technology use, these four attributes could be developed and expanded upon during a student's education. The combination of music and technology experiences in the classroom can offer students the opportunity to develop their 21st century

skills through the "4C's." However, more is to be gained by studying how music teachers are facilitating learning experiences through the inclusion of student-centered technology.

Purpose of the Study

This study investigated student-centered technology inclusion within the Missouri K-12 music classrooms. This investigation centered on two categories of "hands-on," student-centered use of technology within the classroom: (a) gathering information, developing skills, or testing, also referred to as knowledge-based technology use, and (b) using technology as a tool in creating, designing, and programming, also referred to as creative-based technology use. The following questions were examined:

1. What is the primary purpose of technology use?
2. How do student-centered technology practices vary as a function of teaching experience?
3. How do student-centered technology practices vary as a function of grade level?
4. How do student-centered technology practices vary as a function of teacher's pre-service technology training?
5. Is there a relationship between the available technology in the music classroom and student-centered technology practices?

Method

Participants & Procedures

A researcher-designed survey using a web-based application, *SurveyGizmo.com* (Widgix 2011), was used to collect data from Missouri K-12 music educators. Initial contact was made with two randomly chosen elementary, middle, and high schools in each of the 115 counties in the state of Missouri. An email invitation was sent to the principals of each school with a request stating, "Please forward to your music teacher." All email addresses were acquired from the Missouri Department of Elementary and Secondary Education (2012) website. The email invitation asked for volunteer participants to take five minutes to complete the survey by clicking on the *SurveyGizmo.com* link. As a token of appreciation, invited participants were given access to a free PDF article on ten music apps for the iPad.

Email requests were sent to 642 schools with 29 of those messages returned as undeliverable. Therefore, 29 new schools were randomly chosen within each respective county and sent an email request, keeping the total number of invited schools at 642. A second email was resent to all invited participants two weeks after the initial email. Due to the small number of schools in some counties,

representation of six invited schools was non-existent. At the end of 30 days of data collection, individual responses (N = 119) were recorded, providing a response rate of 18.54%. Participants (male n = 40; female n = 79) included primary elementary school (n = 48; 40.34%), middle school (n = 28; 23.53%), and high school (n = 43; 36.13%) music educators from various disciplines of music and demographics in the state of Missouri (see Table 1). Some participants reported also teaching elementary school (24.79%), middle school (49.59%), and high school (25.62%) in addition to their primary teaching level.

Table 1. Frequency Distribution of Participant Primary Teaching Level, Primary Music Teaching Discipline, and School's Demographics

Participant Affiliation	***n***	***%***
Elementary School	48	40.34
Middle School	28	23.53
High School	43	36.13
Performance Ensembles	28	23.53
Non-Performance Classes	16	13.45
Both Performance and Non-Performance Classes	75	63.03
Rural	101	84.87
Suburban	16	13.45
Urban	2	1.68

Survey Design

A researcher-designed survey was developed in three sections from previous surveys on music technology use (Bebell, et al., 2004; Dorfman, 2008). Section one collected data on how students use technology in their music classrooms. When referring to use of technology in the classroom, the survey states "in your classroom" to also include taking a class to another room to use technology if this occurs during classroom time. Participants reported how often students use technology in the music classroom with responses consisting of *never*, *infrequently*, *sometimes*, *frequently*, or *almost always*, and coded with numerical values ranging from 0 = *never* to 4 = *almost always*. As categorized in Table 2, section one also contained items on students' use of technology devices in the music classroom for creative and knowledge-based purposes. To determine the amount of technology within the classroom, one question collected numerical data on how many audio playback devices, computers, computer tablets, electronic instruments, microphones, mixing soundboards, overhead projectors, recording devices, smart boards, televisions, and video cameras were available in the music classroom. The next question asked participants to identify specific types of available music software within their classroom.

Table 2. Two Pedagogical Purposes Among K-12 Students' Technology Use Within a Music Classroom

Creative-Based Purposes	Knowledge-Based Purposes
Compose and arrange music with notation software	Participate in concept learning activities and gathering information through Computer-Assisted-Information (CAI) music software programs
Create, arrange, and compose music on sequencers and/or digital audio workstations	Participate in concept learning activities and gathering information through Internet websites
Play and perform using electronic instruments	Participate in concept learning activities through notation software, but do not create music with the software
Record music in a non-performance/stage environment	Participate in playing music computer/video games
Engineer live sound production and/or record for live musical performances	Use various hardware and software to assist in students' practicing of instrument(s)
Use various hardware and software technologies to create multimedia projects	Burn CDs and/or download music

Note. Student-centered technology was reported by survey participants.

Section two of the survey collected basic data about the participant's primary teaching assignment level, secondary teaching assignment level (if any), school district by geographic location, and the types of music courses taught (see Table 1). The third section collected data on the participant's gender, years of teaching experience, highest degree earned at a post-secondary institution, and type of technology training throughout the participant's career. The survey concluded with an optional comments section.

Data were collected through *SurveyGizmo.com* and maintained in a secure, password protected database. Data were then exported and analyzed using *Statistical Packages for the Social Sciences (SPSS) version 18* for *Windows.* Back-up data were also exported into *Microsoft's Excel: mac 2008* and saved on a password-protected computer.

Results

All reported data were treated conservatively using non-parametric tests. Tests were run on survey data to investigate differences within creative-based and knowledge-based technology uses and differences between creative-based and knowledge-based technology use among the independent variables of teaching experience, teaching level, and pre-service training. Participants reported how often their students used technology in six areas of creative-based technology, and six areas of knowledge-based technology. Each of the six area scores were summed to give each participant a final score in the area of creative-based and knowledge-based technology purposes. A possible total score of 24 was calculated in each of the two uses of technology.

Student-Centered Use of Music Technology

The first research question investigated the difference between music students using technology for creative-based purposes or knowledge-based purposes and the amount of time devoted to technology in the music classroom. A Wilcoxon-Matched Pairs test indicated that there was a significant difference between the use of creative-based technology and knowledge-based technology among music students in K-12 music classrooms, $Z = -7.68$, $p < .0001$. Participants reported that their students used technology at a higher frequency for knowledge-based purposes ($M = 6.95$, $SD = 4.62$) compared to using the technology for creative-based purposes ($M = 3.67$, $SD = 4.06$). As indicated in Table 3, burning CDs/downloading music and Internet use were the most common types of knowledge-based technology. The use of electronic instruments and multimedia hardware and software were the most frequent forms of creative-based technology among K-12 music students (see Table 4).

Table 3. Participant Mean Score of Knowledge-Based Technology Used Among Music Students.

	M	***SD***
Burn CDs/Download Music	1.87	1.37
Internet	1.58	1.12
Computer/Video Music Games	1.14	1.08
Instrumental Practice Hardware and Software	.84	1.21
Computer-Assisted-Instructional Software	.77	1.12
Non-Creative Tasks Using Notation Software	.75	1.08

Note. Participants reported how often students used technology in the music classroom by nominally selecting *never*, *infrequently*, *sometimes*, *frequently*, or *almost always*. Means were based on a 5-point Likert-type scale (0 = *never* – 4 = *almost always*).

Table 4. Participant Mean Score of Creative-Based Technology Used Among Music Students

	M	***SD***
Electronic Instruments	.93	1.11
Multimedia Hardware and Software	.87	1.08
Engineer and Record in a Live Performance Environment	.84	1.21
Record Music in a Non-Live Environment	.64	.90
Notation Software	.46	.75
Sequencers and Digital Audio Workstations	.26	.67

Note. Participants reported how often students used technology in the music classroom by nominally selecting *never*, *infrequently*, *sometimes*, *frequently*, or *almost always*. Means were based on a 5-point Likert-type scale (0 = *never* – 4 = *almost always*).

Teaching Experience

Question two examined whether student-centered technology differed as a function of teaching experience. Teaching experience was broken down into the

following three categories; (a) 0-5 years teaching experience (n = 40), (b) 6-15 years (n = 37), and (c) more than 15 years (n = 42). The original categories consisted of four levels of experience, but 6-10 years and 11-15 years were collapsed in order to include a sizable response.

Two tests were conducted to determine if there were differences in student-centered technology use among the three categories in years of teaching experience. Two Kruskal-Wallis tests were used to examine differences in students' creative-based and knowledge-based technology among the three categories of teaching experience. Results indicated that there were no significant differences between years of teaching experience and for the frequency of creative-based, $H(2) = 3.47$, $p > .05$, or knowledge-based use, $H(2) = 4.03$, $p > .05$.

Three additional statistical tests were used to determine differences between technology used within each teaching experience category. A Wilcoxon-Matched Pairs test was conducted to examine possible differences in determining student-centered technology use among 0-5 year, 6-15 year, and over 15 year teachers. The results indicated significant differences between student-centered creative-based uses and knowledge-based uses among 0-5 year teachers, $Z = -4.83$, $p = < .0001$, 6-15 year teachers, $Z = -4.53$, $p < .0001$, and over 15 year teachers $Z = -3.8$, $p < .0001$ (see Figure 1).

