Texas Music Education Research 2000

Reports of Research in Music Education
Presented at the Annual Meeting of the Texas Music Educators Association
San Antonio, Texas, February, 2000

Robert A. Duke, Chair TMEA Research Committee
School of Music, The University of Texas at Austin

Edited by: Charlotte Mizener,
The University of Texas/Pan American

Published by the Texas Music Educators Association, Austin, Texas

CONTENTS

Edited by
Charlotte Mizener, *The University of Texas—Pan American*

Temperament Variability and Music Styles: Relationships with Dimensions of Emotional Tone, Arousal Magnitude, and Compositional Structure

Deborah Hammond Atkins, *University of North Texas*
John W. Flohr, *Texas Woman's University*

Preferences for music styles and ratings for dimensions of music may vary depending on inherent temperament characteristics and propensities for emotional expressiveness. Research has suggested that how much a style of music is liked or preferred and the magnitude of its intensity or arousal potential may be particularly revealing about music's emotional power and influences on cognition and creativity. Musical intensity, one's affective perception of music or emotional tone, can convey strong levels of concentrated emotion which provide insight into emotions elicited by music in relation to individual variation in temperament (Atkins, 1998; Brittin & Duke, 1997; Weinberger, 1998). Cognitive aspects of music perception and sensory experience are inextricably tied to one's emotions and preferences when listening (Burt, 1939; Payne, 1980; Sloboda, 1985; Atkins, 1998). Music is intrinsically associated with human emotional processes and functional systems, and it is through these processes that music may have its most profound impact on children's learning. Music offers a particularly creative and enriching avenue for enhancing children's learning and development (Atkins, 1999).

Individuals vary greatly in temperament and propensities to seek out and prefer more or less arousing perceptual stimuli, that is, to experience optimal thresholds for sensory stimulation and arousal. Some individuals may prefer music with formal structure, characteristic of most classical styles, whereas others prefer styles with human emotional overtones that are predictable (Kemp, 1996; Atkins, 1998). Individual differences in temperament may further contribute to development of styles of emotional expression, and expressive therapies including music may enhance immune function and well-being (Atkins, 1998; Berry & Pennebaker, 1999; McCraty, Atkinson, Rein, & Watkins, 1996; McKinney, Antoni, & Kumar, 1997).

The purpose of this study was to examine differences in ratings by college students of classical and rock music across dimensions of positive emotional tone, arousal magnitude, and compositional structure. College students completed an Affect Intensity Measure (AIM; Larsen, 1984), a temperament measure of characteristic emotionality and reactivity. Music selections included excerpts 15-20 seconds in length of seven pieces. Students were asked to rate each excerpt on a Likert-type scale ranging from low (1) to high (5). Students were categorized based on affect intensity score (low, moderate or high). Comparisons were made between styles (classical and rock) and dimensions of music (positive emotional tone, arousal magnitude, and compositional structure).

A secondary goal of this study was to (a) identify a group of musical selections in classical and rock styles; (b) rate those pieces in relation to the three dimensions of music indicated; and (c) employ pieces with similar ratings in positive emotional tone (first priority), compositional structure (second priority) and arousal (third priority) in an infant (newborn) music preferences study (Flohr, Atkins, Bower, and Aldridge, 2000).

Method

Participants comprised 108 college students, over 95% female, in early childhood and music education classes at the University of North Texas and Texas Woman's University. An informed consent form was provided for each student's acknowledgement and agreement to participate.

Materials and Evaluation Measures

Selected music included excerpts 10 to 20 seconds in length from the beginning of each of seven pieces recorded on a tape in the order to be presented. Tempo for each piece was approximately 80 beats per minute. A JVC portable CD/tape player was used for presentation of the pieces to classes of students.

Selections included: "Radio" by Smashmouth; "Brandenburg Concerto" by J. S. Bach; "Holier Than Thou" by Metallica; "Jamburino" by G. F. Handel; "Ragdoll" by Aerosmith; "Flight of the Bumble Bee" by Rimsky-Korsakov; and "19th Nervous Breakdown" by the Rolling Stones. Researchers selected pieces on the basis of their being recognizable classical and rock examples receiving high ratings in positive emotional tone.

The Affect Intensity Measure (AIM; Larsen, 1984) is an adult measure of affect intensity (AI), a dimension of temperament defined as one's characteristic emotionality or reactivity to daily life events. Affect intensity has been shown to be highly correlated with emotional reactivity, activity level, and sociability. The AIM is a 40-item measure including statements to be rated on a 1-6 Likert-type scale. Research by Larsen and his colleagues has shown the average score for college students is 3.6, and women tend to score higher than men. In the present study, participants' scores were categorized as low, moderate, or high. Ranges for these scores were as follow: low AI (2.5-3.5); moderate AI (3.6-3.9); high AI (4.0-5.1).

Researchers developed a Music Rating Form for the dimensions of music. A five-point Likert-type scale, with 1 as the low end, was used for rating each dimension of the seven pieces. Definitions of the three dimensions appear below.

Positive Emotional Tone (PET) – noticeable positive qualities of the sounds that elicit pleasurable thoughts, feelings, or sensations in response to the music.

Arousal Magnitude (AR) – noticeable physiological changes or stimulation in response to the music.

Compositional Structure (CS) – organized repetitions and contrasts of sounds.

Researchers presented the music listening study to five college classes and obtained informed consent from all students interested in participating. The AIM measure and music rating form were briefly explained. Participants were then asked to complete the AIM (five to ten minutes). When completed, music segments of the seven pieces were played, and students were given approximately 15 seconds after each piece to record their ratings on the music rating form. At the conclusion of the listening activity, forms were collected and questions were answered.

Results

Principal Components Factor Analysis was used to examine 21 variables including three dimensions of music for each of the seven pieces (see Figure 1). Seven factors were evaluated to determine which composite variables clustered together and accounted for the largest proportion of variance for style and dimension ratings These factors were entered into a Discriminate Function Analysis with the affect intensity group variable. Pooled within-class standardized canonical coefficients over 0.50 indicated that Factors Three, Five and Six showed the largest relationship with the affect intensity group variable and were selected to reduce error and maximize systematic variation. Factor Three = 0.57; Factor Five = -0.55; Factor Six = 0.51. In addition, Factor Seven (0.39) showed a systematic relationship with affect intensity In essence, the predictor variables were reduced to show that these factors indicated the largest separation between means in the affect intensity groups.

Temperament Variability/ Music Styles
Principal Components Factor Analysis
Varimax Rotation

Factor 1		**Factor 2**		**Factor 3**		**Factor 4**		**Factor 5**		**Factor 6**		**Factor 7**	
C1CS	0.53	R1AR	0.58	R4PET	0.88	C2PET	0.81	R1CS	0.74	R3AR	0.82	C1PET	0.79
C2CS	0.70	R1PET	0.68	R4AR	0.78	C2AR	0.76	R2CS	0.74	R3PET	0.77	C1AR	0.73
C3Cs	0.84	R2AR	0.78	R4CS	0.69			R3CS	0.73				
C3PET	0.53	R2PET	0.71										
C3AR	0.64												

Discriminate Function Analysis —
Pooled within-class standardized canonical coefficientone

Factor 3= 0.57
Factor 5= - 0.55

Key

C: Classical Piece
R: Rock Piece
PET: Positive Emotional Tone
AR: Arousal Magnitude
CS: Compositional Structure

Music Stimuli

C1=Bach
C2=Handel
C3=Rimsky-Korsakov
R1=Smashmouth
R2=Metallica
R3=Aerosmith

Figure 1.

Variables in Factor Three showed a positive correlation with affect intensity. These include R4PET, R4AR, R4CS, the Rolling Stones piece. Variables in Factor Six showed a positive correlation with affect intensity. These include R3PET and R3AR, the Aerosmith piece. Those with moderate to high affect intensity scores tended to rate the Aerosmith and Rolling Stones pieces higher in positive emotional tone and arousal than did the low affect intensity group. R4PET, high/moderate affect intensity in comparison to low affect intensity, $F = 5.11$, df (1, 106), $p < 0.0259$. R4AR, high/moderate affect intensity in comparison to low affect intensity, $F = 5.32$, df (1, 106), $p < 0.0231$. R3PET, high/moderate affect intensity in comparison to low affect intensity, $F = 3.45$, df (1, 106), $p < 0.0658$. R3AR, high/moderate affect intensity in comparison to low affect intensity, $F = 2.6$, df (1, 106), $p < 0.11$.

Variables in Factor Five showed a negative correlation with affect intensity. These include R1CS, R2CS, R3CS, all rock pieces, compositional structure. For R1 and R2, examination of the relationship with affect intensity suggests that those with low affect intensity scores tend to rate CS higher in comparison to PET and AR: R1, low AI, $F = 6.96$, df (2, 113), $p < 0.001$; R2, low AI, $F = 7.6$, df (2, 114), $p < 0.0008$.

Results further showed that classical pieces with similar ratings in PET and CS and rock pieces with similar ratings in PET and CS received significantly different overall style ratings when collapsed to evaluate differences between classical and rock styles (see Figure 2) . The classical style received a higher overall rating in comparison to the rock style. C1 and C2 were compared to R3 and R4 for PET (collapsed across AI levels): $F = 17.2$, df (1 ,430), $p < 0.0001$. C1 and C2 were compared to R3 and R4 for CS (collapsed across AI levels): $F= 20.12$, df (1, 430), $p < .0001$. There were no significant differences between styles in relation to arousal ratings.

Temperament Variability and Music Style Mean Ratings on a Scale of 1—5 (*n*=108) January 2000

	R1 Smash-mouth-Radio			C1 Bach-Brandenburg Concerto #2			R2 Metallical-Holier Than Thou			C2 Handel-Jamburino			R3 Aerosmith-Ragdoll			C3 Rimsky-Korsakov-Flight of Bumble Bee			R4 Rolling Stones-19th Nervous Breakdown		
AI	PET	AR	CS	PET	AR	CS	PET	AR	CS	PET	AR	CS	PET	AR	CS	PET	AR	CS	PET	AR	CS
High	2.26	2.82	3.02	3.66	3.03	3.71	2.68	2.82	3.37	4.16	3.63	4.03	3.61	3.84	3.82	3.34	3.45	3.84	3.53	3.39	3.29
Med	2.47	2.63	3.03	3.80	3.20	4.20	2.60	3.10	3.53	4.13	3.50	4.07	3.80	3.80	3.57	3.47	3.30	3.97	3.60	3.23	3.33
Low	2.33	2.74	3.33	3.51	2.77	3.51	2.64	3.05	3.79	4.08	3.46	4.18	3.28	3.49	3.61	3.26	3.31	3.97	3.02	2.82	3.38

C1 and C2 compared to R3 and R4 for PET (low AI): F=12.57, df(1,154), p<.0005
C1 and C2 compared to R3 and R4 for CS (low AI): F=5.5, df(1,154), p<.02
C1 and C2 compared to R3 and R4 for AR (low AI): F=.04, df(1,154), p<.8336
C1 and C2 compared to R3 and R4 for PET (moderate AI): F=224, df(1,118), p<.1374
C1 and C2 compared to R3 and R4 for CS (moderate AI): F=14.03, df(1,118), p<.003
C1 and C2 compared to R3 and R4 for PET (moderate AI): F=.72, df(1,118), p<.398
C1 and C2 compared to R3 and R4 for PET (high AI): F=3.94, df(1,154), p<.0489
C1 and C2 compared to R3 and R4 for PET (high AI): F=3.64, df(1,154), p<.0582
C1 and C2 compared to R3 and R4 for PET (high AI): F=2.1, df(1,154), p<.1496

KEY

AI— Affect Intensity
PET—Positive Emotional Tone
AR— Arousal
CS— Compositional Structure

Figure 2.

When classical and rock styles were evaluated in relation to low, moderate, and high AI levels, there were significant differences for style in relation to PET and CS. The classical style received higher ratings from low affect intensity individuals in relation to dimensions of PET and CS; for high affect intensity individuals, dimensions of PET; and for moderate affect intensity individuals, the dimension of CS. These results should be interpreted with caution as the number of tests inflates the probability of Type I error. In addition, Cohen's *f* effect sizes were all relatively small with only moderate affect intensity, a dimension of CS, accounting for a reasonable proportion of variance (11%). These findings, however, provide some indication of the trends that may be present in relation to affect intensity variability.

The Bach and Aerosmith pieces were selected as stimuli for the infant study based on having most similar means for positive emotional tone (PET). There were no significant differences between the pieces for PET. In addition, there were no significant differences between the pieces for CS. There were, however, significant differences for arousal (AR), $F = 21.60$, df (1, 214), $p < .0001$.

Discussion

Classical and rock music ratings in relation to dimensions of music including positive emotional tone, arousal magnitude, and compositional structure were analyzed with factor and discriminate function procedures to identify those variables which have the largest predictive relationship with affect intensity levels. Temperament traits of affect intensity were defined as an individual's characteristic level of emotionality and reactivity to emotional stimuli (Larsen, 1984). One of the most profound characteristics of music is its power to elicit emotional responses that, as a result, may enhance memory and learning processes (Atkins, 1999).

Results of this study suggest that moderate to high levels of affect intensity traits show a relationship with rock music that is rated high in emotional and arousal dimensions of music, whereas individuals with low levels of affect intensity traits gave higher ratings for compositional structure. Low affect intensity individuals may be more attentive to the structural aspects or qualities of the music. The analyses did not show the same strength of these relationships with affect intensity for classical music. Rock music shows a more systematic, predictive relationship to affect intensity traits than does classical music. The rock pieces that show a larger relationship with affect intensity (Rolling Stones and Aerosmith) are also the pieces that received the highest ratings in positive emotional tone as compared to the other rock pieces (Smashmouth and Metallica). Although the relationship with classical pieces was not as strong, some systematic relationship was present in relation to those with higher ratings in emotional tone.

In the present study, style ratings were shown to have some systematic relationship with affect intensity variability, particularly for select rock music. In general, however, individuals tend to rate classical examples higher than rock examples for dimensions of positive emotional tone and compositional structure. These findings suggest that there may be some associative relationship between the emotional and structural dimensions of the music that should be examined further. Interestingly, differences in overall style ratings were not attributed to differences in ratings of arousal. In addition, participants were not asked to state their preference for classical or rock music. Further research should examine other individual differences in relation to ratings of the perceptual qualities and dimensions of music that may influence preference.

The rock and classical pieces with the most similar ratings in positive emotional tone and compositional structure (Aerosmith and Bach) were employed as stimuli in a study using a non-nutritive sucking preference procedure with newborns. This study further explores the variability in preferences within style and across dimensions of music.

While individuals vary in temperament or traits of emotionality, future research should examine additional characteristics of music that may weigh heavily in establishing preference for style. This line of research suggests implications regarding influences of temperament traits on preferences and relationships to the complex and elegant interactions that exist between dimensions of music and within different styles. As a caveat, researchers should be cautious about prescribing a 'music diet' that primarily focuses on classical or any one style of music. Human development has exhibited a special richness attributed to the diversity of individuals and their preferences which extends to the music they make and enjoy.

Acknowledgements

Support for this research was provided in part by the Velma E. Schmidt Programs in Early Childhood Education, University of North Texas, the Sid Richardson Foundation, Fort Worth, Texas, and the National Academy of Recording Arts and Sciences. Special thanks are extended to Richard Herrington and Ian Tordella for statistical support and data compilation.

References

Atkins, D. H. (1998). *Psychology and physiology of emotion: Perspectives on human emotion.* Under review for publication, Cambridge University Press.

Atkins, D. H. (1999). Research in the arts, child development and neuroscience: Implications for early childhood education. *Success for Life* Curriculum, Chapter 2. University of North Texas.

Berry, D. S. and Pennebaker, J. W. (1999). Nonverbal and verbal emotional expression and health. *Psychotherapy and Psychosomatics, 59* (1), 69-83.

Brittin, R. V. and Duke, R. A. (1997). Continuous versus summative evaluations of musical intensity: A comparison of two methods for measuring. *Journal of Research in Music Education, 45*, 245-258.

Burt, C. (1939). The factorial analysis of emotional traits. *Character and Personality, 7,* 238-254; 285-299.

Flohr, J. W., Atkins, D. H., Bower, T. G. R., & Aldridge, M. A. (2000, February). *Infant music preferences: Implications for child development and music education.* Paper presented at the meeting of the Texas Music Educators Association, San Antonio, TX.

Kemp, A .E. (1996). *The Musical Temperament*. New York: Oxford University Press.

Larsen, R. J. (1984). Theory and measurement of affect intensity as an individual difference characteristic. *Dissertation Abstracts International, 5,*2297B. (University Microfilms No.84-22112).

McCraty, R., Atkinson, M., Rein, G., & Watkins, A. D. (1996). Music enhances the effect of positive emotional states on the salivary iqA. *Stress Medicine, 12,* 167-175.

McKinney, C. H., Antoni, M. H., Kumar, M., McCabe, P. M., & Tims, F. (1997). Effect of guided imagery and music (GIM) therapy on mood and cortisol in healthy adults. *Health Psychology, 16* (4), 390-400.

Payne, E. (1980). Towards an understanding of musical appreciation. *Psychology of Music, 8*, 31-41.

Sloboda, J. A. (1985). *The musical mind.* New York: Oxford University Press.

Weinberger, N. M. (1998). Creating creativity with music and understanding music's emotional power: Music aids memory retrieval in infants. *MuSICA Research Notes, 5),* 1-12.

Edited by
Charlotte Mizener, *The University of Texas—Pan American*

The Self-Expressed Professional Development Needs of Music Educators

Chelcy Bowles
University of Wisconsin-Madison

Continuing education is generally recognized as one of the most important aspects of professional employment. Professionals throughout the nation express concerns about keeping up with and effectively using rapidly developing technology, about the changing workplace, the changing local and global communities, and the expectations of professionals which permeate the hierarchy across disciplines. Professional educators are particularly concerned about their changing roles from deliverers to facilitators of learning, and somehow balancing the need to effectively utilize constantly developing technology and research with the need to develop more effective teaching skills in a changing society.

In addition to external changes and factors that necessitate the pursuit of professional development, educators themselves experience pedagogical, intellectual, affective, life and career stages that should be addressed (Day & Pennington, 1993). Recent studies have sought to understand educators' perspectives on their own professional development, and they underscore the fact that little is known about how in-service teachers learn and apply their learning (Scribner, 1999).

Although university music teacher education programs are equally concerned with providing programs of study for those preparing to enter the field, there is no way for programs to meet the needs of teachers over a lifetime of teaching in countless situations. Day (1998) suggests that teacher preparation programs are only the initial step in the course of a career requiring continuous development; teacher education programs best serve professionals by producing teachers who view themselves as lifelong learners. In addition, there is an inherent delay in being able to respond to immediate and transitory needs of in-service teachers within the complex university system.

Traditionally, university continuing education units; school administrations; arts organizations; and local, state, and national professional organizations or other organizations external to the university music unit have been better able to respond to immediate needs of the profession. Most commonly, responses to needs are in the form of short-term opportunities such as workshops, seminars, conferences, etc., in spite of the frequent arguments that professional development should be a process that takes place on a continuous basis within the context of the

teaching setting (Hussey et al, 1999; Newman, 1998; Olebe, 1999). Numerous examples of long-term professional development programs for educators can be found in the literature, a few of them specifically for arts educators. In Iowa, a Professional Development Residency Program for Arts Educators was developed to provide on-site guidance for applying new strategies in the classroom (Colwell, 1996). Discipline-based institutes have sought to integrate music/arts educators, classroom teachers, and administrators in collaborative initiatives to improve the long-term effect of summer training (Anderson and Wilson, 1996). While programs such as these have been highly effective, they are admittedly costly in terms of time and budget expenditure for all partners in the process of long-term professional development (Colwell, 1996).

At present, while professional development is dictated by state and/or local education agencies and recognized as a necessity by educators themselves, it is not generally supported with financing or with release from teaching responsibilities. Regardless of global recognition of the importance of continued education, it frequently remains the responsibility of educators to obtain and finance their own professional development. Therefore, educators with professional development requirements, both imposed and self-realizing, must consider opportunities that are affordable, are external to the daily demands of the teaching schedule, and meet their needs in terms of licensure/employment, retainment/advancement, curricular demands, and/or personal teaching skill development. Teachers continue to seek short-term, affordable, quality experiences, generally in the form of workshops.

Recognizing the need for professional development experiences of high quality that meet the multiple needs of in-service educators, the Wisconsin Music Educators Association embarked on a mission to provide annual workshops based on the specific needs of state educators. As an initial step, the WMEA Board requested and financially supported a survey of Wisconsin in-service music educators to investigate their professional development needs.

Method

A questionnaire was developed to explore interests in topics for professional development opportunities (workshops in particular) and for general preferences regarding such aspects as motivation, sponsorship, leadership, format, accreditation, costs, location, housing, and study requirements. The form included a brief section clarifying terms used in the questionnaire.

A list of 18 topics were compiled from questionnaires that had been gathered over the prior three years at the Wisconsin Music Educators Association annual conference regarding conference participants' suggestions for "hot topics" for professional development opportunities. Respondents were also given a blank "other" option to list topics of interest that were not included on the list. The portion of the questionnaire regarding general preferences (15 items) was modeled after a survey instrument utilized in a prior study investigating the preferences of respondents wishing to begin or continue music study in adulthood (Bowles, 1991). In addition to choosing general preferences, respondents were asked to indicate their teaching specialty (band, choir, elementary general, etc.) and teaching level (elementary, middle school, university, etc.), with directions to indicate multiple specialties and levels if appropriate.

A letter describing the purpose of the survey and the questionnaire were mailed to 1541 active members of the Wisconsin Music Educators Association. Four hundred fifty-six completed questionnaires were returned, representing a return rate of 30%. Responses were analyzed using Microsoft Excel 5.0. Demographics, topics, and general preferences are reported in numbers and in percentages.

Results

The 456 respondents included teachers of band, orchestra, choir, elementary general music, secondary general music, and private lessons. Because respondents were asked to indicate multiple teaching specialties if appropriate, it was quite common for more than one specialty to be reported by each respondent. Therefore the numbers and percentages reported for specialties taught total more than 456 or 100%. The most frequently reported specialty was by respondents indicating that they teach elementary general music (n = 188; 41%), followed by band (n = 179; 39%), choir (n = 165; 36%), secondary general music (n = 68; 15%), and orchestra (n = 38; 8%). Four respondents reported that they teach private studios only. Results indicated that 31% of all respondents teach two specialties (including private lessons), and 9% (n = 42) teach three specialties. Twelve respondents indicated that they teach four specialties, and two teach five specialties. An analysis was made of frequent combinations of teaching specialties. Of the 188 who teach elementary general music, 46% teach choir and 21% teach private lessons in addition to general music. The 179 teachers of band do not commonly teach other specialties, with only about 12% teaching in any other single category, including private lessons; only 5% teach orchestra as well as band. Of the 165 choir teachers, 52% also teach elementary general music, and 19% teach private lessons. Among the respondents indicating that they teach secondary general music, 65% also teach choir, 44% teach elementary general music, and 21% teach private lessons in addition to secondary general music. Twenty-four percent of the 38 who teach orchestra also teach band (n = 9), and 16% (n = 6) teach private lessons.

An analysis was also made of teaching levels. Results indicated that 51% (n = 234) teach at the elementary level, 48% (n = 221) teach middle school, 40% (n = 121) teach at the high school level, and 8% (n = 38) teach university/college. Again, because respondents were asked to report all levels at which they teach, the totals sum to more that 100%. The additional specialty taught at various levels could not be determined from the data. In analyzing frequent grade level combinations of particular specialty categories, 36% of those teaching elementary general music also teach at the middle school level. Of those teaching secondary general music, 52% teach at the middle school level, 35% at the high school level, and 30% also teach elementary school. Sixty-eight percent of the band teachers teach middle school, and 57% teach high school. Of those who teach choir, 54% teach at the middle school level, 52% at the elementary level, and 42% teach high school. Many respondents teaching orchestra teach in elementary school (71%); 61% teach at the high school level, and 55% teach middle school.

Respondents were asked to indicate which of the 18 topics listed they felt a workshop would benefit; the number of choices was not limited. They were also given an "other" option to write in topics in which they were interested that were not on the list. Table 1 shows a ranking of all topics for all respondents (N = 456) and by specialty categories. The most frequently chosen topics by descending rank order were Technology (66%), Assessment (57%), Instrument/Choral Literature (53%), Standards (45%), Creativity (43%), and Grant Writing (38%).

The most frequently chosen topics by teaching specialty were generally similar to those chosen by all respondents. Elementary general music teachers were most interested in opportunities directly related to general music, however, followed by technology. They were also more interested in Multiple Intelligence (ranked 5) and Multiculturalism and Interdisciplinary Curriculum (tied for rank 6) than were the total responding. Likewise, teachers of secondary general music were interested in workshops focusing on General Music (ranked 2 after

Technology), as well as Multiple Intelligence (ranked 5) and Health-Related Issues (ranked 6). Choir teachers ranked Health-Related Issues 4 and General Music 5. Orchestra teachers were also interested in Health-Related Issues (ranked 5). Topic choices of teachers of band were quite similar to the ranks for all respondents.

In response to the "other" option for topics of interest not included on the list, general categories included community relations/support/advocacy, advanced vocal and instrumental pedagogy, writing curriculum, specific methodologies (Orff, Kodaly, Dalcroze, CMP), brain research, scheduling, teaching composition, instrument repair, multi-age curriculum, and teacher training supervision.

General preferences

Respondents were asked to indicate preferences regarding the programming of workshops intended for professional development. They were asked to choose as many options as they wished for each survey item. (Although an analysis was made of all general preference items according to teaching specialty categories, specialty category responses were almost identical to the selections for all respondents.)

Regarding sponsorship, 54% of the respondents preferred to participate in programs sponsored by university continuing education programs in music; 37% preferred workshops sponsored by a national/state/local music association. The overwhelming motivation for participating in a workshop was to increase skill and/or knowledge (82%). Several respondents wrote that all of the listed options were motivators for participation. Seventy-two percent (329) indicated that they wanted university credit for completing a workshop; 154 specified graduate credit and only eight undergraduate credit. When asked how much time per day they would be willing to spend working on assignments in addition to a seven-hour workshop day to meet curricular or credit requirements, 56% indicated one to two hours would be satisfactory, but 30% would not spend more than one hour. Eighty percent indicated that they would be willing to complete assignments after the workshop ended in order to earn more credits.

Most respondents (63%) preferred that academic leadership be provided by a state or regional professional educator/artist, although 54% preferred a nationally or internationally renowned leader (choir, 64% for each of these options; orchestra, 63% for a national leader). Of the 244 indicating preference for a leader of national reputation, however, 209 said they would not pay more than $200 a day for the expertise. The majority of those writing in a response to this question indicated that "any of the above" or "any qualified person that is an expert on a particular topic" was satisfactory.

Seventy-two percent preferred consecutive-day intensive workshops taking place in the summer, although 49% indicated preference for one-weekend intensive workshops during the academic year. Half of the respondents had no preference for workshop location, but 42% preferred a college/university music facility (61% of orchestra teachers selected this option). Respondents in all categories preferred to stay within 100 miles of their homes to attend workshops, although 32% were not willing to travel over 50 miles. Regarding where respondents wanted to be housed for a consecutive-day workshop, 54% preferred commercial hotels, while 37% indicated they preferred university/college dormitory facilities. Many respondents filled in the "other" option for the housing preference question, with write-ins most frequently indicating preferred housing to be "home" or "least expensive."

While 42% indicated that they considered a reasonable per-day workshop fee to be less than $50, 48% considered a reasonable fee to be as much as $75 per day (52% of elementary general teachers would not pay more than $50). Forty-four percent were not willing to pay more than

$150 per graduate credit. Most respondents (65%) were willing to spend up to $50 on materials in addition to the workshop fee.

The final survey question had to do with distance learning opportunities. Forty-two percent said they were interested in studying via electronic correspondence course, and 37% by mail correspondence. Still, 43% were not interested at all in studying via correspondence. (Band teachers are more interested in studying via electronic correspondence than other specialties, and more interested in studying via correspondence in general; orchestra teachers are generally less interested than other specialties).

Discussion

The survey yielded no startling overall results regarding expressed topics of interest and general preferences in programming to those familiar with the music education profession and those who provide continuing experiences. The most frequently chosen topics of Technology, Assessment, Instrument/Choral Literature, Standards, Creativity, and Grant Writing by all respondents and by teaching specialty groups echo themes of professional journals, conferences, seminars, and workshops across the country. It was interesting that teachers of general music at the elementary and secondary levels ranked multiple intelligence, multiculturalism, and interdisciplinary curriculum among the top six topics of interest. But these are themes that general music educators may be more expected to incorporate into their programs than do teachers of performing organizations. Furthermore, these topics may be new enough that teacher preparation programs did not include them in the college curriculum at the time that many educators pursued college degrees. Certainly that is true of technology, assessment, and standards. The interest in grant writing indicates a general recognition of the inability of traditional school funding resources to meet many of the current needs for adequate facilities, technology, instruments, and literature -- as well as funding for professional development.

Regarding general preferences related to programming professional development experiences, it was interesting that the majority of respondents (63%) were quite satisfied with local or state academic leadership. While 54% were also interested in learning from nationally or internationally renowned leaders, respondents indicated that they were not particularly willing to pay what may be considered the "market" rate.

Although almost half of the respondents were interested in weekend intensive workshops during the academic year, teachers overwhelmingly preferred the traditional summer consecutive-day intensive workshop. Clearly, this traditional format has somewhat responded to the needs of in-service educators. Respondents were asked about their interest in studying via correspondence, either by mail or electronically. It was surprising that 43% were not at all interested in studying at their own pace in their own homes, particularly considering the general concerns of time and money. Only 42% were interested in studying electronically; this aligns quite plausibly with the top-ranking expressed need for more technology expertise. There is some evidence that when given on-line professional development opportunities (as opposed to in-services and workshops), response is quite positive (Mohnsen, 1998). Perhaps as music teachers become more comfortable with electronic teaching and learning, attitudes expressed in the present survey will change.

As a result of the survey, the Wisconsin Music Educators Association is sponsoring its first credit workshop for music educators in Summer 2000, considering all of the expressed needs and preferences possible at this time, and with plans for sponsoring future opportunities. Although this study was designed to investigate the needs of Wisconsin music educators, the results may

be of general use to universities, school administrators, arts organizations, and local, state and national professional organizations that program professional development opportunities for music educators. In addition, the survey instrument may serve as a model to investigate the preferences of particular groups of music educators and for other populations seeking professional development opportunities.

References

Anderson, J. & Wilson, B. (1996). Professional development and change communities. *Music Educators Journal, 83*, 38-42 & 50.

Bowles, C. (1991). Self-expressed adult music education interests and music experiences. *Journal of Research in Music Education, 39,* 191-205.

Colwell, R. (1996-97). Professional development residency program. *The Quarterly Journal of Music Teaching and Learning, 7* (2-4), 76-90.

Day, C. & Pennington, A. (1993). Conceptualizing professional development planning: A multidimensional model. *Journal of Education for Teaching, 19* (2), 251-261.

Day, C. (1998). The role of higher education in fostering lifelong learning partnerships with teachers. *European Journal of Education, 33* (4), 419-433.

Hussey, K., Estrada, N., Decker, D., & Crawford, S. (1999). How much time should teachers devote to professional development? *Journal of Physical Education, Recreation & Dance, 70* 12-13.

Mohnsen, B. (1998). When you want it and where you want it. *Journal of Physical Education, Recreation & Dance, 69*, 14-17.

Newman, J. (1998). We can't get there from here. *Phi Delta Kappan, 80* (4), 288-296.

Olebe, M. (1999). California formative assessment and support system for teachers (CFASST): Investing in teachers' professional development. *Teaching and Change, 6* (3), 258-271.

Edited by
Charlotte Mizener, *The University of Texas—Pan American*

Perception and Recall of Melodic and Rhythmic Patterns: Effects of Example Length and Tonal/Rhythmic Variety

Ruth V. Brittin
University of the Pacific, Stockton, California

The listener's ability to discriminate and remember musical information is an important area of interest to music educators. Organization of musical material has been identified as influencing musical memory (Canelos, Murphy, Blombach, & Heck, 1980, p. 244). As Bartlett summarizes (1980, p. 231), "a melodic sequence of limited length can be stored for a brief period and recalled quite accurately given certain parameters. A longer sequence can be processed accordingly if melodic elements are grouped in some way." In studying tonal memory, Pembrook (1986) speculated this short-term memory limit falls somewhere between 10 and 16 tones. In his study, tonality and motion did not contribute as much to subjects' response variance as much as length of example, leading the author to state, "this may indicate simply that no matter what type of melody is presented (tonal/atonal, conjunct/disjunct, etc.), subjects cannot remember more than a certain number of tones" (p. 254).

The temporal organization of melodic information is one factor not examined in Pembrook's study. Past research seems to indicate that temporal grouping (i.e., rhythmic variety within a melodic passage) improves accurate recall of melodic passages. Dowling (1973) found rhythmic groupings seemed to aid retrieval of melodic information. Deutsch (1982) found that sequences of 12 pitches were recalled more nearly correctly when presented in temporally divided groups of threes and fours; furthermore, temporal groupings by fours in excerpts where pitch contour suggested groups of threes made recall of those excerpts more difficult. As Deutsch states, her experiments "demonstrate that temporal segmentation has a profound effect on perceived structure" (p. 311).

Although rhythmic organization seems to influence melodic recall, at least when patterns conform to some level of listener expectancy, it seems less clear whether melodic organization aids or hampers rhythmic recall. Boisen's (1981) subjects were not more accurate perceiving rhythmic completeness within a melodic context compared to a monotonic setting. Fiske's (1982) subjects listened to pairs of items with rhythmic or tonal discrepancies. The amount of time required to respond "same" or "different" was analyzed, as was response accuracy. Findings were: (a) For atonal, randomly generated phrases, subjects took longer to pinpoint pitch and

rhythm errors in a tonal-rhythmic context than when either factor was presented without the other; (b) For tonal, familiar phrases, less time was required to pinpoint errors in a tonal-rhythmic context than when either factor was presented independently; and (c) response accuracy (for atonal and tonal stimuli) was not significantly different for tonal-rhythmic presentations and exclusively tonal or rhythmic presentations. Further work (Fiske, 1984) showed that, for selected patterns, rhythmic processing occurred faster than tonal processing.

Sink (1983) noted that simultaneous presentation of melody and rhythm may reduce the listener's attention to music's absolute rhythmic structure. With further testing, Sink (1984) advised that "when rhythmic concepts are the focus of music lessons, it initially may be beneficial to some subjects to present concepts relating to rhythm in a monotonic rather than a melodic-rhythmic context" (p. 191).

Schellenberg and Moore (1985), however, suggested that varying the overall melodic-rhythmic context is detrimental to accurate recall. Subjects were more accurate in responding "same/different" to musical examples presented twice in tonal-rhythmic context as compared to examples presented once in a tonal-rhythmic context and once in an abstract setting (either pitch or rhythm excised). The change of overall context interfered with recall. Manipulation of the rhythmic component affected error rates to a greater extent than did manipulation of the pitch component.

