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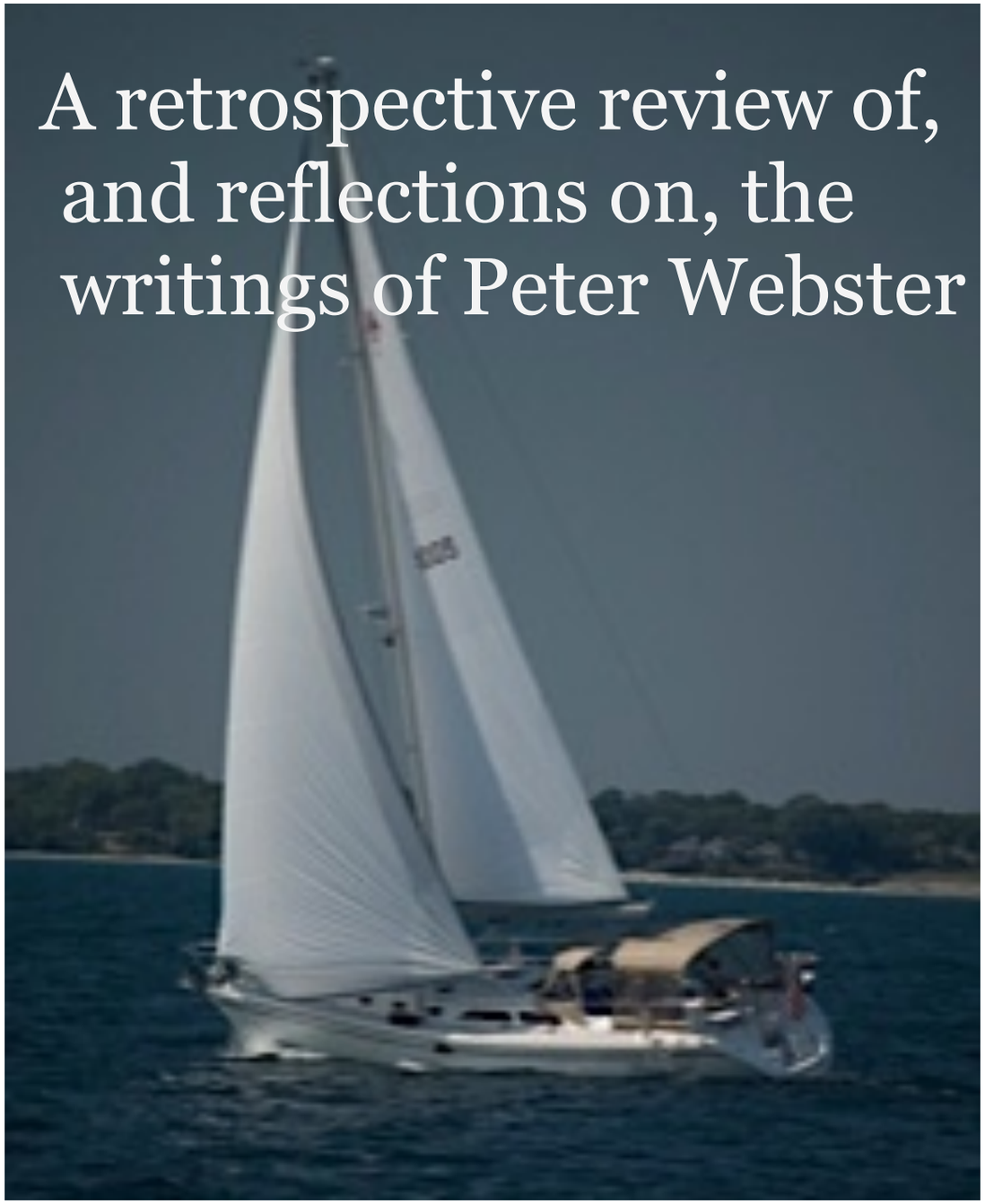

EDITED BY JOHN W. RICHMOND AND MAUD HICKEY

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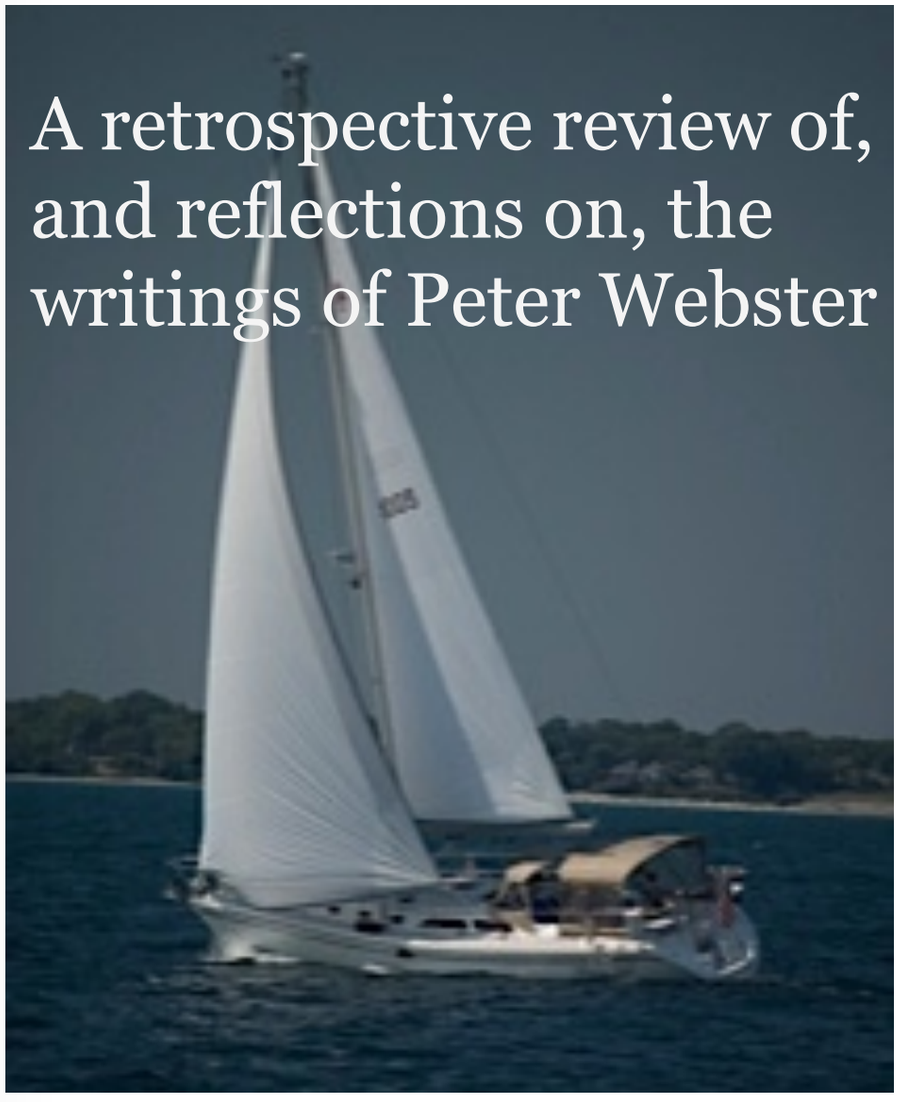

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Preface

John W. Richmond, Professor and Director of the University of Nebraska-Lincoln School of Music in the Hixson-Lied College of Fine and Performing Arts, Lincoln, Nebraska.

Maud Hickey, Associate Professor of Music Education, Bienen School of Music at Northwestern University, Evanston, Illinois

This iBook exists to pay tribute to John W. Beattie Professor Peter R. Webster on the occasion of his retirement from the Bienen School of Music at Northwestern University in June 2012. It does so by reprinting here a very small sample of some of Professor Webster's most influential writings, including an important original essay written by Webster for this publication, coupled then with companion essays that provide thoughtful, sometimes funny, commentary and reflection from his colleagues and former students. The result is exactly that – a stunning tribute to a musician/teacher/scholar/innovator whose work has shaped generations in the music education profession and whose reach is international.

Several recurring themes emerge powerfully in the chapters of this book: composition, creativity, pedagogy, philosophy, psychology, technology, and theory among them. One would expect such a range of interests would preclude much depth in any of them, and such certainly would be the case for a lesser intellect. Professor Webster's career has documented vividly, however, an abiding devotion to these varied interests, coupled with a penetrating, sophisticated, and perhaps peerless understanding of each of them in the context of music teaching and learning. The arc of his career and contributions is simply astounding.

The world surely is filled with music education practitioners and scholars who are well acquainted with Professor Webster's presentations and publications, but who have not had the opportunity to get to know him personally. This iBook will provide some important context, then, for the reader here will

discover that Professor Webster's passion for sailing and all things nautical is nearly equal to his passion for all things musical. In fact, from the title through this Preface to every commentary provided by the impressive scholars represented in this volume, there is a playful yet respectful nod (and an occasional jab, perhaps) toward Professor Webster's seagoing passions.

This is important, for Professor Webster has been a model scholar not only by way of this impressive professional contributions (and they are many), but the manner by which he has achieved this while balancing so gracefully the other roles he embraced as devoted husband, loving father, avid sailor, and generous, joyous human being. Perhaps this is the greatest tribute anyone can earn – to do one's best and then accomplish so much without exacting an unfair cost from the other important domains of one's life.

Professor Webster surely will continue to contribute mightily to the profession he has shaped so magnificently for decades. He simply has too much fun in this work to lay it down and sail away. This means, of course, that there will be occasion in the near future to update a volume such as this, to take stock of his many new contributions, and to attempt to assimilate this work in ways that can continue to guide and empower music educators everywhere. We can imagine no more exciting voyage for our shared futures.

Thank you so much, Peter Webster. Bon voyage!

Personal Note from Peter Webster

I want to offer my deep thanks to both Maud Hickey and John Richmond for this amazing project. I was first told of the iBook at my retirement gathering a Northwestern and I still remember my surprise and emotional state at the time. It was as touching and meaningful as anything that I have ever experienced -- I cherish you both for this effort.

I also want to thank Sandy Stauffer, Pamela Burnard, Betty Anne Younker, John Kratus, Sam Reese, David B. Williams, and the late Bennett Reimer for your contributions to this iBook. You are all my dearest of friends and words cannot express my gratitude for these reflections.

Finally, many thanks to the many colleagues and students that have been and continue to be a part of my life. This iBook is the result of our collaborations over the years in service to children, learning, and to our great art form we love so much.

Marina del Rey, California
April, 2014

CHAPTER 1

Creativity as Creative Thinking

Reflection by Sandra Stauffer

Creative Thinking in Music

CREATIVITY AS CREATIVE THINKING

by Peter R. Webster

Creativity—its definition, evaluation, and place in the curriculum—is often misunderstood. Peter R. Webster clarifies the issue with a model for musical creativity that holds exciting implications for music educators.

There are few topics in music teaching and learning that are as fundamentally important as creativity. From the earliest works of Lowell Mason to the latest publications by MENC, thousands of words have been written about this subject. It has influenced the forming of philosophy, the writing of goals and objectives and the design of countless lesson plans. The Music Educators Journal alone has accounted for more than twenty articles since 1960. One bibliography of literature that deals with creativity in music education contains over a hundred annotated citations organized into theoretical, practical and empirical categories.[1]

Much of this literature focuses on practice. Important monographs on creative teaching have been written, including books on traditional composition techniques as well as unusual approaches. Many of the major texts on teaching practice deal directly with creative strategies. For a listing of some of these materials, see the "Suggested Readings."

In terms of student outcomes, approaches such as those of Carl Orff and Emile Jaques-Dalcroze stress certain kinds of creative activity. The Contemporary Music Project and Manhattanville Music Curriculum Project, two well-known efforts of the 1960s, contained detailed descriptions of creative strategies as a central focus of curriculum design. The Ann Arbor Symposium III and the Suncoast Music Education Forum are examples of professional meetings that have dealt exclusively with this topic.[2]

Continued confusion

Although much of this work has been helpful in understanding the complexities of creativity and in helping to formulate practice, confusion continues about just what the word means. For instance, a ten-year-old child's Sunday piano recital might be termed a milestone of creativity by some, while others might view the same child's Orff improvisation during Monday's music class in the same terms. Some view the very presence of music in the schools as an example of educational commitment to creativity, while others gauge creativity solely by the products of these programs or by the awards they win. Some regard creativity as a term best reserved for geniuses, while others look to the spontaneous songs of the three year old or the daydreams of the adolescent.

Many questions about creativity continue to prevail. Is creativity product, or process, or both? Should it be considered primarily as something that takes place in composition? Can it be readily measured? Does it have anything to do with music aptitude? Isn't it the same as intelligence? Isn't it really only a "general music" activity? Can it be taught? There remains little doubt about the importance of creativity in the music education profession, but little collective sense of what it is.

New thinking

Music educators and psychologists interested in artistic development have recently supplied answers to these and many other questions. Many of their studies are based, in part, on a more focused view of creativity-one that centers on the mental processes associated with creative production. One of the main problems we face is the word "creativity" itself. It has been used in so many different contexts that it has lost much of its meaning and power, especially in terms of music and children. In the educational context, it might be more prudent to use the term "creative thinking." There are a number of reasons for this.

By focusing on creative thinking, we place the emphasis on the process itself and on its role in music teaching and learning. We are challenged to seek answers to how the mind works with musical material to produce creative results.[3] This approach demystifies creativeness, places it in context with other kinds of abilities and external influences, and-perhaps most important-makes our job as educators much clearer.

There are four characteristics of the recent literature on creative thinking that are worthy of consideration: it shows (1) an emphasis on the role of musical imagination or musical imagery, (2) theoretical modeling of the creative process, (3) new approaches to the measurement of creative aptitude, and (4) systematic observation of creative behavior, often in natural settings. A fifth characteristic is now emerging: the use of computers and sound technology as tools for recording and stimulating creative thought. Each of these characteristics has important implications for practice and each helps in its own way to clarify what we really mean by the term "creativity."

Musical imagination

The mind's ability to "think in sound" has been an important issue for musical achievement for some time. For example, the private trumpet teacher might encourage a student to "hear" a musical line internally before playing it to improve the quality of performance. A general music specialist can often encourage a sixth grade class to "remember" a musical passage during a listening lesson in order to compare the passage to an occurrence later. Conducting teachers encourage students to "imagine" the sound of a score before rehearsal.

This ability to internally imagine sound meaningfully is not only important for music achievement and convergent tasks (tasks designed to yield a single right answer), but is also critical for creative thinking ability and specifically for divergent tasks (tasks for which several answers are possible). What is of interest is the encouragement of imaginative, divergent

thinking in the classroom, rehearsal hall and the private studio. Typical questions and statements that encourage this kind of thinking are:

> *"Imagine how the composer might have changed the ending to sound more tentative. How could this be done?"*
>
> *"Think of what it would sound like without the strings-with just the tuba and piccolo playing together."*
>
> *"Can you think of another accompaniment pattern for that melody? Play it for me."*
>
> *"Clarinets, imagine what that fugue subject would sound like if it had been written a century later."*

It is this kind of imaginative problem solving with musical sound that plays such an important role in the creative process and that has captured the attention of many music professionals interested in the formal study of creativity. Ironically, it is precisely this kind of thinking that is so often not stressed by music teachers-often ignored in favor of factual or skill-oriented content. Factual information is, of course, critical for imaginative thinking, but we must provide students with opportunities for applying this conceptual understanding in creative tasks. It is equally ironic that mathematics or history teachers might be more effective in getting students to think imaginatively about their subjects than is the music teacher.