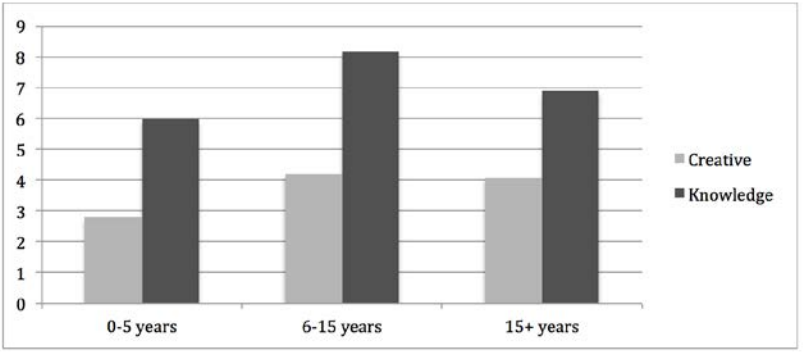


Figure 1. Participant mean score (out of 24) of student-centered technology used within a music classroom based on years of teaching experience. Participants reported how often students used technology in the music classroom by nominally selecting *never, infrequently, sometimes, frequently,* or *almost always*. Means were based on a 5-point Likert-type scale (0 = never – 4 = almost always). Six categories created each student-centered technology use, culminating in a possible score of 24 for each participant.

Teaching Level

The third question investigated whether teaching levels had an effect on how students used technology within the music classroom. Two Kruskall-Wallis tests were used to examine differences on how students used technology between elementary, middle, and high school music classrooms

within each student-centered technology approach. Results indicated that there was a significant difference between the three levels when students used technology for creative-based purposes, $H(2) = 7.06$, $p < .05$, but not knowledge-based purposes, $H = 4.83$, $p > .05$. A post hoc Mann Whitney U test resulted in significant differences for creative-based technology use between elementary and middle school classrooms ($p < .01$), and elementary and high school classrooms ($p < .01$). Middle and high school students used technology for creative-based purposes more frequently than elementary students. No significant difference was found between middle and high school classrooms ($p > .05$).

A series of Wilcoxon-Matched Pairs tests were conducted to determine if any significant differences existed between the two uses of technology within each teaching level. Significant differences between creative-based and knowledge-based technology use among students were found within elementary, $Z = -3.61$, $p < .001$, middle, $Z = -2.53$, $p < .01$, and high school classrooms, $Z = -2.93$, $p < .01$. Results revealed that knowledge-based technology use occurred more frequently than creative-based technology use at all teaching levels (see Figure 2).

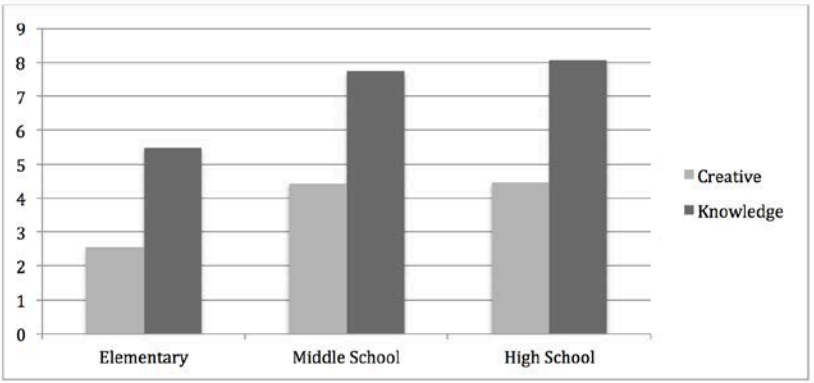


Figure 1. Participant mean score (out of 24) of student-centered technology used within a music classroom based on grade level. Participants reported how often students used technology in the music classroom by nominally selecting *never, infrequently, sometimes, frequently,* or *almost always*. Means were based on a 5-point Likert-type scale (0 = never – 4 = almost always). Six categories created each student-centered technology use, culminating in a possible score of 24 for each participant.

Post-Secondary Pre-service Technology Training

Participants reported their previous technology training. Two Mann-Whitney tests examined whether there were differences in participants' previous pre-service training associated with exposing students to the two types of technology uses. Participants had the option to report either having pre-service

technology training at a post-secondary institution or not having pre-service technology training at a post-secondary institution. Results showed participants' student-centered inclusion of technology for creative-based purposes was significantly higher for participants who had pre-service technology training than those who did not, $Z = 2.49$, $p < .05$. Participants with pre-service technology training ($M = 4.37$) reported students using technology more for creative-based purposes as compared to participants without pre-service technology training ($M = 2.44$). Results also indicated no significant difference in pre-service technology training and knowledge-based technology use within the music classroom, $Z = 1.53$, $p > .05$.

For the second set of tests, the difference between creative and knowledge-based technology use was explored within each pre-service training category. Two Wilcoxon-Matched Pairs tests were conducted to determine if there were differences between creative-based and knowledge-based technology use within classrooms equipped with a pre-service technology trained teacher and classrooms equipped with teachers that have no pre-service technology training. Results indicated significant differences in both pre-service, $Z = -6.02$, $p < .0001$, and no pre-service, $Z = -4.77$, $p < .0001$, technology training participants' student-centered technology use within the music classroom. Regardless of pre-service training, more knowledge-based technology was used compared to creative-based technology use (see Figure 3).

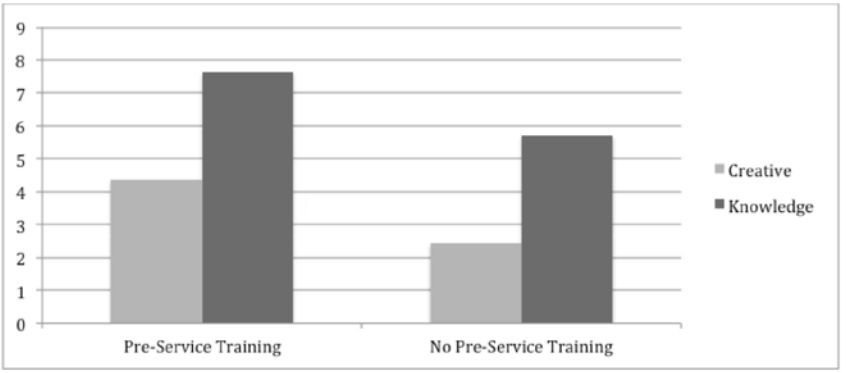


Figure 3. Participant mean score (out of 24) of student-centered technology used within a music classroom based on teacher's pre-service technology training. Participants reported how often students used technology in the music classroom by nominally selecting *never, infrequently, sometimes, frequently,* or *almost always*. Means were based on a 5-point Likert-type scale (0 = never – 4 = almost always). Six categories created each student-centered technology use, culminating in a possible score of 24 for each participant.

Technology Available Within the Music Classroom

In determining the relationship between technologies available to students within the music classroom and how often music students used technology for creative-based and knowledge-based purposes, two Spearman *rho* correlation coefficient tests were conducted. Each participant reported the quantity of technology available for student use within the music classroom. These technologies included audio playback devices, computers, computer tablets, electronic instruments, MIDI controllers, televisions, mixing/sound boards, recording devices, microphones, video cameras, overhead projectors, software programs, and smart boards. The quantity of classroom technologies was summed, creating a technology availability score for each participant. Results from the Spearman *rho* correlation coefficient tests indicated a moderate positive correlation between technology availability and creative-based use, $rho(117) = .555$, $p < .001$, and technology availability and knowledge-based use, $rho(117) = .490$, $p < .001$. Music classrooms with more technology available tend to show a rise in both creative-based and knowledge-based use among students. The ratio of school size to accessibility to technology was not investigated in this study.

Discussion

The present study investigated the differences in creative-based and knowledge-based technology use among students in Missouri K-12 music classrooms. Creative-based purposes included the use of technology to notate sheet music, compose and arrange music using sequencers and digital audio workstations, perform with electronic instruments, record music, engineer and record live sound for concerts, and create multimedia works. Knowledge-based purposes consisted of using computer-assisted instruction (CAI) software/websites, the Internet, non-creative activities using notation software, hardware and software to assist in practicing instruments, and technology to burn CDs and download music.

Based on this survey, Missouri K-12 music students used knowledge-based technology within the music classroom more frequently than creative-based purposes. These findings are similar to other research studies suggesting that students use more knowledge-based technology, such as the Internet and CAI software for attaining and testing music concepts, within the music classroom, as compared to using notation software or sequencers for creative-based purposes (Dorfman, 2008; Reese & Rimington, 2000; Sorah, 2012). This could suggest that technology is perceived as a tool for reinforcing the mastery of music concepts and skills, and music related information rather than an instrument to create new and individualized creative works. While researchers have suggested an observable drop in drill-and-practice technology within classrooms (Greher, 2006), the current study's findings could suggest that

Internet use has resulted in knowledge-based technology use to remain more prevalent than creative-based approaches among K-12 music students.

A similar pattern was found in student-centered technology use based on music educators' years of teaching experience, grade level, and post-secondary pre-service technology training. The current study found that teachers with zero to five years of teaching experience had their students use technology less frequently than experienced teachers. However, each experience group reported similar differences between creative-based purposes and knowledge-based technology purposes. This current study investigated how teachers use technology and found that experienced teachers used more student-centered technology. Perhaps, experienced teachers have developed knowledge, skills, and sensitivity for working with the individual needs of students. In conjunction with the understanding of multiple learning strategies among students, older teachers could be inclined to use technology for differentiating their instruction (Grossman, 1990; Veenman, 1984).