More recent research has examined ear training students' rhythmic and pitch perceptions during two-part dictation tasks. Beckett (1997) studied undergraduate music majors' counterpoint dictation when working in a non-directed situation, concentrating on rhythm first, or concentrating on pitch first. She found that rhythm "seemed to be more independent of pitch than pitch was from rhythm" (p. 621); specifically, delaying pitch notation did not adversely affect rhythmic notation, but delaying rhythmic notation adversely affected pitch notation.

The purpose of the present study was to explore listeners' recall of tonal and rhythmic figures within and exceeding the example length limits suggested by Pembrook (1986). It remains unclear whether presentation in a tonal-rhythmic context or in a presentation where pitch or rhythm are excised promotes more accurate discrimination and recall. This study's design is similar to Schelenberg and Moore's (1985); rather than contrasting the context of an entire passage, however, I manipulated specific pitch and rhythm errors within a consistent context.

Method

This study examined organizational roles of melody and rhythm and their effects on perception and recall for melodies of varying lengths. Subjects, 94 undergraduate music majors in first and second year ear training classes, listened to pairs of passages and indicated whether the second example was "the same" or "different" from the first. Subjects were not informed whether they should focus on melodic or rhythmic discrepancies.

For the stimuli, eight melodies were selected from Kodaly's *Twenty-four Little Canons on the Black Keys,* consisting of quarter, eighth, and half note values. Each melody was paired with itself for comparison, with half of the presentation pairs including an alteration. The pentatonic mode was chosen to avoid leading tone implications, while utilizing actual music. Two additional pentatonic melodies were constructed as practice examples. The same order of presentation was used in all cases.

Subjects were assigned to one of the following presentation groups:

Group A - melody with rhythmic variety (presented in quarter, eight and half notes)

Group B - melody without rhythmic variety (presented in quarter notes only)
Group C - rhythm with melodic variety (presented pentatonically)
Group D - rhythm without melodic variety (presented monotonically)

Thus, Groups A and C heard the same melodies, with Group A distinguishing melodic alterations and Group C distinguishing rhythmic alterations. Group B heard the melodies with the rhythm variety excised, and Group D heard the rhythms with the melody excised.

Subjects heard eight pairs of items, four pairs presented with a change and four pairs presented without change. Subjects in Groups A and B heard melodic changes only (in Examples A, C, D, and E, with no changes in the other examples). Those in Groups C and D heard rhythmic alterations only (in Examples B, F, G, and H, with no changes in the other examples).

Melodic alterations consisted of one quarter note lowered or raised by a major second. Rhythmic alterations consisted of one quarter note changed to two eighth notes, or two eighth notes replaced by one quarter note. In all cases, (a) contour of the melody was retained; (b) alterations were excluded from a passage's first, last, highest, and lowest notes; (c) half of the examples had alterations on a "strong beat" (beats one or three), with the others on "weak beats"; and (d) the pentatonic mode was retained on melodically altered phrases.

To ascertain the effects of example length on perception and recall, passages included 10, 13, 16, or 21 pitches. All examples were in common time, ranging from two to four measures in length, depending on the number of notes in the pattern. Variables already listed were systematically ordered across the four example lengths. Twenty students' test-retest reliability for the tool was .88 (agreements/agreements + disagreements).

Prior to each presentation, the first pitch of the example was sounded to orient subjects to the new pitch center. Melodies were presented so that the four melodies beginning on "la" were alternated with those beginning on "do." Different keys were used for each of the melodies to avoid cumulative familiarity with one key center. Monotonic rhythmic patterns were played on only one pitch, the first pitch of the corresponding melody. Presentations were recorded on a Nakamich BX-300 cassette deck from a Yamaha TXP piano tone generator.

Results

This study was designed to examine perception and recall for rhythmic and melodic patterns of various lengths, subjects indicating "same/different" for eight paired examples. Stimuli featured manipulation of rhythmic figures (quarter and eighth notes) or pitches (changes of a whole step). Each subject's raw score could range from a maximum of eight comparisons to a minimum of zero comparisons answered correctly. Responses were statistically analyzed for effect of example length (10, 13, 16, or 21 pitches) with the non-parametric Friedman Analysis of Variance.

For subjects hearing passages in a varied pitch-varied rhythm context (Groups A and C), there was a significant difference between responses to different-length examples ($n = 47$, df = 3, $x2 = 15.5$, $p < .001$). For those listening to melodies in a quarter-note-only context (Group B), example length significantly affected correct responses ($n = 24$, df = 3, $x2 = 23.6$, $p < .001$). For those listening to monotonic passages, example length effected significant response differences (Group D: $n = 23$, df = 3, $X2 = 7.8$, $p < .05$). In all four treatment groups, subjects were least accurate in detecting changes in the longest examples (see Table 1). All groups except Group B (melodies heard in quarter notes) showed the same overall pattern across the four examples.

Table 1

Percentage of Correct Responses for Treatment Groups per Example Length

Number of Tones	10	13	16	21
Group A (melody with rhythm)	69%	48%	71%	38%
Group B (melody - quarter notes)	52%	67%	75%	21%
Group C (rhythm with melody)	76%	65%	80%	61%
Group D (monotonic rhythm)	78%	74%	91%	65%

Table 2 shows the relative order of difficulty for the various test items. It also indicates the percentages of correct responses per example for each treatment group. The rankings of Groups C and D appear more similar to one another than the rankings of Groups A and B, and there is, in fact, a significant difference in the consistency of example order for Groups A-B and Groups C-D, U (8.8) = 15.5, $p < .05$. Subjects hearing melodies in quarter-notes recalled certain passages, such as Example G, much more easily than when a varied rhythmic structure was used; recall for other melodies, such as Examples C and A, however, suffered under a single-rhythm presentation. That the item orders for Groups C and D did not differ so markedly seems to indicate that the presence/absence of tonality did not as extensively affect perception and recall of specific rhythmic figures.

Table 2
Order of Difficulty and Percentage of Correct Responses per Example

Group A (melody & rhythm)	**Group B** (melody)	**Group C** (rhythm & melody)	**Group D** (rhythm)
B 83%	G 79%	F 96%	**F 96%**
C 71%	B 75%	B 87%	**E 96%**
F 66%	E 71%	D 78%	B 87%
A 63%	F 63%	**E 74%**	D 78%
E 58%	D 58%	**H 74%**	**H 70%**
D 50%	C 42%	G 57%	**G 70%**
G 50%	A 30%	C 52%	**C 61%**
H 13%	H 8%	A 48%	**A 61%**

Note: Bold type indicates ties.

Discussion

This study adds to the body of information useful to those engaged in ear training, imitation through modeling, and rote-teaching of songs. Pembrook (1986) urged caution regarding the number of tones presented consecutively, advising that listeners might not accurately discriminate and recall more than 10-16 pitches. In this study, the effect of passage length on memory, overall, was found to be consequential. Examples included 10, 13, 16, and 21 pitches. The two longest of these eight passages were comparatively difficult to remember, whether in a passage with tonal and rhythmic variety or in a passage with either pitch or rhythm excised.

Based on these results and results of previous study, care should be taken in presenting more than 16 consecutive pitches. This appears true for both melodies and purely rhythmic passages, although certainly much more study should be done concerning the amount of rhythmic information that can be accurately processed and recalled. For example, the passages in this study would have included a greater number of notes had clusters of sixteenth notes been used in place of pairs of eighth notes. Nevertheless, it is interesting that memory declined for examples with 21 notes even when presented monotonically.

Schellenberg and Moore (1985) demonstrated that the tonal/rhythmic context of music is critical and that consistency of presentation will aid retention and learning. Interesting confirmation of this is seen in a study of rote teaching techniques for song acquisition (Klinger, Campbell, & Goolsby, 1998). In this study, second grade students were more successful remembering and singing traditional, one-verse songs learned through the "immersion" method, compared to the "phrase-by-phrase" method. Breaking the songs into four two-bar phrases during the teaching process appeared to interfere with students' recall. The immersion process, whereby the teacher repeatedly performs the song in its entirety, seemed to provide more consistency of presentation.

The immersion process perhaps contributed to the listeners' understanding of how the various phrases related to each other, providing "a greater sense of the continuity and integrity of a song's melody and story line" (p. 32). In the Klinger et al. work, the two melodies contained 25 and 21 pitches. Breaking the melodies into shorter phrases, with three to eight pitches each in this case, did not help recall. It is difficult to know whether the authors would have found the same striking results had the phrase-by-phrase method featured four-bar phrases with 10 to 14 pitches each. The authors state that the songs' particular antecedent-consequent phrase structure may have been at odds with their phrasing choices.

Results of the above-mentioned research relate to data in the current study. Participants were most successful on passages with 16 pitches, in which both examples featured a repeating rhythm and the listener heard a strong "question-answer" structure to the passage. All groups discriminated and recalled these examples more easily than the 13-pitch examples, which appeared less predictable, rhythmically and harmonically. Thus it appears that presentations of more than 21 pitches may be successfully learned *if given enough repetitions*, and that the internal phrase structure of the shorter patterns influences recall to a great extent.

For the eight passages used in this study, the relative difficulty of recall for specific examples changed more when the rhythmic variety was excised than when the melodic information was excised, a result corroborating Schellenberg and Moore's findings (1985) and Beckett's results (1997). Beckett notes, "subjects said that without pitch information, it was very easy to remember rhythms [but] the reverse was not true… without rhythmic organization they could not

hold pitches in memory" (p. 621). In this study, listeners seemed to apprehend rhythmic figures in basically the same way regardless of the presence or absence of tonality. Changing the rhythm to all quarter notes, however, altered the rhythmic "feel," re-organizing points of stress or rest in the melody. This was seen particularly in Example G, a passage comparatively difficult for all groups hearing the original rhythm, but the easiest passage for those hearing it in a quarter note version.

Deutsch (1982) demonstrated that temporally grouping melodic passages in ways that do not "fit" tonal information may discourage recall. In the same vein, "ungrouping" pitch information may change the listener's perception of the melody. Ear training teachers and those teaching songs by rote should be aware that "taking out the hard rhythms" by presenting pitches in equal durations may completely alter perception of the melody.

This study was not designed to test whether excising the rhythm (or melody) results in greater or less discrimination. This effect could be estimated in the future, however, with an increase of items on the testing instrument. This study also does not plumb the depths of melodic-rhythmic implications seen in responses to individual test items. Certainly one might begin to discern the impact of melodic and rhythmic groupings on discrimination and recall by examining key passages.

These passages were pentatonic melodies consisting of quarter, eighth, and half notes. They were selected because they represent patterns familiar to college ear training students. Also, it was hoped that these results might be somewhat generalizable to younger students, based on the fact that pentatonic melodies and these rhythmic patterns are widely taught at the elementary school level.

Curricular decisions dealing with selection, presentation, and sequencing of material are important aspects of music education. Determining listeners' limits of musical apprehension continues to be an area for further scrutiny.

References

Bartlett, D. (1980). Tonal and musical memory. In D. A. Hodges (ed.), *Handbook of music psychology*. Lawrence, KS: National Association for Music Therapy.

Beckett, C. A. (1997). *Journal of Research in Music Education, 45,* 613-625.

Boisen, R. (1981). The effect of melodic context on student's aural perception of rhythm. *Journal of Research in Music Education, 29*, 165-172.

Canelos, J., Murphy, B., Blombach, A., & Heck, W. (1980). Evaluation of three types of instructional strategy for learner acquisition of intervals. *Journal of Research in Music Education, 28*, 243-249.

Deutsch, D. (1982). The processing of pitch combinations. In D. Deutsch (ed.), *The psychology of music*. New York: Academic Press.

Dowling, W. (1973). Rhythmic groups and subjective chunks in memory for melodies. *Perception and Psychophysics, 14*(1), 37-40.

Fiske, H. E. (1982). Chronometric analysis of selected pattern discrimination tasks in music listening. *Psychology of Music, 10*, 37-47.

Fiske, H. E. (1984). Music cognition: Serial process or parallel process. *Bulletin of the Council for Research in Music Education, 80,* 13-26.

Klinger, R., Campbell, P. S., & Goolsby, T. (1998). Approaches to children's song acquisition: Immersion and Phrase-by-phrase. *Journal of Research in Music Education, 46*, 24-34.

Kodaly, Z. (1957). *Twenty-four little canons on the black keys*. New York: Boosey & Hawkes.

Pembrook, R. (1986). Interference of the transcription process and other selected variables on perception and memory during melodic dictation. *Journal of Research in Music Education, 34*, 238-261.

Schellenberg, S., & Moore, R.S. (1985). The effect of tonal-rhythmic context on short-term memory of rhythmic and melodic sequences. *Bulletin of the Council for Research in Music Education, 85*, 207-217.

Sink, P. (1983). Effects of rhythmic and melodic alterations on rhythmic perception. *Journal of Research in Music Education, 31, 101-113.*

Sink, P. (1984). Effect of rhythmic and melodic alterations and selected musical experiences on rhythmic processing. *Journal of Research in Music Education, 32*, 177-193.

Edited by
Charlotte Mizener, *The University of Texas—Pan American*

Infant Music Preferences: Implications for Child Development and Music Education

John W. Flohr, *Texas Woman's University*
Deborah Hammond Atkins, *University of North Texas*
T. G. R. Bower and Michelle A. Aldridge, *University of Texas at Dallas*

Research with infants in relation to preferences for various perceptual stimuli has greatly increased in the past decade. The present research examined newborn's preferences for different styles of music, the nature and characteristics of those styles in relation to positive emotional tone, arousal magnitude and compositional structure. These factors were also examined in consideration of the home music environment and cultural background as the very earliest environments may influence preferences for a range of perceptual stimuli including voices, faces or music (Krumhansi & Jusczyk, 1990; Standley, & Madsen, 1990; Trainor & Heinmiller, 1998; Walton, Bower, & Bower, 1992; Woodward, Fresen, Harrison, & Coley, 1996).

Previous research has also shown that infants show positive reactions to soothing and sedative music that elicits lower arousal states (Kaminski & Hall, 1994; Tims, 1978). In addition, music has been shown to create therapeutic environments, reduce physiological arousal and anxiety, and reduce distress and promote weight gain for premature infants (Klein & Winkelstein, 1996; Cassidy & Standley, 1995; Coleman, Pratt, Stoddard, Gerstmann, & Abel, 1997).

A customized operant choice preference sucking procedure developed by Bower and his colleagues was employed to evaluate infant preferences to musical stimuli (Walton, Bower, & Bower, 1992; Bower & Aldridge, 1999). In the sucking paradigm the baby sucks on a non-nutritive pacifier that is attached to a computer and pressure transducer. The computer program allows the baby to totally control the presentation of musical stimuli and records how long (in seconds) the baby listens to each piece in the set time allotted, therefore providing a measure of preference.

Research has suggested that the degree of liking or preference for a musical style and the magnitude of the intensity or arousal potential of the style may be particularly revealing about music's emotional power and influence on cognition and creativity. Individuals vary in temperament and propensities to seek out and prefer more or less arousing perceptual stimuli;

that is, to experience optimal thresholds for sensory stimulation and arousal (Atkins, 1998; Weinberger, 1998). Some individuals may prefer music with formal structure, characteristic of most classical styles, whereas others prefer styles with emotional overtones that are more predictable. Furthermore, cognitive aspects of music perception and sensory experience are inextricably tied to one's emotions and preferences when listening (Burt, 1939; Payne, 1980; Sloboda, 1985; Kemp, 1996; Atkins, 1999).

In addition, research examining regional activity in the brain in children has shown EEG differences associated with music listening and training, suggesting changes in processing efficiency for children receiving music instruction. This line of research suggests important implications for music education practices (e.g. Flohr, Miller, & Persellin, 1999; Flohr, Miller, Hodges, & Parsons, 1999; Flohr, Miller, &, deBeus, in press).

Results from the present research are discussed in terms of music styles and dimensions of music that may influence preferences in newborns and potential influences of the prenatal environment considered in terms of the mother's home music environment and culture.

Method

Participants were 34 normal newborns between 7 and 22 hours of age. All were Hispanic (n = 28) and African American (n = 6), including 14 females and 20 males. Newborns were recruited with maternal consent from a large English-language county hospital in Dallas, Texas (Parkland Memorial Hospital). All of the mothers who were recruited were speakers of either English or Spanish. All mothers whose babies were recruited had documented prenatal care. Criteria for participation included: 2500g or greater birth weight, Apgars of at least 8 at one and five minutes, minimum 38 weeks estimated gestational age, with no pregnancy or birth complications. All newborns passed a hearing screening test (ABRs – auditory brainstem responses). No male newborns had been circumcised. Two newborns were recruited for the experiment but would not wake up for the experimenters to conduct the stimuli presentation.

Musical excerpts by J. S. Bach and the rock group Aerosmith were selected on the basis of similarity of ratings in positive emotional tone (PET) and compositional structure (CS) (Atkins & Flohr, 2000). Tempo for each piece was in the range of 80 beats per minute. Segments of 21 seconds of instrumental music were transferred from the original CD recordings to an IBM ThinkPad laptop computer. These stimuli were recorded on a CD and loaded into an IBM ThinkPad laptop computer. The music files that were approximately 21 seconds in duration were edited to lengths of 5 seconds and 1 second using Gold Wave software on the IBM ThinkPad. Three stimuli conditions included 1, 5, and 21 seconds.

The newborns were brought to an alert quiet state and placed in their bassinets tilted at a 30-degree angle to maintain alertness. A pair of TDH-49 headphones was placed at the baby's ears. A sterilized pacifier was inserted into the baby's mouth. Both earphones and pacifier were connected to an IBM ThinkPad computer running Operant Assessment Systems (OASYS TM) audio choice-preference software. By sucking, the baby could present the music files to him/herself. The music files were presented at a comfortable adult listening level (70 dB SPL, measured at the earphones). All experimental sessions were carried out in a quiet room in the neonatal nursery.

The Operant Choice-Preference Procedure

By sucking and pausing appropriately, each infant could listen to each stimulus for as long as he/she wanted. Before testing, each infant was picked up and held by one of two experimenters. When it was determined that the infant was awake and alert, he/she was placed back in the bassinet. If either experimenter thought that the newborn became inattentive during the experiment, there was a computer facility to pause the experiment. Utilization of the pause facility was not required with any of the babies. The infant could control the presentation of the music files by sucking on the pacifier which was connected via Tygon tubing to an Omega pressure transducer with sensitivity in the range of = 20 to + 120 cm H2O. The transducer sent input to an IBM ThinkPad computer upon a complete (increment then decrement) positive pressure suck. The first complete suck brought about the presentation of stimulus 1 (S1), which for half of the infants was Bach. Stimulus presentation was uninterruptible in the 20, 5 or 1 second(s) durations of the music stimuli. Each suck was reinforced by presentation of the stimulus for the specified length. Sucks occurring during the music had no effect. After the music ceased, the next suck would re-present the same file unless the interval between the end of the music and that next suck was greater than one second. A suck occurring one second or longer after the last suck elicited the presentation of stimulus 2 (S2), which for half of the infants was Aerosmith. After Aerosmith was over, a suck occurring less than one second after the end of the music would result in presentation of the same file. If the interval was greater than one second, the computer presented the first file once again. The baby could then cycle through the same sequence over and over again, and could dwell on any stimulus as long as he/she wanted, limited only by the five minute duration of the experiment (150 seconds in the case of the 1 second condition). The baby could therefore control which piece was presented i.e., how long each stimulus was presented, by varying his/her rate of sucking.

The duration of total listening time to each music stimulus was taken as a measure. This is analogous to total look durations, a widely used measure in studies of infant vision (Walton, Bower, & Bower, 1992).

Results

Analysis of variance showed a significant effect for listening preference for Bach, $F = 59.62$, df (1,62), $p < .001$. There was a significant effect of listening time; $F = 61.87$, df (2, 62), $p < .001$. There was also a significant interaction effect; $F = 10.85$; df (2, 62), $p < .001$. The more music the infants were allowed to listen to, the more they preferred to listen to Bach. Mean listening times for the three conditions for the two pieces are shown in Table 1.

Table 1
Mean Listening Time in Seconds

1 second	5 seconds	21 seconds
$n = 13$	$n = 13$	$n = 8$

Bach, *Brandenburg Concerto*	36.08	88.54	172.00
Aerosmith, *Ragdoll*	23.54	36.39	79.75

The Bach and Aerosmith pieces were rated across three dimensions of music including positive emotional tone (PET), arousal magnitude (AR) and compositional structure (CS) (Atkins & Flohr, 2000). There were no significant differences between the pieces for (PET), $F = .41$, df (1,214), $p < .52$. In addition, there were no significant differences between the pieces for CS, $F = .68$, df (1,214), $p < .68$. There were significant differences for AR, $F = 21.60$, df (1,214), $p < .0001$, with the Aerosmith piece showing a much higher arousal rating. Means and standard deviations are shown in Table 2.

Table 2
Means and Standard Deviations for Three Dimensions of Music Ratings

	Positive Emotional Tone		Arousal Magnitude		Compositional Structure	
	mean	SD	mean	SD	mean	SD
Bach, *Brandenburg Concerto*	3.66	1.16	2.99	1.18	3.77	1.02
Aerosmith, *Ragdoll*	3.56	1.16	3.71	1.10	3.71	0.98

Reports by the mother on the Home Music Environment indicated that listening to music occurred primarily on the weekends, and music was almost exclusively Latin and hip-hop.

Discussion

Newborns in this study showed a clear preference for listening to the Bach classical piece in comparison to the Aerosmith rock piece. In addition, the longer they were allowed to listen to the music, the more they preferred Bach. The musical stimuli had been previously rated by college students for dimensions of positive emotional tone, arousal magnitude and compositional structure. Complete control of all dimensions of style was not possible. These include melodic, rhythmic, timbral, expressive (dynamics, nuance) and form (e.g. aba, sonata allegro). Pieces were selected on the basis of having similar high ratings in positive emotional tone and compositional structure and similar tempi. Ratings for arousal were significantly different indicating a higher rating for the Aerosmith piece.

The infants chose the Bach excerpt. These findings suggest that the babies may have preferred the more soothing, sedative, and less arousing piece. Because control of all dimensions of style was not possible, however, the babies' preference may be related to the style, arousal differences, or an interaction of the two. As both pieces received similar ratings in positive emotional tone and compositional structure, results suggest that both classical and select rock music possess positive qualities. These infants, however, who received little, if any, prenatal exposure to classical styles of music, showed a clear preference for Bach. This may be attributed to its less arousing qualities or other dimensions of style that may be more preferred by newborns. As indicated in our study with college students, classical music including the Bach selection received significantly higher ratings when compared to rock music for dimensions of positive emotional tone and compositional structure (Atkins & Flohr, 2000).

Other characteristics of music should be explored to further clarify the qualities and dimensions of music that elicit preferences and to provide a more informed developmental view of influences of music on the young child and further consider implications for music education practices. Research with newborns will greatly enhance our ability to evaluate different qualities and dimensions of musical styles and individual characteristics that influence music preferences and relative influences of the environment. Further studies will allow us to move to other stages in evaluating brain functions and cognitive outcomes associated with music listening and preferences and influences of styles of music on children's learning and development.

Acknowledgements

Support for this research was provided in part by the National Academy of Recording Arts and Sciences, Texas Woman's University, the Velma E. Schmidt Programs in Early Childhood Education, University of North Texas and the Sid Richardson Foundation, Fort Worth, Texas. Special thanks are extended to the staff at Parkland Memorial Hospital Neonatal Care Unit and Research Assistants with the Infant Development Laboratory, University of Texas at Dallas, for assistance with data collection.

References

Atkins, D. H. (1998). *Psychology and physiology of emotion: Perspectives on human emotion.* Under review for publication, Cambridge University Press.

Atkins, D. H. (1999). Research in the arts, child development and neuroscience: Applications for early childhood education. *Success for Life* Curriculum, Chapter. University of North Texas.

Atkins, D. H. & Flohr, J. W. (2000, February). *Music style ratings in relation to positive emotional tone, arousal magnitude, compositional structure and individual variation in emotionality.* Poster session presented at the meeting of the Texas Music Educators Association, San Antonio, TX.

Bower, T. G. R. & Aldridge, M. A. (1999). *The operant choice-preference sucking procedure.* Infant Development Laboratory, University of Texas at Dallas and Parkland Memorial Hospital, Newborn Nursery, Dallas, TX.

Burt, C. (1939). The factorial analysis of emotional traits. *Character and Personality, 7*, 238-254; 285-299.

Cassidy, J. W. & Standley, J. M. (1995). The effect of music listening on physiological responses of premature infants in the NICU. *Journal of Music Therapy, 32*(4), 208-227.

Coleman, J. M., Pratt, R. R., Stoddard, R. A., Gertsman, D. R. & Abel, H.-H. (1997). The effects of the male and female singing and speaking voices on selected physiological and behavioral measures of premature infants in the intensive care unit. *International Journal of Arts Medicine, 5*(2), 4-11.

Flohr, J. W., Miller, D. C., & Persellin, D. C. (1999). Recent brain research on young children. *Teaching Music, 6*, 41-43, 54.

Flohr, J. W., Miller, D .C., Hodges, D., & Parsons, L. (1999, February). *Recent Texas research on music and the brain*. Poster session presented at the meeting of the Texas Music Educators Association, San Antonio, TX.

Flohr, J. W., Miller, D. C., & deBeus, R. (in press). A review of EEG studies with young children: Implication for music education. *Music Educators Journal*.

Kaminski, J. & Hall W. (1994). The effect of soothing music on neonatal behavioral state in the hospital newborn nursery. *Neonatal Network, 15*(1), 45-54.

Kemp, A .E. (1996). *The Musical Temperament.* New York: Oxford University Press.

Klein, S. A. & Winkelstein, M. L. (1996). Enhancing pediatric health care with music. *Pediatric Health Care, 10* (2), 74-81.

Krumhansl, C. & Jusczyk, P. W. (1990). Infants' perception of phrase structure in music. *Psychological Science, 1* (1), 70-73.

Payne, E. (1980). Towards an understanding of musical appreciation. *Psychology of Music 8* (2), 31-41.

Sloboda, J. A. (1985). *The Musical Mind.* New York: Oxford University Press.

Standley, J. M. & Madsen, C. K. (1990). Comparison of infant preferences and responses to auditory stimuli: Music, mother, and other female voices. *Journal of Music Therapy, 27* (2), 54-97.

Tims, F. C. (1978). Contrasting music conditions, visual attending behavior, and state in eight-week-old infants. *Alf Gabrielsson Review,* 164-168.

Trainor, L. J. & Heinmiller, B. M. (1998). The development of evaluative responses to music: Infants prefer to listen to consonance over dissonance. *Infant Behavior and Development, 21* (1), 77-88.

Walton, G. E., Bower, N. J. A., & Bower, T.G.R. (1992). Recognition of familiar faces by newborns. *Infant Behavior & Development, 15,* 265-269.

Weinberger, N. M. (1998). Creating creativity with music and understanding music's emotional power; Music aids memory retrieval in infants. *MuSICA Research Notes, 5* (2), 1-12.

Woodward, S. C., Coley, N., Fresen, J., & Harrison, V. C. (1996). The birth of musical language. *Proceedings of the Seventh International Seminar of the Early Childhood Commission,* Winchester, UK, 1-11.

Edited by
Charlotte Mizener, *The University of Texas—Pan American*

Undergraduate Students' Perceptions of Teacher and Student Behavior While Observing an Applied Music Lesson

Jacqueline C. Henninger
The University of Texas at Austin

A great deal of research exists on systematic observation and its uses in the field of music education. Some studies have observed instruction in different music settings in an attempt to acquire information regarding instructional methods, rehearsal strategies, teacher behavior, and student behavior. Other studies have structured instructional observation tasks to be completed by subjects of varying backgrounds.

Duke (1987) compared the perceptions of feedback-trained music therapy and music education majors with untrained education majors who viewed a videotaped recording of an applied lesson. Trained and untrained observers had different perceptions: trained observers estimated a higher proportion of teacher talk and a lower proportion of student talk than the untrained observers, and untrained subjects recorded a higher proportion of evaluative comments and more positive evaluations than the trained subjects. Schmidt (1992) found that untrained observers were capable of reliably evaluating some applied teaching behaviors. These results were found after analyzing the reliability of untrained observers' (music educators and music majors) evaluations of applied music instruction from three different perspectives: test-retest reliability, interrater reliability across different teachers, and interrater reliability for evaluators of lessons.

Gholson (1998) sought to identify and characterize patterns of expert teaching as they occurred in the context of applied lessons taught by a master violin teacher. It was revealed that particular strategies of practice "were characterized through a theory of 'proximal positioning' because these strategies gave the teacher a way of shaping and positioning her instructional interventions in proximity to (the) students' frames of reference" (p. 539). Each of the observation studies that were conducted with an applied lesson setting, which is the setting of the present study, provided valuable information regarding both teacher and student behaviors.

Some studies have compared the perceptions of observers with different types of training. Standley and Greenfield (1987) showed that pre-intern and pre-senior music education and

music therapy majors who viewed an elementary music lesson provided significantly different numbers of observational statements regarding teacher and student behavior. On all of the measured variables (comments, sequences, and types of reinforcement), the pre-interns had significantly more stated observations that were more specific and more accurate than the pre-seniors.

Madsen and Standley (1991) sought to determine whether different levels of expertise of music therapists and educators would affect perceptions of effective instruction, and whether years of teaching experience and expertise were independent of one another. The researchers analyzed the subjects' responses based on their factual and inferential content. A positive correlation was found between individuals' teaching experience or expertise and the accuracy of their observation statements, with scores increasing with subjects' teaching experience or expertise.

Madsen and Duke (1985b) compared observations made by music education and music therapy students instructed to focus on various aspects of an elementary classroom music lesson. These results showed that the two different groups of students provided significantly different types of written observations. While the music therapy students expressed a need for an increased amount of teacher approval, the music education students' estimation of teacher approval was twice as high as that of the music therapy students. Additionally, the music education students' comments were more directed toward the behavior of the teacher while their observations were targeted toward the behavior of the student. Conversely, the music therapy students had a greater frequency of comments that were targeted toward the activities of the class. This study demonstrates that observers with different training focus on different variables while observing music lessons.

One of the purposes of the present study was to determine whether music majors would have similar perceptions of an applied music lesson as non-music majors. Duke and Blackman (1991) examined the perceptions of music and non-music education majors who viewed a general music lesson after being directed to attend to different aspects of the teaching. The researchers found significantly different observations based on the students' major. Non-music majors gave significantly higher ratings for the variables "reinforces correct responses," "gives corrective academic feedback," and "reinforces appropriate behavior" than did the music majors.

Prickett and Duke (1992) also examined the observations of undergraduate students with different backgrounds. Both music and non-music education majors observed and evaluated a videotaped excerpt of a violin lesson. Students' majors affected their perceptions of teacher approvals and disapprovals. Music majors' mean ratings were significantly lower than those provided by the non-music majors on three variables: quality of teacher's musicianship, reinforcement effectiveness, and overall effectiveness of the lesson.

Duke and Prickett (1987) examined the observations and evaluations of non-music education majors who were presented with one of three visual perspectives of a violin lesson: student only, teacher only, and both student and teacher. The results showed that subjects who focused on only the teacher's behavior perceived a higher frequency of disapproval feedback and less positive feedback than was actually observed. Significant differences among the presentation conditions were also found regarding the teacher and student attitudes, with the teacher attitude mean being lower for the teacher condition than for the student and teacher condition.

Duke and Blackman (1991) directed subjects to complete one of four different tasks while viewing a segment of an elementary class. The four different tasks were: record the number of teacher approvals and disapprovals; record and total the number of teacher approvals and disapprovals; record the frequency of the teacher's elicitation of student verbal or musical

responses; or indicate the important aspect of the observation. No significant differences were found between the participants based on the assigned observation task condition.

One of the other purposes of the present study was to determine whether the type of presentation of a videotaped excerpt can significantly affect observers' perceptions. Colprit (1997) sought to determine whether observers' perceptions of music teaching would be affected by different methods of presentation. After presenting undergraduate and graduate music majors with two excerpts of a guitar lesson, Colprit analyzed the subjects' responses regarding lesson structure and teacher and student behaviors. The results indicated that students who viewed the excerpts in brief segments rated various aspects of the lesson significantly higher than did those who viewed the excerpt in its entirety without pause.

The present study had two purposes. The first purpose was to determine whether music majors and non-music majors would have different perceptions of a videotaped applied music lesson. The second purpose was to determine whether the mode of presentation of a videotaped excerpt would affect perceptions. Some students viewed the lesson excerpt in its entirety while others viewed it by rehearsal frames. Additionally, some subjects were told the targets of the lesson prior to and during the observation while others were not.

Method

Undergraduate non-music majors (n = 28) and undergraduate and graduate music majors (n = 24) at the University of Texas at Austin participated as subjects in this study. The non-music majors were currently enrolled in a Fundamentals of Music course and possessed an average of 4 years of music experience. The music majors were music education students (except one vocal major), with an average of 14 years of music experience and were currently enrolled in instructional methods courses. All subjects participated on a volunteer basis and completed the observation task outside of their class time.

Students viewed a 10-minute excerpt of a one-to-one flute lesson. Half of the subjects viewed the excerpt in its entirety. The remaining subjects viewed the same excerpt, but the tape was paused after each rehearsal frame. According to Duke (1994), a rehearsal frame is a time period during which the teacher is addressing an identifiable performance goal (or target). The point at which the teacher identifies a target marks the beginning of the rehearsal frame. Through the use of a variety of instructional methods, the teacher guides the student toward improving his/her performance of the target. Once the target is performed successfully, the teacher moves on to the subsequent rehearsal frame. Participants in the rehearsal-frame condition observed a total of 5 rehearsal frames. Half of the subjects were informed of the instructional goals (targets) that were addressed by the teacher. These targets were listed and clearly defined in directions printed on a response form in the order in which they were addressed. The remaining subjects were not informed of the targets that were addressed during the videotaped excerpt. Prior to the students' scheduled appointments, I randomly assigned the following conditions to the subjects: Rehearsal Frames/No Targets; Rehearsal Frames/Targets; Entire Excerpt/No Targets; Entire Excerpt/Targets. The group to which the students were assigned determined the manner in which the videotaped lesson was viewed and what information was made available to them prior to and during the task.

Upon entering the room, the participants received the observation forms. At the top of each form was a brief questionnaire designed to obtain demographic information and music/music

education experience. After completing the brief questionnaire, the subjects were instructed to read directions regarding the observation task. The directions, different for each experimental condition, were as follows:

> *Entire Excerpt/No Targets Condition* . You will see a 10-minute videotape of a teacher working with a high school flute student. As you observe the tape, notice as much as you can about what is going on, and write brief statements about what you see. Consider the following: Setting, Teacher Behavior, Teacher/Student Interactions, Lesson Organization, Student Performance, Other Student Behavior. Make as many clear and succinct observations as you can and write them down as you watch the tape. If you have any questions, ask now.
>
> *Entire Excerpt/Targets Condition* – The beginning instructions were the same as those for the above condition. Immediately before the statement regarding the posing of questions, the following information was inserted. "Below is a list of topics that the teacher covers with the student during the lesson, listed in the order they appear on the tape, to help you with your note taking. The notes you write regarding each topic should be written in the space directly beneath that particular topic. If you are not sure of the definitions of each of these terms, the following information should help you during your observation and writing. 'Dynamics' refer to the different degrees of loudness and softness at which the music is played. 'Accents' refer to the amount of weight or emphasis that is placed at the beginning of a note. 'Clarity and Precision of Octaves' refers to how clearly and accurately low and high notes of the same pitch are performed. 'Note Lengths and Note Accuracy' refers to how long certain notes are played and whether the correct pitches are played."
>
> *Rehearsal Frames/Targets Condition* – "You will see a videotape of a teacher working with a high school flute student that is divided into 5 excerpts that are each about 2 minutes long." The remaining directions are the same as those that were provided to participants in the Entire excerpt/Targets Condition following the first sentence.
>
> *Rehearsal Frames/No Targets condition* – "You will see a videotape of a teacher working with a high school flute student that is divided into 5 excerpts that are each about 2 minutes long." The remaining directions are the same as those that were provided to participants in the Entire excerpt/No Targets Condition following the first sentence.