Model of the creative process

How does this imaginative thinking relate to the big picture? Figure 1 displays one view of the creative thinking process. Such attempts at conceptual modeling are useful for teachers and researchers. They suggest relationships that imply possible teaching strategy and give direction to research. They can also generate a platform for debate in the profession-always a healthy sign. This model is designed to be representative of creative thinking by both children and adults, although certain aspects of the model might be qualitatively different at various stages of development.[4]

Product intention. Composition, performance/improvisation, and analysis (written and listening) can be considered at the outset of creative thinking as goals or "intentions" of the creator. At the same time, they represent the final product of creation. The product intentions of school-aged children are usually limited under our current educational system to performance/improvisation and listening, a fact that hopefully will change as schools encourage more written composition and analysis. Each product intention results in subtle differences during the creative process, but the inner workings of the process are probably quite similar. An important point for music education is that creative thinking is part of the total curriculum effort and should not be viewed as just a classroom activity.

Enabling skills. With the intention established, the creator must rely on a set of skills that allow for the thinking process

to occur. These skills form the basis of a musical intelligence and interact with the thinking process in a rich variety of ways.

First among these skills is the necessary collection of *musical aptitudes*. These are individual skills that are subject to influence by the environment during the early years of development and possibly into early adult life. They include such convergent thinking skills as the ability to recognize rhythmic and tonal patterns and musical syntax (sensitivity to musical whole). Certain divergent, imaginative skills are also critical, such as musical extensiveness (the amount of time invested in creative imaging), flexibility (the range of musical expression in terms of dynamics, tempo, and pitch), and originality (unusualness of expression). These musical aptitudes are largely innate, although they are subject to developmental improvement with training.

Another enabling skill is conceptual understanding: the *knowledge of facts* that comprise the substance of musical understanding. Furthermore, the possession of two more types of ability fall into this category: *craftsmanship* (the ability to apply factual knowledge in the service of a complex musical task) and *aesthetic sensitivity* (the ability to shape sound structures to capture the deepest levels of personal feeling-an ability that is demonstrated over the full length of a musical work).Conceptual understanding, craftsmanship, and aesthetic sensitivity obviously grow with age and experience, but transfer of these abilities into the mosaic of creative thinking does not often occur naturally. This transfer might well be an important goal of formal music education.

Enabling conditions. In addition to the personal skills that drive the creative thinking process, there are a number of variables involved that are *not* musical. These influences vary greatly from person to person and mingle with musical skills in delicate and complicated ways.

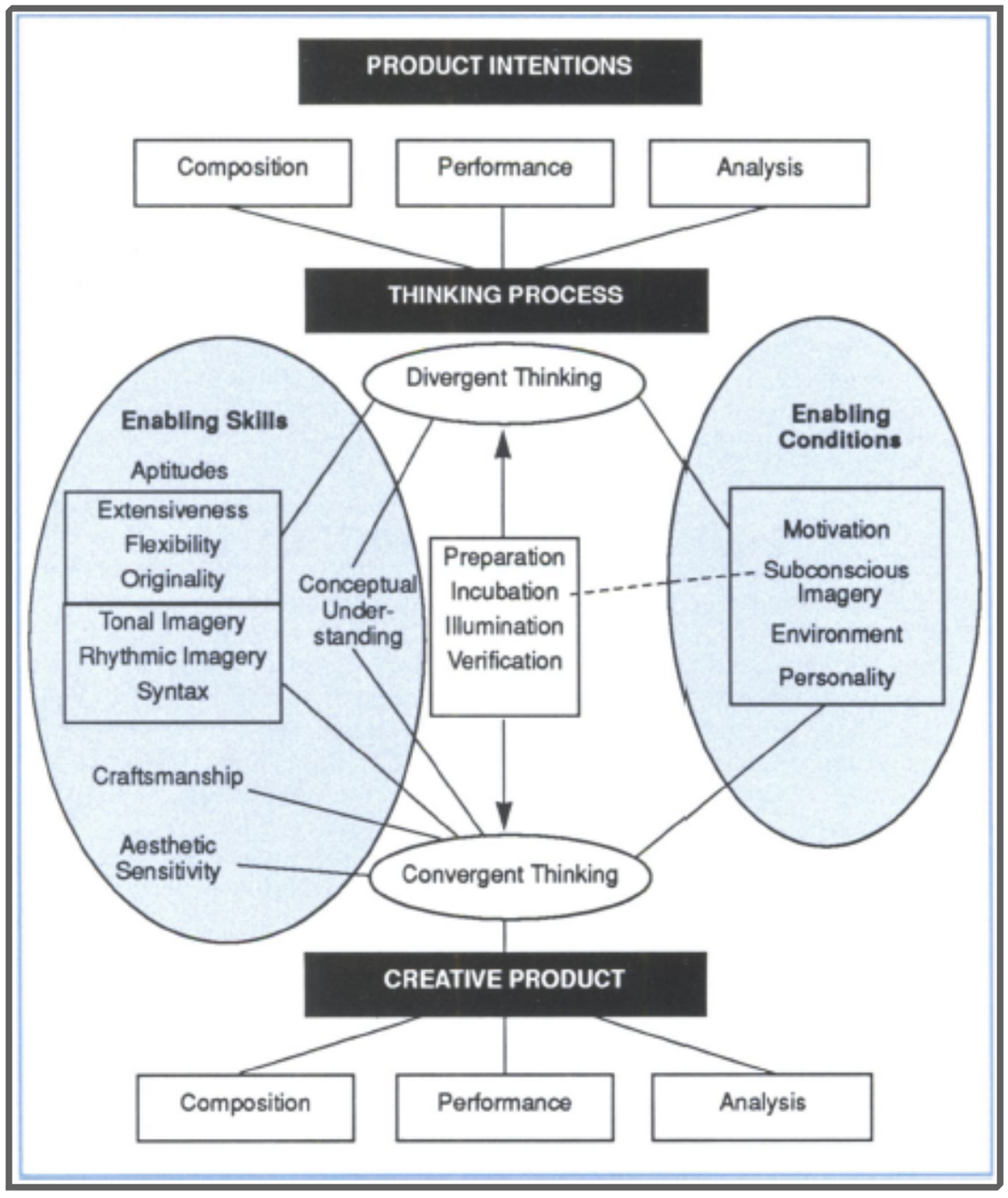

Figure 1. *Model of Creative Thinking in Music*

One of these, *motivation*, comprises those drives (both external and internal) that help keep the creator on task. Another, *subconscious imagery*, is the presence of mental activity that occurs quite apart from the conscious mind and that may help to inform the creative process during times when the creator is occupied consciously with other concerns.

Another, *personality*, describes factors such as risk-taking, spontaneity, openness, perspicacity, sense of humor, and preference for complexity, that seem to exist in many creative persons and that may hold some significance for enabling the creative process. *Environment* is the host of characteristics that define the creator's working conditions and contribute to the creative process, including financial support, family conditions, musical instruments, acoustics, media, societal expectations, peer pressure and many others.

Thinking process in the central core. The center of the model in Figure 1 indicates movement, in stages, between divergent and convergent thinking. These stages involve time to play with ideas (preparation), time to have away from the tasks (incubation), and time to work in structured ways through the ideas (verification) after solutions have presented themselves (illumination). A very important implication for music teaching is that we must allow enough time for creative thinking to occur.

There are a number of important connections between this process and the enabling skills and conditions. Of the musical aptitudes, some (those of tonal and rhythmic imagery and mu-

sical syntax) are most clearly connected to convergent thinking. Tonal and rhythmic imagery concern the ability to perceive sound in relation to change and involve the representation of sound in memory. Musical syntax is the ability to shape musical expressions in a logical manner according to patterns of musical repetition, contrast, and sequencing. In this sense, a grasp of syntax is closely related to aesthetic sensitivity and is an early indication of this skill before extensive formal training. The aptitudes of extensiveness, flexibility, and originality are clearly connected to divergent thinking. Conceptual understanding directly impacts both divergent and convergent thinking. (Divergent thinking requires the mind to survey its data banks for possible musical content, so the more that is in those banks, the better. It is impossible to expect individuals to think creatively if nothing is there with which to think creatively!) Craftsmanship and aesthetic sensitivity are also connected to convergent thinking because they require careful manipulation of musical material in sequential ways. Divergency is directly related to aesthetic sensitivity as well.

Another major implication shown in this model for music teaching is the idea that environments that encourage divergent thinking in music are just as important as environments that encourage convergency of thought. Are we doing enough in our rehearsals, private studios and classrooms to insure the very heart of this model?

Measures of creative aptitude

Only recently have attempts to actually measure creative aptitude in music begun. Much of this work has focused on young children, ages six to ten, and has sought to identify divergent and convergent thinking skills in music using musical tasks in game-like contexts.

For example, a measure I developed uses an amplified voice, a round sponge ball with a piano, and a set of temple blocks to engage children in musical imagery.[5] The tasks begin very simply and progress to higher levels of difficulty in terms of divergent thinking. There are no right or wrong answers to the tasks.

The first section of this evaluation procedure is designed to help the children become familiar with the instruments used and how they are arranged. The children explore the parameters of "high/low", "fast/slow", and "loud/soft" in this section and throughout the measure. The way they manipulate these parameters is, in turn, used as one of the bases for scoring. They are given tasks that involve images of rain in a water bucket, magical elevators, and the sounds of trucks.

The middle section asks the children to engage in more challenging activities with the instruments and to focus on the

creation of music using each of the instruments singly. Children enter into a kind of musical question/answer dialogue with the mallet and temple blocks, and they create songs with the round ball on the piano and with the voice and the microphone. They use images that include the concept of "frog" music (accomplished by hopping and rolling the ball on the piano) and that of a robot singing in the shower (realized with the child's voice through the microphone).

In the last section of the procedure, the children are encouraged to use multiple instruments in tasks whose settings are less structured. They tell a space story in sounds, using drawings as a visual aid. The final task asks the children to create a composition that uses all the instruments and that has a beginning, a middle, and an end.

This measure, and others like it, yields scores for such factors as musical originality, extensiveness, and flexibility, as well as musical syntax. Measurement strategies are based on the careful analysis of video or audio tapes of children actually engaged in the activities. Objective criteria as well as rating scales are used: musical extensiveness, for example, is measured by the time involved in the creative tasks, while evaluators rate originality by observing the manner in which pitch, tempo, and dynamics are manipulated.

Results based on administration of the test to over three hundred children have been encouraging. Reliability and validity data seem to suggest that the children's responses follow consistent patterns and that the content of the tasks is appropriate. The tasks are not measuring the same skills as traditional musical aptitude tests (which measure tonal and rhythmic imagery), nor are they related with any statistical degree of significance to general intelligence. The scores on the tests do not seem to be grouped according to differences in gender, race, or socioeconomic background.

Perhaps the most important point surrounding this work, however, is that what was once thought to be unapproachable and mysterious is now being studied. The actual tasks in these measures also serve as models for music teaching strategy as educators seek to engage children in imaginative thinking about music. (See Figure 2.)

Figure 2. *Administrator's instructions, illustrations, from "Measure of Creative Thinking in Music."*

Observation

Some of the most interesting writing in recent times has come from studies that have systematically observed the products and processes of children's creative expression in music and have attempted to analyze what happens as children create. The aim is to provide a sense of how the mind represents sound at various stages in development and how the music educator might benefit from this knowledge. Strategies involve engaging children in either compositional, improvisatory, or quasi-improvisatory tasks; recording the results; and then studying the characteristics of the music the children produce. Unlike efforts that are designed to create a standardized measure as described above, these studies essentially describe content as it is happening.[6]

We already see some interesting trends. Until children are five or six, their rhythmic and melodic material is somewhat idiosyncratic, with no predictable pattern. It is not clear if this is because of motor coordination problems in the production of sounds or if it is a true representation of the children's inner hearing. After this age, both rhythmic and melodic structures seem to be more predictable. Between the ages of six and ten, changing or mixed meters occur, giving way to quite consistent patterns after age ten. Duple meter seems to be preferred by most older children.

After age five or six, consistent melodic and tonal characteristics also become more pronounced. The music of six- to ten-year-old children exhibits a gradual development of feeling for cadence structures and a growing awareness of tonal center within melodies. It seems clear that as children imitate the songs in their environment, their own music is influenced accordingly. After the age of ten, children become much more conscious of "correctness" of musical structure and tend to cre-

ate music that is more organized in terms of rules, but not necessarily more original.

There appears to be a general rise in the use of both rhythmic and melodic motives from age five to eleven. Interest in the actual musical development of a melodic motive rises as children reach age eleven, but rhythmic development seems to remain relatively unchanged at all levels.

Much of this information is preliminary and more careful study is needed. What is most important for music education is the fact that there do appear to be patterns of thinking and behavior that can be studied. By asking children to solve musical problems with the goal of creating a musical product, we have an opportunity to learn more about the creative process while at the same time engaging children in tasks that are fundamental to music as art.

Technology: Its future role

Musical imagination, conceptual modeling, measurement, and observation are four keys to a better understanding of creative thinking in music. Each of these keys stands to gain immeasurably from technology. Much has been said about computers, electronic keyboards, software, and MIDI as teaching tools for convergent goals in music education. It is not, however, with this kind of education that such technology holds its greatest promise. It is rather with the encouragement and careful study of divergent, imaginative musical thinking.

Imagine a child seated at a music keyboard with a computer screen providing the score. This child composes a brief fragment of music by playing on the music keyboard. This fragment is displayed on the screen (in traditional notation or in other forms) and is played through speakers. The child continues to expand the fragment, working with many different timbres, additional voices, dynamics, and phrase patterns. At one point the child becomes frustrated and quits, saving the work in a file. The child returns later to the saved composition and continues work until a final version is ready to be shared with the teacher and the class. The child then prints a copy of the score and takes it home for the refrigerator door, and transfers the recording to cassette tape for the child's parents to hear. Throughout the entire process, the computer has saved every moment of the child's work and can "replay" the "electronic sketches" in exacting detail. Although this is of little interest to the child, it is of great interest to the teacher, who can use these electronic sketches to evaluate the student's progress. Indeed, Harvard University's "Project Zero" uses teacher review of similar "portfolios" of student work as a basis for evaluation. (See Lyle Davidson's article in this issue.)

Just a few years ago, such a scenario would have seemed financially and technologically out of the question. Not so today. With software and hardware to support multimedia applications, music work stations of this sort now exist in music labs in several schools. Similar projects will be easily designed by the teacher for performers and listeners as well. This technology will soon help us to expand our understanding of musical

imagination, to challenge our concepts of the creative process, and to measure and observe creative thinking in ways never thought possible. The real question is, will we be able to take advantage of this power?