Previous research has clearly shown a wide range in the amount of computer technology music teachers include within their classroom (Jinright, 2003; Reese & Rimington, 2000; Sehmann & Hayes, 1996). Although this current study didn't focus on the differences between general music, choral, and instrumental teachers, a mitigating factor may be that general music classes occur more frequently at the elementary level, and choral/instrumental ensemble classrooms are more frequent at the high school level. The focus of student-centered technology use in this study contrasts with other research that focuses on technology use by both teachers and students. The results of the current study found that middle and high school classrooms used student-centered creative-based technology more frequently than elementary classrooms. In addition, elementary music educators reported fewer instances of student-centered technology use within the music classroom. While these results support Reese and Rimington's (2000) study on computer technology use among teachers and students within the classroom, they contradict other findings that general music classrooms are the most abundant users of computer technology (Sehmann & Hayes, 1996). This may reflect a considerable evolution of technology within the music classroom over the past two decades.

A difference was also found in how music educators prioritize student-centered technology use within their curriculum based on their pre-service technology training. The findings indicated that music educators who had pre-service technology training prior to teaching were more likely to establish student-centered creative-based and knowledge-based technology environments. As technology continues to advance, teachers will likely search for technology training through professional development and workshops. However, Cremata (2010) believes that music technology training at the post-secondary level is more robust for impacting pedagogy. While the impact of high quality, intensive professional training workshops can be lost after nine months (Bauer, et al., 2003), the current study's results suggest that university

computer technology training results in more comprehensive and applicable technology experiences. In addition to music technology courses, universities could embed technology instruction pedagogy as a model for the pre-service teachers over the course of a four-year degree. This would allow pre-service teachers opportunities to consistently observe and seek guidance from music technology instructors over a considerable period of time. Although data on pre-service technology training teachers were not collected in this study, some university music education curricula could have prioritized effective technology pedagogical practices.

Technology use is predicated on accessibility in the K-12 music classroom. Missouri K-12 music classrooms showed a moderate relationship between the access of music technology accessible and student-centered use for both creative-based and knowledge-based purposes. Access to technology has been suggested to drive teacher motivation and commitment to their students' learning and their own professional development (Sheingold & Hadley, 1990). Therefore, a direct relationship can be found between access to technology in the music classroom and how music students are being developed through student-centered technology use.

Limitations

Due to the high number of rural counties in the state of Missouri, sampling six schools from each of the 115 counties did not allow for an equal sample of rural, suburban, and urban schools. Further research should be conducted in Missouri counties that consist of suburban and urban school districts to compare differences in student-centered technology approaches within the music classrooms. One previous study has shown that schools consisting of mostly poor and minority students were primarily exposed to drill-and-practice CAI software technology while middle-class and White students were more likely to use computers for more creative, designing, and programming purposes (Sutton, 1991). Lower socioeconomic schools have fewer computers in their schools compared to affluent schools consisting of primarily White-Caucasian students (Hess & Leal, 2001). Geographic location, socioeconomic condition, and school size could be other factors associated with technology accessibility and student-centered technology use.

Future research should also investigate the grade level taught in association with how much interaction time a teacher has with a classroom for a given week or month. A high school music teacher who teaches the same class, five days a week, may have more opportunities to facilitate student-centered technology learning compared to an elementary music teacher who instructs each class once a week. Elementary music teachers reported fewer instances of facilitating student-centered technology use during music instruction for this investigation. The sheer reality of choosing other non-student-centered technology due to available instructional time could be a factor.

Implications

This study's main focus was to investigate how music students were currently using technology within the music classroom. However, based on the frequent use of knowledge-based technology within the music classroom, further inquiry is needed as to why knowledge-based technology use dominates music classrooms. The collaboration between student and technology could interfere with the traditional methods and authentic practices of rehearsing performance-based traditional ensembles. In addition, while the use of notation software, sequencers, and digital audio workstations can play an obvious role in the general music classroom, ensemble classrooms may benefit from other musical opportunities that supplement traditional rehearsal and performance experiences (Rudolph, 2004).

Besides gaining a wider breadth of acceptance for contemporary music and practices, a closer examination is needed in exploring the entire post-secondary music education curriculum in relation to pre-service teacher development. A required music technology course offers pre-service teachers the mechanics, pedagogical potential and ability to synthesize technology knowledge and skills into other music courses. Pre-service teachers can develop teaching skills with music technology for creative-based purposes through exploring and applying different approaches during their training. This would allow the opportunity to envision technology in ways other than as a simulation for learning, retrieving information, or testing one's comprehension of concepts and skills. Through an increased focus in pre-service teacher education, K-12 music students can be given creative opportunities through technology.

Conclusion

Using technology in retrieving information is one means of acquiring knowledge. The use of the Internet and concept learning software are important forms of technology in the development of K-12 students. Music educators continue to apply knowledge-based approaches for their students in order for them to critically think, communicate, understand, develop, and achieve. At the same time, the opportunity to practice creating, designing, collaborating, and inventing through the use of technology can responsibly prepare them for becoming a contributing citizen. Students should be prepared to innovate and adapt to a changing world, characteristics that lend themselves more towards a creative-based approach. Both creative-based and knowledge-based technology use within the music classroom is providing various modes of learning to a wide variety of learners. Although the results of this study reveal an emphasis on knowledge-based technology use among K-12 music students, technology can be a powerfully creative tool in promoting new forms of creative expression and setting up future adults with the experiences relevant for contemporary society.

References

Bauer, W. I., Reese, S., & McAllister, P. A. (2003). Transforming music teaching via technology: The role of professional development. *Journal of Research in Music Education, 51*, 289-301. doi:10.2307/3345656

Bebell, D., Russell, M., & O'Dwyer L. (2004). Measuring teachers' technology uses: Why multiple-measures are more revealing. *Journal of Research on Technology in Education, 37*, 45-63.

Bell, L., Schrum, L., Thompson, A. D., & Bull, G. (2008). Introduction. In L. Bell, L. Schrum, A. D. Thompson, & G. Bull (Eds.), *Framing research on technology and student learning in the content areas: Implications for educators* (pp. 1-12). Charlotte, NC: Information Age Publishing, Inc.

Chu, J. L. (2000). *Assessment of the integration of technology into the curriculum by middle and high school teachers*. (Doctoral Dissertation). Available from ProQuest Dissertations and Theses database. (UMI Microform 9983692)

Coleman, B. K. (2004). *An examination of teachers' self-efficacy in using computer technology for instruction*. (Doctoral Dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3142806)

Cremata, R. (2010). *The use of music technology across the curriculum in music education setting: Case studies of two universities.* (Doctoral Dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3430388)

Cuban, L. (2001). *Oversold and underused: Computers in the classroom.* Cambridge, MA: Harvard University Press.

Dorfman, J. (2008). Technology in Ohio's school music programs: An exploratory study of teacher use and integration. *Contributions to Music Education, 35*, 23-46.

Ertmer, P. A., Addison, P., Lane, M., Ross, E., & Woods, D. (1999). Examining teachers' beliefs about the role of technology in the elementary classroom. *Journal of Research on Computing in Education, 32*, 54-72.

Greher, F. R. (2006). Transforming music teacher preparation through the lens of video technology. *Journal of Music Teacher Education, 15(*2), 49-60. doi:10.1177/10570837060150020107

Grossman, P. L. (1990). *The making of a teacher: Teacher knowledge and teacher education*. New York: Teachers College Press.

Hess, F. M., & Leal D. L. (2001). A shrinking "digital divide"? The provision of classroom computers across urban school systems. *Social Science Quarterly, 82*, 765-778.

International Society for Technology in Education. (2007). *National educational technology standards and performance indicators for students.* Eugene, OR: International Society for Technology in Education.

Jassmann, A. E. (2004). *The status of music technology in the K-12 curriculum of South Dakota public schools.* (Doctoral Dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3127829)

Jinright, J. M. (2003) *Factors associated with teacher computer use in kindergarten through grade 12 school music classrooms in Alabama, Georgia, and Florida.* (Doctoral Dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3095791)

Littrell, A. B., Zagumny, M. J., & Zagumny, L. L. (2005). Contextual and psychological predictors of instructional technology use in rural classrooms. *Educational Research Quarterly, 29*, 37-47.

Mann, D., Shakeshaft, C., Becker, J., & Kottkamp, R. (1998). *West Virginia's basic skills/computer education program: An analysis of student achievement*. Santa Moncia, CA: Milken Family Foundation.

Mash, D. (2005). Areas of competency in music technology. In F. Richmond, & S. Watson (Eds.), *Technology strategies for music education* (pp. 3-14). The Technology Institute for Music Educators.

Means, B., & Haertel, G. D. (2004). *Using technology evaluation to enhance student learning.* New York: Teachers College Press.

Meltzer, J. C. (2001). *A survey to assess the technology literacy of undergraduate music majors at Big-10 universities: Implications for undergraduate courses in music education.* (Doctoral Dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3023143)

Missouri Department of Elementary & Secondary Education. (2012). *Missouri school directory*. Retrieved from http://dese.mo.gov/directory/

Music Educators National Conference. (1994). *The school music program: A new vision.* Reston, VA: National Association for Music Educators (MENC).