See Appendix 1 for the form used by participants in the entire-excerpt/targets condition.

After reading the directions and asking any pertinent questions, the students observed the videotaped applied music lesson excerpt with a high school flute player. The lesson was 10 minutes in duration and was viewed either in its entirety or broken down into five different rehearsal frames, each approximately two minutes in duration. Students who viewed the lesson by rehearsal frames were given 15 seconds between each excerpt to continue writing their ideas for the previous segment. In an effort to provide all students with the same amount of time to write their observations, the students in the entire-excerpt condition were given an additional minute at the conclusion of their viewing the lesson excerpt to expand upon their written observations. All students were instructed to write their observations during the lesson with the

blue pencil to aid the researcher in distinguishing between the times at which certain statements were written. This was important for data analysis purposes.

After the students finished the first portion of their written observations, which were completed during the viewing of the lesson, the researcher instructed them to summarize various teacher and student behaviors displayed during the lesson on the back of their observation form. These summaries were to be written with the red pencil. Also, if the subjects wanted to use this time to expand on their earlier writings, they were encouraged to do so, still with the use of the red pencil. Again, the use of the different colored pencils assisted the researcher with the data analysis.

At the completion of the observation task and the participants' summarizing of the teacher and student behaviors, the participants were instructed to rate the effectiveness of teaching and to place their response sheet into an envelope that was placed in the center of the table. The placement of the response sheet into an envelope in the center of the subjects was an added measure of confidentiality.

Participants' statements were classified according to three variables: at what point the statement was written (while or after viewing the videotaped lesson); whether the statement was one that addressed the behavior of the teacher, student, or some other factor; whether the statement was factual or inferential in nature; and whether statements regarding the student's performance were evaluative. Statements written during the observation of the lesson excerpt were written with a blue pencil, and the statements written after the observation of the excerpt were written with a red pencil. This distinction enabled me to easily identify at what point subjects noticed and commented on certain aspects of the lesson.

After dividing the form into these different sections, I classified the participants' statements as teacher-directed, student-directed, or other. "Other" statements included those that addressed aspects such as setting and general content of the lesson.

Statements were also classified according to whether they were factual or inferential in nature. Factual statements were operationally defined as descriptions of a behavior or activity that occurred during the lesson. Factual statements included re-statements of teacher or student verbalizations/behaviors and estimates of the frequency with which the behavior occurred. Inferential statements were operationally defined as statements regarding the observer's personal perception of a behavior or activity. Inferential statements included observer evaluations of teacher/student verbalizations/behaviors, and adjectival descriptors of observed events (e.g., "patient," "encouraging," "enthusiastic").

Evaluative statements of student behavior were those that evaluated various aspects of the student's performance. These evaluative statements addressed any aspect of the student's performance, not just her performance of the specific targets that were addressed during the lesson.

Observer reliability was computed for 20% of all observation forms completed by non-music majors (6 of 28 participants) and music majors (5 of 24 participants). The forms on which reliability data were gathered were randomly selected. A graduate student, who received directions and opportunities to practice completion of reliability on other forms, completed the observer reliability. Reliability was calculated by dividing the number of agreements by the sum of agreements and disagreements. Seventy-one percent reliability was found on the non-music majors' forms and 82% reliability was found on the music majors' forms. This averaged to a total reliability of 77%.

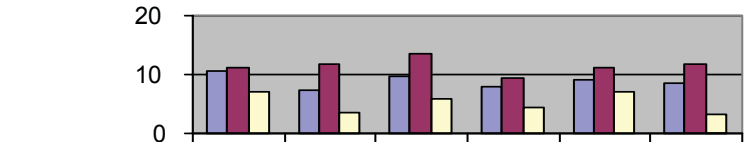
Results

Statements written by the participants regarding various aspects of the observed lesson were analyzed using three-way ANOVAS. Participants were instructed to write succinct statements regarding their observations of an excerpt of a videotaped applied music lesson. Statements were written both during the observation of the excerpt and during the brief summary period that followed, with pencils of different colors representing the time at which a particular statement was written. Some differences, attributable to the way the participants viewed the tape (in its entirety or in rehearsal frames), were found in the quantity and content of the participants' statements during the observation of the excerpt. See Table 1 for the total number of statements written both during and after the observation of the videotaped excerpt.

Table 1
Number of statements written by subjects during observation task based on the viewing of the 10-minute videotaped excerpt

	When statements were written		
Viewing Condition	During	After	Total
Rehearsal Frames	637	254	891
Entire Excerpt	432	253	685

Regardless of the subjects' experimental condition, the quantity and content of stated perceptions that were written during the summary period were very similar. Although the data were originally analyzed according to these different time periods, the proportion of teacher, student, and other statements that were written during the observation of the excerpt and those that were written during the summary period were not different. Hence, all data were combined for analytical purposes. The mean numbers of observation statements per subject are presented in Figure 1.



	Music	Non-Music	Reh. Frames	Entire Ex.	Targets	No Targets
All Student	10.6	7.3	9.7	7.9	9.1	8.5
All Teacher	11.1	11.8	13.4	9.3	11.3	11.7
All Evaluative	7.2	3.5	5.9	4.5	7.1	3.3

Main Effect

Figure 1. Mean number of student, teacher, and evaluative statements at each level of each independent variable.

Several significant differences were found when examining data according to the subjects' major, the way they viewed the tape (rehearsal frames versus entire excerpt), and the amount of information that was made available to them regarding the topics to be covered during the lesson (targets versus no targets). All of the statements written by the participants that focused on the behavior of the student, provided both during the observation of the videotaped lesson and the summary period, demonstrated that music majors provided significantly more of these student-directed statements than the non-music majors, F (1, 44) = 8.7, $p < .005$. Music majors also provided significantly more evaluative statements about the student's performance, both during the observation of the lesson and the summary period, than the non-music majors, F (1, 44) = 18.2, $p < .001$.

The results of this study also showed that depending on how the participants viewed the videotaped lesson, either by rehearsal frames or the entire excerpt, some of their observations contained significant differences. Participants in the rehearsal frames condition provided significantly more statements regarding the teacher's behavior both during the observation of the videotaped lesson and the summary period than the participants in the entire excerpt condition, F (1, 44) = 4.5, $p < .05$.

Analysis of the data according to whether the participants were informed of the lesson's targets prior to completion of the observation task or not produced some significantly different results. Participants in the targets condition had significantly more evaluative statements regarding the student's performance both during the observation of the lesson and the summary period, F (1, 44) = 21.7, $p < .001$ than did those participants who were in the no targets condition.

Some two-way interactions were also found to be significant. A significant two-way interaction was shown between the student's major and whether they viewed the excerpt by rehearsal frames or in its entirety, F (1, 44) = 6.2, $p < .05$. Music majors who were in the rehearsal frames condition provided a higher frequency of student-directed statements than the other groups of students. A significant two-way interaction was also shown between the student's major and whether they were informed of the lesson's targets, F (1, 44) = 6.3, $p < .05$.

These results demonstrated that the major of the students when combined with the target condition to which they were assigned had an effect on the number of evaluative statements provided about the student's performance. Music majors who were informed of the targets prior to the observation task provided a higher frequency of student-evaluative statements.

Discussion

The results of this study indicate that an observer's major course of study, the mode of presentation of a videotaped excerpt, and the amount of information that is made available to them prior to the beginning of an observation task have an effect on an observer's perceptions of teacher and student behavior displayed in a music lesson. The finding that an observer's major course of study, music or non-music, influences an observer's perceptions, was not of great surprise. The music majors that participated in this study came to the observation task with very specific training in both music performance and music education. It would be expected that these undergraduates would have different perceptions than those who are not specifically trained in music. The differences in written observations found in the present study focused on the observed student's behavior. Again, the training of the music majors may account for these significant differences. Music majors, particularly those studying music education, are taught to be aware of students' behaviors as a method of improving instruction. The music majors may have been more inclined to direct their attention to the behavior of the student and subsequently provided more written factual, inferential, and evaluative comments about the student's performance and progress.

Colprit (1997) found that students who viewed a lesson broken down into different excerpts, or segmented, rated certain aspects significantly higher than those who viewed the lesson in its entirety. This study supports those findings. Participants who viewed the lesson excerpt by rehearsal frames wrote more statements regarding both teacher and student behaviors than did those who viewed the excerpt in its entirety. This greater frequency may be attributed to the fact that the participants in the rehearsal frames condition felt they had more opportunities to formulate their observations and therefore wrote more continuously than students who viewed the entire lesson. By providing students with an observation task that is presented by rehearsal frames, the students are more likely to write down more perceptions about the observed situation. Viewing a lesson in its entirety may cause one to miss various behaviors, interactions, and methods of instruction demonstrated during the lesson.

Some of the most interesting findings of this study pertain to the amount of information that was made available to the participants prior to the beginning of the observation task. Participants who were informed of the lesson's targets prior to observing the videotape had significantly more evaluative statements regarding the student's performance than those who were not provided with that information. The participants who were in the targets condition evaluated the student's performances on those targets. Some participants who were not informed of the targets addressed a variety of aspects of the lesson (e.g., setting, student affect) that may not have been directly related to the lesson's objectives. This demonstrates the importance of providing students with specific information regarding the observation task. This may teach students how to observe an instructional setting: where one's attention should be directed; what one should look for; and what is the most important, not salient, aspect of this particular setting. By providing observers pertinent information prior to the task, there may be a greater likelihood of their perceiving the important aspects of the task.

It is important to address a limitation that should be kept in mind while interpreting the findings of this study. The group size of the participants varied. Some subjects observed the videotaped lesson in groups of four while others completed the observation task individually. Although this may appear to be a trivial point, this variance in group size may have contributed to the varying amount of statements that the students provided during the observation task. Students who completed the task alone had a greater tendency to sit and observe either the entire rehearsal frame or the entire excerpt before writing any statements, causing them to provide fewer written observations than those who observed the lesson in small groups. Students who observed the tape in groups might have felt more inclined to write more based on the presence of an individual within the group who may have written more or for longer periods. Consistency in group size may have contributed to slightly different results.

The results of this study showed the importance of providing both music and non-music majors with the targets of the lesson to be observed. These students wrote more statements that were evaluative in nature. It is also important to present the task to observers in rehearsal frames. This may enable one to write more statements regarding his perceptions of the lesson than when he views an entire excerpt of a lesson. Additional research should be completed that examines the effects of providing observers with the targets of a lesson and presenting the lesson to observers by rehearsal frames. Since few studies currently exist that address the concepts of targets and/or rehearsal frames, future research in this area may serve to benefit music students, music educators, and other scholars.

References

Colprit, E. J. (1997, February). *The effect of structural segmentation on observers' perceptions of teaching.* Paper presented at the annual meeting of the Texas Music Educators Association Convention, San Antonio, TX.

Duke, R. A. (1987). Observation of applied music instruction: The perceptions of trained and untrained observers. In C. K. Madsen & C. A. Prickett (Eds.), *Applications of Research in Music Behavior* (pp. 115-124). Tuscaloosa: University of Alabama Press.

Duke, R. A. (1994). Bringing the art of rehearsal conducting into focus: The rehearsal frame as a model from prescriptive analysis of rehearsal conducting. *Journal of Band Research, 30* (1)*,* 78-95.

Duke, R. A. (in press). Measures of instructional effectiveness in music research. *The Bulletin of the Council for Research in Music Education.*

Duke, R. A., & Blackman, M. D. (1991). The relationship between observers' recorded teacher behavior and evaluation of music instruction. *Journal of Research in Music Education, 39,* 290-297.

Duke, R. A. & Prickett, C. A. (1987). The effect of differentially focused observation on evaluation of instruction. *Journal of Research in Music Education, 35,* 27-38.

Gholson, S. A. (1998). Proximal positioning: A strategy of practice in violin pedagogy. *Journal of Research in Music Education, 46,* 535-545.

Madsen, C. K., & Duke, R. A. (1985b). Observation of teacher/student interactions in music: Observer perceptions versus actual events. *Journal of Research in Music Education, 33*, 205-214.

Madsen, C. K. & Standley, J. M. (1991). An observation procedure to differentiate teaching experience and expertise in music education. *Journal of Research in Music Education, 39,* 5-11.

Prickett, C. A. & Duke, R. A. (1992). Evaluation of music instruction by musicians and nonmusicians assigned differential observation tasks. *The Bulletin for the Council of Research in Music Education, 113,* 41-50.

Schmidt, C. P. (1992). Reliability of untrained observers' evaluations of applied music instruction. *Bulletin of the Council for Research in Music Education, 112,* 17-28.

Standley, J. M. & Greenfield, D. G. (1987). The effect of a focused observation task and its transfer on the analysis of a kindergarten music class by pre-senior versus pre-internship music education/therapy majors. In C. K. Madsen & C. A. Prickett (Eds.), *Applications of Research in Music Behavior* (pp. 99-114). Tuscaloosa: University of Alabama Press.

US/T

Video Observation

What is your major? Age?

Year in school? (circle one) freshman sophomore junior senior senior+

During how many years of your life have you either taken music lessons, been part of a performing group (band, choir, orchestra, etc.), or both?
_____ (please round to the nearest whole number)

What instrument(s) do you know how to play? (list)

Have you taken any educational/instructional methods courses?

If so, how many and in which department(s)? (list)

_____

You will see a 10-minute videotape of a teacher working with a high school flute student. As you observe the tape, notice as much as you can about what is going on, and write brief statements about what you see. Consider the following: Setting, Teacher Behavior, Teacher/Student Interactions, Lesson Organization, Student Performance, Other Student Behavior. Make as many clear and succinct observations as you can, and write them down as you watch the tape. Below is a list of topics that the teacher covers with the student during the lesson, listed in the order they appear on the tape, to help you with your note taking. The notes you write regarding each topic should be written in the space directly beneath that particular topic. If you are not sure of the definitions of each of these terms, the following information should help you during your observation and writing. "Dynamics" refer to the different degrees of loudness and softness at which the music is played. "Accents" refer to the amount of weight or emphasis that is placed at the beginning of a note. "Clarity and Precision of Octaves" refers to how clearly and accurately low and high notes of the same pitch are performed. "Note Lengths and Note Accuracy" refers to how long certain notes are played and whether the correct pitches are played.

If you have any questions, ask now.

Dynamics (beginning of piece 1) -

Accents -

Clarity and Precision of Octaves-

(ending of piece 1)

(continue your comments and responses on the back)

Appendix 1, continued
(continue your comments and responses below)

Dynamics (beginning of piece 2)-

Note Lengths and Note Accuracy -

(ending of piece 2)

Please rate the effectiveness of the teaching demonstrated in this music lesson (on a scale of 1 to 4) by circling one of the numbers below.

1	2	3	4
very ineffective	ineffective	effective	very effective

Edited by
Charlotte Mizener, *The University of Texas—Pan American*

Testing the Predictive Value of Co-Curricular and Extra-Curricular Activities Per-Pupil Expenditures upon Student Achievement in North Central Texas

J. Richard Holsomback, Jr., Ed.D.
Pine Tree ISD, Longview, TX

The year was 1982 and America rushed to bookstores across the nation to purchase *Megatrends: Ten New Directions Transforming Our Lives* by John Naisbitt (1982). Naisbitt presented a new way of looking at America's future and a new way of understanding the condition of the present and the past. This work detailed America's shift from industrial production to providing services and information. Naisbitt (1982) asserted several ideas: "As a society, we have been moving from the old to the new. And we are still in motion. Caught between eras, we experience turbulence. Yet, amid the sometimes painful and uncertain present, the restructuring of America proceeds unrelentingly." (p. 1). As applied to our public schools, these words reflected a need for educators to raise academic requirements and test scores to levels that equaled or exceeded those of our competitors.

With such an emphasis being placed on standardized test results, the present degree of accountability expected of schools in the United States has perhaps never been greater. Rising external and internal pressures are forcing the examination of school expenditures and the possible effects of school expenditures upon student achievement. Historically, the origin of estimation of input-output relations in schools is usually traced to the government's monumental study, *Equality of Educational Opportunity*, more commonly referred to in the literature as the "Coleman Report" (Coleman et al., 1966).

This report was the United States Office of Education's response to a requirement of the Civil Rights Act of 1964 to investigate the extent of inequality in the nation's schools. The study involved 600,000 students in some 3,000 schools across the country, and its fundamental contribution was directing attention to the distribution of student performance. The report concluded that environmental factors, not direct expenditures per pupil, predicted student achievement. The findings were clearly controversial and immediately led to a great research effort to compile additional evidence about input-output relationships in schools.

Since the release of the Coleman Report over 30 years ago, scholars have continued to question whether there is a relationship between the amount of resources and level of accomplishment of students in schools. During the period of the 1980s and into the 1990s, the findings of Hanushek (1981, 1986, 1989, 1991) have consistently indicated that variations in school expenditures were not systematically related to variations in student performance.

The recent research of Hedges, Laine, and Greenwald (1994, 1996) offered respectful disagreement with the research of Hanushek (1981, 1986, 1989, 1991, 1994, 1996). Hedges et al. (1994, 1996) were critical of the methodology employed in the Hanushek studies finding that using a meta-analysis of studies of the effects of differential school inputs on student outcomes showed a systematic positive relationship between resource inputs and school outcomes. Moreover, the analysis presented in their research of the magnitude of the relationships suggested that the median relation (regression coefficient) was large enough to be of very practical importance.

Accountability in education continues to rise, and it is imperative for one to study the expenditure-achievement relationship. The public has come to expect this from educators and will continue to make such demands upon the public education system. In addition, with regards to Texas, only Goeglein-Porter (1996) has studied student achievement and the Texas Assessment of Academic Skills (TAAS) tests in Texas. Goeglein-Porter's study was causal-comparative and did not use predictive methodology for determining the possible relationships of financial variables and student achievement. Likewise, no study has placed emphasis on expenditures and implications of those expenditures with regard to co-curricular and extra-curricular activities, which have special implications for music educators.

The purpose of this study was twofold: (a) to examine 11 selected district-level financial functions outlined in the *Academic Excellence Indicator Report* (Texas Education Agency, 1997a), following the implementation of Senate Bill 7 (1993) and the Texas Supreme Court's holding in *Edgewood Independent School District v. Meno* (1995); and (b) to determine the predictive value of those financial functions to the TAAS tests results administered in the spring of 1997.

The following question was addressed descriptively and analytically: Which financial function or functions, as defined in the study, had predictive value upon the TAAS test results taken in the spring of 1997 as determined by stepwise multiple linear regression models? The study was based on the null hypothesis, that there were no differences in the predictive values of the functional expenditures upon TAAS scores taken in the spring of 1997, as determined by stepwise multiple linear regression."

This study assumed that (a) comparable data were available on the number of pupils in the districts under study and that (b) data on the financial functions, as defined in this study, were available for all districts being studied in a standardized format.

Several limitations of the study must be taken into consideration. First, this study was limited to 10 North Central Texas counties, and the study was limited to one academic year. Second, a longitudinal study may have revealed different or similar predictive patterns, but this study was limited to the 1996-1997 school year. Finally, all data were ascertained through the *Academic Excellence Indicator System: District Reports* (Texas Education Agency, 1997a) using data sent to the Texas Education Agency by the individual school districts. Definitions of the functions were important because other financial functions and school site data could yield very different results.

Method

This study consisted of two facets, central tendency descriptive analysis and predictive analysis utilizing stepwise multiple regression. The sample technique for this study utilized a purposive sample of school districts, geographically situated in the North Central Texas area. The districts were located in 10 contiguous counties located in North Central Texas. The sample consisted of 99 independent school districts. No special districts or charter schools were used in this study.

This study focused on per-pupil expenditures for one fiscal year, 1996-1997. The expenditure patterns were studied with the aid of the Academic Excellence Indicator System and the Public Education Information Management System database. In addition, this study was not a longitudinal study of per-pupil expenditures. The study was not longitudinal due to the fact that different reporting techniques were developed during the 1996-1997 reporting period dealing with the financial functions cited in the *Academic Excellence Indicator System Report* (Texas Education Agency, 1997a).

The first step used in the descriptive analysis was to ascertain total actual expenditure cost summaries determined by a summation of the functions defined in the *Academic Excellence Indicator System: District Reports* (Texas Education Agency, 1997a). The analysis included the following per-pupil descriptive statistics per category: (a) highest expenditure, (b) lowest expenditure, (c) range of expenditures, (d) mean expenditures, (e) the median expenditures per pupil, and (f) the standard deviation.

Once the descriptive statistics were calculated to determine the central tendencies, the predictive methodology began. A stepwise multiple regression model was constructed to seek the predictive value of each financial function to student outcomes (achievement). The independent variables were the 11 financial functions selected and included: (a) total per-pupil expenditures, (b) instruction per-pupil expenditures, (c) instruction-related services per-pupil expenditures, (d) instructional leadership per-pupil expenditures, (e) school leadership per-pupil expenditures, (f) student support services per-pupil expenditures, (g) transportation per-pupil expenditures, (h) food services per-pupil expenditures, (i) co-curricular and extra-curricular activities per-pupil expenditures, (j) central administration per-pupil expenditures, and (k) plant maintenance and operations per-pupil expenditures. The dependent variables were TAAS test scores from the spring of 1997. They included mathematics (tested at grades three, four, five, six, seven, eight, and ten), reading (tested at grades three, four, five, six, seven, eight, and ten), writing (tested at grades four, eight, and ten), science (tested at grade eight), and social studies (tested at grade eight).

According to Hinkle et al. (1994), in multiple linear regression, scores on a criterion variable are predicted using multiple predictor variables. Similarly, Borg, Gall, and Gall (1996) stated that for multiple regression models in the social sciences, a minimum of 15 observations should be present per variable. This study met and exceeded that requirement. This study employed 99 observations per variable in the stepwise multiple regression models.

The strategies for conducting a multiple regression analysis involved a four-step process based upon the extensive research of Pedhazur (1982) and Lewis-Beck (1980):

1. Determine the regression model. This step involved determining the regression coefficients and the regression constant.

2. Determine the multiple correlation coefficient (R) and the proportion of a shared variance (R^2). This step involved computing R and R^2, the coefficient of determination.

3. Determine whether the multiple *R* is statistically significant. This step involved testing the null hypothesis.
4. Determine the significance of the predictor variables. This step involved testing the individual regression coefficients for statistical significance.

Results

Two different types of analyses were used for this study. They included descriptive statistics and a stepwise multiple regression utilized to ascertain the predictive value of the independent variables (Academic Excellence Indicator System functions) upon the dependent variables (TAAS tests). After the sample of 99 school districts from the 10 North Central Texas counties was taken, descriptive statistics using the mean, median, and standard deviation began the descriptive analysis. The range was also ascertained for each of the 11 financial functions. These descriptive results are displayed in Table 1. With the descriptive analysis completed, the predictive values of the independent variables (financial functions) upon the dependent variables (TAAS tests) were sought. Prediction involved stepwise multiple regression statistical analysis.

Table 1
Descriptive Statistics for Per-Pupil Expenditures on Eleven Financial Functions

Per-pupil Expenditure	Mean	Median	Standard Deviation	High	Low	Range
Instructional	2,724.62	2,747.00	399.21	3,717	871	2,746
Instructional-related services	119.79	110.50	51.71	298	12	286
Instructional-leadership	58.80	56.50	38.94	178	1	177
School leadership	263.47	255.5	72.44	601	41	560
Student support services	170.03	168.50	58.37	300	20	280
Transportation	120.51	114.00	61.98	341	2	339
Food services	242.48	243.50	69.41	414	7	407
Co-curricular and extra-curricular	133.55	123.00	52.88	269	17	252
Central administration	222.28	196.67	99.40	559	54	505
Plant maintenance and operations	507.61	501.50	114.34	863	87	776
Total	5,324.32	5,313.00	648.58	7,187	2,884	4,304

Note. All amounts are in dollars and are computed on a per pupil expenditure.

For all 11 independent variables and the TAAS mathematics at the third grade level, the stepwise regression model yielded no predictive variables. The R was .352, R^2 was .124, the adjusted R^2 stood at .013, and the standard error was 8.4359. The analysis of variance yielded the F of 1.119. The significance was .3570, not enough to meet the .05 level standard set ($p <$ .05). The stepwise multiple regression model summary for the independent variables and TAAS mathematics at the third grade level is shown in Table 2.

In the TAAS mathematics test at the fourth grade level, similar results were ascertained, except that the adjusted R^2 turned negative in this model. In this model, the R was .314, the R^2 was .099, the adjusted R^2 was -150, and standard error was 9.8034. The F statistic was .867, the significance was .5750, and the results were not significant at the .05 level ($p < .05$). The model results for mathematics in grade four are displayed in Table 2.

The results for the TAAS mathematics test in grade five indicated two variables that were significant in predicting mathematics achievement. Food services and central administration per-

pupil expenditures had predictive value in relation to mathematics in grade five (Table 2). Food services yielded an R of .246, an R^2 of .061, adjusted R^2 of .051, and a standard error of 6.9334. The F statistic was 6.266 and was significant at the .05 level ($p < .05$). The standard beta coefficient for food services was negative. Central administration per-pupil expenditures yielded an R of .325, an R^2 of .106, an adjusted R^2 of .087, and a standard error of 6.8011 (Table 2). This model then yielded an F statistic of 5.662 and had significance at the .05 level ($p < .05$). The standard beta coefficient was also negative.

For all 11 independent variables and TAAS mathematics in grade six, the stepwise regression model yielded no predictive variables. The R was .351, R^2 was .123, the adjusted R^2 stood at .012, and the standard error of estimate was 7.8094. The analysis of variance yielded the F of 1.111. The significance was .363, not enough to meet the .05 level standard set ($p < .05$). The stepwise multiple regression model summary for the independent variables and TAAS mathematics in grade six is shown in Table 2.

Table 2

Stepwise Multiple Regression Model Summaries for Texas Assessment of Academic Skills in Mathematics, Reading, Science, Social Studies, and Writing

Variable	Standard Beta	Standard Error	F	Significance
Mathematics 3				
All Variables		8.4359	1.119	.3570
Mathematics 4				
All Variables		9.8034	.867	.5750
Mathematics 5				
Food Services	-.371	6.8011	5.662	.0310
Central Administration	-.246	6.9334	6.226	.0140
Mathematics 6				
All Variables		7.8094	1.111	.3630
Mathematics 7				
Instructional Leadership	-.293	8.6268	10.554	.0010
Food Services	-.200	8.4787	7.654	.0390
Mathematics 8				
Instructional Leadership	-.315	8.5859	13.127	.0010
Food Services	-.296	8.1955	12.386	.0020
Mathematics 10				
Instructional Leadership	-.427	10.0426	17.284	.0010
Food Services	-.241	9.7264	25.722	.0090
Reading 3				
Instructional Related Services	.226	7.4951	5.197	.0250
Reading 4				
All Variables		8.6653	1.292	.2430

Reading 5				
Food Services	-.392	7.4891	17.622	.0001

(Table 2 continues)

Table 2 *(continued)*

Variable	Standard Beta	Standard Error	*F*	Significance
Reading 6				
All Variables		6.9518	.879	.5630
Reading 7				
Instructional Leadership	-.277	6.4017	7.669	.0060
Reading 8				
Instructional Leadership	-.263	6.5389	8.756	.0070
Food Services	-.241	6.3635	7.805	.1030
Reading 10				
Food Services	-.583	4.7862	24.871	.0010
Co-Curricular/Extra-Curricular	.285	4.6066	17.619	.0050
Science 8				
Food Services	-.452	6.5309	12.494	.0001
Co-Curricular/Extra-Curricular	.372	5.9747	17.317	.0001
Instructional Leadership	-.195	5.8572	13.630	.0300
Social Studies 8				
Food Services	-.294	12.0254	9.058	.0030
Writing 4				
Transportation	-.202	9.5238	4.131	.0450
Writing 8				
Instructional Leadership	-.309	9.3446	10.127	.0020
Writing 10				
Instructional Leadership	-.242	5.3864	12.952	.0190
Food Services	-.336	5.2830	9.070	.0020
Co-Curricular/Extra-Curricular	.266	5.1434	8.399	.0160

Mathematics in grades seven, eight, and ten all exhibited similar results (Table 2). Instructional leadership per-pupil expenditure and food services per-pupil expenditures were found to predict student achievement as measured by the TAAS mathematics in grades seven, eight, and ten. The beta coefficients were negative and significant. Instructional leadership for mathematics in grade seven depicted a R of .135, R^2 of .099, an adjusted R^2 of .091, and a standard error of 8.6268. This produced an F statistic of 10.554, which is significant at .05 ($p < .05$). Food services for mathematics in grade seven yielded a R of .373, a R^2 of .139, an adjusted R^2 of .121, a standard error of 8.4787, an F statistic of 7.654, and was significant at the .05 level ($p < .05$). The standard beta coefficients for instructional leadership and food services were negative.

For TAAS mathematics in grade eight and instructional leadership per-pupil expenditures, the R was .347, R^2 was .120, the adjusted R^2 was .111, and the standard error was 8.5859 (Table 2). This produced an F statistic of 13.127, which is significant at .05 ($p < .05$). Food services for mathematics in grade eight yielded a R of .455, a R^2 of .207, an adjusted R^2 of .190, a standard error of 8.1955, an F statistic of 12.386, and was significant at the .05 level ($p < .05$). The standard betas for food services and instructional leadership were negative.

For mathematics in grade ten and instructional leadership per-pupil expenditures, the R was .465, R^2 was .217, adjusted R^2 was .208, and the standard error was 10.0426. This produced an F statistic of 17.284, which is significant at .05 ($p < .05$). Food services for mathematics in grade ten yielded a R of .523, a R^2 of .273, an adjusted R^2 of .257, a standard error of 9.7264, an F statistic of 25.7222, and was significant at the .05 level ($p < .05$). The standard betas were negative for food services and instructional leadership.

For the TAAS reading tests, grades four and six mirrored the results of mathematics in grades three, four, and six. There were no predictor variables that surfaced for reading in grades four and six in the stepwise multiple regression model. Reading in grade four had an R of .375, R^2 of .140, an adjusted R^2 of .032, and a standard error of 8.6653. The analysis of variance had the F statistic 1.292, significant at .2430, not meeting the .05 level ($p < .05$). None of the 11 independent variables had predictive value upon the TAAS reading in grade four. Reading in grade six had an R of .316, R^2 of .100, an adjusted R^2 of -.014, and a standard error of 6.518 (Table 2). The analysis of variance yielded the F statistic of .879, significant at .5630, not meeting the .05 level of significance ($p < .05$). Instructional related services, however, had predictive value upon TAAS reading at grade three. The R was .226, the R^2 was .051, the adjusted R^2 was .041, the standard beta was .226, the standard error was 7.4951, and the F statistic was 5.197. The standard beta was positive and had significance at the .05 level ($p < .05$).

In the TAAS reading in the grade five model, the R was .392, the R^2 was .154, the adjusted R^2 was .145, and the standard error was 7.4891 for food services. The analysis of variance yielded the F of 17.622, significant at .05 ($p < .05$). The standard beta coefficient was negative (Table 2). In reading in grade seven, the R was .277, the R^2 was .077, the adjusted R^2 was .067, and the standard error was 6.4017 for instructional leadership. This made the F statistic in the analysis of variance 7.669, significant at .05 ($p < .05$). Likewise, the beta coefficient was negative at -.392 (Table 2).

TAAS reading in grade eight is illustrated in Table 2. Both independent variables, instructional-related services and food services, showed predictive value with regard to reading in grade eight. For instructional-related services, R stood at .289, R^2 at .084, adjusted R^2 at .074, and a standard error was 6.5389. Food services showed R at .376, R^2 at .141, adjusted R^2 at .123, and a standard error of 6.3635. The analysis of variance indicated the F statistic of 7.805 for food services and 8.756 for instructional leadership; both were significant at .05 ($p < .05$). Standard betas were negative for both variables in grade eight.

The results of TAAS reading for grade ten also contained food services and co-curricular and extra-curricular activities as predictor variables. Reading in grade ten is illustrated in Table 2. For food services, R stood at .459, R^2 at .211, adjusted R^2 at .203, and a standard error was 4.7862. Co-curricular and extra-curricular activities showed R at .526, R^2 at .277, adjusted R^2 at .261, and a standard error of 4.6066. The analysis of variance summary indicated the F statistic of 17.619 for co-curricular and extra-curricular activities and the F statistic of 24.871 for food services, significant at .05 ($p < .05$). The standard beta was negative for food services in grade

ten; the standard beta coefficient for co-curricular and extra-curricular activities and reading in grade ten, however, were positive.

The science in grade eight stepwise multiple regression extracted three of the 11 variables as predictor variable for the TAAS scores. The three variables were food services, co-curricular and extra-curricular activities, and instructional leadership per-pupil expenditures. Food services had a R of .339, a R^2 of .115, an adjusted R^2 of .106, a standard error of 6.5309, and the F statistic was 12.494. Co-curricular and extra-curricular activities had a R of .517, a R^2 of .267, an adjusted R^2 of .252, a standard error of 5.9747, and the F statistic was 17.317. Instructional leadership had a R of .551, a R^2 of .281, a standard error of 5.8572, and the F statistic was 13.630. All variables were significant at the .05 level ($p < .05$). Standard betas were negative for food services and instructional leadership; co-curricular and extra-curricular activities, however, had a standard beta that was positive.

The results for social studies in grade eight and writing in grades four and eight were similar in that only one predictor variable surfaced and the betas were negative. For grade eight social studies, the following resulted. Food services was the predictor variable, R was .294, R^2 was .086, adjusted R^2 was .077, standard error was 12.0254, and the F statistic was 9.058, significant at .05 ($p < .05$). The standard beta coefficient was negative at -.294. For writing in grade four, the following resulted. Transportation was the predictor variable, R was .202, R^2 was .041, adjusted R^2 was .031, standard error was 9.5238, and the F statistic was 4.131, significant at .05 ($p < .05$). The standard beta coefficient was negative at -.202. For writing in grade eight, the following outcome surfaced. Instructional leadership was the predictor variable, R was .309, R^2 was .095, adjusted R^2 was .086, standard error was 9.3446, and the F statistic was 10.127, significant at .05 ($p < .05$). The standard beta coefficient was negative at -.309 (Table 2).