Providing the answers

Creative thinking, then, is a dynamic mental process that alternates between divergent (imaginative) and convergent (factual) thinking, moving in stages over time. It is enabled by internal musical skills and outside conditions and results in a final musical product which is new for the creator. Focusing on creative thinking is an important beginning to our understanding of creativity and may yield important answers to the questions raised at the beginning of this article.

A child's potential for creative thinking is not so complex that it cannot be measured and should be considered as part of an expanded view of traditional musical aptitude. It is not the same as general intelligence or musical achievement skill. Composition is not the only end product of the creative thinking process. Performances of pre-composed music, improvisation, and careful listening and analysis all involve the creative thinking process. The rehearsal hall, private studio, and the classroom are all sites for such thinking. Creative thinking can be taught by providing children with chances to explore musical images and by applying them in problem solving tasks. Technology may play an important role in our teaching strategy.

In the final analysis, we are limited only by our own creative thinking as teachers. Exciting the imagination of our children about music is what it is all about. Facts and skills will not do it alone.

Suggested Reading:

Balkin, Alfred. "The Creative Music Classroom: Laboratory for Creativity in Life." *Music Educators Journal 71*, no. 5 (January 1985), 43-46. This article presents several practical suggestions for creative activities in teaching music. The author stresses that teachers move away from "yessing" (always expecting children to supply the one correct answer) and toward discovery learning. Encouraging children to make guesses about musical problems is stressed.

Bennett, Stan. "Learning To Compose: Some Research, Some Suggestions." *Journal of Creative Behavior 9*, no. 3 (Summer 1975), 205-10. Bennett suggests approaches to teaching com-position based upon his study of professional composers and his experiences as a composer. Having discovered that a germinal idea is often the first stage of composition and that this is often developed through improvisation, Bennett pro-poses an improvisational approach built on the immersion process by which language is acquired.

Benson, Warren. *CMP 4: Creative Projects in Musicianship*. Washington, DC: Music Educators National Conference, 1967. This volume, the fourth in a series of MENC publications about the Contemporary Music Project (CMP), summarizes projects sponsored by CMP at two locations: Ithaca College and the Interlochen Arts Academy. The book describes each project briefly and concludes with some general observations about teaching "creative-process" courses in music.

_____"The Creative Child Could Be Any Child." *Music Educators Journal 59*, no. 8 (April 1973), 38-40. This article provides excellent

tips on how to evaluate the products of students' creative thinking. Benson urges questions such as: "Did the piece interest us?" "Were there any obvious flaws?" "What would you do to correct the trouble spots?" He makes the point that each student should be encouraged to enjoy the pursuit of creativity and not just understand the procedures or rules for composition in creating a song.

Bums, Mary. "Musical Creative Learning and Problem Solving." *The Creative Child and Adult Quarterly 11*, no. 4 (1986), 234-40. Burns presents a case for the need to include creative activities in the general music curriculum. The Kodaly and Orff approaches are cited as appropriate avenues for this approach. A lesson plan is presented for the composition of a song based on the creation of a haiku poem. The lesson is quite specific as to the musical content of the creative process and to the steps taken in the classroom to make the lesson work smoothly.

Cheyette, Irving. "Developing the Innate Musical Creativity of Children." *Journal of Creative Behavior 11*, no. 4 (Fall 1977), 256-60. This article gives some guidelines for teachers in developing creativity through a project that includes creating a story and the accompanying music. Cheyette argues that children must develop a background of enriched sensory images and presents ways to accomplish this. A list of teacher activities is provided.

Cheyette, Irving, and Herbert Cheyette. *Teaching Music Creatively in the Elementary School*. New York: McGraw Hill, 1969. A textbook for potential teachers of music, this volume approaches the teaching of music from the assumption that the best way to learn music is to make music. In addition to chapters on developing an awareness of the musical ele-ments, it also offers information on developing a classroom orchestra with informal instruments and on developing the innate creativity of children.

Dennis, Brian. "Experimental Music in Schools." *International Society for Music Education Journal 2* (1972), 20-21. The article puts forth the idea that we should think less about teaching the music of the past and consider music of today as an important part of the music we teach. Dennis argues for a better communication between composers of the present and their audiences. Children's performance of contemporary music by established composers is encouraged, and some examples are given.

Feinberg, Saul. "Creative Problem-Solving and the Music Listening Experience." *Music Educators Journal 61*, no. 1 (September 1974) 53-59. Feinberg argues for a new approach to listening based on a model that stresses both a problem-solving approach and a knowledge-based approach. Ideas for music listening lessons are presented based on the general factors of fluency, flexibility, and elaboration of thought. The author also makes a connection between procedures for teaching listening and the overall creative process. The article also provides the underlying theme that such an approach is closely associated with aesthetic education goals.

Galloway, Margaret. "Let's Make An Opera: A Happening with 120 Young Children." *Journal of Creative Behavior 6*, no. 1 (Winter 1972), 41-48. The article describes how the story "Peter Pan" was produced as an opera by students; it is an example of student creativity in original composition, dialogue writing, set making, and involvement in practically every other aspect of production.

Hoenack, Peg. "Unleash Creativity-Let Them Improvise." *Music Educators Journal 57*, no. 9 (May 1971), 33-36. As a foundation for creativity, this article discusses several methods of improvisation in the music class using whatever instruments or rhythm accessories are available. Development of these skills in the early grades supports the art of composing and listening as a child learns to communicate with others.

Holderried, Elizabeth Swist. "Creativity in My Classroom." *Music Educators Journal 55*, no. 7 (March 1969), 37-39. Holderried describes how Edgard Varese's *lonisation* and *Poeme electronique* served as

the stimulus for a creative project in her general music classes. Children suggested various approaches and were included in every phase of the project, which included performances of their works.

Lasker, Henry. *Teaching Creative Music in Secondary Schools*. Boston: Allyn and Bacon, 1971. This book deals with techniques for acquainting children with the process of music composition, specifically for stimulating the ideas and climate for composition. There are many musical examples and suggestions.

Marsh, Mary. *Explore and Discover Music: Creative Approaches to Music Education in Elementary, Middle, and Junior High Schools*. New York: Macmillan, 1970. This book is based on the premise that it is essential to find more creative ways of teaching music in order to develop the creative potential of each student. Marsh advocates a teaching process in which the teacher organizes activities so that the student discovers the concepts of music as he or she is involved in the activity. Specific teaching strategies and examples of how various students react to the activities of these strategies are given.

Paynter, John. *Music in the Secondary School Curriculum- Trends and Development in the Classroom*. New York: Cambridge University Press, 1982. This book offers extensive information on establishing a music curriculum that centers on creative thinking skills. An excellent listing of contemporary scores and recordings is included, together with examples of course organization.

Pogonowski, Lenore. "Bridging the Gap from the Podium to the General Music Class Using Concert Percussion." In *Music in the High School,* edited by Timothy Gerber and William O. Hughes, 55-63. Reston, VA: Music Educators National Conference, 1988. This article provides an approach for teaching music to high school general music students. It allows the student to be actively involved and socially interactive in the classroom by performing, composing, improvising, conducting, and evaluating music. Concert percussion instruments are used because of their accessibility and ease of use by those not able to read music. Specific strategies for implementation are included.

Regelski, Thomas. "A Sound Approach to Sound Composition." *Music Educators Journal* 72, no. 9 (May 1986), 41-45. This article contains a rationale for including sound composition activities in a music curriculum and gives concrete suggestions as to the implementation of these activities. Models of action learning, activities approach, and problem-solving skills in music are also given.

Ristad, Eloise. *A Soprano On Her Head: Right-Side-Up Reflections of Life and Other Performances*. Moab, Utah: Real People Press, 1982. This book challenges traditional music teaching with new insights for dealing with problems in music performance. Ristad suggests gaining control by letting go, achieving excellence by not trying, practicing through imagery, and learning by simple awareness.

Schafer, R. Murray. *Creative Music Education*. New York: Schirmer Books, 1979. This book was originally published as five separate booklets: The Composer in the Classroom, Ear Cleaning, The New Soundscape, When Words Sing, and The Rhinoceros in the Classroom. The author, a Canadian com-poser, describes some dialogues that he has held with elementary, high school, and first-year university students. Examples of music lessons covering the topics of noise, silence, tone, timbre, and texture are included.

Thackray, Rupert. *Creative Music in Education*. London: Novello and Company, 1965. This volume begins with a justification for creative activities in the schools: "The aim of this book is to suggest possible ways of approach for teachers and students at all levels from primary school to the college." Thackray includes sections on vocal improvisation, instrumental improvisation, and composition, and endorses the Orff approaches. The book contains a number of practical suggestions for engaging children in creative activities.

Thompson,Keith P. "Vocal Improvisation for Elementary Students." *Music Educators Journal 66*, no. 5 (January 1980), 69-71. Thompson argues that creating music should be included in the general music curriculum because it allows the students to learn about aspects of music in a personal way. The act of creating music allows the students to exercise cognitive and affective decision-making processes. A three-stage process of creativity is proposed. Vocal improvisation is the recommended medium for exercising the creative process, and a series of activities using the author's creative process is given.

Thoms, Hollis. "Encouraging the Musical Imagination Through Composition." *Music Educators Journal 73*, no. 5 (January 1987), 27-30. Thoms describes three projects involving high school-age students in the composition process: compositions centered on theme and variation form, musical setting of a poem, and a multimedia event with a focus on the musical concept of "line."

Welwood,A . "Improvising with Found Sounds." *Music Educators Journal 66*, no. 5 (January 1980), 72-77. Welwood argues that composing and improvising should be as routine as writing an English composition or learning the multiplication tables. The goal of these activities in the classroom is not to master the art of composition but to become involved in the creative selection and arrangement of musical materials and to develop skills in self-evaluation along with constructive self-criticism. "Found" instruments are any ready-made objects that are capable of producing sound: they may be of materials such as glass, plastic, or paper. Many performance possibilities are available to an individual or an orchestra. This concept will expand the student's attitude toward twentieth-century music and the music of non-Western cultures.

Wiggins, Jacqueline H. "Composition as a Teaching Tool." *Music Educators Journal 75*, no. 8 (April 1989), 35-38. Wiggins lists many benefits of compositional activities, including an increase in innate creative thinking in children, encouraging of pride in their musicianship, and the reinforcement of the meaning of musical concepts. Three lesson plans are presented, each devoted to either individual, small group, or large group instruction.

Williams,Polly. "Musical Creativity: An Interdisciplinary Approach from Troy to Carthage from Vergil to Berlioz." *Creative Child and Adult Quarterly 2*, no. 3 (1977), 148-50. Williams provides curricular suggestions for the use of grand opera in developing various forms of musical creativity among a range of age groups. The author describes ways in which music and subjects such as literature, dance, history, psychology, and the visual arts may be linked through interdisciplinary studies built around opera.

Notes:

1. Peter R. Webster. "Creative Thinking in Music: Approaches to Research," in Music Education in the United States: Contemporary Issues, ed. Terry Gates (Tuscaloosa: University of Alabama Press, 1988), 66-81.

2. Documentary Report of the Ann Arbor Symposium on the Applications of Psychology to the Teaching and Learning of Music: Session III (Washington, DC: Music Educators National Conference, 1983); Proceedings from the Suncoast Music Education Forum on Creativity (Tampa, Florida: Department of Music, University of South Florida, in press).

3. This approach is in line with current work in music cognition and is part of a larger effort in the social and behavioral sciences, neurosciences, and computer science. For a general overview, see Howard Gardner, The Mind's New Science (New York: Basic Books, 1987).

4. For a fuller description of this model, see Peter R. Webster, "Conceptual Bases for Creative Thinking in Music," in Music and Child Development, ed. J. Craig Peery, Irene Peery, and Thomas Draper (New York: Springer-Verlag, 1987), 158-174.

5. Peter R. Webster, "Refinement of a Measure of Creative Thinking in Music," in Applications of Research in Music Behavior, ed. Clifford Madsen and Carol Prickett (Tuscaloosa: University of Alabama Press, 1987), 257-271.

6. For an excellent review of this literature, see John Kratus, "A Time Analysis of the Compositional Processes Used by Children Ages 7 to I I," Journal of Research in Music Education 37, no. I (Spring 1989), 5-20.

Reflection by Sandra Stauffer

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In the opening paragraph of "Creativity as Creative Thinking," Peter Webster notes that "thousands of words have been written" about creativity in music. While that was (and is) indeed the case, Webster's words and his thinking about creativity in music teaching and learning are among the most important in the music education literature. His "Creativity as Creative Thinking," first published in May of 1990 as the lead article in a special issue on creativity, is the most frequently cited article in the history of the Music Educators Journal[1]. Moreover, those citations span more than two decades and indicate a readership that extends well beyond the music education community. So, why is it that "Creativity as Creative Thinking" is read and cited by writers and researchers from nearly every continent? What is it about this article that attracts scholars and teachers who work not only in music education, but also in early childhood and general education, arts policy, music and general psychology, and general creativity? How is it that Webster's "Creativity as Creative Thinking" has such global reach and such staying power?

One clue is in the title of Webster's—"Creativity as Creative *Thinking*." The conversation about creativity in the music education community was already well underway by 1990. The third Ann Arbor Symposium on Applications of Psychology to the Teaching and Learning of Music, which focused specifically on motivation and creativity and at which Webster was a discussion leader, had occurred in 1981. Several book chapters and more than 50 articles, some of them authored by Webster, had appeared in music education periodicals and research journals from 1981-1990, and just as many had been published in the several decades prior. However, Webster's emphasis on thinking—on that particular human ability fundamental to education—placed creative capacity squarely within the larger project of teaching and learning in music. Further, his straightforward distillation of years of research and study targeted an audience of both scholars and teachers—those whom he believed could encourage and support the development of creative thinking in everyday musical engagements with children and youth. With those crucial tacks, Peter Webster helped changed the course of the conversation about creativity in music education from mystery to movement.

Other clues to the broad reach and staying power of Webster's "Creativity and Creative Thinking" lie in his responses to persistent questions (even today) in the creativity literature: "Is creativity process, or product, or both? Should it be consid-

ered primarily something that takes place in composition? Can it be measured? Does it have anything to do with music aptitude? Isn't it the same as intelligence? Isn't it really only a 'general music' activity? Can it be taught?" (p. 22). While firmly anchored to the theory and literature of the time, Webster's answers in this 1990 article charted new territory for exploration. For example, it was widely accepted in 1990 that musical thinking involved, in part, the ability to recall musical sounds or to engage inner hearing. Webster pointed out that creative thinking in music includes not only these abilities, but also the capacity to imagine in sound or to engage one's musical imagination in purposeful and meaningful ways. In other words, creative thinking in music—the ability to engage the mind's ear and to imagine new sonic ideas—is a matter of both achievement and invention.