Norton, S., McRobbie, C. J., & Cooper, T. J. (2000). *Exploring secondary mathematics teachers' reasons for not using computer in their teaching: Five case studies. Journal of Research on Computing in Education, 33*(1), 87-109.

Partnership of 21st Century Skills. (2014). *Partnership of 21st century skills*. Retrieved from http://www.p21.org/about-us/our-mission/

Reese, S. & Rimington, J. (2000). Music technology in Illinois public schools. *Update - Applications of Research in Music Education, 18*(2), 27-32. doi: 10.1177?875512330001800206

Rudolph, T. (2004). *Teaching music with technology: 2nd edition.* Chicago: GIA Publications.

Russell, M., Bebell, D., O'Dwyer, L, & O'Connor, K. (2003). Examining teacher technology use implication for preservice and inservice teacher preparation. *Journal of Teacher Education, 54*, 297-310. doi:10.1177/0022487103255985

Russell, G., & Bradley, B. (1997). Teachers' computer anxiety: Implications for professional development. *Education and Information Technologies, 2*, 17-30.

Sandholtz, J. H., Ringstaff, C., & Dwyer, D. C. (1997). *Teaching with technology: Creating student-centered classrooms.* New York: Teachers College Press.

Sehmann, K. H., & Hayes, C. (1996). *The status of computer technology in Kentucky's music classrooms.* Poster session presented at the national convention of Music Educators National Conference, Kansas City, MO.

Sharpe, R., & Beetham, H. (2010). Understanding students' uses of technology for learning. In R. Sharpe, H. Beetham, & S. de Freitas (Eds.), *Rethinking learning for a digital age: How learners are shaping their own experiences* (pp. 85-99). New York & London: Routledge.

Sheingold, K., & Hadley, M. (1990). *Accomplished teachers: Integrating computers into classroom practice.* New York: Centre for Technology in Education.

Sivin-Kachala, J., & Bialo, E. R. (2000). *2000 research report on the effectiveness of technology in schools* (7th ed.). Washington DC: Software and Information Industry Association.

Sorah, D. W. (2012). *The effects of music teacher beliefs, training, and resources on use of technology*. (Doctoral Dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3519412)

Sutton, R. E. (1991). Equity and computers in the schools: A decade of research. *Review of Educational Research, 61*(4), 475-503. doi:10.3102/00346543061004475

Taylor, J. A. (2003). Proceedings from the fourth national symposium on music instruction technology: The status of technology in K-12 music education. *Journal of Technology in Music Learning, 2*(2), 67-73.

Teclehaimanot, B., Mentzer, G., & Hickman, T. (2011). A mixed methods comparison of teacher education faculty perceptions of the integration of technology into their courses and student feedback on technology proficiency. *Journal of Technology & Teacher Education, 19*(1), 5-21.

Van Braak, J. (2001). Individual characteristics influencing teachers' class use of computers. *Journal of Educational Computing Research, 25*, 141-157.

Veenman, S. (1984). Perceived problems of beginning teachers. *Review of Education Research, 54*, 143-178. doi: 10.3102/00346543054002143

Webster, P. (2002). Historical perspectives on technology and music. *Music Educator's Journal, 89*(1), 38-43. doi:10.2307/3399883

Widgix. (2011). *SurveyGizmo (Version 3.6.26)* [Software]. Available from http://www.surveygizmo.com.

Missouri Journal of Research in Music Education, No. 50, 2013, 51-64
© 2013 Missouri Music Educators' Association

The Effect of Assessment Software on Young Wind Instrumentalists' Performance Achievement

Bryan D. Koerner
University of Colorado at Boulder[1]

The purpose of this study was to examine the effect of practice experiences with iPAS music assessment software on middle school band students' performance achievement. Specifically, the effect of music assessment software on students' rhythmic and melodic music performance accuracy was explored. Sixth-, seventh- and eighth-grade band students (N = 45) were randomly placed in two dependent groups and completed six sessions with the "Interactive Pyware Assessment Software," or iPAS, to practice a melody selected by the researcher. Students' iPAS music performance scores were recorded after each session. To compare the reliability of iPAS to a researcher-designed rubric, students were recorded individually and were evaluated before and after each treatment session. Findings suggest that middle school band students' music performance achievement significantly increased following frequent experiences with iPAS music assessment software. Furthermore, the majority of students indicated that they would enjoy using iPAS in the future. A rubric to software comparison yielded only moderate correlations. Recommendations and implications for educators and researchers are provided.

Beginning in the 1960s, leaders within the Music Education National Conference (MENC), now called the National Association for Music Education (NAfME), realized the significance of technology and its potential impact on both music education and society. To improve the effectiveness of music education, leaders within MENC and experts from disciplines outside of music drafted the Tanglewood Declaration in 1967. The authors believed that "developments in educational technology, educational television, programmed instruction and computer-assisted instruction should be applied to music study and research" (Choate, 1968, p. 139). Shortly after the Tanglewood Declaration was released, Allvin (1971) predicted "that in the next decade computer-assisted instruction will strengthen musical training and raise the level of proficiency in aspiring professional musicians" (p. 143). His prediction was not realized, however, despite rapid advances in technology. More recently, *Vision 2020: The Housewright Declaration*, released in 1999 as a twenty-first century update to the Tanglewood Declaration, emphasized technology's increasing impact on music students and society. The MENC "Opportunity to Learn Standards for

[1]This research was completed while enrolled as a graduate student at University of Missouri - Columbia.

Music Technology," also released in 1999, provided specific guidance regarding technology implementation in the music classroom.

Most public schools now rely on technology as their primary means of communication with students, parents, and community members. Districts host websites containing school policies, calendars, teacher web pages and email directories. They allow parents to access grade books, homework, and attendance through web-based programs or sites, and champion student learning via computers, word processors, and the Internet. Facilitating school operations is not the only use for technology in a district. Contemporary technology scholars in both the education and music communities have promoted curricula that "support technology-enhanced interactivity in learning" (Leong, 2012, p. 233).

When coupled with traditional music classroom instruction, computers have been shown to be both effective (Deal, 1985; Dekaney, 2003; Goodson, 1992; Parrish, 1997) and ineffective (Arms, 1997; Bush, 2000) in increasing students' musical understandings and skills. Only recently have researchers investigated the use of interactive assessment software and intelligent digital accompaniment. One such program, SmartMusic, is described as "interactive" software because the program shows and tracks sheet music on a computer screen, analyzes students' performances while playing background accompaniment, and then provides students with immediate performance feedback and an overall score (Long, 2011). These scores are based on rhythmic and melodic accuracy, and not musical elements such as dynamics, style, phrasing, expressivity, tone, timbre, or interpretation. Despite this, SmartMusic assessment scores have been found to have a high correlation with judges' performance achievement scores (Karas, 2005) and have been used as an evaluation reliability tool (Woody & Lehmann, 2010), suggesting that assessment software can serve as a valid and reliable assessment tool.

In addition to studies investigating the validity and reliability of SmartMusic, research has also focused on performance achievement gains following assessment software. Lee (2007) found that beginning band students who engaged in music assessment practice experiences had no significant gains in their performance achievement. Similarly, Buck (2008) found no statistically significant performance achievement gains in a study of high school band students' experiences with SmartMusic. *Performance achievement,* used as a dependent variable in these studies, has been defined as "a measure of what a student has already learned in music" (Gordon, 2001, p. 81).

Most instrumentalists are expected to practice their instrument regularly in an effort to reinforce correct habits and music concepts. When coupled with accurate self-assessment, music practice can lead to higher music achievement (Howe, Davidson, & Sloboda, 1998). However, descriptive studies investigating beginning musicians' practice behaviors have found that self-regulated practice strategies are used rarely (Austin & Berg, 2006; McPherson & Renwick, 2001). After researching eighth-grade instrumentalists' practice, Rohwer and Polk

(2006) found that analytic practicers, those who broke passages down and focused on specific sections for practice, improved more than holistic practicers. Furthermore, teaching young and mature musicians to employ strategic practice behaviors may result in higher performance quality (Duke, Simmons, & Cash, 2009; Miksza, 2007). Sheldon, Reese, and Grashel (1999) found that college undergraduates who practiced an instrumental solo with Vivace (now called SmartMusic) intelligent digital accompaniment had enjoyable experiences and were motivated to practice. SmartMusic also has been reported anecdotally to guide students' self-monitored music practice (Bazan, 2011), but there currently is a lack of descriptive research that analyzes students' music assessment software practice strategies.

Although SmartMusic might be considered the most prevalent interactive assessment software, similar software products are commercially available for students and educators. The Neil A. Kjos Music Company includes their iPAS Practice and Assessment Software with every purchase of their *Standard of Excellence Enhanced* band method books. iPAS, which stands for "Interactive Pyware Assessment Software," presents selected exercises from *Standard of Excellence Enhanced* as a computer-monitored practice session. Similar to SmartMusic, iPAS allows students to listen to the melody, uses a microphone to analyze students' melodic and rhythmic accuracy, provides a digital accompaniment, and gives visual feedback at the end of each practice session.

The purpose of this study was to examine the effect of practice experiences with iPAS music assessment software on middle school band students' performance achievement. Specifically, I explored whether music assessment software would increase rhythmic and melodic music performance accuracy. Answers to the following questions were pursued: (1) Does the use of iPAS music assessment software improve middle school band students' pitch and rhythmic accuracy in an assigned melody? (2) Do middle school band students value experiences with iPAS music assessment software? and (3) To what extent is iPAS a reliable assessment tool?