The last stepwise multiple regression was performed with three variables surfacing as predictors of student achievement as measured on the TAAS writing in grade ten (Table 2). The variables included (a) instructional leadership, (b) food services, and (c) co-curricular and extra-curricular activities. Instructional leadership had a R .350, a R^2 of .122, an adjusted R^2 of .113, a standard error of 5.3864, and the F statistic was 12.952. Food services had a R of .406, a R^2 of .147, a standard error of 5.2830, and the F statistic was 9.070. Co-curricular and extra-curricular activities had a R of .466, a R^2 of .217, an adjusted R^2 of .191, a standard error of 5.1434, and the F statistic was 8.399. All variables were significant at .05 ($p < .05$). Instructional leadership and food services showed a negative standard beta at -.242 and -.336 respectively, while co-curricular and extra-curricular activities depicted a positive standard beta at .266.

Discussion

The first analysis performed on the data in this study was a descriptive analysis on the 11 financial functions in the *Academic Excellence Indicator System: District Reports* (Texas Education Agency, 1997a) for the 1996-1997 fiscal year. Following the descriptive analysis, the predictive power was measured between the independent and dependent variables using stepwise multiple linear regression models. The significance level was set at .05 ($p < .05$).

The findings of the stepwise multiple regression model analysis indicated that:

1. Expenditures for instructional-related services and TAAS reading at the third grade level were significant at the .05 level in the regression models, and the beta coefficients were positive.

2. Positive beta coefficients appeared in the TAAS reading correlations at the tenth grade level, science at the eighth grade level, and writing at the tenth grade level with expenditures for co-curricular and extra-curricular activities. Relationships between those expenditures and TAAS reading at the tenth grade level, science at the eighth grade level, and writing at the eighth grade level were significant at .05 ($p < .05$).

Based on the findings in the predictive analysis, using stepwise multiple regression, the research question and the hypothesis could be addressed. The research question asked, "Which function, as defined in the study, had predictive value upon TAAS tests taken in the spring of 1997 as determined by the stepwise multiple linear regression model?" It can be stated that instructional-related services per-pupil expenditures predicted TAAS reading in grade three, and co-curricular and extra-curricular activities per-pupil expenditures predicted TAAS reading in grade ten, science in grade eight, and writing in grade ten.

The hypothesis stated, “There were no differences in the predictive values of the functional expenditures upon TAAS scores taken in the spring of 1997, as determined by stepwise multiple linear regression." This hypothesis can be rejected where predictor values surfaced, where the beta coefficients showed positive signs, and where those results were significant at the .05 level ($p < .05$); therefore, the hypothesis can be rejected for TAAS reading at the third grade level, reading in grade ten, science in grade eight, and writing in grade ten, but the null hypothesis must be retained for all other variables.

It must be noted that no causal relationships can be drawn from this study. It cannot be stated that any of the independent variables caused variation in any dependent variable. This study only showed relationships among variables and the predictive value of those variables (stepwise multiple regression analysis).

Although no causal relationships can be drawn from this study, at the very least, music educators can be assured that there is a relationship between spending for co-curricular and extra-curricular activities and student achievement as measured by the Texas Assessment of Academic Skills Test (TAAS). The relationship does not appear in the elementary grades but is present in the secondary grades. The relationship is also strong enough to be a predictor of TAAS scores in grades eight and ten.

Issues remain for future research. Future research questions include: Why do the relationships and the predictive values only appear at the secondary level? Might these results be replicated for the entire state of Texas? Why did the relationships and the predictive values just appear in sporadic fashion in different content areas and not consistently throughout one particular content area? What is the relationship between music instruction and these content areas? What specific instructional strategies can music educators employ in their daily practice to enhance student achievement, as measured by standardized test scores such as the TAAS, that do not take away from their music instruction?

In a technological age nestled in a global economy our society often dictates that certain expenditures should be cut in our curriculum for the sake of better technological training in order that we may remain competitive in the world arena. Geiger (1994) stated that to succeed, today students must graduate with more than knowledge of the past. They must have the ability to synthesize and analyze new information, think for themselves, and adapt quickly to a world where change is the only constant.

Although the evidence here only suggests that there is a relationship between spending for music education programs and student achievement, perhaps there is a relationship between music instruction and students being able to analyze, synthesize, think, and adapt quickly, assuming that those are concepts tested on the TAAS. At the very least, students involved in co-

curricular and extra-curricular activities (which would include music instruction) in the sample, seem to be able to function somewhat better in a testing environment, a testing environment that must include analysis and synthesis of information. Future research now has the mandate to seek new answers as to exactly what those relationships are, in order for the practitioner to apply those findings in the classroom setting and bridge the gap between research and practice.

References

Borg, W., Gall, J., & Gall, M. (1996). *Applying educational research: A practical guide.* White Plains, NY: Longman.

Coleman, J., Campbell, E., Hobson, C., McPartland, J., Mood, A., Weinfield, F., & York, R. (1966). *Equality of Educational Opportunity.* Washington, DC: U.S. Government Printing Office.

Edgewood Independent School District v. Kirby, 893 S.W. 2nd 450 (Texas, 1995).

Geiger, K. (1994). Rethinking American schools in the post-cold war era. Theory into Practice, 33(2), p. 63-66.

Goeglein-Porter, L. (1996). The cost of student achievement as related to financial variables (Doctoral Dissertation, Texas A. and M. University, 1996). *Dissertation Abstracts International, 57*(10), 4269.

Hanushek, E. (1981). Throwing money at schools. *Journal of Policy Analysis and Management, 1*(19), 19-41.

Hanushek, E. (1986). The economics of schooling: Production and efficiency in public schools. *Journal of Economic Literature, 24,* 1141-1177.

Hanushek, E. (1989). The impact of differential expenditures on school performance. *Educational Researcher, 18*(4), 45-65.

Hanushek, E. (1991). When school finance "reform" may not be good policy. *Harvard Journal on Legislation, 28,* 423-456.

Hanushek, E. (1994). Money might matter somewhere: A response to Hedges, Laine, and Greenwald. *Educational Researcher, 23*(4), 5-8.

Hanushek, E. (1996). A more complete picture of school resource policies. *Review of Educational Research, 66,* 397-409.

Hedges, L., Laine, R., & Greenwald, R. (1994). Does money matter? A meta-analysis of studies of the effects of differential school inputs on student outcomes. *Educational Researcher, 23(3),* 5-18.

Hedges, L., Laine, R., & Greenwald, R. (1996). The effect of school resources on student achievement. *Review of Educational Research, 66,* 361-396.

Hinkle, D., Wiersma, W., & Jurs, S. (1994). *Applied statistics for the behavioral sciences*. Geneva, IL: Houghton-Mifflin.

Lewis-Beck, M. (1980). *Applied regression analysis.* Thousand Oaks, CA: Sage Publications.

Naisbitt, J. (1982). *Megatrends: Ten new directions to transforming our lives.* New York, NY: Warner.

Pedhazuer, E. (1982). *Multiple regression in behavioral research.* New York, NY: CBS Publishing.

Senate Bill 7 (1993). Act of May 28, 73rd Legislature, R. S. Ch. 3,4,7, Texas General Laws, 1479. Texas Education Agency (1997a). *Academic excellence indicator system: District reports.* Austin, TX: Author.

Texas Education Agency (1997b). *Public education information management system.* Austin, TX: Author.

Edited by
Charlotte Mizener, *The University of Texas—Pan American*

Effect of Music Selection on Contest Ratings: Year Three of a Continuing Study

Janice Killian
Texas Woman's University

The present study is a third-year report of a continuing study designed to examine characteristics of performing choral groups using contest ratings as the dependent measure. The demographic characteristics that distinguish a highly rated from a less highly rated choir have been closely examined across the three years of the study. The areas of interest have included choir size, school size, the age of the singer, choir configuration (mixed, treble, tenor-bass), and relative number of male and female singers as related to contest ratings received. Of particular interest has been the influence of music repertoire on ratings. Repertoire issues have included the effect of specific voicings (Unison, SA, SSA, SAB, Three-Part Mixed or SATB voicings) as well as the effect of selecting contest repertoire from published lists such as the Texas University Interscholastic League (UIL) Prescribed Music List (1999).

Several characteristics have remained stable across the first two years of the study. In both previous studies (Killian 1998; Killian 1999), superior ratings were awarded more frequently to larger choirs and to treble (rather than mixed or tenor-bass) choirs. The relative number of male singers has remained fairly constant (choirs in 1998 had 21.5% males, and those in 1999 had 24.9% males). Choice of UIL vs. non-UIL repertoire did not appear to significantly affect contest ratings.

There have been several aspects of the study that were different between the first two years of the study. In 1998 larger schools earned more superiors; in 1999 they did not. In 1998 larger schools did not necessarily have larger choirs; in 1999 the reverse was true.

The effect of repertoire selection on contest ratings has remained inconsistent, particularly involving mixed groups of an age that might be expected to involve changing male voices. Cooksey (1977) developed a reliable way of categorizing the stages of male voice change. His data indicated at the time that boys' voices, despite wide individual variability, were changing typically in grades seven and eight. More recent research (Killian, in press; Moore, 1995) indicates that boys' voices may be changing earlier. In fact, according to Killian (in press), most boys' voices have entered the voice change in sixth grade.

In the first study in this series of studies examining performing choral groups (Killian, 1998), there were clear results consistent with an earlier voice change. Significantly more superior ratings were achieved among sixth grade mixed choirs (the age at which boys' voices might be expected to be changing) that performed Three-Part Mixed music (music explicitly arranged for changing voice ranges). In addition, seventh and eighth grade choirs, which previously might have been expected to succeed with changing voice Three-Part Mixed music, did not succeed with Three-Part Mixed arrangements. Instead, significantly more superior ratings were achieved among seventh and eighth grade mixed choirs performing SATB music (music arranged for changed voices). See Killian, 1998, for specifics.

In 1999, these results were not replicated. No sixth grade choirs sang Three-Part Mixed arrangements; thus comparison was impossible. The sixth grade mixed choirs did, however, yield a result that might support the speculation regarding earlier voice change. Killian (1999) determined that the sixth grade groups with the fewest male singers received the highest ratings; conversely the sixth grade groups with the most male singers earned the fewest superior ratings. This finding was true only for sixth grade groups, the groups which one might speculate would have the most difficulty negotiating pitches due to the presence of boys with changing voices.

One could conclude that further study is necessary and use the inconsistencies of the two studies as an example of why replication of research is so vital to the profession. Thus the present study was designed to replicate the findings of the previous studies in hope of resolving some of the inconsistent findings exhibited in the first two studies.

Method

Throughout the present research the author followed identical procedures established in the previous studies (Killian, 1998; 1999). Subjects were intact choirs (N=167) participating in the 1999 Sandy Lake Choir Funfest in Carrollton, Texas. Directors selecting repertoire from the UIL Prescribed Music List (1998) could perform one selection or they could perform two selections from any other source. Consistent with previous procedures, each school was counted as performing 2 selections; any UIL selections were simply counted twice. Thus analysis was made on 167 choirs performing 334 songs.

The groups included 6,849 singers, 1,743 of whom were boys (25.45%). Choirs contained singers from grades 1-12, including 176 elementary choirs (grades 1-6), 68 sixth grade-only choirs, 44 middle school choirs (grades 6-8) and 46 high school choirs (grades 9-12).

Three experienced choral educators individually rated each choir, and the three scores were then averaged into a single rating. Ratings consisted of One (highest) to Three (lowest); pluses and minuses were possible at each rating. Judges were provided with copies of all music performed. Following previous procedures, contest ratings were collapsed into two categories. “Superior” choirs consisted of those receiving three I or I-plus ratings with no more than a single I-minus rating. “Not Superior” ratings were assigned to all other choirs. Using this stringent standard, overall results averaged 37.13% Superior ratings.

As in the previous studies, independent measures consisted of the following categories noted during the performance: (a) song title(s); (b) voicings (SA, SSA, Three-Part Mixed, SAB, or SATB) as evident from the judges' copies of the music; (c) UIL or non-UIL selection (as listed on the entry form); (d) grade level(s) of singers (as listed on each entry); (e) entry type (mixed, treble, tenor-bass); (f) size of choir (based on actual count at time of performance); and (g) number of boys in each choir (based on actual count at time of performance). The only difference in data collection between this study and the previous ones involved school size.

School size was based on UIL class, a classification only available for secondary schools. Since 73% of the choirs at this particular contest were elementary, size of school information was not collected.

Subsequently, data were expanded to include the ratio of boys to the total number of singers. The ratio of boys was collapsed into categories for ease of analysis (0-19%, 20-39%, etc.), and likewise, choir sizes were collapsed into 15 person segments, ranging from 0-15 to 106-120.

As was true for the previous studies, the single dependent measure consisted of judges' ratings collapsed into Superior and Not-Superior as explained above.

Results

All data were analyzed using the chi-squared statistic due to the nominal nature of the dependent measure (frequency of superior ratings). All possible combinations were computed; statistically significant findings are reported below.

Choir Size

Larger choirs had significantly more superior ratings ($X2 = 24.06$ [6, 334] $p < 0.0005$). Specifically, 45.5% of the choirs with memberships less than 30 earned superiors while only 25.0% of those with fewer than 30 members earned superiors. Size varied by age. Sixty-nine percent of elementary choirs comprised more than 30 members; 62% of the middle school choirs had more than 30; and only 20% of high school groups had a membership larger than 30. This tendency remained consistent in mixed, treble, and tenor-bass choirs.

Choir Type

Consistent with both previous studies, treble choirs received significantly more superiors than did mixed or tenor-bass choirs (X2 = 8.437 [2, 334] p < 0.0147). Specifically, 60% of treble choirs, 35.1% of mixed choirs and no tenor-bass choirs received superiors. Note that there were only two tenor-bass choirs entered in the contest so these data should be regarded with caution.

Age of singer

Unlike previous research, overall there were no significant differences in ratings between elementary, middle school, and high school performers (X2 = < 1). Neither mixed choirs' ratings nor tenor-bass choirs' ratings exhibited a significant difference by age of singer (X2 = <1). Treble choirs' ratings, however, were significantly different (X2 = 7.708 [2, 30] p < 0.0212) with higher ratings earned by elementary than by high school groups. Note that only 30 treble choirs entered treble groups (18%) as compared with 35% in 1998 and 38% in 1999.

UIL repertoire selection

Consistent with previous research, there was no significant rating difference among those choirs who performed music from the UIL Prescribed Music List and those who did not (X2 = 1.229 [1, 334] p < 0.2677). Relatively few chose from the list (11.4%).

Ratio of male to total singers

Unlike previous research, there was no significant difference between the number of male singers in mixed choirs and the frequency of superior ratings (X2 = 4.506 [3, 302] p < 0.2118). Specifics are discussed below in reference to sixth grade choirs.

Grade 6 in mixed choirs

Because previous research indicated a drop in superior ratings in sixth grade mixed choirs, mixed choirs were divided into sixth grade mixed groups, older than sixth grade, and younger than sixth grade groups. Results indicated no significant difference among the three groups (2=2.848 [2, 302] p <.2408).

Previous research indicated that below sixth grade, the number of boys in a group had relatively little effect on ratings. Results of this study were consistent (38%, 42%, and 43%

superiors were achieved across the various ratios of boys to total singers). Likewise, previous research indicated that, in groups older than sixth grade, the more male singers, the higher the rating. Such was the case in this study with 20% superiors earned by older than sixth grade groups with less than 20% males and 38% superiors awarded to groups with 40% males.

Previous research indicated that sixth grade choirs containing a greater number of male singers received fewer superiors. These data were not confirmed by this study. Mixed choirs with sixth graders received 35% superiors (with < 20% male singers), 37% superiors (with < 40% male singers) and 22% superiors (with < 60% male singers). The findings simply are not predictable; they did not replicate the previous studies.

The original research (Killian, 1998) indicated that sixth grade mixed choirs who performed Three-Part Mixed arrangements earned significantly more superior ratings. The second study (Killian, 1999) did not confirm this, but instead found that the more sixth grade boys in the choir, the lower the frequency of superiors.

The present study found no significant difference between frequency of superiors and voicings selected ($X2 = 11.93$ [6, 334] $p < 0.0636$). The possible voicings included Unison, SA, SSA, Three-Part Mixed, SAB and SATB. Further analysis indicated that mixed elementary choirs earned higher ratings with SA (42%, $n = 128$), then SSA (33%, $n = 3$), followed by Unison (22% n=41). Middle school mixed groups earned higher ratings with SSA (50%, $n = 6$), followed by SAB (43%, $n = 7$), SA (34%, $n = 70$), SATB (33%, $n = 3$), Three Part Mixed (14%, $n = 7$) and finally Unison (00%, $n = 5$). High school mixed groups were most successful with SATB (43%, $n = 14$) followed by SAB (27%, $n = 11$) and Three-Part Mixed (14%, $n = 7$).

Among treble choirs, elementary choirs received 100% superiors. SA ($n = 2$) and Unison ($n.=.2$) middle school treble choirs received more superiors, with SA (83%, $n = 6$) and SSA (75%, $n = 4$). High school treble choirs were more successful with SSA (50%, $n = 8$) than SA (25%, $n = 8$). Note the very high percentages of superior ratings for treble choirs.

There were too few tenor-bass choirs ($n = 2$) to allow meaningful analysis.

Discussion

There appear to be few consistent substantive results when comparing the three studies. Consistencies include the fact that larger choirs and treble choirs receive superior ratings significantly more frequently than smaller choirs and other voicings. One might question whether this is the result of judges liking a larger sound, or whether larger choirs really do sound better, or whether larger programs are more likely to have qualified directors who have well-established choral programs.

The fact that treble choirs receive more superiors might be because they sing better, or because their voices are more manageable at this age, or because there is a judges' bias in favor of treble choirs, or because there is some other factor affecting exactly which choirs perform at the Sandy Lake Funfest. Note that all three studies have been conducted at the same contest that conceivably would attract the same population each year. Perhaps a selection process happens prior to the contest with more qualified mixed groups performing elsewhere.

Consistent with previous research, ratings were not dependent on whether the director selected music from the Prescribed UIL List or from his/her own judgment.

The most intriguing aspect of this series of studies appears to be the inconsistencies noted. I believe this series makes a strong case for the necessity for replication. At the end of the first study I was confident in saying that sixth graders in mixed choirs would be wise to sing Three-Part Mixed music. At the end of the second study, I could no longer hold that conclusion, but I

could say that the choirs that did well did not have many sixth grade boys in them. And I could lament that fact and search for answers as to why that might be occurring. At the end of this present study, I cannot make either statement with any degree of certainty. In fact, the only sure statement I can make is the fact that data need to be repeated again and again before conclusions are drawn. Replication is particularly important for descriptive data in which the researcher is not in control of the variables but must simply observe what happens. The most vital component in this series of studies could not be evaluated because sixth grade choirs did not choose to perform Three-Part Mixed music. Therefore, no further conclusions can be drawn about the appropriateness of that voicing for sixth graders other than to note that further examination of the relationship between voice change and repertoire is warranted.

It might be wise to use descriptive studies to guide our thoughts regarding what experimental studies need to be conducted next rather than trying to find answers from descriptive data. Obviously, further research is warranted.

References

Cooksey, J. (1977a). The development of a continuing, eclectic theory for the training and cultivation of the junior high school male changing voice. Part I: Existing theories. *Choral Journal, 18* (2), 5-13.

Cooksey, J. (1977b). The development of a continuing, eclectic theory for the training and cultivation of the junior high school male changing voice. Part II: Scientific and empirical findings. *Choral Journal, 18* (3), 5-16.

Cooksey, J. (1977c). The development of a continuing, eclectic theory for the training and cultivation of the junior high school male changing voice. Part III: Developing an integrated approach to the care and training of junior high school male changing voice. *Choral Journal, 18* (4), 5-15.

Killian, J. (in press). A description of vocal maturation among fifth and sixth grade boys. *Journal of Research in Music Education*.

Killian, J. (1999) Music Selection of Successful Choirs: UIL vs. Non-UIL Contests. *Texas Music Education Research 1999.*

Killian, J. (1998). Characteristics of successful choirs in a contest setting. *Texas Music Education Research 1998.* pp. 39-43.

Moore, M.C. (1995). *The adolescent male changing voice: A study of age and attitudinal comparisons.* Unpublished master's thesis, Texas Woman's University, Denton.

University Interscholastic League (1999). *Prescribed Music List.* Austin, TX: The University of Texas at Austin Board

Edited by
Charlotte Mizener, *The University of Texas—Pan American*

Current Admission Criteria for Texas Master of Music Degree Programs: Piano Performance, Piano Pedagogy, and Music Education with Piano Emphasis

Yvonne E. Michalski
Southern Methodist University

Administrators in graduate music degrees use a variety of admission criteria in the selection process of student applicants. These components are reliant on the individual school's emphasis and weighting of particular guidelines. Unfortunately, all of the admission elements are not always communicated clearly and stated in policy documents for faculty or prospective students. Ultimately, these factors determine a level of success for both the student and the long-term success of the school curriculum. Choosing and applying to college is a difficult and time-consuming task in any field and at any level. Students can benefit from viewing not only a general criteria list but from referencing the specifics of particular admission requirements before deciding to pursue graduate studies at a given college.

Achieving and maintaining program criteria and accreditation is an important responsibility of graduate institutions. It ultimately affects the success and long-term health of masters level and doctoral programs. Most graduate music programs are accountable to various state and national accreditation agencies such as the National Association of Schools of Music (NASM) and the Southern Association of Colleges and Schools (SACS), as well as cooperative organizations such as the Texas Association of Music Schools (TAMS).

During the 1999-2000 academic year, there were 273 graduate piano majors in Texas colleges out of approximately 1488 music graduate students. Thus, a case study was deemed important in determining certain criteria emphasized in the 20 Texas colleges offering graduate degrees with piano emphasis.

The purpose of this descriptive study was to determine general and specific graduate criteria and their weight in Texas colleges. The problem primarily lies in which criteria are regarded as most important. It was necessary to not only investigate the spectrum of graduate entry criteria but also the various departmental admissions policies (in this case performance, pedagogy and music education) and their weightings, such as the performance audition area.

The rationale for this study is based on the fact that there is little existing research in the area of graduate admission criteria in music. Furthermore, there is a need for more current studies which follow regional trends in admission criteria. Extensive research of undergraduate admission criteria in non-arts disciplines exists: such as in medicine (Cooke,1992; Elam, 1997,1998), pharmacy (Duncan-Hewitt, 1996), mathematics (Conley, 1997), and engineering (Zinatelli & Dube, 1997). This type of research provides new perspectives into music criteria enabling administrators, professors and students to project broad and specific guidelines for admission.

The accuracy of effective measures of pharmaceutical applicant characteristics, combined with GPA, a problem-solving essay score, and college entrance examinations, attributed to acceptable admissions criteria (Duncan-Hewitt, 1996). The structured interview in selecting prospective graduate chemical engineering students was found to be a method for improving the traditional approach and to reduce the chance of rejecting the 'right' student (Zinatelli & Dube, 1997).

A number of studies have investigated medical school admission criteria procedures, particularly the relationship of academic and personal characteristics. Elam (1998) showed that the admission interview was beneficial in showing the interest of a prospective student in their field, and relating experiences to validate this. Good communication skills and enthusiasm about the particular school was also demonstrated as an important admission factor.

The importance of grades in gaining admission into highly selective medical schools at the graduate level, illustrated that the grade-point average (GPA) was a major influence on the final admission decision (Cooke, 1992). So too, premedical students' perceptions of GPA validated its importance and critical use in the admissions process (p. 848). Medical education research has identified a number of important prospective student characteristics related to the admissions process. Depending on the school, some factors are more important than others. Identifying and giving weight to particular entry items is likely to increase the quality of medical student intake by "broadening criteria to produce the best physicians" (Rabinowitz, 1999, p. S42).

Several studies have focused on selective admissions procedures in both theory and practice (Wallace, 1997; Ebel, 1982; Linn, 1982). According to Ebel (1982), selective admission practices should be justified, policy guidelines clarified for students, and the administrative decisions made by qualified and appropriate admission officers (pp. 22-23). As indicated by Ebel (1982), neither grades nor test scores are free of problems, but neither should be neglected as solid measures of admission at any level.

The use of nontraditional college admission variables was also shown to be a good predictor of college admission and academic success (Hawkins, 1993; Hirschorn, 1988; Tom, 1982). The submission of videotape applications (Hirschorn, 1988), interests and skills statements (Tom, 1982), and the consideration of diversity in graduate school admission criteria, particularly for minority groups (Hawkins, 1993), are all valid nontraditional admission variables.

The Graduate Record Examination (GRE) is considered by many schools to be an important criteria, as studies have shown that the test scores predict some level of success in graduate school (Bornheimer, 1984). However, university administrators should be wary of its validity in each case, as reported by Tisue & Whitaker (1999). In this particular study, the validity of the GRE for the women returning to graduate school (older adult women) was questioned and alternatives to the exam were suggested. Lannholm (1968) investigated the use of GRE scores together with other factors in graduate school admissions in various fields. The study showed that few graduate school departments relied solely on GRE scores in judging the fitness of their applicants. On the other hand, Lindle & Rinehart (1998) reported that there is little existing accurate information which shows the GRE as a predictor of success for nontraditional students'

graduate studies. The results indicated that the most significant predictors of student scholarship potential were GPA combined with analytic score on the GRE.

The study of music admission criteria in various contexts is beneficial for developing appropriate entry procedures at different levels. Aliferis and Stecklein (1953) developed the *Aliferis Freshman Test in Music* (an undergraduate test) as a measure of musical ability. Its purpose was to "provide a measure of musical achievement" (p. 83). The test itself exhibited a high level of reliability and administrators used it for "purposes of grouping, comparison, and specific diagnosis" (p. 96).

A decade later, a concise study of national entrance requirements for graduate study in music indicated certain admission factors that prospective music students should keep in mind (Cheyette, 1962). Some important criteria were determined: grades earned in the undergraduate program, objective examinations in theory and history, and the performance audition (p. 292). The findings of this study found that it was difficult to impose an arbitrary list of admission requirements for a music student seeking a higher graduate degree (p. 294).

Ross (1986) specifically researched graduate music requirements of selected NASM schools. A more recent approach to this study has been the same author's continuation of the 1986 national graduate research (Ross, 1997). This study monitored the effects of changing demographics, uncertain financial support levels, and job market conditions, on admission procedures. Recent changes in graduate admission practices included the volatility in performance major enrollments, and more interest in music education programs. More than half of the schools questioned required the GRE, however in the majority of the schools which included the GRE as an institutional requirement, the music faculty did not necessarily demand its use (p. 44). Most schools used the GRE as added advisory information available about the prospective student. The main intent of the study was to survey national trends and practices regarding general degree requirements.

There is some merit in viewing admission procedures from other countries as there are differences and similarities in graduate entry practices. The extent, to which entrance examinations and intelligence measurements are used in other school contexts, provides administrators with strategies to continue research and practice in admission standards (Handa & Gordon, 1999; Caseiro, 1996; Hyusamen, 1996; Aldrich-Langen, 1983; Fain, 1973).

Judging musical performances is no easy task as it relates to levels of musical ability, subjectivity, complex decision-making, and grading (Fiske, 1983). The issues Fiske mentions are dealt with on a regular basis in the audition process. Robert (1967) viewed the college level entrance audition as oftentimes "highly charged and presenting a distorted picture of the prospective student and their capabilities" (p. 47). There are levels of performance behavior exhibited during the audition and it is vital for higher education institutions to have selection policies in place that are versatile and yet clear in application (Castiglione, 1985; Stiggins, 1985). At the same time, Castiglione (1985) found that committees or boards tend to be "reluctant to state their policies in a forthright, written statement they might someday be required to defend" (p. 34). Ultimately, colleges are challenged to design comprehensive assessment plans that evaluate student achievement in performance. They are also responsible for surveying current assessment practices used in NASM accreditation (Wilborn, 1999).

Obviously, there are several approaches for effective music admission criteria. These approaches require an awareness of the differences in music programs offered. At the same time, admission practices of other disciplines and countries should also be considered. Unfortunately, there is a lack of current national or state music admission research available to faculty, administrators, and prospective graduate students. Educational admission procedures

have changed considerably over the last few decades and yet there is very little research tracking the current criteria developments in music programs (Ross, 1997). Different schools adopt their own admission requirements depending on factors of changing

demographics, financial support levels, tradition, experience, accreditation regulations, committee procedures, and philosophies. Admission criteria and standards in any field should encompass many elements. They should be descriptive, progressive, evolutionary, comprehensive, democratic, realistic, and most of all accessible.

As long as higher education continues to exist, there is a need for ongoing review of the nature of the graduate admission process. Selecting graduate students and finding effective models for predicting success in the short and long term is of benefit to administrators (Hagedorn & Nora, 1996). The ongoing evaluation of general admission criteria procedures should be based on establishing new frameworks with the consideration of other disciplines.

Method

The purpose of this study was to identify current graduate admission trends in three graduate piano degree programs. The graduate admission criteria for 20 Texas music units were collected. The higher institutions were selected from the listing of schools and departments of music in the 1999 College Music Society Directory of Music Faculties in Colleges and Universities (U.S. and Canada) and the 1998-1999 National Association of Schools of Music (NASM) Directory. Internet web pages of individual colleges were also consulted for more current information. The 100% response rate demonstrates the interest of this information by music administrators of Texas colleges.

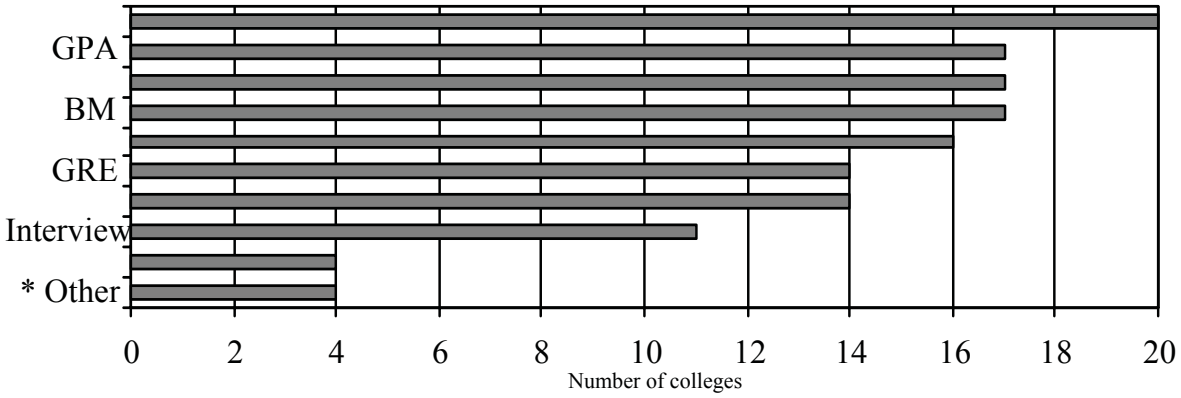
The process involved asking the Director of Graduate Studies or Music Unit Heads to answer a questionnaire including the following data: demographic information, degree plans offered, general criteria list, and the rating of specific criteria of the graduate piano programs in performance, pedagogy, and music education. Additional information included the level of satisfaction with stated criteria, performance audition requirements, and current and future use of the GRE Subject Music Test.

Data received was entered and stored in a database (Filemaker Pro). Data was transferred to a statistical program (Statview) for further analysis. The Fisher exact test was used for the analysis of categorical variables and the Mann-Whitney *U* test for continuous variables.

Results

The number of all graduate music students in the 20 Texas colleges ranged from 2 to 443 (median 33). The combined music units had a total of 273 graduate piano majors (median 10). Music staff to student ratio ranged from 1:7 to 5:1. The most frequent Master of Music (MM) degrees in piano were the performance ($n = 16$) and music education ($n = 12$).

Among general graduate admission criteria, all 20 music units used transcripts. Other frequently used general criteria were GPA ($n = 17$), audition ($n = 17$), and the Bachelor of Music degree ($n = 17$). The general GRE test and recommendations were used by 14 out of 20 colleges. The full breakdown of the general admission list is presented in Figure 1.



* Other General Admission Criteria include: repertoire list, qualifying exams (department placements tests in theory and music history), and statement of objectives.

Figure 1. Frequency of general graduate admission criteria used in Texas colleges.

The GRE was more likely to be used by state than private colleges ($p = 0.04$). There were no differences between state and private colleges in the use of any other general admission criteria. In addition, there was no association between the size of the college and their use of the general GRE. Just over half the units believed the GRE to be a possible indicator of student success in graduate programs. Most units that regarded the

GRE to be an indicator of future success used it as a general admission criteria. Five of the units, who did not regard the GRE as an essential indicator of student success, nevertheless used it as part of their entry requirements.

Most administrators were at least moderately satisfied with their overall graduate music admission standards. Sixty percent of the respondents believed that their admission standards were at a similar level to other Texas colleges.

Piano performance was offered by 18 units. The specific ranking of criteria in the graduate piano performance program revealed that the audition performance ($n = 17$) and level of musicianship ($n = 14$) were considered most important. The GPA was ranked as most important by only 3 schools and the GRE by 2 schools. Each of the above mentioned two criteria (GPA, GRE) were ranked as less important by 8 schools. Both performance experience and reputation of the previous school were rated as moderately important by 9 music units.

The most important factors in the piano audition were level of musicianship and audition performance. Interestingly, applicant piano technique was thought to be of high importance by only 1 music unit in the piano performance admission process.

Piano pedagogy was offered by only 11 units. In the ranking of admission requirements of piano pedagogy applicants, the level of musicianship ($n = 8$) and the audition performance ($n = 7$) were regarded as the most important criteria. Teaching experience was regarded as most important by only 4 music units. The GPA score was regarded as moderately important by 7 units and most important by only 2 units.

Music education was offered by 16 units. In the ranking of admission requirements of music education applicants the GPA ($n = 11$), interview ($n = 10$), and level of musicianship ($n = 9$),

were all regarded as the most important criteria. Interestingly, previous teaching experience was ranked as most important by only 6 music units. The full breakdown of responses for each admission requirement is presented in Table 1.

Table 1
Administrative Ranking of Graduate Admission Requirements in the Music Education Degree Stream (music units $n = 16$)

	Most Important (ranked 1-3)	Moderately Important (ranked 4-6)	Less Important (ranked 7-10)	No Rank Assigned
	n responses			
GPA	11	2	3	0
Interview	10	1	3	2
Level of Musicianship	9	4	2	1
GRE	6	4	5	1
Audition Performance	5	4	4	3
References	5	9	1	1
Reputation of Previous School	4	6	5	1
Teaching Audition/Tape	4	2	4	6
Writing Sample	2	3	5	6
Other*	1	0	0	15

Note. *Other: all criteria are considered of equal importance (no ranking given).

The GRE music test is currently only used by 2 of the Texas graduate programs surveyed. About half of the participants were unlikely to use this subject test as one of the admission requirements in the future.

The different criteria ratings showed significant variations in weighting among the three degree programs in the majority of schools. The results depended on the size of school, emphasis on certain degree programs, resources, policy statements, and personal perceptions of the academic and performance faculty. An interesting finding in the piano performance program was deemed to be the lack of importance in piano technique as a requirement for the audition performance. Instead, most respondents ranked the applicant's musicianship level and the audition performance as more important factors of the audition. Of special concern was the relative low weighting assigned to teaching experience and a teaching audition/tape by a significant number of the music units in the pedagogy admission responses (n = 4). The data presented from the three graduate programs demonstrates current Texas admission practices and the significance of specific criteria. The results provide useful data regarding standards of criteria and the need for standardization in the future.