Further, Webster suggested that it was also possible for both researchers and teachers to observe, record, and study young people's musical creative thinking systematically. To that end, Webster's 1990 article includes early versions of two tools that would be useful to scholars and educators for years to come: his "Model of Creative Thinking in Music," and a description of his "Measure of Creative Thinking in Music." Derived from years of study that began with his 1977 dissertation work and drawing from psychology literature as well as studies in music, both the model and the measure were remarkable, even surprising, in 1990.

For example, the 1990 version of Webster's "Model of Creative Thinking in Music" accounts not only for thinking process and creative products, but also for the characteristics of individuals and the conditions of the environment in which creative thinking might occur. In retrospect, this early version of Webster's model is prescient; contemporary models of creative thinking typically account for the four P's—process, product, person, and place. The readers of 1990 may also have been surprised to find analysis alongside composition and performance as more than (though inclusive of) improvisation in the "Product Intentions" and "Creative Product" sections of Webster's model. Webster argued for a dynamic and comprehensive view of creative thinking as "part of the total curriculum effort" (p. 24). Creative thinking, he asserted, is possible in all kinds of musical engagements, for students of all ages, and can (and should) be supported in music classrooms, rehearsals, and private studios.

At the heart of Webster's model is a dynamic interplay of divergent and convergent thinking, and his "Measure of Creative Thinking in Music" (MCTM)—the second tool Webster proffered researchers and teachers in his 1990 article—aims at assessing children's convergent and divergent thinking in sound through engaging them in a series of playful musical tasks. In fact, the design of the MCTM acknowledges the creative thinking capacities of children. The tasks—making rain sounds in a bucket or frog music with a nerf ball on a keyboard—require neither theory nor notation, but rather the ability to imagine in and with sound. Beyond its value as a research tool, Webster suggests that playful engagements with music and sound

similar to those included in the MCTC may have pedagogical value as well.

Toward the end of his 1990 article, Webster holds out the engagement of musical imagination, the possibilities of conceptual modeling, and the systematic observation and study of divergent thinking in sound as "keys to a better understanding of creative thinking in music" (p. 28). He also suggests that technology, his other extensive body of work in music education literature, holds promise for both the practice and study of creative thinking in music. Indeed, technology and creative thinking intersect frequently in Webster's writing and thinking. A few years after the publication of "Creativity as Creative Thinking," Webster was in an audience of about 200 music educators who heard composer Morton Subotnick give a challenging presentation on the potential of technology for engaging children in creating music, and it was Webster who grasped the ideas and asked the first questions. Like Subotnick, Webster saw the potential for imagining with and thinking with music inherent in technological innovations that were just around the corner.

Peter Webster's publications on creative thinking in music span more than 30 years, and that alone is a gift. And yet, something more needs to be said. Webster has given his Test of Creative Thinking in Music to dozens of researchers and doctoral students for use in their studies. He has compiled an extensive annotated bibliography of studies and articles pertaining to music and creativity and developed a model for categorizing this increasingly diverse literature. He is a founding member of the Creativity Special Research Interest Group of the National Association for Music Education. He has advised numerous doctoral students through dissertation projects that examine a range of different questions about creative thinking in music, thereby launching the careers of several of the most prolific writers on music and creative thinking in music education. His legacy and generosity have extended well beyond the students of Case Western Reserve and Northwestern Universities to students, teachers, and researchers elsewhere—including me.

Several years ago, I had written a manuscript based on observations of an 8-year-old girl who composing music using computer software. I had given the piece to two colleagues for suggestions prior to submitting it for publication, and their opinions differed dramatically. The more positive commentator suggested I seek Peter's help, and I handed him the piece at an MENC meeting. Much to my amazement, he read the manuscript before the meeting was over, and a few days later we sat in a hallway and had a wonderful conversation in which he encouraged me to move forward. I did, and that piece because my first publication on creative thinking in music. Like so many others, I remain indebted to Peter Webster.

Since the 1990 publication of "Creativity as Creative Thinking," Peter Webster has never left his ideas in dry dock. Rather, in an exercise of his own creative capacities, he has kept them in full sail, revising his model of creative thinking in music several times in subsequent publications to account for new discoveries, developing a second version of the Test of

Creative Thinking in Music, exploring new technologies, and engaging in new research methodologies. Throughout the voyage, his message to us is that creative thinking in music is possible for everyone and central to the project of music teaching and learning, wherever and whenever it occurs. We have only to imagine the possibilities.

1 As of July 29, 2012, according to citation counts registered in Google Scholar.

CHAPTER 2

Conceptual Bases

Reflection by Pamela Burnard

Conceptual bases for creative thinking in music.

In (1987) J. C. Peery, I. W. Peery, & T. W. Draper (Eds.), *Music and child development* (pp. 158-174). New York: Springer-Verlag.

J. P. Guilford's 1950 keynote address to the American Psychological Association is often cited as the beginning of modern day interest in the formal study of creative behavior. His message centered on the need to expand thinking about "intelligence" to include creative abilities such as divergent thinking skills. Research expanded throughout the sixties and has continued until this time. In the field of psychology, behaviorists, humanists and developmentalists have all addressed this topic with their respective theories and research procedures. In the introduction to Art, Mind, and Brain, Howard Gardner writes:

> The greatest psychologists—from William James to Sigmund Freud, from B. F. Skinner to Jean Piaget—have all recognized the importance and appeal of a study of the creative processes. They have all sought to explain how human beings can fashion comprehensive theories in science or powerful works of art. And if they have not fully succeeded in providing a coherent and cogent account of this most puzzling of areas, it is not for want of trying. (Gardner, 1982, p. xi.)

Formal study of creative behavior in music by musicians has been slow to benefit from this work. Although a number of writers have commented in a personal sense about the creative process in music and have speculated about ways to encourage creative behavior, carefully designed studies that have sought to explain just what creative thinking in music is have not been plentiful. Nearly all of the literature is in the form of short, speculative articles and exploratory research efforts by doctoral students. There are a few monographs (Lasker, 1971; Schafer, 1979), but they are devoted almost exclusively to methodology in the classroom or music studio and have little theoretical or empirical research base.[1]

Fortunately, there is recent evidence that the small amount of substantive research directed at creative thinking in music is beginning to grow larger. Music researchers, particularly those concerned with educational matters, are beginning to expand the conceptions of music aptitude and achievement by constructing methods for evaluating creative thinking potential (Webster, 1977 and 1983; Gorder, 1976; Flohr, 1979; and Kratus, 1985). Psychologists and educators interested in matters of music cognition and artistic development are continu-

ing to study creative abilities but with greater intensity (Bamberger, 1977; Gardner, 1982). It is in this spirit of growing, interdisciplinary interest that the following remarks are based.

This chapter presents a conceptual model of creative thinking in music. This model is based on what research we do have, plus some speculation about how creative thinking in music might occur. It should be made clear that this is a conceptual model and not a detailed representation of the many interacting variables which constitute the creative process. It is presented in the hope that it will stimulate more focused research so that a much more refined model will result. The chapter will close with a brief look into the future of research in this field, particularly in terms of measurement and technological advances.

The Conceptual Model

Related literature

Rhodes (1971) explored the relationships of various writings by noted philosophers, psychologists, and musicians on the subject of creative thinking and behavior. She organized her study around the manifestation of creativity in the "person", "process", "product" and the educational setting. Comparative data included the writings of Whitehead, Bergson, Maritain, Beardsley and Dewey (philosophers); Freud, Kris Maslow, Koestler, Wertheimer, Barron, Torrance, and Guilford (psychologists); and Schoenberg, Stravinsky, Sessions, Copland, Hindemith, and Mursell (musicians) -- among others. A number of similar viewpoints emerged that hold particular significance for theory:

1. Creative behavior is a normal human response as opposed to an expression of mental illness

2. The source of creative power is of natural origin as opposed to supernatural origin

3. Some relationship exists between creativity and cognitive intelligence and definite groups of cognitive abilities are involved in creative thinking

4. Factors guiding the creative process spring largely from rational choice under the guidance of a pervading creative idea rather than from some form of inspiration

5. The form of the final creative expression is communicable in a material result

6. Stages of creative process are characterized by the recognition of the problem, accumulation of facts and materials, and the development of the problem through manipulation

7. In terms of mental activity during creation, the process is an interaction between conscious and non-conscious states

Greenhoe (1972) suggested a theoretical model of creative musical perception based, in part, on the three dimensions of

Guilford's Structure of Intellect Model (Guilford, 1967). The dimension of Content was defined in terms of the elements of music: timbre, frequency, duration, and dynamics. The dimension of Operations included processes of perception that were defined as a hierarchy (hearing, attention, memory, expectation, and evaluation). Products ranged from blurred impressions to high-level thoughts of musical implication. Greenhoe offered no data to support her adaption, but did argue consistently for the inclusion of music listening as part of the creative experience in music.

As part of her overall view of creative thinking process in music, Greenhoe also endorsed Wallas' stage theory (preparation, incubation, illumination, and verification) (Wallas, 1926) and applies each stage to a musical context. The role of the musical imagination is stressed during the illumination stage, as Greenhoe argued for "...deliberately rehearsing certain sounds in the imagination -- intervals, scales, melodies, entire pieces committed to memory; and by practicing free imagery in sounds, letting the mind go as it will, but attempting, always to think in sound images." (Greenhoe, 1972, p. 181).

Other authors in music have suggested that the Wallas stage theory is workable as a way of generalizing about the progress of musical ideas from initial inception to refinement as part of a musical whole. For example, Feinberg's view of creative thinking in music as a multi-level, problem-solving process is closely tied to the stages that Wallas proposed (Feinberg, 1973).

In addition to these more conceptual studies, there are findings from direct observation of the creative process in music that aid in model construction. Much of this work is based on children's musical efforts. In his review of literature on original songs, Kratus (1985) makes a distinction between research that has focused on the musical content of the songs versus studies that have evaluated the constructs of musical flexibility, fluency, originality and the like (creativity factors borrowed from the psychological literature). This latter approach has been applied largely to children after the age of 10, while the former approach has concentrated on younger children. Both sets of data help to understand the developmental process of creative thinking in music and contribute to theoretical speculation.

Moorhead and Pond (1941, 1942, 1944), Doig (1941), Freundlich (1978), Flohr (1979), Prevel (1979), Gardner (1982) and Kratus (1985) have all studied the musical content of improvisations and compositions of children. Results have been variable and depend largely on the methods of data collection and researcher bias.[2] One clear trend that has implications for a conceptual model of creative thinking in music is the dominance of environment. Until the age of 5 or 6, children seem to exhibit very individualistic approaches to tonal, rhythmic, motivic patterns and tonal center. Motor coordination seems to play an important role in this early stage and a sense of overall musical syntax is absent in original song production. In children between the ages of 6 and 9, rhythmic and tonal patterns become much more predictable and seem to be

more closely related to music the children have heard as part of their culture. Changing meters are more common during this stage and a feeling for tonality is more pronounced, although feeling for musical cadence and phrase structure is not clear. After the age of 10, children become much more conscious of "correctness" of musical structure and tend to create music that is more organized in terms of musical "rules", but not necessarily more original. There is a tendency to imitate more closely the sounds of commonly heard music. Kratus (1985) found a steady rise in children's use of rhythmic and melodic motives until the age of 13 at which time a drop occurred. It is interesting to speculate on whether this drop is a result of a real lack of ability or an increase in the desire to break with the traditional melodic and rhythmic motives heard in the culture.

Using measurement techniques that have their basis in the Guilford model, Vaughan (1971), Gorder (1976) and Webster (1977) have investigated creative thinking in music with children between the ages of 10 and 18. Webster (1983, in press-a) has used similar techniques with younger children as well. Although the products of musical improvisation, analysis, and composition have been the focus of study, the emphasis is less on the musical properties as on the creative expression as a function of the thought process. In each of these studies, criteria such as "musical flexibility", "musical fluency", and "musical originality" were carefully defined in terms of observed behavior and musical content. Tasks were constructed to engage children in the creative process and, in most cases, performances were audio or video taped for later study. Both subjective and objective measurement techniques were applied, and panels of experts were used. The results of validity and reliability data in these studies is encouraging, although none of the measures have used extensively enough for major claims. One of these measures (Webster, 1983; in press-a) has been used in more than one study and will be summarized in more detail later in this chapter. A few tentative findings from this research hold particular importance for a model of creative thinking in music:

1. Musical divergent production skills are measurable and may play an important role in the creative thinking process

2. Musical divergent production skills are not significantly related to traditional measures of musical aptitude (the discrimination of similar and different tonal and rhythmic patterns) and seem to play an independent role in the definition of musical intelligence

3. Musical achievement (training in the knowledge of musical content) does effect the performance on musical divergent production skills

4. Cognitive intelligence, academic achievement, nor gender seem significantly related to musical divergent production skills

Model

There are no comprehensive, published models of creative thinking in music that serve as the basis for research and professional debate. The literature outlined above is helpful in forming such a model. Figure 1 represents an attempt to draw together both the results of this research and some careful speculation.

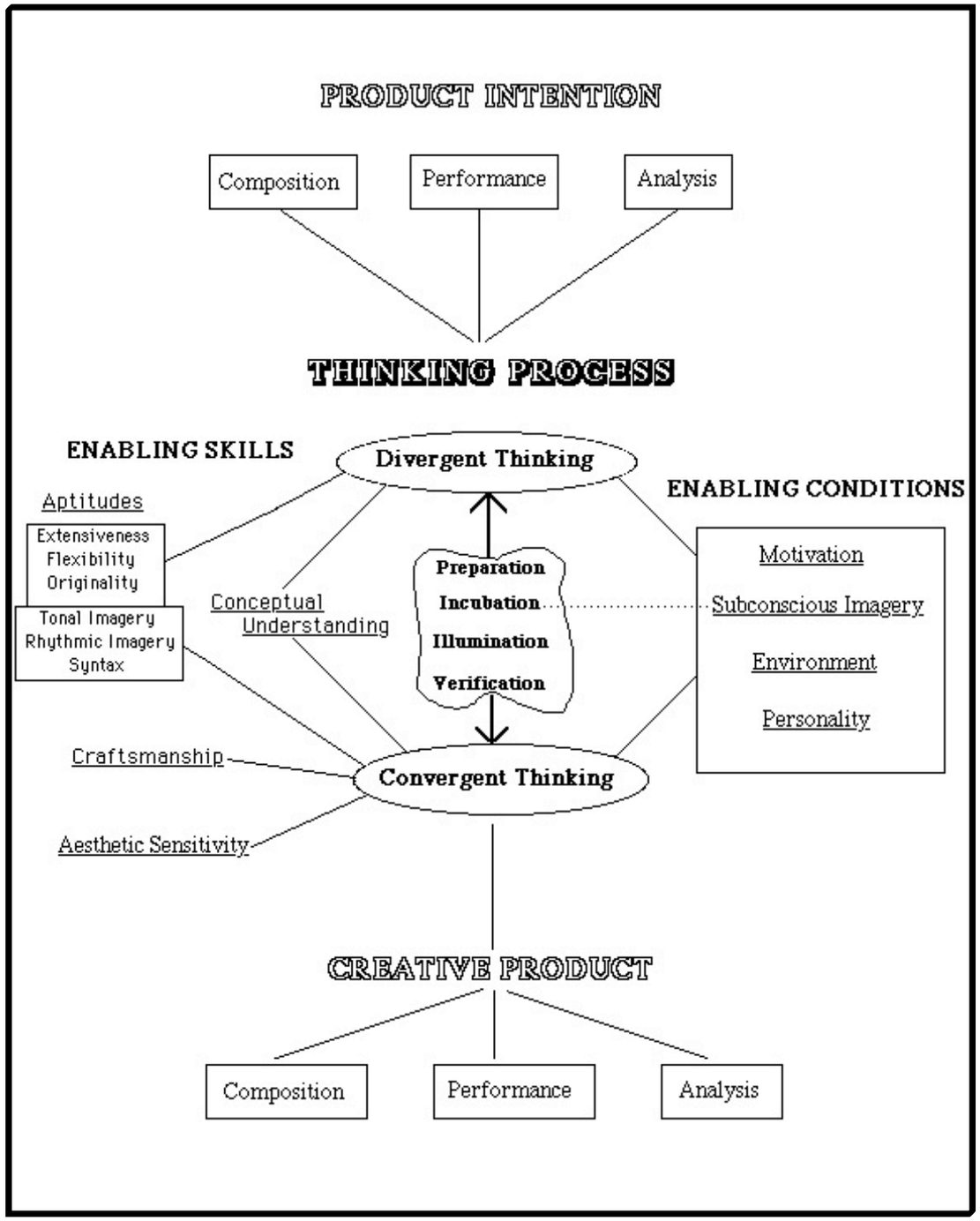

Figure 1. *Model of Creative Thinking in Music*

Product intention

Few would argue that there are three principle ways that man involves himself with music as art:

1. Composition—the conception and recording of sound structures for presentation at a later time

2. Performance/Improvisation—the transmission of sound structures that are either composed previously or actually conceived by the performer at the time of performance

3. Analysis—the process of understanding and explicating sound structures in written, verbal, or (in the case of active listening) in mental form

Many who have studied and written about creativity in general argue for a distinction between creativity as "process" versus "product." This is a legitimate distinction particularly if one is concerned with more singular matters of measurement, teaching strategy, or aesthetics. In generating theory, this distinction also plays a role, although the distinction is more blurred. Composition, performance/improvisation, and analysis can be considered at the outset of creative thinking as goals or as "intentions" of the creator. At the same time, they represent the final product of creation. These intentions also help to define entrance and exit points in the model as seen in the top and bottom portions of Figure 1. Subtle differences in the process result form each product intention, however the inner workings of the process are thought to be quite similar.

Enabling skills

With the intention established, the creator must rely on a set of skills that allow for the thinking process to occur. These skills form the basis of a musical intelligence and interact with the thinking process in very rich ways. Figure 1 displays these skills as a group of four:

1. Musical Aptitudes: individual skills that are likely to be subject to great influence by the environment during the early years of development and possibly into early adult life. They include skills of tonal and rhythmic imagery (Gordon,1979), musical syntax (sensitivity to musical whole), musical extensiveness, flexibility and originality (Webster, in press-a).

2. Conceptual understanding: single, cognitive facts that comprise the substance of musical understanding.

3. Craftsmanship: the ability to apply factual knowledge in the service of a complex musical task.

4. Aesthetic sensitivity: the shaping of sound structures to capture the deepest levels of feelingful response—achieved over the full length of a musical work.

These enabling skills are used in slightly different ways, depending on the intention of the creator. The composer, performer and the listener must all possess an understanding of the materials of music -- rhythmic, melodic, harmonic and timbral concepts. In turn, this knowledge is built on an innate

core of aptitudes that has been nurtured by the environment. As the creator begins to gain a storehouse of experiences based on the interaction of aptitudes and learned information, the application to solve musical problems begins to reveal craftsmanship. This skill involves sensitivity to complex musical relationships. For example, it is common to hear of the composer's craftsmanship in the writing of a fugue or in the scoring of a particular vocal passage. The performer is often evaluated on the technical mastery (craftsmanship) of a musical performance. The ability of a person to hear the return of a theme or the juxtaposition of harmonic content are additional examples.

When this craftsmanship is accompanied by the creator's ability to communicate meaningful musical substance over a long time span, then aesthetic sensitivity is in evidence. This skill is seen in the ability to sustain a sense of musical growth and direction over a long period of time. This is often the ultimate goal of a creative musician and can spell the difference between the mundane and the very great.

Enabling conditions

In addition to personal skills which drive the creative thinking process, there are a number of variables to be considered that are not musical. These influences vary greatly from person to person and mingle with musical skills in delicate, complicated, and certainly profound ways. These "conditions" are listed on the right of the model and are explained below:

1. Motivation: those drives (both external and internal) that help keep the creator on task.

2. Subconscious Imagery: mental activity which occurs quite apart from the conscious mind and that may help to inform the creative process during times when the creator is occupied consciously with other concerns.

3. Personality: factors such as risk-taking, spontaneity, openness, perspicacity, sense of humor, and preference for complexity that seem to exist in many creative persons and that may hold some significance for enabling the creative process.

4. Environment: the host of characteristics of the creator's working conditions that contribute to the creative process, including financial support, family conditions, musical instruments, acoustics, media, societal expectations, and many others.

There are many obvious examples of these enabling conditions at work. Composers are externally motivated by commissions or deadlines, and internally motivated by an overwhelming desire to compose. Listeners who engage in active and creative musical study are often internally motivated by a deep desire to understand musical structure. Certainly for performers who wish to rise to the top of their chosen profession, combinations of both internal and external motivation are vital for success.

Other enabling conditions are less obvious and need careful study. Subconscious imagery has not been investigated in any formal way in music, although is part of a number of anecdotal accounts by creative musicians. It clearly plays a role in problem-solving over time, tasks that are common in composition and analysis. It may play a role in performance as well.

Personality assessment in terms of its relationship to musical behavior is a fascinating, but difficult area. Kemp (1982), Lang (1976), Trollinger (1981), and Swanner (1985) have all investigated such factors as preference for complexity, introversion, aggressiveness, verbal imagination, and many others. Results are mixed, especially with younger subjects. Although no clear pattern emerges from these studies, the findings which we do have from music and other sources argue for the placement of personality in the model.

In terms of child development in creative thinking in music, environment must be singled out as a major factor. To date, there have been few controlled, comparative studies of creative thinking development between different environments or cultures. There is evidence that certain convergent listening skills such as tonal and rhythmic imagery can be influenced by teaching and exposure to musical experiences before the age of 9 or 10. There is every reason to believe that this is also true for other aptitudes. Certainly an encouraging environment for the skills of conceptual understanding, craftsmanship, and aesthetic sensitivity is vital. For creative adults, hostile environments can be a great determent to creative thinking. A supportive work environment for a composer or performer is obviously desirable, although history has shown that this is not always an absolute requirement.

Thinking process

Much of what has been noted thus far about the model is relatively well known, at least intuitively. In fact, the education enterprise in music has been devoted almost exclusively to improving certain enabling skills and providing enabling conditions. What has not received much study or attention by educators is the process by which these skills and conditions are connected to creative production. The center of Figure 1 indicates movement between two types of thinking (Guilford, 1967) , facilitated by stages of operation (Wallas, 1926). Connections between this process and the enabling skills and conditions are also noted.

Divergent thinking involves the generation of many possible solutions to a given problem—a kind of personal brainstorming. Convergent thinking, on the other hand, involves the weighting of those several possibilities and "converging" on the best possible answer.

In divergent thinking, imagination plays an important role and is fueled by the individual's conceptual understanding of the material itself. The obvious is noted, then placed "on hold" in favor of other possibilities—often without regard for tradition or common practice. At some point , however, this thinking process must cease in favor of a more convergent filtering. The mind must sift through the mass of possibilities in order to "create" a final solution.

Direct relationships between these modes of thinking and the enabling skills and conditions are noted on the model. The aptitudes of tonal and rhythmic imagery and musical syntax are most clearly connected to convergent thinking. Tonal and rhythmic imagery concern the ability to perceive sound in relation to change and involves the representation of sound in short-term memory (Gordon, 1979). Musical syntax is the ability to shape musical expressions (usually during improvisation activities) in a logical manner according to patterns of musical repetition, contrast, and sequencing (Webster, 1983). In this sense, syntax is closely related to aesthetic sensitivity and is an early indication of this skill before extensive formal training.

The aptitudes of extensiveness, flexibility, and originality are clearly connected to divergent thinking. Extensiveness is a measure of a person's ability to generate a number of musical ideas or solutions to problems. Flexibility can be seen in the skill necessary to move within the musical parameters of tempo (fast/slow), dynamics (loud/soft), and pitch (high/low). Originality can be viewed as a function of uniqueness of musical expression, not necessarily associated with internal logic (syntax).[3]

Conceptual understanding 3 directly impacts both divergent and convergent thinking. Since divergent thinking requires the mind to survey its "databanks" for possible musical content, it is reasonable to assume that the more that is there the better. It is impossible to expect individuals to think creatively if nothing is there to think creatively with -- a common error in creative teaching strategy! It is also true that convergent thinking requires the continued development of a knowledge base. Craftsmanship and aesthetic sensitivity are also connected to convergent thinking because they require careful manipulation of musical material in sequential ways. Of course divergency plays a role here as well, but to a lesser degree.

Enabling conditions play important roles in all stages of the creative process and in each of the thought modes. A direct link between subconscious imagery and incubation is obvious.

Movement between modes of thought: Stages

The movement back and forth between divergent and convergent thinking is not the same at all times. There are "stages" in this process that begin first with a preparatory phase. It is here that the creator first becomes aware of the problems at hand and for the dimensions of the total work that lies ahead. For the person who seeks to creatively analyze a composition, this preparatory time might involve initial sketches of the harmonic structure or possibly a first hearing in order to determine overall formal structure. For a performer, it might involve an initial reading and a quick analysis of the more troublesome passages. In terms of composition, this phase often takes the form of rhythmic, melodic, or harmonic sketches, or perhaps early decisions regarding formal content.

Regardless of the nature of this first set of creative experiences, there is likely to be resistance to immediate closure. In fact, a number of problems may result that force abandon-

ment of the project for a time. Incubation may take the form of subconscious imagery (note the direct connection to this enabling condition) or some "informal" or "part-time" thinking of the problems at hand. It is during this phase that divergent thinking may play a crucial role, for it is here that a number of musical solutions are considered.

Movement to the third stage of illumination has been referred to in rather romantic terms as the "light bulb" or "Eureka!!!" stage. In fact, solutions to problems might come suddenly and provide the creator with a flood of energy that drives thinking ahead to the final stages of completion. More realistically, however, this stage comes in controlled segments, perhaps in a number of small solutions which begin to point the way for the final version. It is at this time that the creator may be "taken over" by the music -- he or she may become "one" with the art and the sounds begin to form themselves as formal work continues at a much faster rate. Movement between convergent and divergent thinking becomes more weighted toward convergent processing. Craftsmanship and aesthetic sensitivity become very important here and the motivation to continue toward closure becomes internal.

For musical creative thinking, this stage often blends imperceptibly with the final plateau of verification. As final drafts of a composition are completed, the composer may search for as many opportunities to hear the composition as possible, often seeking the opinions of fellow musicians. Performers work to refine their interpretations, seeking to share their efforts with as many listeners as possible. Those analyzing scores will continue to listen and study the music in hopes of verifying the fine points of their analysis, always looking for additional subtleties that were not heard before.

It should be noted that in music, as in other art, the process is really never finished. Although a particular product is created and finally communicated to society, the creator is compelled to begin again and again with other product intentions until the motivation for creative thinking—or the "spirit" of creativity is no longer present.

The model and children's creative development

There is little, controlled research on creative process in music. We gain some perspective by talking with people about the process after the creative product is completed, but this is not completely satisfactory because of the idiosyncratic nature of the data. Often, these discussions are with creative adults and so even less is known about how this process works with children as they grow in their aptitudes, conceptual understanding, craftsmanship and aesthetic sensitivity and as their thinking is influenced by environment and motivational drives.

Although the model in Figure 1 is not designed in developmental terms, there is no reason to suspect that any of the major aspects of the model are different for the young child engaged in creative thinking. The product intentions of the child are usually limited to performance/improvisation intuitively, and in all three domains if the child is in an environment educationally that encourages written composition or analysis.

There is no evidence in the educational literature which supports the notion that structured experience in all three of these domains is harmful, so long as the physical and intellectual development of the child is taken into account.

Enabling skills develop with age and experience. Aptitudes are likely to be present from birth and continue to develop with age. Stabilization of these aptitudes may well occur at some point between the ages of 9 and 11. There is statistical evidence for this in terms of tonal and rhythmic imagery (Gordon, 1979), but not as yet for the other aptitudes listed. Conceptual understanding grows with age and experience obviously, but transfer of this conceptual information into the mosaic of creative thinking experience does not often occur naturally and might well be an important goal of formal music education. This is certainly true of craftsmanship and aesthetic sensitivity as well. One way to view the enabling skills developmentally is to assume that they represent a hierarchy of abilities that can be encouraged as the child grows. Care should be taken not to discourage some exploration of craftsmanship and aesthetic sensitivity at a young age, but one must be aware that these skills will appear more slowly in young children and should be treated as such in planning curricula.

The enabling conditions of motivation and environment are important for child development in music. Various theories of motivation do suggest that younger children are naturally curious, with much of their motivation coming internally. This natural curiosity requires external encouragement at key times during the middle school years (10-13) and during adolescence. In the general creativity literature, there is evidence of "creative slumps" during the transition periods in schooling (entrance into elementary, junior high, and high school). These may be times when external motivation becomes very important to the continued development of creative thinking ability. There is no evidence to suggest that this is any different in terms of music.

One of the major implications of the model for child development in music is that environments which encourage divergent thinking in music are just as important as environments that encourage convergency of thought. It seems quite clear that many children have the benefit of rich opportunities to develop musical skills at home or in formal schooling (music lessons with instruments and voice, performance opportunities in large groups, and instruction in music theory). These experiences are very important, of course, and fit nicely into the model for the development of enabling skills. However, little is done which encourages divergent thinking in music as it interacts with the more convergent aspects of musical thought. In other words, there is little development of environments that support the very core of the model.

An astonishing fact is that we have little or no data to support the role of creative thinking in music in the overall musical development of children. If this model is to be retained as a workable explanation of the creative thinking process in music for children and adults, we simply need more evidence. If this model is verified through careful study, the implications

for how we structure environments both at home and in school are enormous.

Future Research

In addition to questions about child development, the model presents a number of other issues that should be considered:

1. What specific differences would one postulate based on different product intentions? In other words, what differences are there between the creative process employed by composers versus performers versus listeners?

2. What role does formal education play? Can divergent thinking in music be taught?

3. Preliminary research has shown that divergent thinking in music is possible to measure in young children. Is this true for older children? What is the predictive validity of such measurement?