Method

Interactive Practice Assessment Software (iPAS)

Prior to the study, the researcher created user accounts for all participants. Once logged in to iPAS, students were capable of playing an assigned method book melody with the assessment software. iPAS displays pitches and rhythms as a series of rectangles rather than as musical notation, which required students to perform from their band method book. Following the performance, correct or incorrect pitches were displayed on the monitor as green or red bars, respectively, and an overall percentage score was provided. Students then compared the monitor's visual analysis to the printed notation in their band method book to detect errors.

Data Collection

Participants (N = 45) were sixth-, seventh-, and eighth-grade wind instrumentalists from two middle school band classes in a rural Midwestern public school band program. Participants were seventh- and eighth-grade students (N = 25) who meet daily in a combined band setting, and sixth-grade students (N = 20), who were in their second year of band instruction, and also met daily. The distribution of participants across instruments was as follows: flute, n = 6; clarinet, n = 14; alto saxophone, n = 2; tenor saxophone, n = 1; trumpet, n = 15; trombone, n = 6; tuba, n = 1. Percussionists were excluded from the study, because the iPAS software does not offer snare drum or keyboard percussion instruments to be selected for assessment.

After brief instruction by the researcher, each ensemble played through their respective melody twice. Immediately following this instruction time, the researcher collected students' music. Participants individually entered a practice room to record a pretest of the melody. An RCA RP3503-B tape recorder with TDK D120 Type I cassette tapes were used.

Following the pretest recording, students were randomly placed into two groups, with Group 1 (n = 22) first receiving six iPAS sessions in six consecutive class periods. At the conclusion of Group 1's treatment with iPAS, students in both groups played the melody twice as a tutti ensemble, then were recorded individually for Posttest 1. Participants in Group 2 (n = 23) then engaged in the same treatment conditions as Group 1 had. After Group 2's treatment segment had concluded, all participants played the melody twice in class, then were recorded individually for Posttest 2. It should be noted that while participants in one group were engaging in iPAS sessions, students in the other group received no additional experiences with the target melody until the next in-class session and posttest. This design was used so that all students in each class would be able to participate in the research, while still permitting treatment group comparisons. Figure 1 outlines the timeline and design used for the study, which lasted three weeks.

Group 1

In-class playing of melody	Pretest	6 iPAS sessions	In-class playing of melody	Posttest 1	(no iPAS sessions or playing of melody)	In-class playing of melody	Posttest 2
Day 1		*Days 2-7*		*Day 8*	*Days 9-14*	*Day 15*	

Group 2

In-class playing of melody	Pretest	(no iPAS sessions or playing of melody)	In-class playing of melody	Posttest 1	6 iPAS sessions	In-class playing of melody	Posttest 2

Figure 1. *Study design implemented by the researcher.*

During their seven-minute iPAS sessions, students entered a practice room, logged on to iPAS with their user name, and were instructed to use iPAS in the following manner: listen to the melody once, practice the melody (while hearing melody and accompaniment) twice, assess (while hearing only accompaniment) once, and then log out of iPAS. Dell desktop PCs were in each of the two practice rooms, as were stereo microphones and headphones. Each day after school, the researcher logged in to student iPAS accounts and recorded student scores both on paper and in a Microsoft Excel spreadsheet.

Immediately following Posttest 2, students anonymously completed a five-point Likert-type scale anchored by *strongly disagree* (1) and *strongly agree* (5). Students circled their response to questions concerning their growth as a musician, their overall enjoyment of iPAS, and if they would use iPAS or a similar music assessment software program in the future.

To determine the reliability of iPAS, pre- and posttest scores served as a reliability measure. These evaluative scores were determined by listening to taped pre- and posttest recordings and scoring to a researcher-designed rubric. Performance measures included pitch accuracy, rhythmic accuracy, and tempo consistency, which are present in iPAS. A pilot study explored how iPAS determines an overall score following each assessment software experience. After comparing the relationship between the iPAS-generated overall score and subset scores for "notes" and rhythm," the researcher derived the following overall scoring formula: *(.5(Pitch Accuracy %) + .5(Rhythmic Accuracy %)) X (Tempo Consistency %) = SCORE*

Pitch Accuracy, Rhythmic Accuracy, and Tempo Consistency are percentage values out of 100 points, with Tempo Consistency converted to a decimal value. For example, a Pitch Accuracy value of 60%, a Rhythmic Accuracy value of 80%, and a Tempo Consistency value of 50% would be scored as such: (.5(60) + .5(80)) X .50 = a 35% iPAS score.

The melody was included on each rubric to aid in scoring. While listening to the taped pre- and posttest recordings, the researcher indicated mistakes on the printed melody. A circle represented a melodic mistake, while a box represented a rhythmic mistake. Tempo consistency was rated by the researcher's musical inclinations and with the aid of a Dr. Beat DB-90 metronome. Student tempo consistency scores were anchored by the following scale: *tempo is largely uneven* (0-39), *tempo is slightly more even* (40-59), *tempo is mostly even* (60-89), and *tempo is even* (90-100). Musical elements (e.g., articulations, dynamics, phrasing, etc.) are not assessed by iPAS, and were intentionally not included on the evaluation rubric. During the pilot study, student scores were used to derive the scoring formula, but the evaluative rubric was not tested or used to evaluate students. An example of the evaluation rubric can be found in Appendix A.

Music Selection

The melody for each ensemble's iPAS sessions was carefully selected from *Standard of Excellence Enhanced Comprehensive Band Method Book 2* (Neil A. Kjos Publishing Company, 1994). Each melody selected included musical knowledge and technical skills that had been introduced recently to the students. The melodies were never played prior to the start of the study, nor were they played at other times during the study besides during iPAS practice sessions or during the pre- or posttests.

Both melodies were chosen for this study because they incorporated newly-introduced musical concepts and because they were lesser-known folk songs. The melody selected for the sixth-grade students was "Shepherd's Hey," number five in *Standard of Excellence Enhanced Comprehensive Band Method Book 2*. This melody required musicians to change pitches during eighth notes. Clarinetists were faced with pitches "above the break," which had been introduced the two weeks before the start of the study. These higher pitches require the use of the register key. Range was not an issue for the remaining instrumentalists, because the melody comprised pitches learned during fifth grade band instruction. The first four measures were repeated, with a D.C. al Fine also occurring, resulting in an AABA melody.

The melody chosen for seventh- and eighth-grade students was "When Johnny Comes Marching Home," number 87 in *Standard of Excellence Enhanced Comprehensive Band Method Book 2*. This melody is in the time signature of 6/8, with an eighth note pick-up note occurring before the first measure. The rhythm of quarter-eighth note is prevalent, with a series of three eighth notes occurring six times. The highest pitch is a concert D, which challenged brass players to repeatedly reach the higher partial. Woodwinds were expected to demonstrate successful pitch accuracy in the higher register, which was largely above the staff for both the flutes and alto saxophones and above the break for clarinetists.

Results

Data consisted of iPAS assessment scores, researcher-evaluated performance achievement scores (a pretest and two posttests), and student-reported Likert-type scales indicating their perceptions of individual musical growth and their enjoyment in using iPAS.

The Role of iPAS in Improving Melodic and Rhythmic Accuracy

Results indicated that students' musical performance achievement scores significantly increased following experiences with assessment software. Participants in both classes experienced six practice sessions with the iPAS music assessment software. A dependent paired-samples *t*-test determined

statistically significant improvement in Group 1 students' first iPAS score (50.23 ± 4.96) to their sixth iPAS score (68.73 ± 4.82), $t(21) = -5.693$, $p < .001$. The same analysis for Group 2 determined significant improvement from students' first iPAS score (48.70 ± 5.85) to their sixth iPAS score (58.39, ± 6.54), $t(22) = -3.23$, $p < .005$.

Pre- and posttests were assessed using the researcher-designed evaluative rubric, with rhythmic accuracy, pitch accuracy, and tempo consistency determining students' scores. Scores for each evaluation were out of 100 total points, and were determined using the formula listed in the *Data Collection* section of the Method. These scores are presented below.

Table. Mean Music Performance Achievement Scores

	Group 1 (n=22)		Group 2 (n=23)	
	M	SD	M	SD
Pretest	57.62	(19.20)	46.56	(27.48)
iPAS Session 1	50.23	(23.28)	-	-
iPAS Session 6	68.73*	(22.60)	-	-
Posttest 1	80.56	(18.17)	61.88	(20.86)
iPAS Session 1	-	-	48.70	(27.44)
iPAS Session 6	-	-	58.39*	(31.38)
Posttest 2	79.41	(16.82)	77.74	(13.47)

* $p < .005$

Students' Expressed Value of iPAS

Immediately following the study, all participants completed a five-point Likert-style survey regarding their growth as a musician and their experiences with iPAS. Students were asked to indicate their response on three statements regarding their musical growth, their enjoyment of using assessment software, and if they would enjoy using assessment software in the future. The Likert-type scale was anchored by *strongly disagree* (1) and *strongly agree* (5). Fifty-five percent of the sixth-grade students responded with an "agree" or "strongly agree" response to "I improved as a musician by using the iPAS assessment software." When asked the same question, only 24% of seventh- and eighth-grade band students responded with "agree" or "strongly agree." 72% of the seventh- and eighth-grade students responded with "neutral" or "disagree" statements. The majority of students in both classes indicated "agree" or "strongly agree" that they would enjoy using iPAS in the future (75% in sixth-grade, 84% in seventh- and eighth-grade).

iPAS Reliability

To determine the reliability of iPAS, students' final iPAS scores were compared to their posttest scores that followed software usage (Group 1 and Posttest 1; Group 2 and Posttest 2). A Pearson correlation coefficient test indicated a moderately strong relationship ($r = .61$, $p = .001$).