Conclusion

With the emphasis on accountability in twenty-first century education, colleges are challenged to design and implement effective models of admission criteria at all levels. General and specific criteria in admission procedures at the graduate level are necessary to determine the quality of student admission and success within music schools. The application and weight of these admission criteria are dependent on current policies of schools that offer graduate programs.

In the future it will be essential to analyze case studies of a variety of different schools in order to view trends in the area of graduate admissions. Such research could affect many facets of educational and professional preparation, as it relates to the further study of music and ultimately assists students, educators and administrators in improving admission standards at the tertiary level. Within the music unit, the various admission requirements should be described in departmental policy statements, handbooks and guidelines. Hopefully in the future, prospective graduate music students will deal with clearly defined institutional regulations and requirements for admission.

References

Aldrich-Langen, C. (1983). Australia: A Study of the Educational System of Australia and a Guide to the Academic Placement of Students in Educational Institutions of the United States. (Washington: American Association of Collegiate Registrars and Admissions Officers). *ERIC Microfiche* ED 249 884.

Aldrich-Langen, C, ed. (1978). The admission and academic placement of students from selected South American Countries: Bolivia, Brazil, Paraguay, Uruguay. A workshop report, September-October 1977. (Washington: American association of Collegiate Registrars and Admissions Officers). *ERIC Microfiche* ED 214 451.

Aliferis, J. & J. E. Stecklein. (1953). The development of a college entrance test in music achievement. *Journal of Research in Music Education, 1*, 83-96.

Bornheimer, D. (1984). Predicting success in graduate school using GRE and PAEG aptitude test scores. *College and University, 60* (1), 54-62.

Caseiro, T. A. (1996). The development of higher engineering education in Portugal and the monitoring of admissions: a case study. *European Journal of Engineering Education, 21* (4), 435-45.

Castiglione, L. V. (1985). Selection procedures in the performing arts:
performance, practice, and policy considerations. *Design for Arts in Education, 87* (1), 31-37.

Cheyette, I. (1956). Entrance requirements for graduate study in music. *Education, 82* (5), 292-94.

Conley, D. (1997). Performance standards. *Oregon School Study Council Bulletin, 40* (3), 35.

Cooke, W. D. (1992). The role of grades in gaining admission to highly selective medical schools. *Academic Medicine, 67* (12), 846-849.

Duncan-Hewitt, W. (1996). Designing admissions criteria: a framework. *American Journal of Pharmaceutical Education, 60* (2), 109-121.

Ebel, R. (1982). Selective admission: Whether and how. *College Board Review*, *123*, 22-24.

Elam, C., Burke, M., Wiggs, J. & Speck, D. (1998). The medical school admission interview: perspectives on preparation. *NACADA Journal, 18* (2), 28-32.

Elam, C, & Johnson, M. (1997). An analysis of admission committee voting patterns. *Academic Medicine, 72* (10), S72-S75.

Fain, S. S. (1973). Graduate music study in the universities of the British Isles. *American Music Teacher, 22* (6), 24.

Fiske, H. E. (1983). Judging musical performances: method or madness? *Update*, *Spring*, 7-10.

Fiske, H. E. (1979). Musical performance evaluation ability: toward a model of specificity. *Council for Research in Music Education*, *59*,
27-31.

Hagedorn, L. S. & Amaury, N. (1996). Rethinking admissions criteria in graduate and professional programs. *New Directions for Institutional Research, 92*, 31-44.

Handa, S. & Peter-John, G. (1999). University admissions policy in a developing country: evidence from the University of West Indies. *Economics of Education Review, 18* (2), 279-89.

Hawkins, D. B. (1993). Educators push for diverse graduate school admission criteria. *Black Issues in Higher Education, 10* (10), 26-30.

Hirschorn, M. (1988). Change of pace for college admissions officers: students submit applications on videotape. *Chronicle of Higher Education, 34* (17), A31.

Hyusamen, G. K. (1996). Fair and unbiased admission procedures for South African institutions of higher education. *South African Journal of Higher Education, 10* (2), 199-207.

Jameson, S., ed. (1973). The admission and placement of students from the Pacific-Asia area. A workshop report: Australia, Ceylon, Hong Kong, India, Malaysia, New Zealand, Pakistan, Singapore, Okinawa, and Pacific Islands. (Washington: American association of Collegiate Registrars and Admissions Officers). *ERIC Microfiche* ED 084 991.

Lannholm, G. V. (1968). The use of GRE scores and other factors in graduate school admissions. Graduate Record Examinations special report, *no. 68-4*. Educational Testing Service Princeton: New Jersey.

Lannholm, G. V.. (1968). Review of studies employing GRE scores in predicting success in graduate study 1952-1967. Graduate Record Examinations special report, *no. 68-1*. Educational Testing Service Princeton: New Jersey.

Lindle, J. C. & Rinehart, J. (1998). Emerging issues with the predictive applications of the GRE in educational administration programs: one doctoral program's experience. Paper presented at the annual meeting of the American Educational Research Association. San Diego: California.

Linn, R. (1990). Admissions testing: recommended uses, validity, differential prediction, and coaching. *Applied Measurement in Education, 3* (4), 297-318.

Rabinowitz, H. K. (1999). The role of the medical school admission process in the production of generalist physicians. Academic Medicine, 74 (1), S39-S44.

Raessler, K. R. 1967. A comparative study of music course requirements and professional laboratory experiences of undergraduate programs in music education in selected colleges and universities in Pennsylvania, Maryland and New Jersey. Ph.D, Michigan State University.

Robert, W. (1967). Auditioning piano students. *Clavier, September*, 45-47.

Ross, R. D. (1997). The status of graduate studies in music in the United States: a preliminary report. Paper presented at the National Associations of Schools of Music Proceedings.

Ross, R. D.. (1997). The status of graduate music studies in the United States. *Bulletin of the Council for Research in Music Education, 134*,
43-60.

Ross, R. D. (1986). Graduate music requirements at selected NASM schools. *Bulletin of the Council for Research in Music Education, 89,* 1-7.

Sparks, L., ed. (1993). *College Admissions: A Selected, Annotated Bibliography*. Westport: Greenwood Press.

Stiggins, R. J. (1985). The challenge of measuring artistic performance. *Design for Arts in Education, 87* (1), 40-43.

Tambroni, P. (1999). Pre-professional perspectives: choosing a music school with the help of the internet. *American String Teacher, 49* (4).

Tisue, L. & Whitaker, D. (1999). The GRE: a barrier to women returning to graduate school? *Journal of Educational Opportunity, 17* (2), 31-43.

Tom, A. (1982). Non-traditional predictors of academic success for special action admission. Research report: California University Davis.

Varios. (1954). Graduate study in music education - a report of the Committee on Graduate Study in Music Education. *Journal of Research in Music Education, 2*.

Wallace, R. (1997). Formative and summative evaluation at ground zero: some comments on the selective admissions college application experience. Clearing House, 71 (2), 119-22.

Wilborn, D. (1999). Current assessment practices of college music majors: alternatives to the jury system. Poster session at the Texas Music Educators Conference, San Antonio.

Willingham, W. & Hinter Breland. (1982). *Personal Qualities and College Admissions*. Princeton: College Board Publications.

Winter. (1993). Music performance assessment: a study of the effects of training and experience on the criteria used by music examiners. *International Journal of Music Education, 22*, 34-39.

Wooly, J. M., Jr. (1975). The organization and administration of graduate music programs in selected southern institutions of higher education. Ph.D, University of Southern Mississippi.

Zinatelli, M. & Dube, M. (1997). A structured interview for selection of graduate students. *Chemical Engineering Education (CEE), 31* (4),
210-213.

Edited by
Charlotte Mizener, *The University of Texas—Pan American*

Attitude Toward Singing Among Instrumental Musicians, Choral Musicians, and Non-Musicians

Charlotte P. Mizener
University of Texas-Pan American

Singing is a basic human behavior. From the earliest times, people have engaged in singing activities. It is a "highly specialized communication about special aspects of human life" (Crist, Dunn, & Revicki, 1976). How is it that some people choose to use singing, a natural human behavior, as a means of communication, and some people choose to avoid singing? What are some of the influences on attitude toward singing? Research regarding attitude toward singing has centered primarily on students of all ages, from pre-school children to university students. A large number of studies deal with attitude toward music and singing in terms of home musical environment and experience, classroom activities, teaching method, and singing skill. Bowles (1991), Brand (1986), and Mawbey (1973), among others, found that musical environment in the home, parental attitude, and parental musical involvement with the child influenced attitude toward music.

Not only do parents and the home environment affect attitudes toward music and singing. Teachers and the learning environment of the classroom also seem to influence the interest and attitudes of children in several ways. Regarding attitude toward music in general, Boswell (1991) found a relationship between the teacher variable and scores on standardized tests of attitude toward music among middle and junior high school general music students. Several researchers found links between teacher behaviors and children's music attitudes expressed in musical preferences. Among these were Peery and Peery (1986), who indicated that teachers can influence musical preference by structuring lessons to include examples of classical music literature, and Sims (1986), who concluded that a high-affect style of teaching increased the attentiveness of preschool-aged children in listening lessons. In a preschool setting including frequent music-making activities, students seemed to participate more freely and enthusiastically in music lessons presented as part of a research study than did students from a preschool setting in which music-making was rare. Furthermore, anecdotal reports reveal the degree of influence teachers may have on attitude toward singing. Smith (1991) related his experiences at the junior

high level with one teacher who encouraged him to sing and heightened his personal confidence, and with another who demeaned his singing and caused him to avoid singing well into adulthood. In a study of the views of classroom teachers regarding music, Kritzmire (1991) reported many incidents in which teachers either encouraged or discouraged students from participating in singing and other forms of musical activities. It appears, then, that the learning environment in music classes affects musical preferences, attitudes, and degree of participation among students.

A smaller body of literature deals with attitude toward singing among adult non-musicians (Apfelstadt, 1989; Gates, 1989; Mitchell, 1991; Wheaton, 1998). Apfelstadt (1989) found that among elementary education majors, a majority of those with a musical background felt comfortable using their singing voices in the classroom. She also found that positive experiences with singing in childhood were associated with positive attitudes toward singing in adulthood. In contrast, negative experiences in childhood did not always result in negative attitudes in adulthood among the subjects in the study. The author of the study speculated that the lack of a significant relationship between negative experiences and negative attitude could have resulted from the fact that the questionnaire was administered late in the semester after student attitudes may have been affected by experiences in the course. Finally, Apfelstadt found that most subjects who participated in musical activities with their families felt comfortable using their singing voices.

It is often assumed that increased musical skill will lead to more positive attitudes toward music, and, indeed, in some academic areas, such as art and mathematics, research indicates that attitude toward the subject is directly related to training and skill in the subject (Hollingsworth, 1983; Schofield, 1982). Increased skill and training appear to be associated with more positive attitudes toward music in general secondary school students, college students, and adults (Crowther & Durkin, 1986). In one study of attitude and musical skill, however, attitude and skills in playing a musical instrument were not significantly related (McCarthy, 1974). No significant relationships were found between skill in singing and attitudes toward singing among elementary school-aged subjects (Mizener, 1990). Among adult subjects, however, Jellison and Siebenaler (1991) found that stronger singers generally had more positive attitudes toward singing activities than did weaker singers.

Throughout the population, there are individuals who are disinclined to sing. They feel uncomfortable using their singing voices for many reasons. Derogatory remarks from family members, friends, or teachers have caused many non-singers to feel that they should not sing. For others, a perceived lack of singing skill keeps them from singing. Still others do not sing because of limited musical experience. In many studies, the factor of musical background and experience was related to attitude toward singing. It might be expected that all trained musicians would have a positive attitude toward singing, given their extensive musical background and experience. No information, however, was found regarding performing instrumental musicians and their attitudes toward singing, and relatively little research has been done on non-student adults and their attitudes toward singing. The purpose of this study was to compare the singing attitudes and skills of instrumental musicians in a community orchestra, choral musicians in church choirs, and subjects not actively involved in music making. The research questions included:

1. How do the attitudes toward singing of subjects in each group compare?
2. What musical experiences are associated with a positive attitude toward singing in each group?

3. What is the relationship between self-perceived singing skill and attitude toward singing in each group?
4. What musical experiences are associated with a higher self-perception of singing skill in each group?
5. What is the relationship between assessed singing skill and attitude toward singing in each group?
6. What is the relationship between assessed singing skill and self-perception of singing skill in each group?
7. What is the relationship between assessed singing skill and past musical experiences in each group?

The following questions will also be addressed:

1. What are the relationships between gender and attitude toward singing in each group?
2. What are the relationships among orchestral musicians between self-perceived singing skill and age at which instrumental study began?
3. What are the relationships among orchestral musicians between self-perceived singing skill and kind of instrument played?

Method

In this study, adults representing three groups served as subjects (N = 96). The three groups were members of a community orchestra (n = 52), members of church choirs (n = 21), and church members not participating in the choir (n = 23). Data collection took place at regularly scheduled rehearsals and in adult Sunday school classes. Subjects completed a questionnaire with items regarding demographic information, attitude toward singing, and singing background and experience. After completing the questionnaire, subjects were recorded on audiotape singing "America," a song familiar to most subjects and used in previous studies of singing skills, in the key of C. The key of C was chosen for the singing portion of the study because it allows the range of the song (B3 to A4 for women, where middle C = C4; B2 to A3 for men) to fall within the comfortable singing range of most adults (Vennard, 1967). A few subjects asked for a different key because the range in the key of C was perceived as being either too high or too low for them. In these cases, the key of F was used. Subjects were offered a copy of the printed notation for the song, also in the key of C, or a page containing only the words with no musical notation. One subject, a horn player, asked for the key of F so that transposition would not interfere with singing. The subject declined to use the word sheet and opted for the musical notation.

Singing skills of the subjects were assessed according to an eight-point set of criteria based on criteria used by Mizener (1990) for assessing singing skills of untrained singers. The following is a listing of the criteria and respective singing accuracy ratings: Begins and ends in same tonality, with no loss of tonality within the song and no noticeably inaccurate intervals = 8; begins and ends in same tonality with no loss of tonality within the song but with some noticeably inaccurate intervals = 7; ends on pitch one half-step or more different from beginning pitch through a progression of slightly inaccurate intervals but with no abrupt shift in tonality = 6; begins and ends in same tonality but with loss of tonality within the song and some noticeably inaccurate intervals = 5; ends in tonality different from beginning tonality, with some noticeably inaccurate intervals and an abrupt shift in tonality within song = 4; begins and ends in same

tonality but with little pitch variation around the tonal center = 3; ends in tonality different from beginning tonality, or ends in spoken tones, with little pitch variation around the tonal center = 2; has no clearly established tonal center and most intervals are inaccurate, or is chanted in spoken tones = 1. Rhythmic accuracy was rated with a "Yes" or "No" according to whether or not the rhythm of the singing performance was recognizable as the rhythm of the song. Tapes were analyzed further to determine pitch matching skill (did the subject match pitch without prompts, with one or two prompts, or not at all?). Frequency counts and percentages of scores for pitch matching and melodic accuracy, as well as results of analysis of questionnaire data, are reported below.

Results

Data from the questionnaire responses and the audiotapes were analyzed by crosstabulations to determine relationships between the variables in the study: singing interest, participation in musical performance activities, singing experiences, self-perception of singing skill, and assessed singing skill. Many questionnaires were returned with missing data, so the number of subjects in the following discussion may vary from the total number of subjects.

Questionnaire data showed that the majority (83%) of all subjects had a positive attitude toward singing. Figures from the separate groups of subjects indicated that 82% of orchestra members liked to sing, and, as might be expected, 100% of church choir members indicated that they liked to sing. A smaller portion, however, of the church members not in choir (68%) liked to sing.

Data from the items eliciting a self-assessment of singing skill ("Overall, would you say that you are a good singer?" and “How would you rate your singing skills?”) showed varying results among the groups (Table 1). Of all subjects, 48% thought that they were good singers. On a rating scale of one to five, with five being the highest point, nearly half (47%) gave themselves a middle rating of three. A rating of four or five was claimed by 22% of the subjects, and 31% rated themselves at a level or one or two. Similarly to the total number of subjects, 49% of orchestra members considered themselves good singers, with over half (58%) rating themselves at a three, 20% at a four, and 22% at one or two. Not unexpectedly, 76% of the choir members thought they sang well, and a much smaller 18% of people not participating in musical performance activities thought they were good singers. Fifty-two percent of the choir members thought they were in the middle of the scale, 43% rated themselves at a four or five, and only 5% gave themselves a rating of one. Among the church members not in choir, only 18% thought they were average singers, whereas 78% rated themselves poor with scores of one or two, and 5% claimed a rating of five.

Table 1
Frequencies and Percentages of Responses to Selected Items from the Attitude Toward Singing Questionnaire

I. Attitude Toward Singing

A. "Do you like to sing?"

	Yes		No	
	n	%	*n*	%
All Subjects (*N* = 94)	78	83	16	17
Orchestra Subjects (*N* = 50)	41	82	9	18
Choir Subjects (*N* = 21)	21	100	0	0
Non-Choir Subjects (*N* = 23)	16	70	7	30

B."Overall, would you say that you are a good singer?"

	Yes		No	
	n	%	*n*	%
All Subjects (*N* = 94)	45	48	49	52
Orchestra Subjects (*N* = 51)	25	49	26	51
Choir Subjects (*N* = 21)	16	76	5	24
Non-Choir Subjects (*N* = 22)	4	18	18	82

II. Self Perceived Singing Skill Rating: "How would you rate your singing?"

	Singing Skill Rating									
	1		2		3		4		5	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
All Subjects (*N* = 94)	16	17	13	14	44	47	16	17	4	4
Orchestra Subjects (*n* = 50)	2	4	9	18	29	58	10	20	0	0
Choir Subjects (*n* = 21)	1	5	0	0	11	52	6	29	3	14
Non-Choir Subjects (*n* = 22)	13	60	4	18	4	18	0	0	1	5

Crosstabulation procedures performed on responses to questions about self-perceived singing skill and liking to sing resulted in some interesting relationships. Among subjects in all groups, all those who thought they were good singers liked to sing, and 67% who thought they were not good singers still liked to sing. Of those who liked to sing, however, only 58% thought they were good singers, and none who disliked singing thought they sang well. Subjects in the orchestra yielded similar results. Of those who liked to sing, 60% thought they sang well, little different from the 58% among all subjects. And, as with the entire pool of subjects, none who did not like to sing thought they were good singers. All orchestra members who thought they were good singers liked to sing, and similar to the results from the combined groups of subjects, 64% of orchestra musicians who thought they were not good singers still liked to sing. All choir members liked to sing, but only 76% thought they were good singers. Most church members not in choir said that they liked to sing, but of those, only 27% thought they sang well. Of all those who said they sang well, all liked to sing, and of those who thought they did not sing well, 61% also liked to sing.

The questionnaire contained several items about past singing experiences. Crosstabulation procedures were performed to find any associations between the past experiences and attitude toward singing ("Do you like to sing?"). Among all subjects, only one item, "Someone sang to me when I was a child," yielded a significant relationship (X^2 (9, N = 93) = 14.84, $p < 0.02$, Cramer's $V = 0.40$). To this item, 56% of subjects who said they liked to sing marked five or six on a scale of zero to six, with six indicating strongly agree. Of subjects who said they did not like to sing, only 14% gave the item a rating of five or six. Among church members who did not sing in choir, one past singing experience was related to singing attitude: "Generally, singing in the elementary school was a pleasant experience for me as a young child." (X^2 (7, N = 23) = 11.98, $p < 0.04$, Cramer's $V = 0.72$).

Past singing experiences were also analyzed for any relationships to the question, "Overall, would you say that you are a good singer?" Several significant associations emerged from this analysis, as shown in Table 1. A significant relationship was found between self-perceived singing skill and the item, "Someone in my family sang to me when I was a child." (X^2 (8, N = 93) = 24.54, $p < 0.00$, Cramer's $V = 0.51$). Of all subjects who thought they were good singers, 73% responded with a rating of five or six, and only 11% gave a rating of zero or one. In contrast, 27% of subjects who did not think they were good singers gave ratings of five or six, whereas 34% indicated a rating of zero, one, or two. Another particularly interesting relationship occurred between self-perceived singing skill and the item, "When I was a child, teachers encouraged me to sing and praised my singing." (X^2 (8, N = 94) = 18.55, $p < 0.01$, Cramer's V = 0.44). Thirty-six percent of subjects who thought they were good singers gave the two highest ratings, and 13% gave the two lowest. Among those who thought they were not good singers, 51% gave the two lowest ratings. Similar patterns were found among the remaining items significantly related to self-perceived singing skill among all subjects (Table 2). Those items included, "I used to sing songs with some of my family when I was a child," "When I was a child, I knew adults in my family who liked to sing and/or sang in a choir," and "When I was a child, family members encouraged me to sing and praised my singing."

Table 2
Crosstabulations of Self-Perception of Singing Skill (Would you say that you are a good singer?) by Responses to Selected Questionnaire Statements.

1. "Someone in my family sang to me when I was a child."

			% of Statement Response						
Self-Perception of Singing Skill Response	Response Frequency		0 (*n*=15)	1 (*n*=6)	2 (*n*=4)	3 (*n*=9)	4 (*n*=13)	5 (*n*=23)	6 (*n*=23)
	n	%	%	%	%	%	%	%	%
Yes	45	48	11	0	0	4	11	33	40
No	48	52	21	13	8	15	17	17	10

X^2 (8, N = 93) = 24.54, p < .0.00, Cramer's V = .51

2. "I used to sing songs with some of my family when I was a child."

			% of Statement Response						
Self-Perception of Singing Skill Response	Response Frequency		0 (*n*=16)	1 (*n*=7)	2 (*n*=12)	3 (*n*=9)	4 (*n*=11)	5 (*n*=19)	6 (*n*=19)
	n	%	%	%	%	%	%	%	%
Yes	45	48	11	2	2	9	13	33	29
No	48	52	23	13	23	10	10	8	13

X^2 (8, N = 93) = 23.23, p < .00, Cramer's V = .50

3. "When I was a child, I knew adults in my family who liked to sing and/or sang in a choir."

			% of Statement Response						
Self-Perception of Singing Skill Response	Response Frequency		0 (*n*=15)	1 (*n*=14)	2 (*n*=8)	3 (*n*=5)	4 (*n*=18)	5 (n=18)	6 (n=15)
	n	%	%	%	%	%	%	%	%
Yes	45	48	9	9	4	4	16	31	27
No	48	52	23	21	13	6	23	8	6

X^2 (8, N = 93) = 23.23, p < .00, Cramer's V = .50

Table 2 continues

Table 2 *(continued*).

4. "When I was a child, family members encouraged me to sing and praised my singing."

Self-Perception of Singing Skill Response	Response Frequency		% of Statement Response 0 (*n*=19)	1 (*n*=13)	2 (*n*=5)	3 (*n*=13)	4 (*n*=13)	5 (*n*=17)	6 (*n*=14)
	n	%	%	%	%	%	%	%	%
Yes	45	48	31	18	2	9	13	31	27
No	49	52	23	21	8	18	14	6	4

X^2 (8, N = 94) = 26.23, p < .00, Cramer's V = .53

5. "When I was a child, teachers encouraged me to sing and praised my singing."

Self-Perception of Singing Skill Response	Response Frequency		% of Statement Response 0 (*n*=17)	1 (*n*=14)	2 (*n*=5)	3 (*n*=21)	4 (n=13)	5 (n=11)	6 (n=13)
	n	%	%	%	%	%	%	%	%
Yes	45	48	11	2	4	27	20	18	18
No	49	52	24	27	6	18	8	6	10

X^2 (8, N = 94) = 18.55, p < .01, Cramer's V = .44

Note. Some percentages do not equal 100% due to rounding of figures.

In the separate groups, a few significant relationships occurred between self-perception of singing skill and past singing experiences. Among members of the orchestra, the items "Someone in my family sang to me when I was a child." (X^2 (8, N = 51) = 16.81, p < 0.01, Cramer's V = 0.57) and "When I was a child, family members encouraged me to sing and praised my singing." (X^2 (8, N = 51) = 16.77, p < 0.01, Cramer's V = 0.57) were associated with self-perception of singing skill. The item, "When I was a child, teachers encouraged me to sing and praised my singing." showed a significant relationship (X^2 (7, N = 21) = 13.65, p < 0.02, Cramer's V = 0.81) to self-perception of singing skill among church choir members.

Not all subjects who responded to the questionnaire sang for the assessed singing skill portion of the study. Several from the orchestra and from the non-choir church members groups declined to sing. Of the 96 subjects, 71 were audiotaped. Analysis of the audiotapes revealed that as a whole, the subjects were generally accurate singers. Singing skills of 77% of all subjects received ratings of seven or eight, indicating that they matched pitch, sang intervals with reasonable accuracy, and maintained tonality throughout the song. Of the orchestral and choral musicians, 90% and 91%, respectively, had the two highest ratings. Singing skills of only 45%

of the church members not in choir were rated at a seven or eight. All subjects sang with acceptable rhythmic accuracy, allowing for some impatient shortening of long note values at the ends of phrases and expressive lengthening of note values at the end of the song. All subjects eventually matched the initial pitch. Ninety percent of those singing matched pitch on the first attempt, 7% matched on the second attempt, and 3% required two or more attempts to match pitch.

In addition, an informal assessment of tone quality was noted for each singer. Tone quality was rated on a scale of one to five, with five being, in the opinion of the researcher, professional performance quality; three, an average recreational singing quality generally acceptable in a non-professional choir; and one, a quality not acceptable in a non-professional choir. Of all subjects, 44% scored a four or five and 46%, a three. In the orchestra, 54% had an above-average tone quality and 43%, average tone quality. Choir subjects claimed scores of four or five for 62% of their number, and a score of three for 33%. Among the non-choir members, 63% sang with average tone quality; 11%, above average; and 27%, below average.

Among the subjects as a whole and among the subjects from the orchestra, significant differences occurred between gender and singing attitude and/or self-perception of singing skill. Female subjects overall had a more positive attitude toward singing than did male subjects (X^2 (3, N = 94) = 380.27, $p < 0.00$, Cramer's $V = 2.01$). Likewise, more females than males viewed themselves as good singers (X^2 (3, N = 94) = 102.17, $p < 0.00$, Cramer's $V = 1.04$). In the orchestra, more women than men indicated a positive attitude toward singing (X^2 (3, N = 50) = 4.08, $p < 0.04$, Cramer's $V = 0.29$). It should be noted that in those relationships between liking to sing and gender, approximately 75% of the men liked to sing.

No significant relationships were found between assessed singing skill and attitude toward singing or between assessed singing skill and self-perception of singing skill, for either the subjects as a whole or for the individual groups. One significant relationship between assessed singing skill and past singing experiences was found in the group of church members not in choir. Again, that item was, "Generally, singing in the elementary school was a pleasant experience for me as a young child." (X^2 (11, N = 20) = 40.17, $p < 0.03$, Cramer's $V = 0.63$). For the orchestra subjects, no significant relationships were found between singing attitude or self-perceived singing skill and type of instrument played or age at which instrumental study began.

Discussion

Responses to the question, "Do you like to sing?" indicated that the majority, or 83%, of all subjects did have a positive attitude toward singing. Data from previous research support the results of this study. Mizener (1992) found that 98% of students in an elementary music methods class for prospective classroom teachers liked to sing, and in 1993, 92% of a similar group showed a positive attitude toward singing. In contrast to attitudes toward singing specifically, Austin (1991) cites several studies showing that the attitude among adults toward music in general is not nearly so positive. He proposes that a solution to the problem lies in nurturing positive attitudes toward music among children, and those children will, as adults, pass on the positive attitude to children with whom they come in contact. He suggests that the cultivation of positive attitude may be accomplished through appropriate teaching techniques in elementary general music and the involvement of elementary classroom teachers.

When asked, "Overall, would you say that you are a good singer?" about half of all subjects and about half of the orchestra members responded positively. Three-fourths of the choral subjects agreed, but less than one-fifth of the subjects not in choir thought they sang well. This

compares with a study by Mizener (1993) that found that only 24% of students in an elementary music methods class thought that they sang well. These responses seem to point to the conclusion that experience and training specifically in singing are necessary for confidence in singing ability. Experience and training in other areas of music do not necessarily transfer to a positive self-perception of singing skills.

The results show that a negative attitude toward singing (not liking to sing) influences self-perception of singing skill negatively. A low self-perception of singing skill, however, does not necessarily result in a negative attitude toward singing. It seems, then, that developing a positive attitude toward singing is more important than developing a positive self-perception of singing skill.

Singing to children in their early years was the one item of the past singing experiences that was significantly related to positive attitude toward singing among all subjects. In addition, recalling a pleasant singing experience in elementary school was associated with positive singing attitude among the subjects who did not sing in a choir. The lack of any other significant relationships with singing experience items may be due to the rather specialized nature of the subjects involved. Most subjects actively participated in music-making activities, so there may have been little difference in the effect of past experiences on their singing attitudes. Other factors must have been at work for subjects in this study. For subjects not regularly involved in music-making, however, a pleasant experience with singing at the elementary level was significantly associated with positive singing attitude. This finding emphasizes the importance of elementary music activities in molding attitudes toward music and singing.

A larger number of past singing experience items were significantly associated with self-perception of singing skill among all subjects. Of the five related items, four of them dealt with singing experiences within the family, and only one with singing in school. It seems, then, that the home environment is particularly influential in the development of self-perception of singing skill and that the development probably begins before a child starts school.

As the figures suggest, the majority of subjects are adequate singers. They sing with average or better tone quality, match pitch, sing pitches with reasonable accuracy, and generally stay on key. More research needs to be done to determine what factors are involved in developing a positive self-perception of singing skill among people who possess more singing ability than they think they have.

The lack of significant relationships between assessed singing skill and singing attitude or self-perception of singing skill for all subjects may be due to the generally high degree of singing skill of all the subjects, as judged by ability to match pitch, sing intervals reasonably accurately, and maintain tonality throughout a song. The large number of subjects participating in music-making activities seemed to have a uniform level of demonstrated singing skill and confidence in their singing abilities. Results might have been different with a larger number of non-music-making subjects. The one significant relationship involving assessed singing skill occurred with a past singing experience item for the church members not in choir ("Generally, singing in the elementary school was a pleasant experience for me as a young child."). It is interesting to note that it was the same item for the same group that was associated with attitude toward singing.

The gender differences in attitude toward singing and self-perception of singing skill are not surprising, although it was surprising to find no differences in the church members not in choir. Such differences emerge early and continue through adulthood (Mizener, 1990; Gates, 1989).

The lack of any significant relationships between instrumental factors and singing attitudes for the orchestra subjects is interesting. It might have been thought that early instrumental study could affect singing attitudes. It appears, however, that many orchestral musicians, with

extensive musical training and experience and more than adequate singing skill simply choose not to sing. They also seemed to be more critical of their own singing skill, perhaps due to their training and experience.

The results of this study support previous studies regarding attitude toward singing and also provide new information about the singing attitudes of instrumental musicians. A high degree of positive singing attitude among most subjects and gender differences are in agreement with several previous studies.

Singing is an important musical activity that provides joyful experiences, a means of self-expression and communication, and a source of entertainment to all people capable of hearing and producing vocal sounds. People who are uncomfortable singing are missing out on valuable and pleasurable experiences in their lives. The results of this study reinforce the idea that singing attitudes are affected most importantly by singing experiences in the home and also by singing experiences at school. The implications are that parents should sing to and with their children, just as they read to and with them. Music experience classes should be available to parents of young children in order to teach parents to encourage positive attitudes toward singing among their children. Music educators at all levels are also obligated to teach toward not only the acquisition of musical skills and concepts but also toward a positive attitude toward music and singing, as recommended by Austin (1991). Teacher educators at the college level should ensure that prospective elementary classroom teachers as well as prospective music specialists learn to teach music in such a manner that students develop a positive attitude that they can pass on to their own students. Elementary and secondary music teachers should also examine their teaching procedures for the effect they have on singing attitude. Singing is one way for almost all people to participate actively in music making. Attitude education can open the door to a new avenue of communication through music.

References

Apfelstadt, H. (1989). Do we have to sing?: Factors affecting elementary education majors' attitudes toward singing. *Update,* Fall-Winter, 24-26.

Austin, J. R. (1991). The negative music attitude syndrome: Finding a cure. *General Music Today, 5* (1),3-5.

Boswell, J. (1991). Comparisons of attitudinal assessments in middle and junior high school general music. *Bulletin of the Council for Research in Music Education, 108,* 49-57.

Bowles, C. L. (1991). Self-expressed adult music education interests and music experiences. *Journal of Research in Music Education, 39*, 191-205.

Brand, M. (1986). Relationship between home musical environment and selected musical attributes of second-grade children. *Journal of Research in Music Education, 34,* 111-120.

Crist, C., Dunn, J. & Revicki, R. (1976). Song as a measure of man. *Music Educators Journal 76* (9), 26-35.

Crowther, R. D. & Durkin, K. (1982). Sex- and age-related differences in the musical behaviour, interests, and attitudes towards music of 232 secondary school students. *Educational Studies, 8,* 131-139.

Gates, J. T. (1989). A historical comparison of public singing by American men and women. *Journal of Research in Music Education, 37*, 32-47.

Hollingsworth, P. L. (1983). The combined effect of mere exposure, counterattitudinal advocacy, and art criticism methodology on upper elementary and junior high students' affect toward art works. *Studies in Art Education, 24,* 101-110.

Jellison, J. A. & Siebenaler, D. J. (1991). Singing and the prospective classroom teacher: A study of experience, attitude, and skill. Unpublished manuscript.

Kritzmire, J. A. (1991). Talking with neighbors: Musical views of classroom teachers. *General Music Today,* 5(1)*,* 6-7.

Mawbey, W. E. (1973). Wastage from instrumental classes in schools. *Psychology of Music, 1,* 33-43.

McCarthy, J. F. (1974). The effect of individualized instruction on the performance achievement of beginning instrumentalists. *Bulletin of the Council for Research in Music Education, 38,* 1-16.

Mitchell, P. A. (1991). Adult non-singers: The beginning stages of learning to sing. *Psychology of Music, 19,* 74-76.

Mizener, C. (1990). *Attitudes of third through sixth grade students toward singing and choir participation and assessed singing skill.* Unpublished doctoral dissertation, The University of Texas at Austin.

Mizener, C. (1992). Musical background, singing skill, and attitude toward singing among undergraduate non-music majors. *Texas Music Education Research 1992,* 47-55.

Mizener, C. (1993, February). Attitude, experience, and procedures for improving singing skill among preservice elementary classroom teachers. Poster session presented at the annual meeting of the Texas Music Educators Association, San Antonio.

Peery, J. C. & Peery, I. W. (1986). Effects of exposure to classical music on the preferences of preschool children. *Journal of Research in Music Education, 34,* 24-33.

Schofield, H. L. (1982). Sex, grade level, and the relationship between mathematics attitude and achievement in children. *Journal of Educational Research, 75,* 280-284.

Sims, W. (1986). The effect of high versus low teacher affect and passive versus active student activity during music listening on preschool children's attention, piece preference, time spent listening, and piece recognition. *Journal of Research in Music Education, 34*, 160-191.