4. There is mounting evidence that traditional measures of musical aptitude (the ability to discriminate differences in tonal and rhythmic patterns) are not significantly related to divergent music skills when measured across large samples. Does this indicate the need for an expanded view of musical potential -- considering both kinds of abilities? Are those few individuals who possess both sets of skills best thought of as "gifted"?

5. Is the ability to think creatively in music related to creative thinking in other fields? In other words, is there a kind of "g" factor for creative thinking?

6. Is it possible to have more meaningful data about the musical creative process itself? What new methods can we employ to understand the highest levels of artistic creation?

To answer these and other questions prompted by the model, there are three possible avenues of research which hold special promise: (1) further development of a useful measurement tool such as the Measures of Creative Thinking in Music, (2) continued use of ethnographic research techniques, and (3) increased use of technology as tools for musical creation and measurement.

Development of Measures of Creative Thinking in Music [4]

The Measures of Creative Thinking in Music (MCTM) (Webster, in press-a) deserves special note here because of the promise it holds for measuring creative thinking in music for children in the 7 to 10 year old age group. Its scoring factors are also candidates for use with older children and adults and for experimentation with preschool children. Extended use by a number of researchers may help to answer some of the questions posed above.

MCTM uses three sets of instruments: (1) a round "Nerf" ball of about 4" in diameter that is used to play tone clusters on a

piano (either in a rolled fashion or as individual clusters), (2) a microphone that is suspended in front of the piano and is attached to an amplifier, speaker and small reverberation unit to cause an "echo" effect, and (3) a set of five, wooden resonator blocks (temple blocks) that produce different pitches when struck by a mallet. The instruments are all in easy reach and can be played easily by children who have had no musical training. There is a brief warm-up period that is not scored and is designed to familiarize the children with the simple techniques necessary to play the instruments. The entire measure is administered in a private room with only the child and the administrator. All tasks are video taped unobtrusively and scored at a later time.

The measure consists of a series of 10 scored tasks, divided into three parts: exploration, application, and synthesis. The tasks begin very simply and progress to higher levels of difficulty in terms of divergent behavior. The atmosphere is game-like in nature, with no indication that there are any right or wrong answers expected. The text used by the administrator is standardized for each child and few models of instrument performance are given.

The exploration section is designed to help the children become familiar with the instruments used and how they are arranged. The musical parameters of "high/low", "fast/slow", and "loud/soft" are explored in this section, as well as throughout the measure. The way the children manipulate these parameters is, in turn, used as one of the bases for scoring. Tasks in this section involve images of rain in a water bucket, magical elevators, and the sounds of trucks.

The application tasks ask the children to do more challenging activities with the instruments and focus on the creation of music using each of the instruments singly. Requirements here ask that the children enter into a kind of musical question/answer dialogue with the mallet and temple blocks and the creation of songs with the round ball and the piano and with the voice and the microphone. Images used include the concept of "frog" music (ball hopping and rolling on the piano) and of a robot singing in the shower (microphone and voice).

In the synthesis section, the children are encouraged to use multiple instruments in tasks whose settings are less structured. A space story is told is sounds, using colored line drawings as a visual aid. The final task asks the children to create a composition that uses all the instruments and that has a beginning, a middle, and an end.

The scoring of the video tapes involves both objective and subjective techniques. The factors of Musical Extensiveness (ME) and Musical Flexibility (MF) are measured objectively by either counting the actual seconds of time a child is involved in a task (ME) or by observing the manipulation of musical parameters and the number of instruments used in combination (MF). Musical Originality (MO) and Musical Syntax (MS) are evaluated by a panel of judges using carefully developed criteria. Subjective evaluations based on rating scales are used for

these factors. Each factor yields individual scores which can be used as such or converted to standard scores, summed and used to create a total score.

Reliability and validity data have been collected in three separate studies (Webster, 1983; in press-a; and Swanner, 1985) involving over 150 children and the results appear promising. In terms of inter-scorer reliability, coefficients range from .57 to .78 with an average of .70. Internal reliability, measured in the form of Cronbach Alpha coefficients range from .45 to .80 with an average of .65 (.69 for the most recent version). Measures of test-retest reliability have yet to be established.

Content validity was established with a panel composed of music educators, composers, and psychologists which met on four different occasions to review the measure, audit pilot tapes, critique scoring procedures, and offer suggestions for improvement. To help establish construct validity, the scoring factors from the first administration of the measure were studied to determine feasibility of factor reduction. Factor analysis showed each factor significantly contributed to two global factors that represented the theoretical existence of convergent and divergent thinking. Some empirical validity exists in the form of significant correlations between music teacher ratings of divergent thinking and scores on the MCTM, although this has not been investigated extensively. All of the studies have shown a lack of correlation between measures of music aptitude and achievement and the MCTM, thus establishing a certain inverse validity.

Although the measure offers a workable approach to the measurement question, continued work is necessary to improve its usability and technical quality. Future research must address the problems of lengthy scoring, specialized instruments, and incomplete reliability and validity data.

Ethnography

A second future direction that is important for research on creative thinking is ethnographic study, especially techniques surrounding protocol analysis.[5] Ethnographers immerse themselves in a single or small number of settings for an extended period of time, collecting as much data as possible about what is observed. There are few preconceived ideas about what is supposed to be observed and there are often no stated hypotheses established before data collection. The system for data collection varies and is sometimes unspecified until the initial stages of observation. Typically the researcher uses a log or journal, audio and video tape recordings, or photographs. In protocol analysis, subjects are encouraged to "talk through" the process under investigation. The researcher keeps careful record of this and studies the result at a later time to detect a pattern. Theoretical implications for the research are considered as part of the ongoing process and are compared with existing theory on the topic.

The disadvantages of this type of study are clear for the rationalist: lack of control, fuzzy methods of evaluation, no apparent basis for inductive logic, and little chance for exact replication. For the ethnographer, these shortcomings are under-

stood, but seen as acceptable in light of the advantages: (1) more "humanistic" approaches to describing phenomena because of the nature of the actual experience being observed, preserved and explained; (2) the immediacy of the behavior observed -- the reliance on first hand observation of natural actions rather than performance on a written measure that might be obtrusive; and (3) compatibility with the diversity (complexity) of the arts experience (stated another way, that ability to explain the richness of aesthetic response in a descriptive manner).

These advantages hold special importance for research in creative thinking and behavior. Moorhead and Pond's work (1942-1944) is probably the best example of this methodology in action for this literature. Using classic ethnographic techniques during a time when such strategies were not codified, Pond observed children improvising music in a natural, unstructured setting. The chronicles of these observations still provide a rich source of hypotheses for other forms of research today. Other examples include the more recent studies by Flohr (1979), Webster (1983; in press-a), and Kratus (1985). Although these later projects do not employ all of the ethnographic procedures that are noted above, they are concerned with natural settings, non-traditional measurement techniques, and complex artistic response.

This line of investigation holds promise for the careful study of the creative process and for the verification of many elements within the model in Figure 1. Especially cooperative subjects are necessary, as well as technological enhancements such as video tape and computers.

Computers and synthesizers

Certainly computers have aided the researcher in numerical analysis for years, but this is only one use for this technology. With the advent of powerful microprocessors that are also affordable, the researcher interested in creative thinking can program the computer to: (1) present the user with creative problems to solve, (2) record the reactions to and the solutions for the problem, (3) suggest alternative solutions, and (4) analyze the results of the work of a number of users.

Within the last few years, a method for linking a computer with a music keyboard synthesizer has developed, largely for the purposes of specialized performance and electronic music composition. This link, known as MIDI (musical instrument digital interface), holds particular significance for creativity research.

Imagine a subject seated at the music keyboard with a computer screen as the score. The subject is encouraged to compose a brief fragment of music. This fragment is displayed on the screen and is played through speakers. The subject continues to expand the fragment, working with it until a longer composition is created. The subject may save the work, take a break for a time, only to return later to his saved composition and continue work until a final version is ready. Throughout this process, the "electronic sketches" have been saved, to-

gether with the final version of the composition. These sketches can be studied further at a later time.

Similar experiments might be envisioned for the performer and the listener. Because of its ability to capture complicated data, store it, sort it, and retrieve it at a later time, the researcher is able to study rich, objective evidence about the creative process in music. These techniques are expanded even further by the developments in laser technology that provide vast amounts of storage and retrieval space for this kind of research.

The challenge in all of this is to recognize the strengths and weaknesses of the research and place what is of value together with other data as we advance theories and working models of musical ability. Music researchers and teachers must themselves be creative thinkers as they work with children and adults. This is not an easy task for many. The risks are great and the rewards may not always be clear. What is clear is that few issues in our profession deserve a higher priority. It is at the very core of what music is—of what art is.

Notes:

1. For a more detailed account of the literature on creative thinking in music, see Webster (in press-b). This chapter contains a literature model and a listing of over 100 articles on the subject.

2. Kratus (1985) contains an excellent review of this literature.

3. These factors are extensively discussed in Webster, 1983 and in Webster (in press-a).

4. MCTM is available on loan from the author for examination and possible use in research projects. Contact: Department of Music, Case Western Reserve University, Cleveland, Ohio 44106.

5. For an interesting description of protocol analysis in cognitive research, see Hunt (1982).

References

Bamberger, J. (1977). In search of a tune. In *Arts and Cognition*. Baltimore: Johns Hopkins University Press.

Feinberg, S. (1977). *A creative problem-solving approach to the development of perceptive music listening in the secondary school music literature class*. Unpublished doctoral dissertation, Temple University.

Freundlich, D. (1978). *The development of musical thinking: case studies in improvisation*. Unpublished doctoral dissertation, Harvard University.

Flohr, J. (1979). *A longitudinal study of music improvisation*. Unpublished doctoral dissertation, University of Illinois.

Gardner, H. (1982). *Art, mind and brain*. New York: Basic Books.

Gorder, W. (1976). *An investigation of divergent production abilities as constructs of musical creativity*. Unpublished dissertation, University of Illinois.

Gordon, E. (1979). Primary measures of musical audiation. Chicago: G. I. A. Publications.

Greenhoe, M. (1972). *Parameters of creativity in music education: an exploratory study*. Unpublished doctoral dissertation, University of Tennessee.

Guilford, J. (1967). *The nature of human intelligence*. New York: McGraw Hill.

Hunt, M. (1982). *The universe within: a new science explores the human mind*. New York: Simon and Schuster.

Kemp, A. (1981-1982). The personality structure of the musician. *Psychology of Music*, 9(1), 3-14; 9(2), 69-75; 10(1), 48-58.

Kratus, J. (1985). *Rhythm, melody, motive and phrase characteristics of original songs by children aged five to thirteen*. Unpublished doctoral dissertation, Northwestern University.

Lang, R. (1976). The identification of some creative thinking parameters common to the artistic and musical personality. *British Journal of Educational Psychology*. 46, 267-279.

Lasker, H. (1971). *Teaching creative music in secondary schools*. Boston: Allyn and Bacon, Inc.

Moorhead, G., & Pond, D. (1941-1944). *Music of young children*. Santa Barbara, California: Pillsbury Foundation for Advancement of Music Education.

Prevel, M. (1979). Emergent patterning in children's musical improvisations. *Canadian Music Educator,15*, 13-15.

Rhodes, E. (1971). *A comparative study of selected contemporary theories of creativity with reference to music education in the secondary schools*. Unpublished doctoral dissertation, Louisiana State University and Agriculture and Mechanical College.

Schafer, R. (1979). *Creative music education*. New York: Schirmer.

Swanner, D. (1985). *Relationships between musical creativity and selected factors including personality, motivation, musical aptitude and cognitive intelligence as measured in third grade children*. Unpublished doctoral dissertation, Case Western Reserve University.

Trollinger, L. (1981). Responses of high and low creative women musicians to undergraduate music courses: anxiety, boredom, avoidance, and pleasure. *Journal of creative behavior,* 15(4), 257-264.

Vaughan, M. (1971). *Music as model and metaphor in the cultivation and measurement of creative behavior in children*. Unpublished doctoral dissertation, University of Georgia.

Wallas, G. (1926). *The art of thought*. New York: Harcourt, Brace and World.

Webster, P. (1977). *A factor of intellect approach to creative thinking in music*. Unpublished doctoral dissertation, Eastman School of Music of the University of Rochester.

Webster, P. (1983). An assessment of musical imagination in young children. In P. Tallarico, (Ed.) *Contributions to symposium/83 the Bowling Green State University symposium of music teaching and research*. Vol. 2, Bowling Green Ohio: Bowling Green State University.

Webster, P. (in press-a). Refinement of a measure of creative thinking in music. In C. Madsen, (Ed.) *Research in Music Behavior: Application and Extensions*. Tuscaloosa, Alabama: The University of Alabama Press.

Webster, P. (in press-b). Creative thinking in music: approaches to research. In T. Gates (Ed.), *Music, Society and Education in the United States*. Tuscaloosa, Alabama: The University of Alabama Press.

Reflection by Pamela Burnard

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Where did it all start?

For me, the journey to creative understanding started during my first year of teaching. I began my professional career as a conservatoire trained musician and was then drawn to secondary school music teaching, while searching for ways to break or at least blur the boundaries between individual art forms and understand the potential and power of creativity. In teaching, I soon realized how students struggled to find their own voice and recognize what creative thinking in music was and how it could be identified and evaluated. When my colleagues and I reflected on our teaching of music and how to get students to compose creatively or engage them in problem solving abilities and creative learning in music, it seemed that the pedagogical activities that might underpin classroom creativity were never clear-cut but, rather, relied on an almost intuitive practice. This fascinated me.

Since the mid ’70s, I have dedicated a lot of effort and time to reading diverse literatures and elaborations of creativity, acknowledging creativity within cultural parlance whilst emphasising the active role and individual psychological properties of the learner. I have spoken with Webster, been fortunate to see him present in Australia, Europe, the US and England. I have read all of his writings, and written extensively about his ideas, theories and research on creative thinking in music and its assessment . The origins of my passion for reading about creativity and wanting to research creativity in music can be traced back to Peter Webster and his pioneering 1977 doctoral dissertation ‘A factor of intellect approach to creative thinking in music’. This was my introduction to the field and its themes, debates and terms. Webster’s ideas shaped and directed my thinking in many ways. As a novice researcher, reading Webster’s book chapter on the ‘Conceptual Bases for Creative Thinking in Music’, I discovered an invaluable springboard for further study, with the histories of debates, alliances, accommodations and the methodological fields which inform creativity research. This was of pivotal importance for my doctoral research. At this time, I also met with ways of naming and framing the literature review and traversing complex theoretical terrains on creativity and creativity research – all of which led to the particular focus of my PhD and fuelled and exercised my interest in creative learning and practice and research in the field of creativity.

Before reading Webster's 1987 book chapter that introduced the timely and original 'conceptual bases for creative thinking in music', I was actively involved in music education at various levels and in a number of different roles (musician, performer, teacher, departmental head and external examiner). In that sense my reflections on creativity had an active relationship with my practice and I shared with other fellow music and arts educators in my school the process of evaluating and developing the kind of creative practices that I thought might lead to creative behavior or stimulate creative thinking in music.