Discussion

The findings of this study suggest that middle school band students' music performance achievement significantly increased following frequent experiences with iPAS music assessment software. This result is at odds with previous studies (Buck, 2008; Lee, 2007), which found that students' performance gains following assessment software practice experiences were observable, but not significant. Although Lee (2007) did notice a significant difference when older grades' performance achievement scores were compared to those of beginners, this current study found significance in performance achievement for all grade levels after frequent experiences with iPAS.

In earlier research, it was suggested that music assessment software is both a valid (Karas, 2005) and reliable (Woody & Lehmann, 2010) evaluation tool. Although primary data collection in this investigation consisted of performance achievement scores generated by iPAS, a comparison of iPAS scores to the rubric-based posttest evaluations indicated only a modest correlation. This could be the result of a design issue of the rubric or a lack of an additional reliability checker. The rubric scoring formula, which was approximated from analysis of audio recordings and iPAS-generated scores collected during a pilot study, now appears to need further refinement. After a secondary analysis, it seems iPAS does not place such a strong emphasis on tempo consistency as originally thought. Future studies implementing a similar study design could benefit from additional reliability checkers (i.e., expert evaluators), an improved rubric scoring formula, or by using identical performances to determine the reliability of iPAS. Notwithstanding, only scores generated by iPAS—and not determined from the rubric—were used in the statistical analysis of students' performance achievement gains.

While significant increases in performance achievement were found across evaluations following music assessment software experiences, a deeper analysis of mean gains by Group 1 and Group 2 within the experimental design context is necessary. Students in Group 2, who did not play the melody nor receive iPAS experiences during approximately two weeks following their pretest recording, experienced a mean gain from the pretest to Posttest 1 of 15.32 (see Table). Perhaps the increase in mean performance scores was caused by the development of similar musical and technical skills through daily classroom instruction or a desire to perform as well as Group 1 participants. Although the melodies for both ensembles were chosen specifically for their approximation to

students' abilities, the reasons mentioned above could possibly have had an effect on students' score gains.

iPAS immediately displays visual feedback (e.g., incorrect pitches as red rectangles, a percentage score indicating overall correct score) after a melody is performed or practiced. Assessment software provides a young musician more rhythmic and melodic accuracy feedback than is possible during traditional practice sessions and classroom rehearsals. The presence of such feedback could also explain why mean performance scores increased, but more investigation is necessary.

iPAS provides students with immediate visual feedback and allows students to practice as many times as they desire—holistically, analytically, or both. Assessment software has the potential to guide students' self-monitored practice (Bazan, 2011). However, students will only become analytic practicers if specifically guided so by their teachers, as these programs will not make recommendation for future practice sessions or strategies (Oare, 2012). Teachers must instruct students how to practice effectively and also how to use their practice time for maximum performance gains (Miksza, 2007; Rohwer & Polk, 2006). Simply relying on music assessment software alone likely will not enhance students' self-awareness or performance. Teachers who elect to incorporate these programs as formative assessments should consider listening to each individual performance submission to ensure that the software correctly assesses student performances (Long, 2011) and to ensure students' proper development of expressive musical characteristics (e.g., articulation, tone quality, dynamics, phrasing). Knowing middle school instrumentalists are less accurate in evaluating their individual tone, intonation, and technique (Hewitt, 2005), music assessment software can serve as an effective means to evaluate melodic and rhythmic accuracy.

It is widely understood that music teachers, especially conductors of large ensembles, are constantly assessing their groups' performance quality and demonstration of skills. Ensemble directors that involve students in a collaborative process can develop students' self-assessment skills by directing students' critical listening abilities and by posing group questions during rehearsals (Crochet & Green, 2012; Hale & Green, 2009). These abilities are particularly important, as assessment software will not provide immediate performance feedback during ensemble rehearsals. The ultimate goal is for students to develop and transfer assessment skills to both group performance and their individual practice. Since accurate self-assessment abilities and specific practice strategies have been shown to increase students' musical achievement (Duke, Simmons, & Cash, 2009; Miksza, 2007; Oare, 2012), teachers must be cognizant of students' self-assessment abilities and guide students in setting individual practice goals that are both motivating and attainable. Perhaps future research could investigate how assessment software can further supplement young music students' self-assessment abilities or analyze students' practice strategies when using music assessment software.

While assessment software may not be the ultimate means to determine students' progress and achievement, it could serve as an excellent addition to a teacher's assessment repertoire. In knowing that iPAS only evaluates rhythmic and pitch accuracy, teachers must design assessments which determine students' mastery of other music performance characteristics and additional content knowledge. Any band teacher incorporating assessment software has a tremendous responsibility to broaden and develop students' musical abilities beyond mere rhythms and pitches.

Although gathering verbal comments about the software was not part of the study design, I became aware of students' changing perceptions. Perhaps not surprisingly, many students initially felt frustrated, which was caused by the lack of notation present on the screen (both during performance and when showing errors), issues in perceiving the computer-generated tempo count-off, or difficulty performing a melody at the tempo set by iPAS (e.g., the tempo was too fast for student success). Hermanson and Kerfoot (1994) noted that implementing technology in music private lessons can devote attention to addressing technical glitches, which results in a loss of instructional time. Once students were more comfortable with iPAS, they generally perceived the program as more of an aid, not a distraction. Perhaps students' struggles were related to the assessment software's interface. Zanutto (2007) suggested that "SmartMusic's graphical organization is logical" (p. 4), whereas the display for iPAS is "somewhat less convenient for the student" (p. 5). Additional research comparing iPAS to SmartMusic may be of significance.

Research investigating student efficacy and motivation following experiences with SmartMusic assessment software has yielded positive results (Buck, 2008; Walls, Erwin, & Kuehne, 2013). It is interesting that 55% of the sixth-grade students in the present study believed they had improved performance achievement following iPAS, while only 24% of seventh- and eighth-grade students shared that belief. Although no students received a perfect iPAS score, most students (75% of sixth-grade students, 84% of seventh- and eighth-grade students) agreed that they desired to use iPAS in their future musical practice. Differences in students' expressed perceptions of and experiences with iPAS, especially across varying age levels, may be worthy of further investigation.

It is encouraging that students' music performance achievement increased after using music assessment software and that most students wished to use the program in the future. With this being said, additional research is necessary to determine the exact causes of these score increases. Despite the results of this study, it remains unclear if the mean student music performance achievement scores increased solely because of usage of assessment software or if additional factors (e.g., musical development through other classroom activities, peer competition, individual practice opportunities during class time, frequent feedback) influenced score increases. Although iPAS provides an immediate score following a full performance, the program lacks concert band literature,

sight-reading exercises, or other supplementary musical materials. iPAS is programmed to only assess the melodies contained within the *Standard of Excellence* books. To supplement iPAS, the teacher can create MIDI recordings using Finale notation software and then upload files for future assessments. Another limitation is that only wind instruments are able to use iPAS, because the software platform was not designed to recognize snare drum, mallet or auxiliary percussion. Band directors who choose to use iPAS to assess wind instrumentalists' performance achievement must create alternative assessments for their percussionists.

The twenty-first century student is immersed with technology, but a gap in research regarding music assessment software currently exists. Although this study was perhaps limited by both its short time period and a small number of participants, the findings are encouraging. Further investigation on assessment software's potential to improve students' performance achievement is needed. In recognizing the significant impact of technology upon our profession, future research must be conducted on music assessment software and its roles in improving melodic and rhythmic accuracy, sight-reading accuracy, and the development of students' self-assessment abilities; its application in both the classroom and at home; its effects on students' self-efficacy; its effectiveness in the choral, orchestral and jazz realms; its role in aiding students' short- and long-term musical retention; and the types of practice strategies used by students while using assessment software.

References

Allvin, R. L. (1971). Computer-assisted music instruction: a look at the potential. *Journal of Research in Music Education, 19,* 131-143. doi: 10.2307/3343819

Arms, L. (1997). *The effects of computer-assisted keyboard instruction on meter discrimination and rhythmic discrimination of general music education students in the elementary school.* Unpublished doctoral dissertation, Tennessee State University, Memphis.

Austin, J. R., & Berg, M. H. (2006). Exploring music practice among sixth grade band and orchestra students. *Psychology of Music*, *34*, 535–558. doi: 10.1177/0305735606067170

Bazan, D. (2011). The use of student-directed instruction by middle school band teachers. *Bulletin of the Council for Research in Music Education*, *189*, 23-56.