Smith, G. R. (1991). Who told you you could sing? *General Music Today, 5* (1)*,* 37-38.

Vennard, W. (1967). *Singing: The mechanism and the technic* (rev. ed). New York: Carl Fischer.

Wheaton, B. A. (1998). Self-perceptions of singing ability for the adult, self-proclaimed, nonsinger. *Missouri Journal of Research in Music Education, 35,* 18-27.

Edited by
Charlotte Mizener, *The University of Texas—Pan American*

Medical Problems of Flautists

Cari Rollins, *University of North Texas Health Science Center*
Kris Chesky, *University of North Texas*

Musicians are required to put physical demands on their bodies. Recently, the musical community has begun to study injuries produced from the strain of constant performance. These maladies are called performance injuries. The most common types of performance injuries are overuse injuries. Carpal tunnel syndrome (CTS) is one type of overuse injury that involves the hands and wrists. According to the U. S. Department of Health and Human Services, CTS is undoubtedly underreported in aggregate statistics (1989). The Department of Health and Human Services attributes the underreporting to the fact that CTS does not cause observable injuries and that it can take months or even years to detect damage.

Carpal Tunnel Syndrome is one of the more frequent maladies of the performance community. CTS is categorized as an entrapment neuropathy. "Entrapment neuropathies are disorders of nerve function ... [in] which the nerve may be subject to compression, stretch or friction" (Lederman, 1993, p. 35). "CTS is caused by the compression of the median nerve" (Cantatore, Dell'Accio, & Lapadula, 1997, p. 598). The carpal tunnel is a porous structure that acts like a subway tunnel. The median nerve and other nerves, tendons, and ligaments act like the subway trains carrying messages from the brain to and from the hand. The collapse of these tunnels leads to a particular set of symptoms. Symptoms of CTS include tingling or numbness of fingers, pain radiating up the arm, weak grip, and nocturnal limb pain that usually causes sleeplessness. "Weakness and clumsiness of the hand, including dropping objects, are common complaints" (MacLean, 1993, p. 41). Dr. P. C. Amadio (1993) notes that alteration of sweat or skin temperature patterns to affected areas is a diagnostic consideration. The cause of CTS is most often associated with repetitive wrist movements, awkward hand positions, extensive prolonged force, and vibration.

Because diagnosis criteria are not standardized, the task of identifying CTS is quite a challenge (Nordstrom, DeStefano, Vierkant, & Layde, 1998). Most diagnoses are made on the basis of history and clinical examination (Lam & Thurston, 1998). The most commonly used clinical diagnostic tests are Tinel's sign and Phalen's test. Tinel's sign consists of tapping on the wrist and Phalen's test requires the patient to hold the wrist in forced flexion for 60 seconds (Cantatore, Dell'Accio, & Lapadula, 1997). Phalen's test is considered to be more accurate than Tinel's sign

especially in the diagnosis of early stages of nerve damage (Cantatore et al., 1997). CTS can only be confirmed using nerve conduction studies (NCS). NCS are used to confirm the existence and/or degree of nerve damage. This test measures the strength and amount of time it takes for an electrical pulse to travel along the median nerve through the carpal tunnel (MacLean, 1993). If the carpal tunnel is compressed, then the median nerve's ability to carry an electrical message will be hindered. In the medical community only about 50% of suspected CTS patients undergo the nerve conduction test (Nordstrom et al., 1998). Eighty percent of cases that were labeled as probable or definite CTS presented an abnormal response to at least one clinical test. This suggests that clinical diagnosis of CTS is highly accurate. This is important because it shows that patients' reactions to stress tests are moderately accurate in helping the medical community diagnose this injury.

A recent survey conducted by the International Conference of Symphony and Opera Musicians (ICSOM) reported that 16% of musicians indicated problems with the left fingers, 14% with the left hand, and 9% with the left wrist (Fishbein, Middlestadt, Ottati, Strauss & Ellis, 1988). The ICSOM questionnaire was completed by 2,212 musicians in 47 different ICSOM orchestras. Fishbein et al. noted that the percentage of musicians reporting hand pain may be lower than the percentage of musicians actually experiencing pain due to the fact that there were twice as many males as females who participated in the survey. The data collected by the ICSOM survey show that musculoskeletal problems among musicians demand attention, but that the orchestral community as a whole might not be the best population for examination due to the imbalance between genders.

Flute players may be more at risk than most instrumentalists for several reasons. According to Norris, " there are numerous joint, muscle, and nerve problems that occur in flutists" (1995, p. 77). "The biomechanics of the hand dictate that to inhibit movement of one joint automatically transfers stress to neighboring joints" (Stotko, 1998, p. 109). This means that the stress that is placed on the left index finger, or MCP joint, by holding the flute is transferred to other joints and consequently that pressure radiates to the left wrist. This occurrence is supported by the results of a survey conducted by Richard Norris at the 1991 National Flute Association Convention. Of the 420 respondents, 12% identified left index finger pain, and 7.5% confirmed left wrist pain (Norris, 1996). Flautists may be more prone to cumulative trauma disorders (CTD) than other instrumentalists due to the position required to hold the instrument. According to Dawson, instruments other than the flute "have larger barrel diameters, which distribute[s] the pressure more widely (1997, p. 110). Norris (1995) stated that strain on the tendons of the thumb increased when the thumb was brought under the hand towards the pinkie as in holding a violin bow or possibly holding the flute. Sataloff, Brandfonbrener, and Lederman (1991) concluded that many of the pains caused by playing the flute were due to the position used to support the horizontal angle of the instrument.

There is some dispute as to what other factors make a person more at risk for CTS. Some suggest that those with small hands are more prone to injury (Sataloff et al., 1991). "The most widely documented intrinsic factor that increased the risk of musculoskeletal pain in instrumentalists is female gender" (Roach, Martinez, & Anderson, 1994, p. 126). In the general population, "female incidence of CTS has been reported to be between 2 and 10 times greater than incidence in men" (Lam & Thurston, 1998, p.192). This was partially attributed to less upper body strength in females. A contrasting study, however, was "unable to show that strength workouts had any protective effect" against musculoskeletal disorders (Manchester & Park, 1996, p. 22). This leads us to believe that the link between upper body strength and CTS is not clearly defined.

Obesity is a significant factor in determining risks for CTS. Lam and Thurston (1998) found that obesity results in an increased risk for slowing of median nerve conduction at the carpal tunnel. The type and amount of physical activity may also play a part in protecting against CTS. According to Roach et al., "instrumentalists who had joint pain reported only 17.3 hours of physical activity a week, compared with the 26 hours reported by the instrumentalists who did not have joint pain" (1994, p. 128-129). Sometimes, however, CTS may present itself transitorily as in cases that are attributed to pregnancy, contraceptive pills, or lactation. Tam outlines 10 risk factors for CTS that include " force, repetition, sustain hold, twist/angle, impact, vibration, acceleration, same task for long time, coldness, and stress" (1997, p. 71). There are numerous factors that affect the presence of CTS, of which obesity, occupation, gender, and physical activities have been identified.

Although other surveys have been administered, the magnitude of medical problems related to flute playing is unclear. The purpose of this study was to obtain information about medical problems of flautists.

Method

This project was designed to use two independent but related surveys to collect data concerning health issues of flutists. The first survey was the University of North Texas-Musician Health Survey (UNT-MHS). This Internet-based survey has been used to examine medical problems of musicians who primarily play clarinet (Thrasher & Chesky, 1998a; Thrasher & Chesky, 1998b), double reeds (Thrasher & Chesky, in press), saxophone (Thrasher & Chesky, 1999), and guitar (Chesky, Rubin, & Corns, 1998). Data from this survey have also been useful for determining vocational patterns (Chesky & Corns, in press), problems with hearing loss (Henoch & Chesky, 1999; Chesky & Henoch, in press), and the perception of drug use among musicians (Chesky & Hipple, 1999). To date, the UNT-MHS has yielded a heterogeneous cross sectional sample of 4,017 musicians. From the current study, 328 subjects who indicated flute as their primary instrument were extracted for analysis.

The Flute Health Survey (FHS), a modified version of the UNT-MHS, was developed to include specific flute-related questions and to overlap selected questions from the UNT-MHS. Questions included localized evaluation of musculoskeletal problems at the digits of each hand (thumb, pointer finger, middle finger, ring finger, and pinkie) as opposed to viewing the hand as one musculoskeletal body site. The FHS also asked questions concerning instrument specifications such as the use of flute plugs, crutches, G key placement, flute wall thickness, metal type, and extra options. This survey also was designed to further assess factors related to cumulative trauma disorders of the upper extremities, including the frequency of non-musical manual tasks, the severity of night hand pain, weakness of grip, and numbness of the hands and/or wrists. Questions concerning pain, grip, and numbness were asked using a 100-cm Visual Analogue Scale (VAS). All other questions concerning musculoskeletal pain were modeled after the five-point grading scale used in the UNT-MHS. Various photos of left wrist position, right thumb placement, and finger curvature during flute performance were presented to subjects. Subjects were asked to self-identify the postures they assume while playing the flute.

The FHS was administered during the 1999 National Flute Association's annual convention in Atlanta, Georgia. The survey was administered to volunteers on site at the convention. Data sets from both surveys were analyzed separately using descriptive statistics. Data were described in terms of demographics, non-musculoskeletal problems, and musculoskeletal problems. The FHS also contained an additional category of data to address flute-specific issues. In order to

determine if the two populations were similar, demographic data were compared using non-paired t-tests and chi-squared statistics. Data from the FHS concerning hand and wrist pain were then compared to hand and wrist positions using descriptive statistics.

Results

The combined population of both surveys yielded 369 total responses. The mean age was 29 years with a gender split of 13% male (n = 46) and 87% female (n = 318). Subjects' average weight was 147.8 pounds and height, 66.0 inches. Respondents participated in an average of 3.5 hours of exercise per week with 41.6 % of the total population reporting that they practiced until they were fatigued.

The UNT-MHS yielded 328 total subjects who identified flute as their primary instrument. The mean subject age was 28 years. Twelve percent of subjects in the MHS were male (n = 40) and 88% were female (n = 284). The mean weight was 146.6 pounds. The mean height was 65.9 inches. MHS subjects reported an average of 3.4 hours of exercise per week, and 42.1% of subjects reported practicing until they felt fatigued.

The FHS had similar findings with a much smaller population (n = 40). Subjects' mean age was 31 years. Participants had played flute for an average of 18.5 years, and the mean age for beginning flute instruction was 11.5. Six respondents were male (15%) and 34 were female (85%). The mean weight was 157.7 pounds. The mean height was 66.8 inches. Subjects reported an average of 4.3 hours of exercise per week with 37.8% of subjects reporting that they practice until they felt fatigued. There were no significant differences between the two groups with respect to these variables.

Subjects in the UNT-MHS identified a number of non-musculoskeletal problems. They reported problems with depression (38.0%), eyestrain (44.4%), fatigue (56.8%), headache (57.4%) and stage fright (45.0%). Other areas of concern included acute anxiety, earache, respiratory allergies, sleep disturbances, and weight problems (see Table 1).

Subjects in the FHS also reported having problems with eyestrain (37.5%), fatigue (42.5%), headache (35.0%) and stage fright (57.5%). Acute anxiety, asthma, respiratory allergies, and weight problems were also earmarked as areas of concern (see Table 1).

Table 1
Percentages of Participants Reporting Non-Musculoskeletal and Musculoskeletal Problems by Groups Surveyed

Type of Problems	UNT-MHS	FHS	Significant Differences	Total
Non-Musculoskeletal				
Acute Anxiety	24.0	22.5	NS	23.8
Asthma	19.1	20.0	NS	19.2
Blackouts/Dizziness	19.8	15.0	NS	19.2
Depression	38.0	12.5	p = 0.001	35.2
Earaches	23.5	10.0	p = 0.035	22.0

Eyestrain	44.4	37.5	NS	43.6
Fatigue	56.8	42.5	NS	55.3
Headache	57.4	35.0	$p = 0.006$	55.0
Hearing Loss	18.5	12.5	NS	17.9
Resp*i*ratory Allergies	27.7	30.0	NS	27.9
Sleep Disturbances	31.9	15.0	$p = 0.028$	30.2
Stage Fright	45.0	57.5	NS	45.4
TMJ Syndrome	20.4	15.0	NS	19.8
Weight Problems	31.2	27.5	NS	30.6
Musculoskeletal				
Right Hand	32.8	22.5	NS	31.7
Right Wrist	38.6	35.0	NS	38.2
Right Forearm	21.6	25.0	NS	22.0
Right Elbow	12.8	7.5	NS	12.2
Right Shoulder	29.5	35.0	NS	30.1
Right Neck	24.0	37.5	NS	25.5
Right Upper Back	24.6	32.5	NS	25.5
Right Middle Back	13.1	22.5	NS	14.1
Right Lower Back	20.7	25.0	NS	21.1
Left Hand	30.7	10.0	$p = 0.028$	28.5
Left Wrist	36.2	27.5	NS	35.2
Left Forearm	19.1	17.5	NS	19.0
Left Elbow	11.9	7.5	NS	11.4
Left Shoulder	27.1	37.5	NS	28.2
Left Neck	27.1	37.5	NS	28.2
Left Upper Back	24.6	32.5	NS	25.5

Subjects in the UNT-MHS reported having problems with several musculoskeletal sites. On the right side, problems of the upper extremities included those in the hand (32.8%), wrist (38.6%), forearm (21.6%), shoulder (29.5%), neck (24.0%), upper back (24.6%), and lower back (20.7%). For the left side, subjects reported problems with hand (30.7%), wrist (36.2%), shoulder (27.1%), neck (27.1%), and upper back (24.6%).

Subjects from the FHS reported right side problems with hand (22.5%), wrist (35.0%), forearm (25.0 %), shoulder (35.0%), neck (37.5%), upper back (32.5%), middle back (22.5%), and lower back (25.0%). Problems with the left side also included those in the wrist (27.5%), shoulder (37.5%), neck (37.5%), and upper back (32.5%).

Demographic variables from both surveys (age, gender, weight, height, exercise, and fatigued practice) were compared using non-paired t-tests and chi-squared statistics. There were no significant differences between any of these variables, indicating that the two groups were similar. Comparative analysis of the non-musculoskeletal data revealed a significant difference

between these two populations in only four variables. Depression (p = 0.0001), earaches (p = 0.035), headache (p = 0.006), and sleep disturbances (p = 0.028) were all found to be significantly different. The only musculoskeletal site which was significantly different between the MHS and the FHS was left hand (p = 0.028%). FHS subjects reported specific right hand problems with thumb (27.5%), pointer finger (22.5%), ring finger (30.0%), and pinkie (37.5%). The left hand had a lower percentage of problems when compared to the right side as illustrated in Table 2.

Table 2
Percentages of FHS Participants Reporting Musculoskeletal Problems and Scores for Degree of Pain According to the Visual Analogue Scale (VAS)

Hand Musculoskeletal Problems	%
Right Thumb	27.5
Right Pointer Finger	22.5
Right Middle Finger	15.0
Right Ring Finger	30.0
Right Pinkie	37.5
Left Thumb	17.5
Left Pointer Finger	12.5
Left Middle Finger	10.0
Left Ring Finger	10.0
Left Pinkie Finger	10.0
Musculoskeletal Pain	**(VAS scale, 1-100)**
Frequency of pain while playing	32.0
Severity of pain while playing	32.7
Frequency of night hand pain	11.2
Loss of grip strength	20.6

FHS subjects were asked to identify the thickness of the wall of their flute as either thin (5%), medium (47.5%) or heavy (15.0%). The remaining 32.5% could not identify the thickness of the wall of their flutes. Subjects classified their flutes as having an in-line G key placement (74.4%) or an offset G key placement (25.6%). A large number of flautists (92.5%) reported playing on an open-holed instrument. Three subjects (7.5%) reported the use of plugs and crutches to aid

flute playing. Participants in the FHS were given pictorial representations of different approaches to hand position. They were then asked to identify which picture most closely represented their hand position. In terms of the left wrist, 25.75% identified a neutral left wrist position, 65.7 % identified a position of 135° flexion at the wrist, and 8.6 identified a 90° flexion. Eighty percent of subjects stated that the fingers of their right hand were curved in relation to the keys. Fifty percent of subjects stated that they aligned the thumb of the right hand in opposition to the pointer finger, whereas 32.5% aligned the thumb with the middle finger, and 17.5% placed the thumb to the left of the pointer finger.

Conclusions

Data collected from both surveys showed similar trends regarding the medical problems of flautists, although these data were collected using separate methods. Data collected from flautists attending the 1999 National Flute Convention used a traditional approach to administration of a survey, while the UNT-MHS was conducted over the Internet. The two surveys collected data from two different populations with similar gender and age distributions. Groups reported very similar trends regarding musculoskeletal problems, suggesting the likelihood that these trends represent a true portrayal of problems experienced by this population. Further randomized controlled investigations are needed, however, to understand fully the extent of these particular problems.

Both the UNT-MHS and FHS yielded similar responses to almost all non-musculoskeletal problems. Eyestrain, fatigue, headaches, and stage fright were certainly reported by a percentage of this population large enough to warrant further investigation. Unlike the musculoskeletal problems, there were four non-musculoskeletal variables including depression, earache, headache, and sleep disturbances that were statistically different between the two groups. Perhaps the differences can be associated with the psychosocial influences of attending a national conference versus being at home or school using the Internet. Although incidence of headache was found to be statistically different between the two data sets (57.4% and 35.0%, respectively), this should not diminish the impact of the number of subjects reporting headache as problematic.

Musculoskeletal problems were problematic in the hands and wrists. The hands and wrists of both the left and right sides were reported as problem areas for over a quarter of the subjects. A large percentage of participants also cited right shoulder, upper, and middle back as locations of problems. These findings support previous discussions by Sataloff, Brandfonbrener and Lederman (1991). They argued that many pains caused by playing the flute were due to the position used to support the horizontal angle of the instrument. Data from the present study, however, do not fully support previous suggestions that the tendons of the thumbs would be strained by the position required to hold the flute (Norris, 1995). Data indicated that the left thumb (17.5%) or right thumb (27.5%) appeared to be less problematic than other sites such as the right ring finger (30.0%) and right pinkie (37.5%).

Data derived from the FHS concerning flute specific issues should be interpreted with caution due to the small number of subjects and the uncertainty that subjects can adequately assess their performance posture from a set of pictures. The validity of these procedures needs to be determined.

Findings from both surveys, however, suggest that medical problems do exist as reported by flutists to a degree that warrants further attention and study. Additional research may show how certain performance factors, including posture and hand and wrist position, influence risk of

injury. The identification and correction of such factors could help to decrease the rate of occurrence of these problems.

References

Amadio, P. C. (1993). Diagnosis and treatment of ulnar nerve entrapment at the elbow and carpal tunnel syndrome in musicians. *Medical Problems of Performing Artists, 8*, 53-58.

Andersen, J. I. (1990). Orthotic device for flutist's digital nerve compression. *Medical Problems of Performing Artists, 5,* 91-93.

Cantatore, F. P., Dell'Accio, F., & Lapadula, G. (1997). Carpal tunnel syndrome: A review. *Clinical Rheumatology, 16,* 596-603.

Chesky, K. S. & Henoch, M. (in press). Instrument specific reports of hearing loss: Differences between classical and non-classical musicians. *Medical Problems of Performing Artists.*

Chesky, K. S. & Corns, J. S. (in press). Vocational research in music using the World Wide Web. *Texas Music Education Research 1999.*

Chesky, K. S., & Hipple, J. (1999). Musicians' perceptions of wide spread drug use among musicians. *Medical Problems of Performing Artists, 14,* 187-195.

Chesky, K. S., Rubin, B., & Corns, S. (1998, June). Electric and acoustic guitar: Rates of occurrence and severity levels of musculoskeletal and non-musculoskeletal problems. Paper presented at Medical Problems of Musicians and Dancers National Conference, Aspen, CO.

Dawson, W. J. (1997). Common problems of wind instrumentalists. *Medical Problems of Performing Artists, 12,* 110.

Fishbein, M., Middlestadt, S. E., Ottati, V., Straus, S., & Ellis, A. (1988). Medical problems among ICSOM musicians: Overview of a national survey. *Medical Problems of Performing Artists,* 1-8.

Henoch, M., & Chesky, K. S. (1999). Hearing loss and aging: Implications for the professional musician. *Medical Problems of Performing Artists*, 14, 76-79.

Lam, N. & Thurston, A. (1998). Association of obesity, gender, age, and occupation with carpal tunnel syndrome. *Australian and New Zealand Journal of Surgery,* 68, 190-193.

Lederman, R. J. (1993). Entrapment neuropathies in instrumental musicians. *Medical Problems of Performing Artists*, 8, 35-41.

MacLean, I. C. (1993). Carpal tunnel syndrome and cubital tunnel syndrome: The electrodiagnostic viewpoint. *Medical Problems of Performing Artists, 8,* 41-45.

Manchester, R. A. & Park, S. (1996). A case-control study of performance-related hand problems in music students. *Medical Problems of Performing Artists, 11,* 20-22.

Nordstrom, D. L., DeStefano, F., Vierkant, R. A., & Layde, P. M. (1998). Incidence of diagnosed carpal tunnel syndrome in a general population. *Epidemiology, 9,* 342-345.

Norris, R. N. (1995). *The musician's survival manual: A guide to preventing and treating injuries in instrumentalists.* San Antonio, TX: Crumrine.

Norris, R. N. (1996). Clinical observations on the results of the 1991 NFA survey. *Flutists Quarterly, 21,* 77-80.

Roach, K. E., Martinez, M. A., & Anderson, N. (1994). Musculoskeletal pain in student instrumentalists: A comparison with the general student population. *Medical Problems of Performing Artists, 9,* 125-130.

Sataloff, R. T., Brandfonbrener, A. G. & Lederman, R. J. (Eds.). (1991). *Textbook of performing arts medicine.* New York: Raven.

Stotko, L. (1998). Dynamically splinting the musical hand. *Medical Problems of Performing Artists, 13,* 109-113.

Tam, L. I. (1997). *A prevention and early intervention protocol for carpal tunnel syndrome in work settings.* Unpublished master's thesis, University of Wisconsin, La Crosse.

Thrasher, M., & Chesky, K. S. (1999). Medical problems of saxophonists: A comparison of physical and psychological dysfunction among classical and non-classical performers. *The Saxophone Symposium*, *24,* 77-84.

Thrasher, M. & Chesky, K. S. (1998). Medical problems of clarinetists: Preliminary findings from the UNT Musician Health Survey. *Texas Music Education Research 1998.*

Thrasher, M. & Chesky, K. S. (1998). Medical problems of clarinetists: Results from the UNT Musician Health Survey. *The Clarinet. 25,* 25-27.

U. S. Department of Health and Human Services. (1989). *Carpal tunnel syndrome: Selected references* (AHCPR Publication No. H89-595). Cincinnati, OH: Author.

Edited by
Charlotte Mizener, *The University of Texas—Pan American*

Effectiveness of Pitch-Matching Feedback for Young Children

Dennis J. Siebenaler
Austin Independent School District

If singing is a life-long skill with real-world applications, then several requisite skills such as breath control, tone quality, and pitch production should be taught and reinforced. Strategies for teaching the essential components of vocal production are at the discretion of the teacher. Singing continues to be an integral component of the elementary music curriculum as seen in district, state, and national guidelines and standards. How to most effectively improve pitch-matching in children is a common concern among music educators.

There does not appear to be strong evidence suggesting that pitch perception and pitch production are related causally. Students who discriminate pitches successfully do not necessarily sing accurately (Geringer, 1983). Training in pitch discrimination (Jordan-DeCarbo, 1982) and use of visual and physical cues to reinforce melodic direction (Apfelstadt, 1984) have not consistently improved singing of pitch patterns.

Various singing tasks have been investigated in previous studies. Flowers and Dunne-Sousa (1990) found that maintaining tonality in a song is more difficult than matching short pitch patterns. Welch, Sergeant, and White (1995/96) confirmed that short pitch patterns are sung more accurately than the melody of a song, and that the text of a song is mastered more quickly than the melodic contour. It also appears that performance of a short song in a major tonality is easier than performance of a longer song in a minor tonality (Levinowitz et al., 1998), and that melodic patterns are more easily reproduced than matching inner, harmonic parts (Moore, 1994).

One might assume that singing and pitch-matching skills would improve with developmental age. In a recent study from England, the pitch accuracy of boys actually declined from ages five to seven (Welch, Sergeant, & White, 1997). Levinowitz et al. (1998) did not find significant differences between grades one through six in appropriate use of the singing voice. It appears that singing is not a skill that automatically improves with maturity.

Phillips and Aitchison (1997) studied the effects of breathing and posture exercises on the singing of fourth through sixth graders. They found that breath support and vocal range increased with specific instruction, and the pitch accuracy of girls did improve.

The evidence concerning pitch accuracy when singing alone versus singing in a group is inconclusive. Rutkowski (1996) found that kindergarten students performed significantly better after individual and small-group practice, and Goetze and Horii (1989) suggested that group singing may interfere with self-monitoring of pitch accuracy for young children. Green (1994), however, found that small groups of four to eight fifth-grade students performed better on a short rote song than individual students. Upper intermediate students appeared to benefit from peer support when singing.

An appropriate singing model is another concern when teaching young children. Small and McCachern (1983) practiced with young children, using male and female puppets in conjunction with corresponding male and female vocal models. There was not a significant difference in vocal accuracy for the treatment groups at the end of five rehearsal sessions. In a study of kindergarten through eighth-grade students (Price et al., 1994), girls responded more accurately to a male falsetto model while boys responded more accurately to a male singing in his typical range.

The effectiveness of feedback and cues has also been examined. Apfelstadt (1984) found no significant differences in vocal accuracy between groups that received visual-kinesthetic cues and students receiving rote imitation instruction. While corresponding hand signs were helpful for first-graders in singing a descending minor third (Yarbrough et al., 1991), Curwen hand signs and solfege seemed to detract from pitch accuracy for other first-graders in performing a more difficult task (Martin, 1991).

The purpose of this study was to further investigate the possible effectiveness of verbal feedback, visual cues, and physical gestures as they might contribute to pitch-matching accuracy for young children. A similar, previous study (Siebenaler, 1999) using a smaller sample of subjects and a more difficult pitch pattern found no significant differences between the same pitch-matching strategies (verbal, visual, and physical).

Method

Subjects (N = 116) were kindergarten and first-grade children from an economically disadvantaged, urban school. All students were served by a music specialist (the current investigator) every third day. Singing and vocal exercises were a consistent portion of each 45-minute music class. At the end of the 1998-99 academic year, children were tested individually for pitch-matching ability, using a "so-mi" pattern from a familiar song (Teddy Bear). Students accurately matching the starting pitch on the first trial, 43 (37%) of the 116 subjects, were sent back to the classroom. The remaining 73 (63%) subjects who failed to match the pitch on the first attempt, were given two additional trials using one of three randomly-assigned treatments. The three treatment conditions were (a) verbal, using verbal feedback only; (b) visual, using a ruler to visually represent the relationship of the correct starting pitch to the one incorrectly sung; and (c) physical, moving the subject's hand to physically represent the relationship of the correct starting pitch to the one incorrectly sung. The recorded model, the students' male music teacher singing in his falsetto voice, remained the same for all three conditions. The tape-recorded responses of the kindergarten and first-grade subjects were then analyzed for accuracy of the starting pitch.

Results

The starting pitch of the subjects was compared to the starting pitch of the taped model (E above middle C). Fifty-six percent of the students in the verbal feedback group were successful

in matching the correct starting pitch, 32% of the students in the visual feedback group were successful, and 29% of the students in the physical feedback group were successful (see Figure 1). The number of correct and incorrect responses in each group were analyzed using a chi-squared test for independent samples, and no significant differences were indicated ($df = 2$, $N = 68$, $x^2 = 5.64$). Of the 73 subjects not matching the correct starting pitch on the first trial, 58% began lower than the model stimulus and 42% began higher than the taped model.

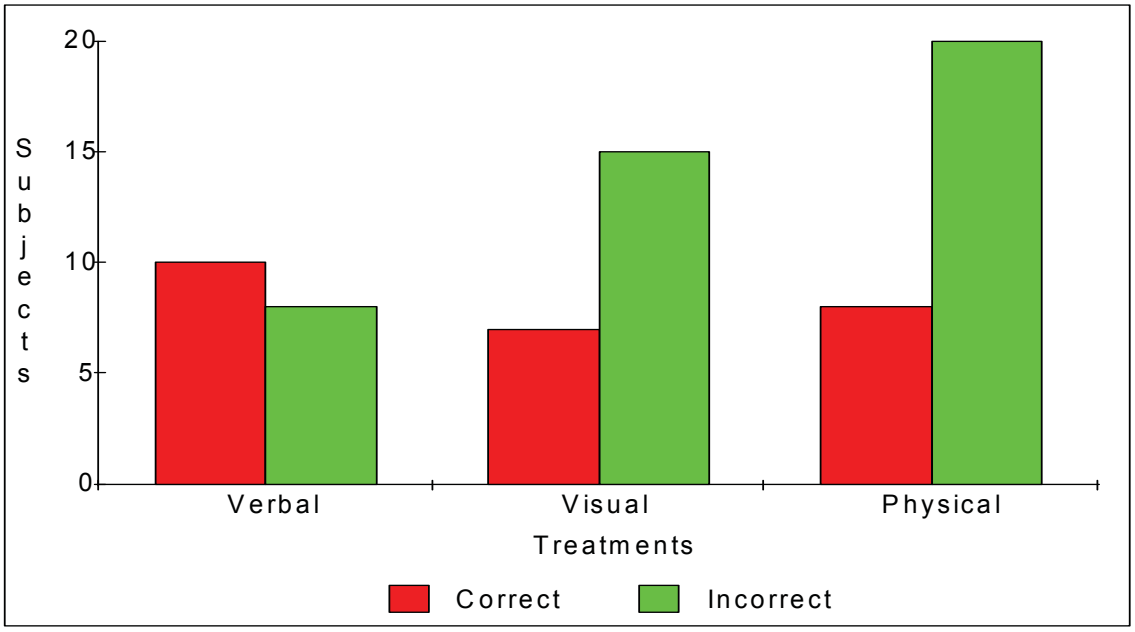


Figure 1. Comparison of correct and incorrect responses to the feedback conditions.

Of the students not matching pitch accurately, how many responded to the feedback strategies in the right direction, i.e., being told "You must try again and sing higher this time" and actually responding with a higher pitch? Sixty-five percent of the students in the verbal feedback group responded with a pitch closer to the modeled starting pitch, 48% of the students in the visual feedback group were closer to the correct starting pitch, and 44% of the students in the physical feedback group were closer to the correct starting pitch. See Figure 2. Again, using a chi-squared test for independent samples, no significant differences between the three treatment conditions in regard to approximating the correct pitch were indicated ($df = 2$, $N = 63$, $x^2 = 3.25$).

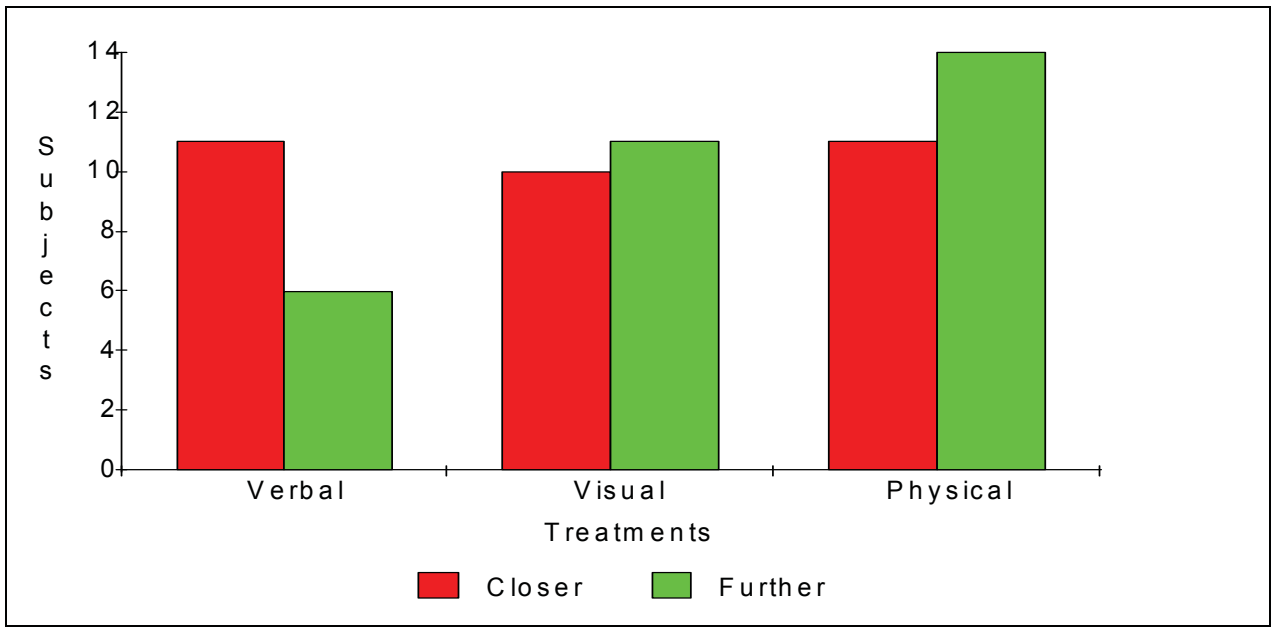


Figure 2. Comparison of closer and further responses to the correct starting pitch.

Discussion

There appeared to be no significant difference between the three feedback groups (verbal, visual, and physical) in their performance of the correct starting pitch for this short melodic pattern ("so-mi") from a familiar song (Teddy Bear), although the verbal feedback group had a higher percentage of correct responses. The young subjects seemed to have some understanding of the concept and/or terminology of 'higher' and 'lower' but were inconsistent in singing the pitches accurately. The procedure of leaving the classroom and singing alone into a microphone after a recorded model was somewhat unfamiliar for these kindergarten and first-grade children. Subjects may have performed better if they had been more comfortable with the recording procedure. When subjects did begin on the correct starting pitch, they did not necessarily match the correct minor third interval.

The male investigator's use of falsetto on the stimulus tape and in the classroom may have been confusing. Recall that 42% of the subjects responding inaccurately were higher than the actual pitch. The choice of E above middle C for the starting pitch may also have been too low.

Only 33% of the kindergarten students matched the starting pitch on the first attempt and only 42% of the first-graders were successful on the first trial, for an overall 37% singing accurately. Considering these results came at the end of an academic year in which subjects had music every third day, sang frequently, and were regularly exposed to the feedback strategies investigated, continued research regarding effective pitch-matching strategies is certainly warranted.

References

Apfelstadt, H. (1984). Effects of melodic perception instruction on pitch discrimination and vocal accuracy of kindergarten children. *Journal of Research in Music Education, 32*, 15-24.

Flowers, P. J., & Dunne-Sousa, D. (1990). Pitch-pattern accuracy, tonality, and vocal range in preschool children's singing. *Journal of Research in Music Education, 38*, 102-114.

Geringer, J. (1983). The relationship of pitch-matching and pitch-discrimination abilities of preschool and fourth-grade students. *Journal of Research in Music Education, 31*, 93-99.