After reading Webster's highly influential 1987 book chapter, with its detailed explanation of a conceptual model of creative thinking in music, and which posed some of the most challenging questions for the profession about creativity research, my ideas, practice and future direction as a researcher changed. Rather than piling up layers of literature in order to critically survey and categorize texts and the field itself, Webster's idea was to construct a new conceptual model for creative thinking in music; this approach was groundbreaking. Before reading Webster's chapter I had read enough to come to grips with the issues and debates about musical creativity and creativity research, but I had not positioned myself in relation to the field of creativity research and the potential of drawing together the results of literature reviews and as Webster put it 'some careful speculation' (p.161) to put forward a model from which to shape and define the 'role of creative thinking in music in the overall musical and creative development of children' (p.166).

Mapping a model and charting a new path.

As Kamler and Thomson (2006) make clear in a recent book called 'Helping Doctoral Students Write: Pedagogies for Supervision',

> *to be critical is not just about praising and demolishing the work of others…Being critical involves making a number of judgments and decisions about which literatures to engage with, and which to ignore, which aspect of texts to stress and which to omit or downplay. Adopting a critical stance to a text means paying attention to: definitions; underpinning assumptions; theoretical resources mobilized; epistemology and methodology; method (who, what, where, how), and findings.' (p 40).*

In Webster's presentation of a conceptual model of creative thinking in music, the model is based on past research and speculation. Webster characterizes what lies within the concept of creativity, what creativity is, why it is a necessity rather than an option as a line of promising enquiry for music researchers, important for understanding the real work of teaching and learning. I am constantly struck by how many times Webster points out the need to be courageous, to have an intensive immersion in the literature and have conversations about the literature which take up the tangled nature of methodologies and their critique. The writing of literature reviews occur at the beginning of doctoral research and continue as an

evolving and ongoing task that must be updated and revised throughout the process of writing the thesis. The literatures reviewed by Webster are multiple. As he progresses with his discussion in this chapter, Webster returns to some earlier issues: what it means to use the literature, rather than be used by it and where/how literature work might be located in relation to the overall structure of research design. For Webster, elements of the model include groups of enabling conditions, enabling skills, and a central process that is seen as a movement from preparation to verification (see Burnard and Younker, 2002, for the application of aspects of this model). Webster makes it clear that there is neither one monolithic research canon, nor necessarily only one place in the thesis where it belongs. The potency of his thinking and unpacking of the taken-for-granted terminology is significant.

In his review of the different views of creativity in music, Webster proposes his now famous model of creative thinking in music. The model represents a synthesis of both the results of his research and 'some careful speculation'. Webster links the concepts of process and product, enabling skills and conditions, product intention and divergent and convergent thinking as a complex set of multidimensional interacting components that each play important roles in all stages of the creative process and creative thinking in music.

This book chapter was written back in the '80s and remains groundbreaking in its mapping of ideas about the geography of creativity research and about the role research plays in our understanding of creativity and thinking about and identifying what has been done, when it was done, what methods were used and who did what. On yet another level, it is about identifying links between what has been done and revealing the thinking that has influenced what has been produced. Webster suggests a number of methods for mapping ideas, arguments and concepts. His techniques are useful. They help us to identify connections between ideas and arguments and find relationships that exist between individual pieces of work and between different bodies of research. His categorizing of research was, and remains, a significant contribution to the field of knowledge production.

Webster posed many questions, not only about why it is important to continue to study creativity as a research construct and as a research practice, but also why it is important to examine the outcomes of individual creative behavior and investigate what children do and say. Whether we seek to research creativity as a unique individual disposition that is multi-causal and interactive and evolves in relation to a range of conditions, influences and environmental factors, or a construal linked to technological developments, Webster insists that creativity research is valued for its own sake; this is a significant step in the proposed development of a workable model.

Understanding creative thinking in music for creative understanding and change

Arguing the case for this, or any creativity model, unsurprisingly, has been, and will always be, fraught with challenges. We often see passionate statements that, although society has

a vested interest in the development of creative thinking in music, there is little support from governments willing to recognize or accept their role in the promotion of creative thinking in music education.

In 1987, Webster systematically provided the theoretical, empirical and historical context for changing the way we think about creativity in music. Webster provided us with the conceptual bases for creative thinking in music, pointing the reader to relevant and groundbreaking research and literature. In this profoundly original model, and in this seminal book chapter Webster offered a virtually standalone resource for both the theoretical and empirical means of researching the creative process in music. This was writing which not only contributed a long awaited wealth of cogent arguments and ideas about creativity research but, importantly, offered ways for researchers to think creatively about researching the creative processes – processes common in all of us – that help us to think creatively in music, as well as the processes that help generate creative thinking in music. Webster's work provided a substantial body of empirical findings from robust research that opened up new advocacy windows and, crucially, reformulated the arguments that challenge us still.

The chapter stands as a seminal set of recommendations for researchers, educational policy writers and practitioners. It systematically maps concepts and conditions against relevant findings of significant research. Nearly 30 years on, it still helps build the capacity for radical thinking in researching creativity.

Unlike previous texts, which often focus on a particular question, contextualized and viewed through a particular lens, Webster's work provided significant empirical evidence for building conceptual understanding of the enabling conditions which play important roles in all stages of the creative process.

This book chapter continues to stand tall as an intensive study of the relevant literature. It makes a significant contribution to the field for many reasons. Its finely-grained mapping strategies offer more than passionate arguments: they are supported by multiple sources and resources of scholarly authority and persuasion. In this text you will not find unsubstantiated assertions or unsupported inferences being used as a basis for generalisations but rather national and international bodies of scholarship that have natural boundaries and affinities and emphasise the constructive capacity of this intellectual work.

This particular contribution to the field highlights Webster's capacity to capture and clarify the complex sources that map, locate and create new knowledge. It epitomizes what is unique, special and exceptional about Webster's body of work.

Webster's recommendations for research, policy and practice have applications beyond the classroom: they are culturally-transcendent and relevant strategies that can be used by leaders, educators, practitioners, academics and researchers; they are particularly relevant for researchers developing a capacity

for innovation and mapping locations and relationships between different bodies of research.

For one must-have, indispensible source for music researchers, students and educators, and even for parents interested in children's creative thinking in music and its development, I can do no better than to recommend this chapter. It will enhance their understanding and prompt them to rethink the nature of creative thinking in music.

How does the challenge of change underpins Webster's model?

Re-reading this seminal book chapter rekindles one's interest in debates about the relationship between theoretical and practical understandings of creative thinking in music. It does much more than simply capture the elusiveness of creativity as a concept: it also identifies and maps relevant characteristics for its conceptualization. It has significantly influenced the creativity research agenda for music education in ways that move us forward in assessing capabilities in creative thinking, of the harnessing of technology in order that it can offer many opportunities for change offering a platform for creative learning in many ways and stimulating some rethinking of music education to fit today's extraordinary challenges. Webster recognized that teachers have a vital role in the kindling or stifling of creative thinking in music. Webster also recognized the need for employment of specific tools, including tasks, resources, and assessment, in order to provide the appropriate interactive opportunities, enabling environment for the coexistence of several factors to give rise to creative learning and teaching in music.

From all of my personal experiences and academic undertakings, this book chapter stands out in that it invited me on a journey toward a refashioned dream of music education that honours creativity as a marvelously magical multidimensional set of creative experiences, where, just as Webster says, 'in music, as in other art, the process is really never finished' (p. 167). In this chapter, Webster welcomes us to a model of change, an alternative approach of journeying to respond to our life's calling, to fulfill perhaps the biggest assignment of our lives as music researchers and educators, to pave the way toward teaching that harnesses creativity and for creating 'the mosaic of creative thinking experience' (p.167) within the classroom environment of today's music education systems. In this chapter, Webster invites us to reflect on what we can learn (as teachers, researchers and as a society) by listening to children's voices, observing their experiences in creative actions and creating with them. Teachers and researchers will gain immeasurably from listening to children's initiatives and learning about teaching for creativity and teaching music creatively together with them. But, primarily, Webster offers a way forward for how we can view creative thinking in music.

On a professional development level, this book chapter established a basis for my creative synthesis as a teacher and to track a new journey within the broader context of thought and practice in which I moved in the field of creativity study as a researcher. Webster challenged my thinking about how a cur-

riculum places emphasis on the need for creative thinking in music without imposing another task in a busy schedule for teachers. Webster's 1987 book chapter and his model taught me to reflect on and to keep exploring my own taken-for-granted assumptions, core questions and justifications about creative processes in music and the development of individuals skills in a way which recognizes that there is a minimum threshold of knowledge needed to be creative in any field, but particularly so in music. Furthermore, learners and teachers need to know how to think, how to make connections, how to seek for problems and how to solve them and having some degree of expertise (Livingston and Hope, 2011) or confidence is a pre-requisite for being creative in any given field (Burnard and Murphy, 2013) I have learned to honour and live by the wisdom of Webster's closing words for music researchers and teachers, who 'must themselves be creative thinkers as they work with children and adults … What is clear is that few issues in our profession deserve a higher priority. It is at the very core of what music is – of what art is' (p.173). In this regard, Peter Webster remains one of my all time heroes. His seminal model of creative thinking in music is like no other. It prioritises the cognitive and musical development of the child, and pays attention to the social and contextual environment and collaborative spaces in which the creativities of both teachers and students, can flourish.

Peter Webster is to be congratulated for doing what great scholars do. He defined as essential the need to value and nourish children's creative thinking in music; to teach for creativity in music by considering the factors, enablers and support mechanisms that make creativity in music more likely to thrive.

References

Burnard, P., & Murphy, R. (2013) *Teaching music creatively*. London: Routledge.

Burnard, P., & Younker, B.A. (2002) Mapping pathways: Fostering creativity in composition. *Music Education Research*, *22*(1), 59-76.

Kamler, B., & Thomson, P. (2006) *Helping doctoral students write: Pedagogies of supervision*. London: Routledge.

Livingstone, I., & Hope, A. (2011) *Next gen: Transforming the UK into the world's leading talent hub for the video games and visual effects industries*. London: NESTA.

Webster, P., (1987) Conceptual bases for creative thinking in music. In J. C. Peery, I. W. Peery, & T. W. Draper (Eds.), *Music and child development* (pp. 158-174). New York: Springer-Verlag.

Chapter 3

MCTM

Reflection by Betty Anne Younker

Refinement of a measure of creative thinking in music.

Webster, P. R. (1987). In C. Madsen and C. Prickett (Eds.), *Applications of research in music behavior* (pp. 257-271). Tuscaloosa, AL: University of Alabama Press.

In the closing pages of Invented Worlds: The Psychology of the Arts, Winner (1982, pp. 385-386) suggests that cognitive psychologists have focused largely on the question of perception rather than production in the study of artistic behavior. The issue of how art works are produced has received much less attention. A study of the most recent literature in music education, the psychology of music, and psychoacoustics will reveal this tendency toward the study of the "receiver" rather than the "producer." Rigorous and controlled empirical study of the perception of music is a relatively attractive approach, particularly for those who subscribe to the current line of thought regarding information processing theory in psychological research.

There is little doubt that such research is needed and that it is a welcome addition to our understanding of man. At the same time, it is dangerous to ignore the questions that surround the producers of art only because of difficulties in research design or quantification. One would hope that rigorous and controlled research might be done with these questions, as well, in order to accompany and make more rich the data on perception. How does man create? Are there patterns of behavior common to all? Is the process of creation different for adults than for children? Can you teach creative thinking?

In terms of music, these questions—and others like them—have been asked for generations. A rather large body of speculative literature exists, but little empirical evidence of the type that contemporary cognitive science would view as meaningful is available.

Some rather clear signs indicate that this is changing. Interest within the research communities in the study of creative thinking is growing, as evidenced by such groups as Project Zero at Harvard University and the recent Ann Arbor Symposium on Creativity and Motivation, sponsored in part by the Music Educators National Conference. This interest is supported by or is a result of: philosophical endorsement of naturalistic data collection techniques; advances in cognitive science research techniques, including protocol analysis, videotaping, and computer aided data collection; and a more daring and creative resolve on the part of the researcher, a willingness to take the risks associated with difficult and supposedly "unmeasurable" tasks.

Approaches to the study of creative behavior in music are detailed by this author in a number of other writings. Of main importance to the present study is the aspect of the empirical approach that deals with the direct observation of the creative process/product in a musical context. Research in this subcategory might be best viewed in terms of how composition, analysis, and improvisation behaviors interact with process and product. It is possible to place both composition and analysis (written and listening) in terms of musical process and musical product. Because of its singular nature, improvisation is seen as residing in both process and product.

Surprisingly, we have little organized study of student composition from the standpoint of the finished product. This may be a function of the music teacher's lack of emphasis on original composition in the classroom or perhaps a reluctance by researchers to face the difficult problems of analysis in this area. Webster (1977) asked high school music students to complete a set of composition tasks that were evaluated with factors borrowed from the general creativity literature but defined in musical terms. Results suggested that musical achievement was the most strongly related variable to creative behavior in high school students and was the best single predictor. Cognitive intelligence, grade level, age, and gender played minimal roles in terms of relationship. More recently, Kratus (1985) used a portable Casio keyboard to engage grade school children in composition of original songs. Results demonstrated specific developmental patterns across different ages, many of which suggest a desire to conform to traditional patterns of tonal music. Of equal importance was the fact that the methodology used to gather and study these songs is reliable, practical, and shows great promise for the future.

In terms of creative analysis from the product side, the study by Pfeil (1972) is noteworthy. His measure of creative listening analysis, designed for college level non music majors, is itself a model of creative thinking and is quite applicable to younger subjects. Although the study yielded little data, the use of graphic patterns to stimulate musical imagination in a measurement context is noteworthy. The approach deserves more study and refinement, especially if merged with the creative listening approaches outlined by Feinberg (1973).

The organized study of the compositional process has received little attention, especially in younger subjects. Bamberger's study (1974), using compositional tasks that are monitored by computer, offers a fascinating angle on this aspect of musical behavior. In such a context, the computer can be used both as an aid to composition and as a recording device for discovering patterns of thought. Although her study did not yield conclusive evidence, it remains as an excellent candidate for future replication and extension using modern microprocessors.

Improvisation activities have received the most attention by researchers whose goal it has been to measure creative behavior. The pioneer work of Pond (Moorhead & Pond, 1941-44; Pond, 1981) and the more recent research by Flohr (1979) are examples of naturalistic observation that emphasizes process. Developmental patterns are noted in this research, and the

tentative findings help establish hypotheses of musical thinking and behavior.

Other researchers interested in improvisation have taken a more product oriented approach, including the work of Vaughn (1971), Webster (1977, 1983), and Gorder (1976). It is in this tradition that the present study most directly falls. Children are presented with simple musical tasks and asked to improvise while the researcher records the sounds on audio or videotape. A carefully defined set of criteria are then used to evaluate these improvisations, basing judgments on musical and psychological constructs. Results from these studies have demonstrated modest levels of reliability and validity and some tentative conclusions about relationships with other variables. A need exists for more refined tasks and evaluation schemes,tighter statistical evidence, and replicated results. This study is based on those needs.