Buck, M. W. (2008). *The efficacy of SmartMusic assessment as a teaching and learning tool.* (Doctoral dissertation). Retrieved from ProQuest, UMI Dissertations Publishing. (UMI No. 3346520)

Bush, J. E. (2000). The effects of a hypermedia program, cognitive style, and gender on middle school students' music achievement. *Contributions to Music Education*, *27*(1), 9-26.

Choate, R. A. (Ed.) (1968). *Documentary report of the Tanglewood Symposium.* Washington, DC: Music Educators National Conference.

Crochet, L. S., & Green, S. K. (2012). Examining progress across time with practical assessments in ensemble settings. *Music Educators Journal*, *98*(3), 49-54. doi: 10.1177/0027432111435276

Deal, J. J. (1985). Computer-assisted instruction in pitch and rhythm error detection. *Journal of Research in Music Education, 33,* 159-166. doi: 10.2307/3344803

Dekaney, E. M. (2003). The effect of computerized versus classroom instruction on the phonetic pronunciation of English. *Journal of Research in Music Education, 51,* 206-217. doi: 10.2307/3345374

Duke, R. A., Simmons, A. L., & Cash, C. D. (2009). It's not how much; it's how: characteristics of practice behavior and retention of performance skills. *Journal of Research in Music Education, 56,* 310-321. doi: 10.1177/0022429408328851

Goodson, C. A. (1992). *Intelligent music listening: An interactive hypermedia program for basic music listening skills.* Unpublished doctoral dissertation, University of Utah, Salt Lake City.

Gordon, E. (2001). *Preparatory auditation, audiation, and music learning theory: A handbook of a comprehensive music learning sequence.* Chicago, IL: GIA Publications.

Hale, C. L., & Green, S. K. (2009). Six key principles for music assessment. *Music Educators Journal*, *95*(4), 27-31. doi: 10.1177/0027432109334772

Hewitt, M. P. (2005). Self-evaluation accuracy among high school and middle school instrumentalists. *Journal of Research in Music Education*, *53*, 148-161. doi: 10.1177/002242940505300205

Hermanson, C. D., & Kerfoot, J. (1994). Technology assisted teaching: Is it getting results? *American Music Teacher*, *43*(6), 20-23.

Howe, M. J. A., Davidson, J. W., & Sloboda, J. A. (1998). Innate talents: Reality or myth? *Behavioral and Brain Sciences*, *21*, 399-442. doi: 10.1017/S0140525X9800123X

iPAS (2008). iPAS Interactive Pyware Assessment. Retrieved from http:// www.pyware.com/ ipas/

Karas, J. B. (2005). *The effect of aural and improvisatory instruction on fifth grade band students' sight reading ability.* (Doctoral dissertation). Retrieved from *Dissertations & Theses: A&I*. (Publication No. AAT 3199697).

Lee, E. (2007). *A study of the effect of computer assisted instruction, previous music experience, and time on the performance ability of beginning instrumental music students.* (Doctoral dissertation). Retrieved from *Dissertations & Theses: A&I*. (Publication No. AAT 3284028).

Leong, S. (2012). Navigating the emerging futures in music education. *Journal of Music, Technology and Education*, *4*, 233-243. doi: 10.1386/jmte.4.2-3.233_1

Long, M. K. (2011). *The effectiveness of the SmartMusic™ assessment tool for evaluating trombone student performance.* (Doctoral dissertation). Retrieved from *Dissertations & Theses: A&I*. (3457640).

McPherson, G. E., & Renwick, J. M. (2001). A longitudinal study of self-regulation in children's musical practice. *Music Education Research*, *3*, 169–186. doi: 10.1080/14613800120089232.

Miksza, P. (2007). Effective practice: an investigation of observed practice behaviors, self-reported practice habits, and the performance achievement of high school wind players. *Journal of Research in Music Education, 55*, 359-375. doi: 10.1177/0022429408317513

National Association for Music Education (1999). Vision 2020 Housewright Declaration. Retrieved from https://musiced.nafme.org/resources/vision-2020-housewright-declaration/

National Association for Music Education (1999). Opportunity to Learn Standards for Music Technology. Retrieved from http://www.nafme.org/resources/view/opportunity-to-learn-standards-for-music-technology

Oare, S. (2012). Decisions made in the practice room: A qualitative study of middle school students' thought processes while practicing. *Update: Applications of Research in Music Education*, *30*(2), 63-70. doi: 10.1177/8755123312437051

Parrish, R. T. (1997). Development and testing of a computer-assisted instructional program to teach music to adult nonmusicians. *Journal of Research in Music Education*, *45*, 90-102. doi: 10.2307/3345468

Pearson, B. (1994). *Standard of Excellence Enhanced Comprehensive Band Method Book 2*. San Diego: Neil A. Kjos Music Company.

Rohwer, D. & Polk, J. (2006). Practice behaviors of eighth-grade instrumental musicians. *Journal of Research in Music Education, 54*, 350-362. doi: 10.1177/002242940605400407

Sheldon, D. A., Reese, S. & Grashel, J. (1999). The effects of live accompaniment, intelligent digital accompaniment, and no accompaniment on musicians' performance quality. *Journal of Research in Music Education, 47,* 251-265. doi: 10.2307/3345783

Walls, K. C., Erwin, P. M., & Kuehne, J. M. (2013). Maintaining efficient ensemble rehearsals without sacrificing individual assessment: SmartMusic assessment could leave the director on the podium. *Journal of Technology in Music Learning*, *5*, 4-16.

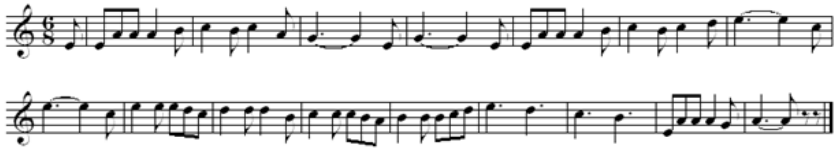
Woody, R. H., & Lehmann, A. C. (2010). Student musicians' ear-playing ability as a function of vernacular music experiences. *Journal of Research in Music Education*, *58*, 101-115. doi: 10.1177/0022429410370785

Zanutto, D. R. (2007). Comparison of online music assessment software. Paper presented at the annual conference of the California Music Educators Association, Ontario, CA. Paper retrieved from http://csulb.edu/depts/music/wordpress/dzanutto/files/2011/07/ATMI-Comparison-of-Online-Music-Assessment-Software21.pdf

Appendix A

Sample rubric created by the researcher used to determine participant pre- and posttest scores.

Student ID _____ Class _____ Test_____



A circled note indicates a pitch error in the performance. A boxed note indicates a rhythmic error.

____ / 50 Pitch Accuracy (-1 point for each individual error)

____ / 50 Rhythmic Accuracy (-2 points for each error)

Tempo is largely uneven.			Tempo is slightly more even.		Tempo is mostly even.			Tempo is even.	
10	20	30	40	50	60	70	80	90	100

$\frac{\text{}}{\text{.5 Pitch}} + \frac{\text{}}{\text{.5 Rhythm}} = \frac{\text{}}{\text{}} \times \frac{\text{}}{\text{Tempo \%}} =$ **/ 100**

The Effects of Projected Films on Singers' Expressivity in Choral Performance

Daniel Keown, lPhD
University of Missouri–Kansas City
April 2013
Committee Chairperson: Dr. Charles Robinson

Dissertation Abstract:

The purpose of this study was to investigate the effects of projected film visuals on singers' expressivity in choral performance. The study was divided into three phases. In Phase One, university choir singers (N = 21) viewed eight audiovisual pairings (two film excerpts and four choral etudes) and rated these pairings according to perceived music to film congruency. Based on these ratings, two choral etudes were identified that elicited the broadest congruency contrasts when paired with the film segments.

In Phase Two, a different group of university choir singers (N = 116) rehearsed and prepared both of the selected choral etudes referred to as "Doh" and "Noo." Subsequently, these singers were organized into smaller chamber ensembles (n = 11), and performed each choral etude three times under the following conditions: (1) while viewing congruent film, (2) while viewing incongruent film, and (3) with no film projected. After each performance, singers reported their level of self-expression. At the completion of all three performances, singers reported their preferred performance condition. Finally, participants listened to their audio-recorded performances and rated these for performance expressivity and personal preference. During Phase Three, choral experts (N = 8) rated performance expressivity and reported personal preference for each audio-recorded performance.

A two-way ANOVA with repeated measures found significant main effects of both etude and film visual performance condition on participants' expressivity ratings ($p < .001$). Additionally, a significant etude x film visual performance condition interaction was discovered ($p < .001$). Participants rated self-expression significantly higher when singing with a congruent film compared with other conditions for both etudes ($p < .001$). Chi-square tests found most preferred experiences during congruent performances, and least preferred experiences during incongruent performances for both etudes ($p < .001$). Expressivity ratings for audio-recorded performances indicated significantly higher expressivity ratings for the performances influenced by the congruent film visual of etude "Doh" ($p < .05$), while no significant differences were found for etude "Noo" ($p > .05$). Implications of these findings are discussed in relation to filmmaking techniques, music education curriculum, choral rehearsal pedagogy, and composition/performance practice, with recommendations for future research.