Goetze, M. & Horii, Y. (1989). A comparison of the pitch accuracy of group and individual singing in young children. *Bulletin of the Council for Research in Music Education, 99*, 57-73.

Green, G. (1994). Unison versus individual singing and elementary students' vocal pitch accuracy. *Journal of Research in Music Education, 42*, 105-114.

Jordan-DeCarbo, J. (1982). Same/different discrimination techniques, readiness training, pattern treatment, and sex on aural discrimination and singing of tonal patterns by kindergartners. *Journal of Research in Music Education, 30*, 237-246.

Levinowitz, L., Barnes, P., Guerrini, S., Clement, M., D'April, P., & Morey, M. J. (1998). Measuring singing voice development in the elementary general music classroom. *Journal of Research in Music Education, 46*, 35-47.

Martin, B. A. (1991). Effects of hand signs, syllables, and letters on first graders' acquisition of tonal skills. *Journal of Research in Music Education, 39*, 161-170.

Moore, R. S. (1994). Effects of age, sex, and melodic/harmonic patterns on vocal pitch-matching skills of talented 8-11-year-olds. *Journal of Research in Music Education, 42*, 5-13.

Phillips, K. H., & Aitchison, R. E. (1997). Effects of psychomotor instruction on elementary general music students' singing performance. *Journal of Research in Music Education, 45*, 185-196.

Price, H. E., Yarbrough, C., Jones, M., & Moore, R. S. (1994). Effects of male timbre, falsetto, and sine-wave models on interval matching by inaccurate singers. *Journal of Research in Music Education, 42*, 269-284.

Rutkowski, J. (1996). The effectiveness of individual/small group singing activities on kindergartners' use of singing voice and developmental music aptitude. *Journal of Research in Music Education, 44*, 353-368.

Siebenaler, D. (1999). Effectiveness of verbal, visual, and physical feedback on pitch-matching in young children. *Texas Music Education Research 1999* (in press).

Small, A. R., & McCachern, F. L. (1983). The effect of male and female vocal modeling on pitch-matching accuracy of first-grade children. *Journal of Research in Music Education, 31*, 227-233.

Welch, G. F., Sergeant, D. C., & White, P. J. (1995/96). The singing competencies of five-year-old developing singers. *Bulletin of the Council for Research in Music Education, 127*, 155-162.

Welch, G. F., Sergeant, D. C., & White, P. J. (1997). Age, sex, and vocal task as factors in singing "in tune" during the first years of schooling. *Bulletin of the Council for Research in Music Education, 133,* 153-160.

Yarbrough, C., Green, G., Benson, W., & Bowers, J. (1991). Inaccurate singers: An exploratory study of variables affecting pitch-matching. *Bulletin of the Council for Research in Music Education, 107*, 23-34.

Edited by
Charlotte Mizener, *The University of Texas—Pan American*

Medical Problems of Double Reed Performers

Michael Thrasher, *North Central Texas College*
Kris S. Chesky, *University of North Texas*

The instruments of the oboe and bassoon families have been members of the standard orchestral woodwind section for centuries. Although these instruments present stark contrasts to one another in regards to size and register, they are often grouped together because of their common means of sound production—the double reed. This element places specific demands above and beyond simply mastering the technical requirements of each instrument. For example, the double reed requires advanced performers of oboe or bassoon to also become proficient in such areas as reed making, adjustment and management. Beyond instrument-specific skill demands, however, another element warranting consideration involves the biomechanical stress placed on the human body through the performance of double reed instruments.

Instead of considering homogeneous groups of same-instrument performers, numerous authors have investigated medical issues of musicians by examining large populations of heterogeneous groups. For example, Newmark and Hochberg (1987) evaluated problems based on the following categories: keyboard, bowed string, guitar, and all others (in which harp, woodwinds and percussion were combined into one group). Overall, these findings are limited because of the unique and varied demands associated with each instrument. Examining homogeneous populations of performers, however, allows for a more reliable picture of instrument-specific medical concerns. This approach has been utilized in other studies to identify medical problems that may be related to specific woodwind instruments. For example, Thrasher and Chesky (1998) identified problems related to the right wrist and hand in a homogeneous population of clarinet players that varied according to gender. The same authors found certain genre-related physical and psychosocial problems in a saxophone population (Thrasher & Chesky, 1999).

Among the double reed-specific literature, most medical information consists of informal testimonials and case reports. For example, one author wrote of adapting a neck strap for oboe performance to alleviate right wrist pain (Nelson, 1996). Smith (1995) described the construction of an ergonomic device to assist with oboe-related right thumb pain. Another oboist testified regarding relaxation techniques, instrument straps and supports, keywork alterations, and alternative playing postures used to treat career-threatening pain (Blatt, 1990). Fry (1988) cited certain soft palate problems caused by the high air pressure of oboe playing, whereas Williams (1996) suggested the need for proper bassoon weight support to prevent pain, tension and

discomfort. William Dawson produced a series of articles discussing medical problems of double reed performers based on clinical experiences. He suggested the prevalence of right wrist problems among bassoonists who perform without a crutch and also mentioned the possible need for oboe neck straps or English horn or bassoon floor pegs. Furthermore, he discussed relationships between satisfactory body weight, physical exercise and abstinence from cigarette smoking and the prevention of performance-related medical problems.

Though the above-mentioned studies represent efforts at understanding medical issues related to double reed performance, inadequate information exists which can effectively answer questions regarding the types of physical problems experienced by oboe and bassoon players and the percentages of players who suffer from such problems. As described in Thrasher and Chesky (1999), a unique approach which utilizes the World

Wide Web was developed at the University of North Texas in an attempt to address these issues. Following successful pilot studies and research funding from the National Academy of Recording Arts and Sciences, the University of North Texas Musician Health Survey (UNT-MHS) has developed into a viable platform for obtaining information from musicians across the nation and around the world. To date, over four thousand musicians have participated in the project. The purpose of the present study is to describe medical problems of double reed players utilizing data collected through the UNT-MHS.

Method

A non-probability method for creating an accidental sample population was achieved by recruiting subjects through the World Wide Web (WWW). The main advantage of this process is the ability to find and recruit musicians from diverse locations and musical backgrounds. On the other hand, a major limitation is the inability to know what specific attributes are present in those who offer themselves as subjects via the WWW. The authors recognize that those who volunteer to take the survey may be atypical of the target population of all musicians in terms of such characteristics as socioeconomic status, motivation and other correlates of health consciousness.

Following approval by the UNT Institutional Review Board, subjects were recruited through messages posted to Internet links, Internet discussion groups, professional publications, and professional societies and organizations. Subjects were directed to log on at: http://www.scs.unt.edu/surveys/msurvey/index.html. Once logged on, standardized instructions prompted subjects through various sections of the survey. Subject participation is considered anonymous. At the end of the survey, subjects were allowed to submit comments with their responses. Data files received over the Internet were downloaded into a master file for periodic preliminary inspection. This step allowed for identification of questionable, duplicate, or faulty data. Following screening procedures, data were merged into a master SPSS file.

The UNT-MHS is divided into five sections and asks questions regarding: (a) demographics, (b) musculoskeletal problems, (c) nonmusculoskeletal problems, (d) lifestyle and environment, and (e) feedback and comments (Corns, Edmonds, & Wilson, 1996). The development of the UNT-MHS allows for direct comparison of data to other well-known musician health surveys. The musculoskeletal section seeks information on 16 bilateral body locations. Questions regarding pain severity utilize a five-point graded severity score developed by Fry (1988) that incorporates a measure of functionality and problem duration. The scale is as follows:

Grade 1: Pain while playing; should be consistent rather than occasional; pain ceases when not playing.

Grade 2: Pain while playing; slight physical signs of tenderness; may have transient weakness or loss of control; no interference with other uses of this location.
Grade 3: Pain while playing; pain persists away from instrument; some other uses of this location cause pain; may have weakness, loss of control, or loss of muscular response or dexterity.
Grade 4: As for Grade 3; all common uses of the location cause pain: housework, driving, writing, turning knobs, dressing, washing, etc., but these are possible as long as pain is tolerated.
Grade 5: As for Grade 4; including loss of use of location due to disabling pain.

Similar to the ICSOM study (Fishbein, Middlestadt, Ottati, Straus, & Ellis 1988), the nonmusculoskeletal section asks questions regarding incidence and severity of several possible problems. The lifestyle/environment section seeks information about marital status, diet, travel demands, work-related stress levels, and alcohol and cigarette usage.

Results

Subjects included 129 musicians (N = 129) selected from an accidental sample of 3,907. Subjects were included if they reported oboe or bassoon as their primary (most-played) instrument. A total of 58 (male = 17, female = 41) respondents identified oboe as their primary instrument. The average age of oboe-playing respondents was 34.1 years. Subjects reported an average of 4.2 years of formal college music instruction and 10.3 years of professional musical activity. Subjects' mean income was $36,710 with 23.7% of that income coming directly from music performance. A total of 43.1% of respondents drink alcohol in moderation (identified as 1-7 drinks per week), while 46.6% abstain from alcohol. The vast majority of players (94.7%) are non-smokers. Subjects identified their work environments as highly stressful (19.6%), moderately stressful (53.6%), or slightly or not stressful (26.8%).

The majority of musculoskeletal problems reported by oboists related to right bilateral body locations, including the right wrist (44.8% indicated some type of problem), the right hand (24.1%), right fingers (24.1%), right forearm (22.4%), right neck (19.0%) and right lower back (19.0%). Table 1 shows response percentages for both males and females for all body locations sorted by grade of severity. In all areas, females reported higher percentages of problems than did males. For the right wrist, 58.5% of females described some degree of pain compared to only 11.8% of males. Similar contrasts were found for the right hand (31.7% to 5.9%), right forearm (29.3% to 5.9%) and right lower back (29.3% to 5.9%).

Table 1
Musculoskeletal problems

	Response Rates (%)			
	Oboe		Bassoon	
	Problem	No Problem	Problem	No Problem
Rt. Finger				
Male	23.5	76.5	27.3	72.7
Female	24.4	75.6	18.4	81.6

Lft. Finger				
Male	5.9	94.1	31.8	68.2
Female	9.8	90.2	30.6	69.4
Rt. Hand				
Male	5.9	94.1	22.7	77.3
Female	31.7	68.3	28.6	71.4
Lft. Hand				
Male	0.0	100.0	31.8	68.2
Female	9.8	90.2	40.8	59.2
Rt. Wrist				
Male	11.8	88.2	27.3	72.7
Female	58.5	41.5	34.7	65.3
Lft. Wrist				
Male	0.0	100.0	27.3	72.7
Female	24.4	75.6	59.2	40.8
Rt. Forearm				
Male	5.9	94.1	40.9	59.1
Female	29.3	70.7	14.3	85.7

(Table 1 continues)

Table 1 *(continued)*

	Response Rates (%)			
	Oboe		Bassoon	
	Problem	No Problem	Problem	No Problem
Lft. Forearm				
Male	5.9	94.1	27.3	72.7
Female	14.6	85.4	26.5	73.5
Rt. Elbow				
Male	5.9	94.1	0.0	100.0
Female	9.8	90.2	4.1	95.9
Lft. Elbow				
Male	0.0	100.0	0.0	100.0
Female	2.4	97.6	12.2	87.8
Rt. Shoulder				
Male	11.8	88.2	22.7	77.3
Female	17.1	82.9	30.6	69.4
Lft. Shoulder				
Male	5.9	94.1	9.1	90.9
Female	14.6	85.4	36.7	63.3
Rt. Neck				
Male	5.9	94.1	18.2	81.8
Female	24.4	75.6	26.5	73.5
Lft. Neck				
Male	11.8	88.2	22.7	77.3
Female	14.6	85.4	20.4	79.6
Rt. Lower Back				
Male	5.9	94.1	13.6	86.4
Female	24.4	75.6	16.3	83.7
Lft. Lower Back				
Male	5.9	94.1	9.1	90.9
Female	19.5	80.5	16.3	83.7

Among nonmusculoskeletal problems, oboists reported a high incidence of headaches (46.6%), blackouts/dizziness (36.2%), stage fright (34.5%), and acute anxiety (29.3%). Table 2 shows response percentages for nonmusculoskeletal problems differentiated by instrument and gender. In 13 of the 15 categories listed, females reported a higher percentage of problems than males. Differences were most notable for blackouts/dizziness (48.8% of females reported some type of problem compared to 5.9% of males); acute anxiety (39.0% of females to 5.9% of males); and headaches (56.1% of females to 23.5% of males).

Table 2
Non-musculoskeletal problems

	Response Rates (%)					
	No Problem		Mild		Severe	
	Male	Female	Male	Female	Male	Female
Acquired Dental Malocclusion						
Oboe	100.0	80.5	0.0	19.5	0.0	0.0
Bassoon	90.9	85.7	9.1	12.2	0.0	2.0
Acute Anxiety						
Oboe	94.1	61.0	5.9	36.6	0.0	2.4
Bassoon	72.7	69.4	18.2	18.4	9.1	12.2
Asthma						
Oboe	94.1	87.8	5.9	12.2	0.0	0.0
Bassoon	95.5	75.5	4.5	20.4	0.0	4.1
Blackouts/Dizziness						
Oboe	94.1	51.2	5.9	43.9	0.0	4.9
Bassoon	90.9	67.3	9.1	32.7	0.0	0.0
Depression						
Oboe	88.2	68.3	5.9	29.3	5.9	2.4
Bassoon	54.5	75.5	36.4	14.3	9.1	10.2
Eyestrain						
Oboe	70.6	73.2	29.4	24.4	0.0	2.4
Bassoon	59.1	51.0	31.8	42.9	9.1	6.1
Fatigue						
Oboe	82.4	68.3	17.6	24.4	0.0	7.3
Bassoon	63.6	53.1	36.4	28.6	0.0	18.4
Headaches						
Oboe	76.5	43.9	23.5	41.5	0.0	14.6
Bassoon	72.7	40.8	22.7	34.7	4.5	24.5
Hearing Loss						
Oboe	88.2	85.4	11.8	14.6	0.0	0.0
Bassoon	77.3	75.5	13.6	22.4	9.1	2.0

Mouth Lesions						
Oboe	94.1	85.4	5.9	12.2	0.0	2.4
Bassoon	72.7	85.7	8.2	12.2	9.1	2.0
Respiratory Allergies						
Oboe	82.4	68.3	17.6	22.0	0.0	9.8
Bassoon	77.3	71.4	22.7	16.3	0.0	12.2

(Table 2 continues)

Table 2 *(continues)*

	Response Rates (%)					
	No Problem		Mild		Severe	
	Male	Female	Male	Female	Male	Female
Sleep Disturbances						
Oboe	76.5	82.9	23.5	14.6	0.0	2.4
Bassoon	59.1	63.3	40.9	34.7	0.0	2.0
Stage Fright						
Oboe	88.2	56.1	11.8	39.0	0.0	4.9
Bassoon	77.3	53.1	9.1	28.6	13.6	18.4
TMJ Syndrome						
Oboe	100.0	78.0	0.0	19.5	0.0	2.4
Bassoon	90.9	81.6	9.1	12.2	0.0	6.1
Weight Problems						
Oboe	82.4	75.6	11.8	19.5	5.9	4.9
Bassoon	59.1	67.3	27.3	26.5	13.6	6.1

A total of 71 subjects (N = 71) identified bassoon as their primary instrument (male = 22, female = 49). Bassoonists averaged 28.0 years of age with 4.0 years of college music instruction and 7.8 years of professional music activity. The average income was $23,177 per year with 24.5% coming directly from music performance. A large majority (91.5%) described themselves as non-smokers, and 47.8% abstain from the consumption of alcohol. Approximately half of respondents (44.9%) identified their alcohol usage as moderate (1-7 drinks per week). A majority (61.4%) described their work environments as moderately stressful, 20.0% as highly stressful, and 18.6% as slightly or not stressful.

The majority of musculoskeletal problems reported by bassoonists related to left bilateral body locations, including the left wrist (49.3% indicated some type of problem), left hand (38.0%), left fingers (31.0%), and left shoulder (28.2%). Subjects also reported high levels of problems with the right wrist (32.4%) and right shoulder (28.2%). In 11 of the 16 areas listed, females reported higher percentages of problems than did males. Differences were most notable with regards to the left wrist (59.2% of females described some degree of pain compared to 27.3% of males) and left shoulder (36.7% to 9.1%). In five areas, males reported a higher percentage of problems than females, with the right forearm illustrating the greatest contrast (40.9% of males described some degree of pain compared to 14.3% of females).

Among nonmusculoskeletal problems, bassoonists reported a high incidence of headaches (49.3%), eyestrain (46.5%), fatigue (43.7%), stage fright (39.4%), and sleep disturbances (38.0%). In 11 of the 15 categories listed, females reported a higher percentage of problems than did males. Differences were most notable for headaches (59.2% of females reported some type of

problem compared to 27.3% of males); stage fright (46.9% of females to 22.7% of males); and blackouts/dizziness (32.7% of females to 9.1% of males). In the area of depression, males reported a much higher incidence of problems (45.5%) than did females (24.5%).

Discussion

For oboe players, the majority of musculoskeletal problems reported affected the right upper extremities--in particular, the right wrist, hand, fingers, and forearm. Because the right thumb remains statically loaded during performance, playing the oboe involves a continuous downward force on the right thumb, hand, and wrist. The right thumb serves not only to bear the weight of the instrument but also to stabilize the instrument during performance and to maintain a certain amount of upward force towards the performer's mouth. This element of oboe performance is similar to clarinet performance, where similar problems have been identified. Thrasher and Chesky (1998) found that 37.2% of clarinet players experienced pain in the right wrist, 30.0% in the right fingers, 29.0% in the right hand, and 23.0% in the right forearm. Testimonial accounts of right thumb and wrist pain are also parts of the oboe-specific literature.

The bassoon contrasts these points in that the majority of musculoskeletal problems reported affected the left upper extremities, including the left wrist, hand and fingers. Though the bassoon shares a common means of sound production with the oboe (the double reed), its manner of performance is substantially different. The weight of the bassoon is typically supported by either a neck or shoulder sling, a floor peg, or a seat strap. This relieves the hands of the direct weight of the instrument. The bassoon, however, is held obliquely across the body of the performer. This is somewhat like a saxophone, except that the greater size of the instrument requires the left hand to be held higher and at a greater angle. Other studies have shown that as many as 24.1% of saxophonists experience pain in the left wrist (Thrasher & Chesky, 1999). For bassoon, subjects report an alarmingly higher incidence of pain in the left wrist and hand (49.3% and 38.0%, respectively).

The leading nonmusculoskeletal problems of oboists included headaches, blackouts/dizziness, and stage fright. For bassoonists, the leading problems also included headaches as well as eyestrain and fatigue. These problems have been identified in other studies. Shoup (1995), for instance, found that eyestrain (15.8%) and severe headaches (14.8%) were the two leading nonmusculoskeletal problems reported by 425 junior high and high school-aged instrumental music students. A study of clarinetists found that 43.5% experienced eyestrain, 43.0% headaches, and 42.4% fatigue (Thrasher & Chesky, 1998). A study of saxophonists found that as many as 48.3% experienced headaches, while 55.2% experienced fatigue (Thrasher & Chesky, 1999). The issues of headaches, fatigue and eyestrain have been identified as areas of concern for performing woodwind musicians and warrant further exploration.

Gender-related contrasts of medical problems have also been established in related literature. For example, Zaza (1992) calculated that gender was the best predictor of injury in 300 university instrumental students. Among double reed performers, females reported higher levels of pain in most categories than did males, particularly with regards to the right wrists and hands of oboists and the left wrists of bassoonists.

These results should be interpreted with caution. The lack of a truly randomized sample prevents generalization of these results to the total double reed-playing population. The high rates of right upper extremity dysfunction among oboists and left upper extremity dysfunction among bassoonists illustrated in this study, however, deserve additional research. Furthermore, the high incidence of headaches and contrasting gender-related prevalence of problems require

additional exploration before causal relationships can be established. A thorough understanding of medical issues plays a vital role in the development and implementation of sound pedagogy. Further research is recommended.

References

Blatt, R. (1990). Preventing overuse injuries in oboists. *The Double Reed, 13* (2), 61-66.

Corns, J. S., Edmund, D., & Wilson, S. (1997). World Wide Web research in performing arts medicine: The University of North Texas Musician Health Survey. In: K. Chesky and B. Rubin, (Eds.) *Applications of Medicine in Music*, Denton, TX, University of North Texas, 13-18.

Dawson, W. J. (1992). Nerve compression problems: Arts medicine for the double reed player. *The Double Reed, 15* (1), 56-58.

Dawson, W.J. (1994). Caring for your "equipment": Arts medicine for the double reed player. *The Double Reed, 17* (3), 53-58.

Fishbein, M., Middlestadt, S. E., Ottati, V., Straus, S., & Ellis, A. (1988). Medical problems among ICSOM musicians: Overview of a national survey. *Medical Problems of Performing Artists*, *3*, 1-8.

Fry, H. J. H. (1988). Patterns of over-use seen in 658 affected instrumental musicians. *International Journal of Music Education*, *11*, 3-16.

Nelson, R. T. (1996). Wrist pain form oboe playing. *The Double Reed, 19(1)*, 80.

Newmark, J. & Hochberg, F. H. (1987). Doctor, it hurts when I play: Painful disorders among instrumental musicians. *Medical Problems of Performing Artists*, *2* (3), 93-97.

Shoup, D. (1995). Survey of performance-related problems among high school and junior high school musicians. *Medical Problems of Performing Artists 10* (3), 100-105.

Smith, K. (1995). Finally, it doesn't hurt to play the melody. *The Double Reed, 18* (2), 60.

Thrasher, M. & Chesky, K. S. (1998). Medical problems of clarinetists: Results form the U.N.T. musician health survey. *The Clarinet*, *25)*, 24-27.

Thrasher, M. & Chesky, K. S. (1999). Medical problems of saxophonists: A comparison of physical and psychosocial dysfunction among classical and non-classical performers. *The Saxophone Symposium, 24*, 77-84.

Williams, G. (1996). Insights into supporting the bassoon. *Double Reed News, 34*,10-12.

Zaza, C. (1992). Playing-related health problems at a Canadian music school. *Medical Problems of Performing Artists 7* (2), 48-51.

Edited by
Charlotte Mizener, *The University of Texas—Pan American*

A Brief History of String Education in United States Public Schools and a Review of the Concept Organization of Seven Method Books

G. Dwayne Wasson
Austin Independent School District

The Law of 1647 in Massachusetts set into motion the public school movement in the United States. This law stated that all towns of 50 or more families had to provide a grammar school for its children. This was the first law in United States history that required towns to provide public education, and it was supported through taxes (Bernhard, Mensoian, & Turner, 1999). It was not until almost 100 years later that music was officially introduced to the public schools. In Boston in 1838, Lowell Mason taught the first music classes at the Hawes School. The classes he taught met with such success that music classes were expanded to other schools in the Boston area. These first classes were intended to teach singing skills (Birge, 1928). It was another 40 years before instrumental music began to make its way into the public schools.

Some of the first instrumental programs to be seen in the United States were after-school rehearsals with students who already played an instrument. The interest in these programs was attributed to the return of musicians to their communities following the decommissioning of Civil War bands. These musicians wanted to continue performing music, and they became the conductors of these groups (Birge, 1928). One of the first school orchestras to be founded was in 1878 in Aurora, Illinois, under the direction of B.W. Merrill. Other orchestras were founded before the turn of the century. In 1896 Jessie Clark directed one in Wichita, Kansas; in 1898 Will Earhart directed the orchestra in Richmond, Indiana; and Charles E. Emmerich founded an orchestra in 1898 in Indianapolis, Indiana. These orchestras were associated with high schools. Charles B. Jennings founded the first grammar school orchestra in 1896 in New London, Connecticut, and in 1899, W. D. Monnier founded a grammar school orchestra in Hartford, Connecticut (Birge, 1928). These early orchestras, comprising students who already played or took private instruction, did not seek to teach instrumental technique. Instrumentation of these groups was not balanced due to the small numbers of viola, cello, and bass players.

The next significant development in the school orchestra movement occurred in 1911 in Boston. Albert Mitchell, supervisor of music, began teaching violin classes following his study of the Maidstone movement in England. The Murdoch Music Company originated the Maidstone movement in 1898. For a small fee, this music company provided rental instruments, music, and teachers to thousands of students. These violin classes were held under the supervision of the schools (Hoisington, 1980). In 1912, Mitchell published his *Class Method.* Two years later, in 1914, violin classes were admitted to the school day as a part of the elective curriculum (Norman, 1939). These classes were considered to be the first f instrumental string classes included as a part of the regular school day.

In Los Angeles in 1903, Jennie Jones, a kindergarten teacher, organized a before- and after-school orchestra program at Grant Avenue Elementary. These programs were emulated around Los Angeles, and by 1909, there were 30 such programs. Los Angeles was considered the first school district with an Orchestra Department in the Elementary Schools, which was established in 1910. Jennie Jones became the supervisor of this department in 1913. By this time, the district had 77 orchestras. Rehearsals did not become a part of the school day until the 1920s. By 1931, there were over 227 orchestras and more than 4,000 student participants. The program did not include class instrumental instruction because students who were participating were involved in private instruction. Jones saw class instruction as a waste of time due to the varying needs of the students. Jones retired as supervisor of orchestras in 1944, and class instruction in the schools of Los Angeles was implemented in 1947. (Baxter, 1960).

With the inclusion of class instruction into the school day, a variety of publications began to appear to meet the need for instructional material. Some of the first books were Mitchell's *Class Method* in 1912, *Municipal Loose Leaf Method*, and Maddy and Giddings' *Universal Teacher* in 1928 (Woods, 1930). These methods were some of the earliest editions for class instruction of heterogeneous class grouping.

Since the 1930s, a large number of methods have emerged for use with heterogeneous string classes. The remainder of this paper will analyze some of the method books and will explore the organization of these books.

Procedures

Seven string instruction method books were selected for study. The areas investigated included finger patterns, note and rest values, meter signatures, key signatures, scales, and other musical concepts. Following is the analysis of those features.

Primer Method (1936)

In 1936, Samuel Applebaum published the *Primer Method*. This book was designed for individual or class instruction. The book began with a description of how to hold the bow, and this was followed with a narrative of how to hold the violin. No pictures were used to demonstrate these skills.

Students were encouraged to sing each line before they played. A fixed *do* system was utilized. The early exercises in the book introduced notes to the students by using whole notes. The first six pages of the book used whole-note exercises to teach the first notes. The A string was the first string to be introduced. Note values and the corresponding rests presented in this book included whole notes, half notes, quarter notes, eighth notes and sixteenth notes. Also included were the following dotted rhythms: half, quarter, and eighth. Closely related to the note values

presented were the meter signatures included in the book. Applebaum presented the following meter signatures: 4/4, 3/4, 2/4, 3/8, and 6/8. Each meter had a few songs included for practice.

The first finger patterns presented in the book were the minor tetrachord. The minor tetrachord contained the half step between the first and second fingers. Throughout the book, several finger patterns were presented. The major tetrachord with the half step between fingers two and three was included on page 13 of the book. The half step was also placed between the open string and the first finger. These finger patterns allowed the student to play in many different keys. Throughout the book, the following scales were introduced: G major, F major, C major, A minor, E minor, D minor, Bb major, B minor, and G minor. The first recognizable tune included in the book was "Mary had a Little Lamb." This song was introduced on page 11. The whole-step between the third and fourth finger was introduced on page seven, and the half step between these two fingers was introduced on page fifteen. With this information, the students were able to play all notes in the first position of the instrument.

Other skills that were introduced in the method book involved the use of the bow. Some of these skills included up-beats, slurs between notes and across strings, and ties. Directional markings for the bow were also presented. A brief mention of dynamics appeared on page 19.

The Applebaum *Primer Method* introduced many notes and skills for the students. The introduction of new skills occurred very quickly without much practice before a new skill was introduced.

Method for the Violin (1938)

In 1938, Ralph Lewis published his *Method for the Violin.* This book was also intended for either group or individual instruction. The book contained 61 pages that were divided into 25 lessons. Each lesson covered an average of two pages. The book began with a page of photos labeled with the parts of the instrument, bow, and hand. This was followed by instructions for the care of the instrument and bow. The elements of music were addressed on the following page. The elements included the following: the staff, clef sign, letter names, note values, bar lines, repeat signs, sharps, flats, and naturals.

The first lesson in the book included a step-by-step approach to holding the violin. Included with this were photographs of someone holding the instrument**.** Lesson two began open string exercises with the use of pizzicato. The bow was introduced in lesson six.

The first note values used were quarter notes and half notes and the corresponding rests. Other note values presented in the book included whole notes, eighth notes, dotted quarter notes, dotted half notes, and corresponding rests. The time signatures presented were 4/4, 3/4, and 2/4. The first recognizable tune was "Mary had a Little Lamb." This was in lesson four on page 14.

The first finger patterns presented were the major tetrachord. This placed the half step between fingers two and three. Other finger patterns presented included the minor tetrachord in lesson 19 and the whole tone pattern with a whole step between each finger in lesson 22. The scales presented in this book included D major, G major, A major, and C major. The half step between the open string and first finger was introduced in lesson 21. Fourth finger on the string was introduced in lesson 13. The notes introduced in this method book allowed the student to play all notes between the open G and fourth finger B on the E string. Each lesson introduced new concepts with several exercise lines. This was followed by two or three tunes to practice the skill.

Other skills presented in the *Method for the Violin* included two-, three-, and four-note slurs between notes on one string and across strings, ties, up-beats, and arpeggios. Each of these skills was introduced and practiced in various lessons in the book.

The *Method for the Violin* was an excellent resource for teaching the violin. The skills were introduced and practiced before other skills were added. Lesson 24 was a review of most concepts included in the book. The final lesson was a series of eight duets to practice the concepts in conjunction with another player.

Graded Violin Method

Arthur T. Cremin published his *Graded Violin Method* in the early part of this century. No publication date appears on the printed document, but the researcher was led to believe that publication was in the 1930s because of the similarities to Ralph Lewis' *Method for the Violin.* Both books mentioned the "new psychological idea in teaching beginners" (Cremin, p. 1). Lewis subtitled his book, "A progressive presentation of material based on psychological principles of learning suitable for individual or group instruction" (Lewis, 1938).

The Cremin book begins with three pages of "rudiments of music." The following concepts were introduced on these pages: staff; note names; ledger lines; note durations from whole notes to thirty-second notes with corresponding rest values; triplets; sextuplets; meters of 4/4, 3/4, 2/4, 3/8, 6/8; accidentals; and key signatures.

The book began with no introduction to holding the bow or the instrument. Presentation of bow posture was left to the teacher. The first lesson began with the introduction of the notes on the A string, using whole notes. The other note and rest values presented in this method book included half, quarter, eighth, sixteenth, dotted half, and dotted quarter. Time signatures presented in the book included 4/4, 3/4, 2/4, 6/4, and 6/8.

The first finger pattern presented in the book was the minor tetrachord with the half step between the first and second finger. Whole note and half note exercises were used to introduce the notes. Other patterns included the half step between the open string and first finger, the major tetrachord with the half step between fingers two and three, and the augmented tetrachord with the whole-step between each finger. The two-octave G scale was introduced on page 24. No other formal introduction of scales was made.

Several other concepts were introduced in this method book. These concepts were slurs between notes on one string and across strings, up-beats, and ties. There were no other concepts introduced.

Cremin's *Graded Violin Method* contained several interesting features. Within the text of the book, biographies of several noted violinists were included. These violinists were Paganini, Viotti, Tartini, and Vieuxtemps. Another interesting feature of the book was a mid-term exam and final exam. These exams tested playing ability and theory knowledge. The information on these exams indicated what the author of the book thought was necessary information for the student to remember.

String Builder (1960)

Samuel Applebaum wrote the *String Builder*, which was a method book intended for class or individual instruction. The introduction gave the parts of the instrument and bow. No instruction was given on how to hold the bow or instrument. Presentation of bow holding skills was left to the teacher.

The first pages used quarter note open string exercises. Other note and rest values presented in the first volume included whole, half, dotted half, and eighth. The time signature of 4/4 is the first one introduced. Other time signatures included 2/4 and 3/4.

Major tonality was the primary key used in the book. The major tetrachord on the D string was the first pattern presented. The only other finger pattern was the minor tetrachord, presented on

page 20. Scales included in the book were D major, G major, and C major. The first recognizable tune was "Mary had a Little Lamb." Other concepts presented in the *String Builder* included slurs, ties, and dynamics.

String Method (1961)

The Müller-Rusch *String Method* was one of the most used string methods for many years. This book was intended for class or individual instruction. The first two pages included the following fundamentals of music: staff, note names, time signatures, flats, sharps, naturals, note and rest values, and parts of the instrument and bow. The book was divided into 30 lessons. Most lessons contained three to four lines to practice the new concept. Following the practice of the new concept, two to four tunes were included in order to practice the new skill.

The first note value used in the book was quarter note and quarter rest. Other note and rest values presented in the book included whole, half, and eighth. These first lessons placed the notes on a one-line staff with the note name and finger number listed below the line. The five-line staff was used for the first time in lesson seven. The time signatures in the book were 4/4, 3/4, and 2/4.

Notes on the D string were presented first. The major tetrachord was the first pattern used. Another pattern presented in the book was the minor tetrachord. In lesson two, "Mary had a Little Lamb" was the first familiar tune. Scales presented in the book included D major, G major (in two octaves), and C major. Other concepts included in the book were up-beats, slurs, and left-hand pizzicato.

There were two review lessons in this book. They were found in lessons 14 and 19. A series of duets were used in lessons 26 and 27. These duets were in various keys and meters that had been presented earlier in the book.

All For Strings (1985)

Gerald Anderson and Robert Frost wrote the *All for Strings* method book in the 1980's. This book quickly became one of the most widely used methods in the string teaching profession. Early exercises in this book focused on rote learning. This was the first time this was found in a method book. The first eight pages of exercises wrote the letter names with no reference to a staff. Students learned finger names, but the staff was introduced later.

The introductory pages of the book included the parts and care of the instrument and bow. Pictures and text of how to hold the bow and instrument followed. A page of basics introduced the student to terminology and symbols necessary for playing. The terminology included down-bow, up-bow, pizzicato, arco, and basic rhythm patterns. Words and phrases were associated with rhythm patterns. Students were not taught to count the rhythms using numbers until page 14.

The major tetrachord on the D string was the first to be presented. The minor tetrachord and the half step between the open string and first finger were the only other finger patterns presented. "At Pierrot's Door" was the first familiar tune.

Quarter notes and rest were the first rhythms to be presented. Other note and rest values found in the book included whole, half, and eighth. Time signatures presented included 4/4, 3/4, and 2/4. Other concepts included up-beats, slurs, ties, bow lifts, staccato bowing, louré bowing, string crossings, fermata, and ritard. The book concluded with an orchestra arrangement based on the 12-bar blues.

Another feature of the book was the way that new concepts were presented. The concept was highlighted in a red text box. This brought the idea to the attention of the student. The concept

was described using text, and it was also shown with musical notation. Theory exercises were included on some pages. These were referred to as "pencil pushers."

Essential Elements (1995)

One of the most recent additions to the available string method books was the *Essential Elements for Strings* by Michael Allen, Robert Gillespie, and Pam Tellejohn Hayes. This book has become of the most widely used string methods today.

The book began with a brief history of the instrument. Pictures showing parts of the instrument and bow followed this. The first several pages of exercises kept the bow and instrument separate. The authors felt it necessary to keep the two skills separate until basic proficiency was met.

The first exercises use quarter notes and rests placed on the staff. A unique feature of this book was the use of letter names on the note head. Open string pizzicato exercises made up the first two pages of the note reading section of the book. Other note and rest values presented in this book were whole, half, and eighth. The meters used include 4/4, 3/4, and 2/4.

The first finger patterns presented began with the note G on the D string. This was the first time that a method book did not begin by adding the first finger. The authors' reason for doing this was to shape the left hand. The descending major tetrachord on the D string was the first pattern to be presented. The only other pattern presented in the book was the minor tetrachord. The first recognized tune was "Rolling Along." Other concepts presented in the book included up-beats, slurs, ties, staccato bowing, and hooked bowing.

Theory exercises were incorporated into each lesson of the book. Some historical connections were made within lessons of the book. General information about music and musicians was given. Some effort to make the connection to other events in history was made. Three pages of orchestra arrangements were included near the end. A Bach Minuet solo was also included. The end of the book contained a glossary of terms and symbols used in the book.

Discussion

The method books reviewed contained many common elements, but they also showed a difference in the organization of the material. The method books by Cremin and Applebaum in the 1930s began by teaching the minor tetrachord. All other books introduced the major tetrachord. The song material available with the major tetrachord allowed more recognizable tunes to be learned more quickly. Some of the books had several pages of composed material before recognizable tunes were included. The inclusion of familiar song material may help to keep the interest of the student.

Methods from the 1930s also included more tonal patterns. The *Primer Method* from 1936 by Samuel Applebaum included more patterns than any of the other books reviewed. Books from the latter part of the century spend much more time reviewing and reinforcing a tonal pattern before introducing a new one. An interesting note was the 1960 *String Builder* by Applebaum. In this method book, he introduced only two tonal patterns. When compared to his *Primer Method,* this was a major reduction in the amount of material covered.

Rhythmic material used in the initial lessons of the books was also different. The method books from the 1930s often began with the use of whole notes and rests. The bow control necessary for this type of bowing was often difficult for young students. More recent books began with quarter notes. Students may more easily control the bow when it changes direction more often. One consideration that may affect how a teacher introduces rhythmic elements may be changed when the age of the student is taken into consideration. Older students may have a

greater degree of fine motor skill needed for controlling the bow. Younger students usually need shorter note values due to muscles that have not yet developed.

Through research and years of teaching strings in the public schools, authors of method books have changed the content and presentation of materials. The more recently published books tend to present the material in a more sequential manner with more time for practicing the concepts before new concepts are introduced. Some of the features of the older books are still present in the new books, but authors today are integrating special features such as history and theory. In order to see how the number of concepts presented has changed, the table below shows the concepts and where they are presented in the books (see Table 1).

Table 1

Concepts in Method Books Under Review Listed by Page Number

	Primer Method 1936	*Method for Violin* 1938	*Violin Method* 19??	*String Builder* 1960	*Graded String-Method* 1961	*All for Strings* 1985	*Essential Elements* 1995
Total Number of pages	29	64	35	32	32	48	48
Finger Patterns							
Major Tetrachord	13	14	—	11	4	11	6
Minor Tetrachord	3	46	7	20	19	39	32
Lowered First Finger	15	50	11	—	—	—	—
Extended Third Finger	—	52	—	—	—	—	—
Fourth Finger	7	35	15	—	26	—	24
Lowered Fourth Finger	15	—	—	—	—	—	—
Note/Rest Values							
Whole	3	13	7	6	26	27	39
Half	6	10	7	5	2	14	24
Quarter	8	10	10	3	2	14	4
Eighth	18	44	27	30	30	36	22
Sixteenth	26	—	32	—	—	—	—
Dotted Half	—	11	15	17	22	28	27
Dotted Quarter	20	55	28	—	—	—	—
Meter Signatures							
4/4	3	10	7	3	2	14	5
3/4	12	10	15	21	22	28	28
2/4	13	10	—	—	15	31	23
6/4	—	—	22	—	—	—	—
6/8	24	—	30	—	—	—	—
3/8	24	—	—	—	—	—	—
Key Signatures							
G Major	18	32	—	—	17	33	26
D Major	25	28	—	—	14	13	14
C Major	3	50	—	—	20	39	38

F Major	20	—	—	—	—	—	—
A Major	—	36	—	—	—	—	—
Bb Major	27	—	—	—	—	—	—

Table 1 continues

Table 1 *(continued)*

	Primer Method 1936	*Method for Violin* 1938	19??	*Violin Method* 1960	*String Builder* 1961	*Graded String-Method* 1985	*All for Strings* 1995	*Essential Elements*
Scales								
C Major	21	50		35	29	20	45	38
G Major	18	32		24	21	17	33	27
D Major	25	28		—	21	14	25	11
A Major	—	36		—	—	—	—	—
F Major	20	—		35	—	—	—	—
Bb Major	27	—		—	—	—	—	—
A Minor	21	—		—	—	—	—	—
D Minor	24	—		—	—	—	—	—
G Minor	28	—		—	—	—	—	—
E Minor	23	—		—	—	—	—	—
B Minor	26	—		—	—	—	—	—
Other Concepts								
Dynamics	19	—		—	25	—	—	42
Up-Beat	16	43		17	21	18	28	30
Slur 2 Notes	15	38		9	17	15	30	29
Slur 3 Notes	17	39		33	21	23	31	33
Slur 4 Notes	—	42		27	—	—	—	—
Slur across strings	15	40		—	—	15	30	29
Ties	—	12		—	—	15	31	27
Lift Bow	—	23		—	—	9	20	17
Left Hand Pizzicato	—	—		—	26	26	—	24

When choosing a method book for use in the classroom, a teacher must examine what he or she wants to teach. Once this is done, the teacher should examine the available books in order to see which one meets the needs of the teaching situation. Great care should be taken in selecting the method book so that students may become successful players of stringed instruments.

References

Allen, M., Gillespie, R. & Hayes, P. T. (1995). *Essential elements for strings.* Milwaukee, Hal Leonard.

Anderson, G. E. & Frost, R. S. (1985). *All for strings.* San Diego, CA: Neil A. Kjos.

Applebaum, S. (1936). *A primer method*. Philadelphia: Oliver Ditson.

Applebaum, S. (1960). *String Builder.* New York: Belwin.

Baxter, F. H. (1960). A history of music education in the Los Angeles public schools. (Doctoral dissertation, University of Southern California, 1960). *Dissertation Abstracts International, 21,* 204.

Bernhard, W. A. .E., Mensoian, .G. & Turner, R. L. (1999). Massachusetts. In *The world book encyclopedia* (Vol. 13, pp. 270-293). Chicago: World Book.

Birge, E. B. (1928). *History of public school music in the United States.* Washington, D.C.: Music Educators National Conference.

Cremin, A. T. (n. d.) *Graded violin method*. New York: City Schools Publishing.

Hoisington, J. E. (1980). The development of American public school elementary string classes and orchestras to 1950. *Missouri Journal of Research in Music Education, 4,* 39-62.

Lewis, R. C. (1938). *Method for the violin*. Chicago: M.M. Cole.

Muller, J. F. & Rusch, H. W. (1961). *String method.* Park Ridge, IL: Neil A. Kjos.

Norman, T. F. (1939). *Instrumental music in the public schools.* Pennsylvania: Oliver Ditson.

Edited by
Charlotte Mizener, *The University of Texas—Pan American*

A Descriptive Study of Music Student Teachers' Issues Derived from Postings on an Electronic Bulletin Board

Kenneth E. Williams and Rosemary C. Watkins
Institute for Music Research, The University of Texas at San Antonio

The transition from pre-service teacher to in-service teacher may be described as professional and personal growth toward self-reliance. As the pre-service music methods student moves to the position of student teaching, there is inevitably a decline in the amount of attention from teachers and fellow students. Despite years of preparation to allay the uncertainty of this new role, student teachers may feel a sense of detachment or a loss of support. University student teacher supervisors who have also served as methods teachers may feel a similar sense of detachment. The methods classes have provided a variety of means to assess student thinking: class discussions, journals, reflective thinking on teaching, and development of teaching philosophies (Atterbury, 1994; Barry, 1996; Bean & Zulich, 1989; Gromko, 1995; Harwood, 1999; Stephens & Reimer, 1990). Electronic journal correspondence has been used as a tool for reflective practice in methods classes (Bush, 1998). An assessment of student teacher thinking, however, may be more difficult. One strategy that could ease the transition from pre-service teacher to in-service teacher is the use of a password-protected electronic bulletin board that could be used exclusively by student teachers during internship and monitored without intervention by supervisors. Interaction among student teachers through written and uncensored communication could give students a sense of community and a means of making comments without retribution. Such a vehicle could also afford a forum for announcements and opportunities to both request and give advice.

The purpose of this study was to identify the professional, academic, and affective content of student teacher electronic bulletin board postings in order to provide more effective preparation of student teachers in the future. Research questions asked were:

Was there a difference in the frequency that specific categories were identified in student teacher postings on the bulletin board?

Was there a difference in the frequency that specific categories were identified in the postings of choral and instrumental subjects?

Method

Subjects were a diverse group of four choral and four instrumental student teachers attending a mid-sized university located in south central Texas. Their ages, academic backgrounds, and socio-economic backgrounds were widely disparate. Over the semester, choral students—three females and one male—taught elementary general music and either middle school or high school choir. Instrumental students—two females and two males—taught both middle school and high school instrumental ensembles.

Before beginning the project, students were given instructions about technical aspects for posting messages on the password-protected World Wide Web bulletin board. Each subject previously had completed a course, required of all music students, in microcomputer applications in music. Although weekly postings were required of subjects, content of postings was not dictated by researchers; subjects were free to discuss any theme or topic, new or in response to previous postings. This detail in procedure differed from previous research that required student teachers to initiate new themes at periodic intervals (Freidus, 1996; Walls & Watkins, 1998). It was assumed that experiences during student teaching—not predetermined schedules for new postings—would determine the content of postings.

Using an Internet browser, student teachers posted messages on the password-protected WWWBoard (Wright, 1996). The WWWBoard allowed students to begin new topic strings or to respond to a previous posting.

Data were collected by extracting postings in chronological order. Messages were initially identified as Reponses, New, or Repost. Repost was used to indicate a repetition of a previous posting and, therefore, was not subject to analysis.

Researchers used bulletin board postings from past semesters for classification training. For the investigation, each of the two researchers analyzed 50% of randomly selected postings to identify content categories; each categorized 20% of postings assigned to the other researcher. Agreement was determined by dividing the total number of agreements by the total number of agreements plus disagreements. Reliability calculated in this manner was .87.

A list of 27 categories (see Table 1) adapted from a previous study (Walls & Watkins, 1998) was used to classify the content of the 121 postings and, subsequently, to identify a range of potential student teacher issues and concerns.

Results

Subjects posted 151 messages on the student teacher bulletin board, 30 of which were reposts attributed to two of the eight subjects. Identification of reposts reduced the number of viable postings to 121. Of the 121 bulletin board messages, new postings accounted for 63; responses accounted for 58.

The first research question asked if there was a difference in the frequency that specific categories were identified in the postings. In the postings, researchers identified 310 occurrences from the 27 categories. Results, as seen in Table 1, indicated a difference in the frequency that specific categories were identified in student teacher postings on the bulletin board.

Table 1
Frequency of Categories Identified from Student Teachers' Electronic Bulletin Board Postings

Category	∑	*M*	*SD*	*Min*	*Max*	*N*
Advice	14	1.75	1.58	0	4	8
Anticipation Observation	1	.13	.35	0	1	8
Anticipation Site	1	.13	.35	0	1	8
Anticipation Teaching	3	.38	.52	0	1	8
Apprehension	13	1.63	1.06	1	4	8
Approval Other	1	.13	.35	0	1	8
Beginning Positive	5	.63	.52	0	1	8
Business	15	1.88	1.81	0	4	8
Clerical	0	.00	.00	0	0	8
Complaint	11	1.38	1.69	0	5	8
Camaraderie	46	5.75	3.69	1	13	8
Contest	6	.75	1.75	0	5	8
Disbelief	5	.63	.74	0	2	8
Family	5	.63	1.41	0	4	8
Fit In	4	.50	.76	0	2	8
Management (Classroom)	12	1.50	1.69	0	4	8
Personal	9	1.13	1.36	0	4	8
Physical	9	1.13	1.36	0	3	8
Professional Inclusion	1	.13	.35	0	1	8
Reflection	23	2.88	1.81	1	6	8
Reporting	22	2.75	1.16	1	4	8
Request	15	1.88	2.36	0	7	8
Student Affection	6	.75	1.04	0	3	8
Student Progress	7	.88	.64	0	2	8
Technical Problem	7	.88	.99	0	3	8
Technique (Performance)	7	.87	.99	0	2	8
Time	4	.50	1.07	0	3	8
Responses (To postings)	58	7.25	5.18	1	15	8

Camaraderie occurred most often over the twelve weeks for a total number of 46 postings. Statements of well wishes and good luck preceded important deadlines or college supervisor observations. "Good luck on your observations and Teach Well!!!!" *Reflection* postings totaled 23—half the number for *Camaraderie*—accounting for the second highest number of topics.

"Overall, the last two weeks of high school were the BEST! I got to teach more, and I got to try some of my own discipline 'rhetoric' and ideas." *Reporting*, the third-ranked category, could be described as casual student remarks about events during student teaching. Much of the content of *Reporting* centered on verbal announcements that college supervisor observations of teaching went well. "I, too, survived my first observation and it was relatively painless." An argument possibly could be made for classification of these themes as *Reflection*; the casual tenor of the remarks, however, was neither introspective nor analytical. Categories of *Business* and *Request* both ranked fourth, each with 15 postings. *Business* focused on deadlines for graduation, applications for teaching positions, and the state certification test. "Is everyone ready for graduation? Hope everyone has picked up their cap, gown, and tix [sic]." The category, *Request,* often dealt with pleas for suggestions in classroom management. "…yet I still wish they would stay on-task. Any suggestions are VERY, VERY, VERY welcome." All categories except *Clerical* were represented, frequencies ranging from 14 to 1 in decreasing increments of one or two postings (See Table 1).

The second research question asked if there was a difference in the frequency that specific categories were identified in the postings of choral and instrumental student teachers. In 21 of the 27 categories, frequency differed by four or less. Eight of the categories showed differences in frequency, ranging from 5 to 10. For six of those categories, instrumental subjects accounted for a higher frequency: Advice, Apprehension, Complaint, Contest, and Request. For two of the categories, Personal and Physical, choral subjects accounted for a higher frequency.

Table 2

Frequency of Categories Identified in Postings of Choral and Instrumental Student Teachers

Category	Choral Area	Instrumental Area	Total Identified Categories
Advice	2	12	14
Anticipation Observation	1	0	1
Anticipation Site	1	0	1
Anticipation Teaching	2	1	3
Apprehension	4	9	13
Approval Other	1	0	1
Beginning Positive	4	1	5
Business	6	9	15
Clerical	0	0	0
Complaint	3	8	11
Camaraderie	25	21	46
Contest	0	6	6
Disbelief	2	3	5
Family	5	0	5
Fit In	1	3	4
Management (Classroom)	4	8	12
Personal	8	1	9

Physical	7	2	9
Professional Inclusion	1	0	1
Reflection	11	12	23
Reporting	10	12	22
Request	3	12	15
Student Affection	5	1	6
Student Progress	3	4	7
Technical Problem	5	2	7
Technique (Performance)	1	6	7
Time	3	1	4
Responses (To postings)	16	42	58

Discussion

Messages relating to *Camaraderie* were identified twice as many times as any other category, a finding that seemed to indicate use of the bulletin board as an emotional support. One of the messages summarized a common thread: "It's nice to know I'm not out here all alone." Some of the student teachers demonstrated *Camaraderie* more freely than others. The maximum frequency identified was 13; the minimum, 1.

The frequency of messages identified as *Reflection* was an indicator that at least some of the student teachers were willing not only to examine their teaching experiences but also to communicate their discoveries. Together, *Reflection* and *Reporting* approximated the frequency of postings identified as *Camaraderie*. Messages identified as *Business* pinpointed important deadlines and details of paperwork but also appeared to indicate consideration for peers. *Requests* for advice and favors, such as extra graduation tickets, could be interpreted as collegiality. *Camaraderie, Reflection, Reporting, Business,* and *Request,* accounting for 121 of the identified categories, seemed to address a common need— to share the experience of student teaching, in its many manifestations, with peers undergoing the same experience. One could argue that *Camaraderie* could have been a single broad category under which *Reflection*, *Reporting*, *Business*, and *Requests* were subsumed. Other identified categories may have been equally as important in the daily experiences of student teaching but did not take precedence in the postings.

Instrumental student teachers gave advice, requested help, expressed apprehension about teaching, made complaints about teaching situations, reported on music contests, and discussed performance techniques more often than the choral students. Choral student teachers discussed personal issues and physical conditions regarding health and fatigue more than the instrumental group. The small number of subjects might preclude drawing inferences relating to differences in frequency of the identified categories in the postings of choral and instrumental students.

Recommendations for further research in this area include an analysis of postings in proximity to the beginning, midpoint, and ending of each student teacher placement. An analysis of this kind could help to show trends in the priorities, concerns, and developing professionalism of student teachers. Data collected over several semesters could provide information that is more conclusive.

References

Atterbury, B.W. (1994). Developing reflective music educators. *Journal of Music Teacher Education, 4* (1), 4-12.

Barry, N.H. (1996). Promoting reflective practice in an elementary music methods course. *Journal of Music Teacher Education, 5* (2), 6-13.

Bean, T.W. & Zulich, J. (1989). Using dialogue journals to foster reflective practice with preservice, content-area teachers. *Teacher Educational Quarterly, 16* (1), 33-40.

Bush, J.E. (1998). Promoting electronic reflective practice. *Proceedings of the Fifth International Technological Directions in Music Learning Conference* (pp. 118-120). The University of Texas at San Antonio: Institute for Music Research.

Freidus, H. (1996). *Reflection in teaching: Can it be taught?* New York, NY: American Educational Research Association (ERIC Document Reproduction Service No. ED 397 016)

Gromko, J.E. (1995). Educating the reflective teacher. *Journal of Music Teacher Education, 4* (2), 8-13.

Harwood, E. (1999, Spring). Who are we teaching and what are they thinking? *The Mountain Lake Reader,* 16-22, 24-25.

Stephens, D. & Reimer, K.M. (1990*). Explorations in reflective practice*. (Technical Report No. 514). Cambridge, MA: Bolt, Beranek and New, Inc. & Urbana: University of Illinois Center for Study of Reading. (ERIC Document Reproduction Service No. ED 324 692)

Walls, K.C. & Watkins, R.C. (1998). A naturalistic descriptive study of music student teachers' electronic bulletin board postings. *Proceedings of the Fifth International Technological Directions in Music Learning Conference* (pp. 102-106). The University of Texas at San Antonio: Institute for Music Research.

Wright, M. (1996). WWWBoard [Computer software]. Available http://www.worldwidemart.com/scripts/. (Version 2.0 Alpha 2).

Edited by
Charlotte Mizener, *The University of Texas—Pan American*

Music-Specific Terminology Used by Intern Teachers and Middle and High School Band Directors in the Rehearsal Setting

Stephen G. White
Baylor University

The school band movement in the United States fulfills two primary functions for countless Americans of all ages: first, it provides basic musical training, mostly through class instruction, and second, it provides training in performance skills. While much of these primary functions typically occur during the school day within the classroom or rehearsal setting, it is becoming increasingly common for them to continue after regular school hours. These additional rehearsal sessions have been necessitated by an increasing demand for performances from our school ensembles (Blocher, Greenwood, & Shellahamer, 1996). A growing concern has developed that time spent in class (i. e., rehearsal) is being devoted to preparation for performances at the expense of providing appropriate musical foundations (Arrowood, 1991). As a response to this concern, many directors have implemented comprehensive musicianship practices and have found that their students learn more about music and have better attitudes toward music and performance than do students in traditional programs. In order to accomplish this, however, directors must work very hard to prepare for comprehensive teaching and to evaluate their programs. They must be willing to de-emphasize somewhat the performance aspect of their programs. To do so requires them to be music educators rather than directors, a role that demands a different expenditure of time, effort, and resources from that of the traditional ensemble director (Mark, 1986).

A major component of any comprehensive musicianship program is language planning. Language planning can be defined as "the activity of preparing a normative orthography, grammar, and dictionary for the guidance of writers and speakers in a non-homogeneous speech community" (Daoust 1991, p. 281). Others later would call this "standardization." It is the standard language of music that enables teachers across the globe to put into words those concepts that will ultimately go beyond the power and defining characteristics of language. With its roots firmly established in European history and tradition, music terminology maintains a

cross-cultural link for musicians of the present and the past. Without this standard language, the music of Mozart, Beethoven, and Mahler would be subject to the mere interpretive whim of each performing musician. In her book *An Introduction to the Language of Music,* Stephanie Barach (1962) states:

> As in any strange tongue, the language of music can be a complex and frequently baffling form of communication. It consists of unfamiliar signs and strange words whose origins are Latin, Italian, French, or German. And yet, usage of this language is as precise for the musician as the equally strange nomenclature of science is for the physicist and chemist. No musician – beginner or advanced – can hope to perform well unless he understands these signs, guides, and directions which every composer must employ to indicate how his music is to be played and interpreted (p. xi).

As with any act of learning, the learning of these signs, guides and directions should serve the musician in the future. This act of learning serves the future by providing both skill learning and general idea (conceptual) learning. The latter of these is at the heart of the educational process (Bruner, 1960).

When one uses the term *learning* it must be understood as a word that is many-sided. It can refer to kinesthetic or psychomotor skills, memorizing information, problem solving, or being able to convey aesthetic intent (Hoffer, 1983). In the instrumental classroom these multiple sides of learning can be demonstrated in fingering notes on the instruments correctly, defining musical terminology accurately, deciding upon interpretation through basic knowledge, and performing music accurately according to the composer's instructions. All of these begin the first day (if not before in some households and general music programs) a student touches a musical instrument. From that point on, the instrumental music student is immersed in a world of unique wonder that allows him access to knowledge and emotions that those outside of this world may never know. It becomes the instrumental music teacher's responsibility to convey to students through speech and action what it means to understand music. In *Applications for Research in Music Behavior* (Madsen & Prickett, eds., 1987), Cornelia Yarbrough suggests that good teaching may be in sonata form. In her discourse of the same title, she notes that good teaching often includes an Exposition – a statement of the first and second themes connected by a bridge (can be translated into musical concepts, terminology, etc.); a Development – the section where the teacher is allowed to demonstrate the art of teaching in order to make the learning real; a Recapitulation – a restatement of the original exposition with certain modifications based on the development; and finally a Coda – a concluding section, extraneous to the basic structure of the lesson but added in order to confirm the knowledge. Although this musical analogy may at first seem basic, it must be understood that it is a prominent cornerstone of the spiral curriculum. The complete understanding of a concept at a particular stage allows for a re-visitation later when more information may be added to the present knowledge.

In order for any spiral curriculum to be successful, it is imperative that all educators in a specific field continue the use of subject-specific language to reinforce and/or develop knowledge. The purpose of this study was to determine the frequency with which music-specific terminology is used in middle and high school instrumental rehearsal rooms across the United States.

Method

Video taped teaching episodes were solicited from middle and high school band directors as well as from intern teachers from across the United States. These tapes, originally used for a study on conceptual teaching (Blocher, Greenwood & Shellahamer, 1996), consist of 76 total teaching samples (24 national teachers, 24 Florida teachers, and 28 intern teachers). This study used 25% of each of the teacher populations for a total of 19 teaching episodes. The grade level breakdown was as follows: National teachers – six high school teachers; Florida teachers – three middle school and three high school; Intern teachers – three middle school and four high school. Each episode was randomly selected from the total in each category and viewed by two trained, independent observers. Music-specific terminology was counted while the teacher was in view of the camera. If the teacher left the view of the camera, no terms were counted. The count for each rehearsal episode does not represent the total number of different terms used but rather identifies the number of times within the rehearsal segment that music-specific terms were used (see Table 1). The data were collected and processed to assess statistical significance of responses by means of a one-sample chi-square test.

Table 1
Frequency of Use of Music-Specific Terminology Among Participants in the Teacher Groups

	Teacher Group				
National Terms	Florida HS (n = 6)	Florida MS (n = 3)	Intern HS (n = 3)	Intern MS (n = 4)	(n = 3)
A tempo				3	
Accent	1	1		12	
Accompaniment	1			3	
Allargando				1	
Allegro				2	
Augmented	1				
Calore		1			
Chord	2				
Circle of Fourths	1				
Con brio				2	
Con moto				1	
Crescendo	5	1	7	6	9
Cut time					1
Decrescendo	1	1	1	1	
Dotted Quarter note		1	1		1
Down beat					1
Dynamic	1			2	3
Eighth note	6	2	7	9	4
Embouchure					1
Fermata	1		1		

(Table 1 continues)

Table 1 *(continued)*

Terms	Teacher Group				
	National (n = 6)	Florida HS (n = 3)	Florida MS (n = 3)	Intern HS (n = 4)	Intern MS (n = 3)
Flam		1			
Forte	1		1	1	1
Forte piano					2
Fortissimo	2				
Half note	7	5	3	3	1
Harmonic minor	2				
Harmony		1	1		
Intonation			1		
Key Signature				1	
Legato	2	1	4	2	1
Maestoso				1	
Melody(ic)	2				
Mezzo forte			3		
Mezzo piano			2	1	1
Natural minor	2				
Non-harmonic tone	1				
Octave	9				
Off beat					1
Pianissimo	1				
Piano	3		1	4	

(Table 1 continues)

Table 1 *(continued)*

Terms	Teacher Group				
	National (n = 6)	Florida HS (n = 3)	Florida MS (n = 3)	Intern HS (n = 4)	Intern MS (n = 3)
Piu mosso				1	
Poco piu mosso	1				
Quarter note	8	5	3	1	4
Rhythm		1	1	8	1
Ritard				4	
Sixteenth note	6			3	
Slur	1		1	1	12
Sonority			3		
Staccato	2			6	1
Tempo				2	1
Tempo primo				3	
Tenuto			3		
Timbre	2				
Time signature				2	
Tonic	1				
Triad	1				
Triple forte					1
Triplet	3			2	1
Tutti	1				1
Vibrato	1				
Vivace				1	
Whole note		1		4	2

Results

The null hypothesis for this study was that there would be no significant statistical differences in observed music-specific term usage. Results of the one-sample chi-square test indicate that there were significant statistical differences within the National Teacher sample and the Florida Teacher sample. The Intern Teacher sample, however, showed no significant statistical differences. Results between subject groups indicate statistically significant differences in music-specific term usage. Additional data (Table 2) indicate that participants in the Intern Teacher sample not only showed no significant statistical differences in their usage of music-specific terminology but also used considerably more music-specific terms more frequently than their instrumental music educator colleagues from both the National and Florida Teacher samples.

Table 2

Number of Occurrences of Music-Specific Terminology by Participant

Participant	Number of Occurrences	Terms Used
National Sample		
1.	20	accent, augmented, crescendo (3), eighth note (2), half note (3), harmonic minor (2), legato, natural minor (2), sixteenth note (5),
2.	3	decrescendo, legato, sixteenth note
3.	7	chord (2), circle of fourths, melodic, octave, tonic, triads
4.	4	accompaniment, octaves (3)
5.	25	crescendo (2), dynamic, eighth notes (3), fermata, melody, non-harmonic tone, octave (2), piano (3), pianissimo, quarter notes, slur, staccato (2), timbre (2), triplet (2), tutti, vibrato
6.	19	eighth note, forte, fortissimo (2), half note (4), octave (2), poco piu mosso, quarter notes (7), triplet
Florida Master Teacher Sample		
High School		
1.	13	quarter note (4), dotted quarter note, half note, whole note, crescendo, decrescendo, calore, legato, accent, harmony
2.	8	half note (4), rhythm, eighth note, quarter note, flam
3.	2	melody, eighth note
Middle School		

1.	28	mezzo forte (2), decrescendo, harmony, crescendo (4),mezzo piano, piano, eighth note (7), tenuto (3), legato (4), quarter note, half note, slur, rhythm
2.	10	quarter note, half note (2), intonation, sonority (3), crescendo (3)
3.	10	fermata (4), mezzo piano, mezzo forte, forte, dotted quarter note (2), quarter note

(Table 2 continues)

Table 2 (continued)

Participant	Number of Occurrences	Terms Used
Intern Teacher High School		
1.	20	accent (9), vivace, dynamic (2), piano (2), allargando, ritard, staccato (2), half note, decrescendo
2.	21	piano, ritard, eighth note, slur, key signature, time signature (2), tempo (2), maestoso, allegro (2), con brio (2), con moto, piu mosso, rhythm (3), triplet (2)
3.	23	legato (2), staccato (4), eighth note (6), sixteenth note (3), rhythm (5), accompaniment (3)
4.	32	eighth note (2), crescendo (6), tempo primo (3), piano, accent (3), forte, half note (2), mezzo piano, a tempo (3), ritard (2), whole note (4), decrescendo (3), quarter note
Middle School		
1.	15	crescendo (2), whole note (2), half note, forte, dynamics (2), staccato, legato, eighth note, mezzo piano, tempo, quarter note, dotted quarter note
2.	20	crescendo (7), cut time, down beat (4), dynamic, embouchure, forte piano (2), off beat, triple forte, triplet, tutti
3.	20	eighth note (3), quarter note (3), rhythm (2), slur (12)

Discussion

Although difficult to generalize to the entire instrumental music educator population, results of this study do provide interesting insight into the use of musical language in instrumental music rehearsals. As a rule, the use of music-specific terminology in instrumental rehearsals is

infrequent. The delineation between sample groups was designed to determine if experience and/or geography influenced the observed behavior. Results appear to indicate no effect due to experience and/or geographical location. Although the Intern Teacher sample utilized considerably more terminology, it is estimated to be well below 25% of total verbal interaction. It must be stated that music-specific terminology is defined, for this study, as terminology that cannot be used outside the music field (i.e., flat, sharp, slow, fast, etc.). Although certain terms such as flat and sharp do incorporate musical concepts when used in a musical environment, they also refer to non-musical concepts when used in non-musical environments.

The results of this study do not present surprising information. They do, however, provide documentation and incentive for behavioral and ideological changes in instrumental rehearsal techniques. The continual struggle to maintain music education as a vital component of the school curriculum can only be aided by a concerted effort to speak the language of our subject when immersed in it. Additional studies of this nature would not only be helpful in providing additional data on subject-specific language, but also in identifying other areas of concern for music education.

References

Abeles, H. F., Hoffer, C.R., & Klotman, R. H. (1984). *Foundations of music education*. New York: Schirmer.

Arrowood, J. (Ed.). (1991). CBDNA golden anniversary issue [Special issue]. *College Band Directors National Association Journal, 8*.

Barach, S. (1962). *An introduction to the language of music*. Washington, D.C.: Robert B. Luce.

Blocher, L., Greenwood, R., & Shellahamer, B. (1996). Teaching behaviors exhibited by middle school and high school band directors in the rehearsal setting. *Journal of Research in Music Education*.

Boardman, E. (Ed.). (1989). *Dimensions of musical thinking*. Reston, VA: Music Educators National Conference.

Boardman, E. (1988). The generative theory of music learning, part two. *General Music Today, 2* (2), *3-6,* 28-31.

Broudy, H.S. (1990). The role of music in general education. *Bulletin of the Council for Research in Music Education, 105,* 23-43.

Bruner, J.S. (1960). *The process of education*. Cambridge, MA: Harvard University Press.

Campbell, M.R. (1991). Musical learning and the development of psychological processes in perception and cognition. *Bulletin of the Council for Research in Music Education, 107,* 35-48.

Colwell, R. (Ed.). (1992). *Handbook of research on music teaching and learning*. New York: Schirmer.

Daoust, D. (1991). Terminological change within a language planning framework. In D. F. Marshall (Ed.), *Language planning: Focusschrift in honor of Joshua A. Fishman*. Philadelphia: John Benjamins.

Duke, R. A. & Madsen, C. K. (1991). Proactive versus reactive teaching: Focusing observation on specific aspects of instruction. *Bulletin of the Council of Research in Music Education, 108,* 1-14.

Duke, R. A. & Pierce, M. A. (1991). Effects of tempo on transfer of performance skills. *Journal of Research in Music Education, 39,* 93-100.

Garofalo, R. (1983). *Blueprint for band*. Fort Lauderdale, FL: Meredith Music Publications.

Gary, C. L. (1967). *The study of music in the elementary school – a conceptual approach*. Washington, D.C.: Music Educators National Conference.

Grashel, J. (1993). An integrated approach: Comprehensive musicianship. *Music Educators Journal, 79* (8), 38-41.

Henson, K. T. (1995). *Curriculum development for education reform*. New York, NY: Harper Collins College Publishers.

Hoffer, C. R. (1983). *Introduction to music education*. Belmont, CA: Wadsworth.

Jellison, J. A. & Wolfe, D. E. (1987). Verbal training effects on teaching units: An exploratory study of music teaching antecedents and consequents. In C. K. Madsen & C. A. Pricket (Eds.), *Applications of research in music behavior*, (pp. 135-148). Tuscaloosa, AL: University of Alabama Press.

Madsen, C. K. & Kuhn, T. L. (1978). *Contemporary music education*. Arlington Heights, IL: Harlan Davidson.

Madsen, C. K. & Yarbrough, C. (1985). *Competency-based music education*. Raleigh, NC: Contemporary Publishing.

Mark, M. L. (1986). *Contemporary music education* (2nd ed.). New York: Schirmer.

O'Brien, J. P. (1971, September). How conceptual learning takes place. *Music Educators Journal,* 34-35.

Price, H. E. (1983). The effects of conductor academic task presentation, conductor reinforcement, and ensemble practice on performers' musical achievement, attentiveness, and attitude. *Journal of Research in Music Education, 31,* 245- 257.

Price, H. E. (1992a). Sequential patterns of music instruction and learning to use them. *Journal of Research in Music Education, 40*, 14-29.

Price, H. E. (1992b). Transferring teaching concepts from methods courses to studio instruction. *Contributions to Music Education, 19,* 75-86.

Reahm, D. (1986, March). Developing critical thinking through rehearsal techniques. *Music Educators Journal,* 29-31.

Reimer, B. (1989). *A philosophy of music education* (2nd ed.). Englewood Cliffs, NJ: Prentice Hall.

Spradling, R. L. (1980). *The effects of timeout from performance on attentiveness and attitudes of university band students.* Unpublished doctoral dissertation, Florida State University.

Yarbrough, C. & Price, H. E. (1981). Prediction of performer attentiveness based on rehearsal activity and teacher behavior. *Journal of Research in Music Education, 29*, 209-217.

Yarbrough, C. Price, H. E. (1989). Sequential patterns of instruction in music. *Journal of Research in Music Education, 37*, 179-187.