Factors Influencing Non-Music Majors' Decisions to Participate in Collegiate Bands

Jennifer Ann Moder, IPhD
University of Missouri–Kansas City
April 2013
Committee Chairperson: Dr. Joseph Parisi

Dissertation Abstract:

William Revelli stated that perhaps one of the greatest weaknesses of our school band programs is that, for the majority of the students, active participation ceases upon the day of graduation from our high schools. Music educators should strive to motivate all students, regardless of degree path, toward lifelong music making. After high school, many students do not pursue music as a major yet decide to participate in a collegiate ensemble. It seems relevant to investigate the influences behind these choices. The purpose of this study was to determine what factors contributed to a non-music major's decision to participate in their collegiate band(s). An email soliciting student participation was sent to college band directors through the College Band Directors National Association (CBDNA). The 17-question electronic survey included an open-ended response, a 7-point Likert-type scale investigating factors that influenced their decision to participate in a collegiate ensemble, and demographic information. Participants (N = 2,933) were students enrolled at 95 colleges and universities from 37 states. The majority (56%) were enrolled in more than one type of band. Results from the open-ended response revealed that an overall love/enjoyment for music was the primary reason for continued music participation. Likert-type scale analysis showed a compilation of factors ultimately led to student participation. The factors with the highest mean scores, representing the strongest influences, were love/enjoyment for music, the overall high school band experience, self-pride of being a member of the college band, social aspects involved with the college band, and quality and reputation of the college band. Students enrolled in athletic bands (marching and pep bands) displayed higher motivation to continue playing from social influences whereas students enrolled in concert ensembles (concert and jazz bands) appeared to be more influenced by musical aspects. Findings from this study suggest that participants' intrinsically motivated desire to continue playing is largely due to the enjoyment started in beginning band, and continued throughout high school. Further research may investigate specific aspects related to the high school experience that promote continued music performance as well as techniques directors of all levels can utilize to encourage lifelong music making.

In-Service Elementary ESOL Teachers' Perspectives, Usage, and Difficulties of Teaching English Through Music

Pei-Ying Lin, Ph.D
University of Missouri–Columbia
May 2013
Committee Chairperson: Dr. Wendy L. Sims

Dissertation Abstract:

Due to the increasing numbers of English Language Learners (ELLs) in the U.S., additional ways of teaching English need to be discovered. This study was designed to investigate teachers of English for Speakers of Other Languages' (ESOL) perspectives, usage, and difficulties of teaching English through music. Missouri in-service elementary ESOL teachers (*N*=108), responded to a researcher-designed online survey, which collected the participants' background information, their perspectives on using music, the methods they used to incorporate music into their classes, and their difficulties and needs. The majority of participants perceived a positive effect of music on students' learning, and felt comfortable singing and teaching songs to their students. However, they reported a generally low use of music to teach English, with vocabulary being the English language skill taught most frequently with music. Singing songs was the most popular music activity, and children's songs were the most commonly used genre. Songs that include repetition were the most frequently chosen criteria for song selection, and having students echo line-by-line was the most frequently used music teaching method. The majority of the ESOL teachers preferred finding music materials and resources through the Internet, and online video clips were the most popular. The main obstacles reported were a lack of time in the class schedule and lack of training in teaching with music, knowledge about music resources, music integration, and song selections. Recommendations include a redesign of teacher preparation and professional development programs to incorporate strategies and materials for teaching English through music.

Promoting Parent-Child Secure Attachment Bonds in Adoptive Families through Community-Based Family Music Groups: A Heuristic Grounded Theory Study

Erin Lyn McAlpin, MA
University of Missouri–Kansas City
May 2013
Committee Chairperson: Dr. Deanna Hanson-Abromeit

Thesis Abstract:

The purpose of this heuristic grounded theory study was to discover how community-based family music groups could foster bonding development in adoptive families. The subjects were 11 adoptive families with a total of 41 family members. Every adoptive family included at least one parent and at least one adopted child under three and one-half years old: siblings also participated. Data sources included three parental interviews, eight-weeks of parental journaling, and an eight-week Kindermusik® Wiggle & Grow family music class. Through the analysis of data three themes were identified, (a) healing awareness, (b) acceptance awareness, and (c) compassion awareness. These three themes then informed the development of a conceptual summary of community-based family groups to promote parent-child secure attachment bonds.

A Rhythmic Auditory-Motor Entrainment of Gait patterns in Adults with Blindness or Severe Visual Impairment

Della Molloy-Daugherty, lPhD
University of Missouri–Kansas City
May 2013
Committee Chairperson: Dr. Deanna Hanson-Abromeit

Dissertation Abstract:

The following study investigates the impact of a rhythmic cue on the observational gait parameters of a population of adults with blindness or severe visual impairment. Forty-six adults who had sight loss significant enough to require the use of a long cane for mobility purposes participated in the study. Participants were between the ages of 18 - 70 years. The study design was a within-subjects, repeated measures design with two levels for the independent variable of the metronome (uncued versus cued) and two levels for the independent variable of tempo (normal walk versus fast walk). Dependent variables of cadence (steps per minute), velocity (meters per minute), and stride length (cadence ÷ (velocity ⁄ 2)) were recorded. Within-subjects repeated measures statistical analyses identified a main effect for the independent variable of the metronome; subsequent analysis revealed that the metronome had a significant effect on the dependent variable of cadence. The presence of a rhythmic cue seemed to improve observational gait parameters for many of the study participants. A more in-depth investigation reveals the complex interrelationship of gait parameters, as well as the need to differentiate between the clinical importance of the study and the need for additional basic scientific research. While compelling clinical inferences can be drawn from this study, there continues to be a need to establish rhythmic auditory-motor entrainment as a sound theoretical framework upon which further research and clinical protocol development for this sample population can be based.

Missouri Music Educators Association State Conference Research Poster Presentations
January 2014
Osage Beach, MO

Faculty Research

A Content Analysis of Country Western Music 1923-2013
Robert Groene, University of Missouri-Kansas City

Pilot Participant Perceptions of the Missouri Preservice Teacher Assessment
Daniel Hellman, Missouri State University

"My Life's Playlist:" The Role of Music in the Lives of Adolescents
Daniel Keown, University of Missouri-Kansas City

The Effects of Nia Movement on Collegiate Female Choral Singing
Marci L. Major and Melissa Baughman, University of Missouri-Columbia

Are They Ready to Teach? Reflections from Two Music Student Teachers Concerning Their Field Experiences and Student Teaching
Carol McDowell, Coverdell Elementary School, St. Charles, MO

The Effect of Disability Type, Biased Statements, and Musical Task Complexity on Undergraduate Music Majors' Decisions Related to Inclusion in Music Performance Ensembles
Charles R. Robinson, Joseph Parisi & Melita Belgrave, University of Missouri-Kansas City

Missouri High School Band Directors' Reports of Tuning Procedures, Warm-Up Materials, and Rehearsal Time Allocation
Brian A. Silvey, University of Missouri-Columbia

The Role of the Dissertation in Music Education Doctoral Programs
Wendy L. Sims, University of Missouri-Columbia

Thai Pre-Service Music Educators and Their Future in Music Education and its Role in Society
Lindsey Williams, University of Missouri-Kansas City & Somcha Trakarnrung, Mahidol University, Thailand

Master's and Doctoral Degree Final Research Projects, Theses, or Dissertations

Elementary Classroom Teachers' Usage and Perceptions if Music in the General Classroom
Jennifer E. P. Campbell, University of Mississippi

Motivations and Influences of Undergraduate Music Education Students Electing to Perform a Senior Recital
D. J. Culp, Jr., University of Mississippi

The Effects of High Arousal and Low Arousal Background Music on Human Reaction Time
Justin A. Doss, University of Missouri-Kansas City

The Effect of Tempo and Director Instruction on Practice Time In New Horizons Band Participants
Philip Edelman, University of Missouri-Kansas City

Academic Hazing in Music Education
Cameron W. Jenkins, University of Mississippi

University Music Appreciation Lectures: Observations of Nonverbal Behaviors Used by Novice and Experienced Instructors
Erica Kupinski, University of Mississippi

Paid In Joy: A Qualitative Study of Singers' Decisions to Persist as Members of MU Choral Union
Elizabeth Hogan McFarland, University of Missouri-Columbia

The Effects of Integration on the Little Rock Central High School Band Program, 1954–1964: A Review of Literature
Brandon E. Robinson, University of Mississippi

And to What, Pray Tell, Might These Feelings Refer? An Observational Study of Students' Self-reported Cognitive Behaviors Concerning Referential Attentiveness
Jeremy Edwin Scarbrough, University of Mississippi

Inclusion of the Exceptional Child in the Music Classroom
Mark Sweat, University of Mississippi

From Segregation to Integration: A Historical Study of Music Education in Louisville Colored School (Camile High School) through 1970
Jeremy S. Thompson, University of Mississippi

Student Projects

Popular Perceptions: Are Students Ready to Accept Videogame Soundtracks as a Viable Medium
Josh Barbre, University of Missouri-Columbia

Call for Papers
2015 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, 2014. 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.

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.

Submission Procedures. Authors are invited to submit an abstract of 150 – 200 words and manuscript in a single doc attachment to the editor via DanielHellman@MissouriState.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 subscribes to the Research Publication/Presentation Code of Ethics of the Music Education Research Council of MENC: The National Association for Music Education and the National Research Committee of the American Music Therapy Association.

M J R M E

The oldest continuously published state journal dedicated to music education research

www.mmea.net/content/mmea-mjrme