This paper presents the results of the second in a series of studies devoted to the refinement of a measure of musical thinking in young children. The first study was completed in 1980 and was published as part of the proceedings of the second Bowling Green State University Symposium on Music Teaching and Research (Webster, 1983). The purpose of this second study is conceived in three parts: to refine aspects of the measure, including the underlying factors, scoring procedures, and task items; to use this refined measure to replicate questions of relationship and mean differences determined in the first study; and to study, for the first time, the relationship between scores on this refined measure and those from an established, traditional music aptitude test.

Background: The first study

Through a carefully organized period of field testing and content analysis, an 18-task measure was constructed that employed several different musical tasks and sound sources. Tasks were evaluated using 10 component factors that were defined before evaluation. The measure was administered individually and recorded on videotape for analysis. Of the 10 factors, 7 were scored objectively by one judge, and 3 factors were aesthetic judgments made by two independent referees who were familiar with the established criteria for the factors involved. In addition to divergent musical factors, factors of convergent musical behavior and factors of verbal creative thinking were defined.

The measure was administered to 42 randomly selected children ranging in age from 6 to 9 years. The sample was drawn from two different school settings and was balanced with respect to gender and grade level. Data relating to school behavior as well as achievement and various musical skills were collected from classroom and music teachers in each school. Three questions were posed:

1. To what extent were the 10 factors viable in terms of frequency distribution, shape, and intercorrelation?

2. To what extent were the 10 factors related to aspects of classroom behavior (general classroom and music classroom) and variables of grade, age, and gender?

3. Were there significant differences between means on the 10 factors when compared across grade level, gender, and school setting?

The detailed results of this first study will not be completely reviewed here (see Webster, 1983). However, findings that are particularly important for the present study are summarized below:

1. A number of the factors were found to have satisfactory shape and discrimination, but the large number of significant intercorrelations between these factors suggested the feasibility of factor and/or task reduction.

2. The relationships between the factors and classroom teacher ratings on such items as motivation, ability to imagine and adapt, confidence, originality of ideas, and quickness of response showed little or no relationship to creative behavior in music. Assuming valid measurement, this suggests the uniqueness of this musical behavior.

3. A study of the means of the factors suggested a tendency for second and third grade children to score closely together, with the larger gap occurring between these two groups and the first graders. The musical originality factor was statistically significant across grades; the greatest gap existed between the first and second grades. In terms of gender, no real pattern of difference was demonstrated except that the musical extensiveness factor was significantly in favor of the males.

Method

Measure refinement

The first step in the refinement process was to restructure the measure in terms of the tasks themselves and the scoring strategy. Rationale for this work came from two sources: a decision to eliminate the verbal and the convergent music factors (and their associated tasks) that were included in the first measure; and statistical evidence provided by a factor analysis and a Cronbach alpha analysis of internal task reliability.

Task revision was clearly necessary because of the length of the scoring process and the unfocused nature of the original instrument. The divergent musical factors were chosen as the only factors for the new instrument, and the musical tasks that related directly to these factors were retained for study. All other factors and related tasks were deleted. The divergent factor associated with spontaneity was also deleted because initial experience with this showed a complete lack of discrimination ability.

The four divergent factors of creative musical thinking were evaluated by a principal components factor analysis. The goal was to determine if any further factors could be eliminated.

Another statistical strategy was also used to evaluate each musical task's contribution to the reliability of the various factors using the Cronbach alpha.

Finally, to improve both the statistical qualities of the instrument and its content validity, a rethinking of the nature of each scoring factor was also accomplished. A panel of music educators carefully reviewed the definition of factors, the scoring process, and the content of the tasks and suggested revisions. The panel also recommended changes in instrument choice, wording of the directions, and physical layout of the equipment.

Questions of relationship and mean difference

The second purpose of this study was to attempt a replication of the statistical findings of the first study using the revised measure. Of particular interest were the relationships between factors of creative behavior in music and ratings by classroom teachers because such data was seen as helpful in establishing inverse validity. To accomplish this, a new sample of children was drawn and new data collected.

The sample

Based on a desire to obtain meaningful data that could be generalized to as large a population as possible, several initial decisions were made about the nature of the desired sample:

School Setting. The school chosen served a middle to upper middleclass, suburban community on the east side of Cleveland. The student population was mixed with respect to race and religion, and the final random sample reflected this mix.

Random Selection. To control for selection bias, children were chosen randomly for participation in the study. Those who had prior musical training in the form of private lessons or special lessons in music theory or musical enrichment were systematically eliminated from the final population pool. Final selection (n = 32) was made from a pool of 93 children.

Grade Level. The sample was limited to nearly equal numbers of children from the entire first, second, and third grades (ages 69).

Gender. Care was taken to balance the sample with respect to gender. In addition to making a more representative sample, this also allowed for the proper comparison of group means.

Table 21.1 displays the breakdown of the numbers of children in the sample by grade and gender.

TABLE 21.1

Sample Broken Down by Grade and Gender

	1st		2nd		3rd	
	M	F	M	F	M	F
	5	6	6	5	4	6
Totals:	11		11		10	

Grand total: 32

Data collection

The revised measure was administered to children individually in the school auditorium. They were excused from their regular classroom activities for the 25-minute testing period. No attempt was made to control for the time of day for each testing. Great care was taken to ensure that the child felt at ease during the session. This was accomplished, in part, by the measure itself, which begins with warmup activities that familiarize the child with the musical instruments and the simple techniques needed to play them. The evaluated tasks that follow are presented in a gamelike fashion, allowing the child to respond freely.

In addition to the data generated by this measure, a 14item rating scale dealing with student behavior characteristics was completed by each child's classroom teacher. This rating scale, identical with the instrument used in the first study (Webster, 1983), dealt with such items as attention span, school conduct, school achievement, originality of ideas, and quickness of response.

Relationship to music aptitude

The third purpose of the present study was to investigate possible relationships between the revised measure and scores on a measure of musical aptitude. It was important to determine if the abilities measured by the creative behavior measure were the same as those tapped by traditional aptitude tests, which typically require discrimination of tonal and rhythm patterns. It was reasoned that if this were the case, large correlations would be found. This would throw into question just how unique and meaningful the creative thinking measurement was.

The Gordon (1979) Primary Measure of Musical Audiation (PMMA) was administered to the children during regular class time. Part 1, the Tonal Test, was given a week prior to administration of the creative behavior measure. This was done to familiarize the children with the test administrator and his presence in the school. Part 2, the Rhythm Test, was given after a 3week period. The test was administered as specified in the manual.

Statistical procedures

All data were submitted to various subroutines of the Statistical Package for the Social Sciences (SPSS), Version 9 (Hull & Nie, 1981). The .05 level of significance was used as the decision rule.

Results

Measure refinement

Musical data from the first measure were studied by factor analysis to determine the feasibility of factor reduction. In brief, the four musical factors at issue were: Musical Extensiveness (ME), the actual clock time (in seconds) involved in a musical response; Musical Flexibility (MF), the extent to which a child can freely move from one extreme to another with one of the three musical parameters: low to high, soft to loud, fast to

slow; Musical Originality (MO), the extent to which the child manipulates musical phenomena in a unique fashion; and Musical Syntax (MS), the extent to which the child manipulates musical phenomena in a logical and inherently musical manner, with attention to the shaping of the whole response and not just a single part. The first two factors are measured behaviorally by studying the audio and videotapes. MO and MS, on the other hand, are evaluated subjectively by judges using rating scales. Strong intercorrelations of these factors in the first measure lead to the hypothesis that some of these factors might be reduced without seriously weakening the measure.

Table 21.2 gives the factor matrix using a principal factor method with no interactions. It can be seen that each factor contributes to one of two global factors. On the basis of this evidence, it was concluded that any factor elimination would be unwise. These four factors were retained as the basis for the revised measure. (One plausible interpretation of the global factors would be that ME, with loadings on the extensiveness and syntax factors, represents the rational side of creative thinking. MF, with its loadings on flexibility and originality, might represent the more fanciful.)

Table 21.2

Factor Matrix Loadings, Musical Factors

	Factor 1	Factor 2
ME (Extensiveness)	0.817	0.279
MF (Flexibility)	−0.383	0.569
MO (Originality)	0.172	−0.778
MS (Syntax)	0.814	−0.22

Another approach to revision was to study each individual task's contribution to the stability of each factor. The tasks from the first measure that contributed to each of the four factors were studied using the Cronbach alpha procedure. The results are displayed in Table 21.3.

It was concluded that MF was in need of special attention in terms of task redefinition. A careful study of the scoring procedures by the panel of music educators revealed a possible flaw in the way points were awarded for flexibility, a problem that was subsequently corrected in the revised measure.

Table 21.3 also gives the Cronbach alpha assessed after the administration of the revised measure to the new sample. Results indicate that changes in ME and MF resulted in marked improvement of reliability, but some ground was lost in MO and MS factors.

Final adjustments were made in the measure upon the recommendation of the content validity panel of music educators.

Additional suggestions included the following: feature the three principal instruments (piano, voice, and temple blocks) more systematically as the child explores sound; tie the tasks more closely to the exploration of the three music parameters used in the measure (low to high, soft to loud, fast to slow); and give the child more time with each instrument.

The new measure

Figure 21.1 briefly summarizes the revised measure that was the product of these refinements.

TABLE 21.3
Cronbach Alpha Data for Factors

	1st Version		2nd Version	
Factor	No. of tasks	Stand. alpha	No. of tasks	Stand. alpha
ME	8	.74	7	.80
MF	11	.45	10	.78
MO	3	.72	5	.66
MS	3	.55	3	.51

The interested reader should compare the measure as it was first proposed (Webster, 1983, pp. 105107) with the current version as outlined in Figures 21.1 and 21.2 in order to achieve a complete picture of the changes made. The title "Measure of Creative Thinking in Music Version II (MCTM-II)" was given to this new version. Figure 21.2 displays the scoring summary in order to demonstrate which tasks contribute to the factors.

MCTM-II consists of a series of 10 scored tasks, divided into three parts: exploration, application, and synthesis. The exploration section is designed to help the children become familiar with the instruments used and how they are arranged. The musical parameters of "high/low," "fast/slow," and "loud/soft" are explored in this section, as well as throughout the measure.The application tasks ask the children to engage in more challenging activities with the instruments and focus on the creation of music using each of the instruments singly. In the synthesis section, the children are encouraged to use multiple instruments in tasks whose settings are the least structured.

The activities are intended for children in first through third grade, and the measure takes about 25 minutes to administer. All responses are recorded on videotape for future analysis. In terms of scoring, objective observation of the tapes for ME and MF is required. MO and MS are evaluated with 5 point rating scales. Total scores for each factor are entered on the bottom, summary line. If a grand total is required, conversion to standard scores is necessary for each factor and an equally weighted average of all four factors is recommended.

Questions of relationship and mean difference

Table 21.4 displays the correlations between the rating items on the classroom teacher's rating scale of student behavior and the MCTM-II factors. Assuming accurate measurement, it

might be concluded that MCTM-II is measuring characteristics unrelated to the teacher ratings—at least for the most part. The higher ratings for such items as confidence, self esteem, peer respect, shyness (negatively related), originality of ideas, and quickness of thought are quite consistent with the literature on creative thinking. Similar results were also seen in the first study. Such findings offer some evidence of the validity of the measure, but in an inverse sense.

MCTM–II

Equipment needed: 1) Set of temple blocks; 2) Microphone connected to an amplifier with echo; 3) Nerf ball; 4) Piano; 5) Set of colored line drawings; 6) 3 pieces of blank paper; 7) Cassette tape recorder/video tape recorder

Section	Factor	Instrument	Task
Warm-up	Not scored	All	Freely experiment with the sounds of all instruments
Part I: Exploration			
1 a–c Rain Bucket	MF	Temple Blocks	Sound of rain falling into a bucket (slow/fast)
2 a–b Elevator	MF	Nerf Ball/piano	Sound of voice on an elevator (low/high)
3 a–c Truck	MF	Voice in mic	Truck coming toward you (soft/l loud)
Part II: Application			
4 a–d Robot	ME, MF, MO	Voice in mic	Robot singing in shower
5 a–b Talking blocks	ME, MF, MO	Temple Blocks	Stimulus-response back and forth
6 a–c Frog	ME, MF, MO, MS	Nerf ball/piano	Frog music
Part III: Synthesis			
7 a–d Space story	ME, MF, MO, MS	All instruments	Sound story based on trip to outer space
8 Free Composition	ME, MF MO, MS	All instruments	Compose your own piece with a beginning, middle, and end

Note: Guidelines for MCTM–II, including the complete text for administering the measure, a set of scoring sheets, and suggested criteria, are available from the author. A small fee is required, to cover photocopying and mailing costs, and an agreement form must be signed. Sample videotapes are also available.

Figure 21.1 *MCTM-II*

Table 21.5 reveals no significant differences across grade and gender for any of the factors. The grouping of second and third graders that was noted in the first study is not seen here. It should be clear from these findings that conclusions about developmental patterns are hardly possible. The same is true for gender differences.

Relationship to music aptitude

An important aspect of this study was the question about relationship between MCTM-II scores and the PMMA of Gordon (1979). Table 21.6 displays these results. Correlations range from .00 to .24, all nonsignificant. Although this is a hopeful indication of the establishment of a valid measure (again, in an inverse sense), caution must be exercised because of the small sample size. Certainly, any further study should investigate this issue closely.

A final word

This is the second in a series of studies devoted to the refinement of a measure of creative thinking in music. Much remains to be done before this measure can assume any professional posture of note. By combining the results of the first study together with the findings of this work, a start has been made toward respectability. Two panels of musicians

Measure of Creative Thinking in Music
Scoring Summary

Child's Name _____ Classroom Teacher _____ Room _____ School _____ Music Teacher_____ Age in Months _____ Gender _____ Grade Level _____

Task	Musical Extensiveness	Musical Flexibility	Musical Originality	Musical Syntax
Part I				
1c Rain Bucket (Temple Blocks)		_____		
2c Elevator Music (Nerf Ball/Piano)		_____		
3c Truck Music (Voice/Microphone)		_____		
Part II				
4d Robot Song (Voice/Microphone)	_____	_____	_____	
5a Talking Blocks Responses (Temple Blocks)	_____	_____		
5b Talking Blocks Stimuli (Temple Blocks)	_____	_____	_____	
6c Frog Music (Nerf Ball/Piano)	_____	_____	_____	_____
Part III				
7a Space Pictures (All instruments)	_____	_____		
7b Space Voyage (All instruments)	_____	_____	_____	_____
8 Free Composition (All instruments)	_____	_____	_____	_____
Totals	_____	_____	_____	_____

FIGURE 21.2 *MCTM Scoring Summary*

TABLE 21.4

Correlation between Classroom Teacher Ratings and Factors of MCTM-II

	Coefficients of, n = 32				
Items	ME	MF	MO	MS	ZT
Attention span	.05	.00	.06	.26	.11
Handling of stress	.00	-.06	.11	.20	-.07
Motivation	.00	-.09	-.07	.23	-.02
School achievement	.01	-.02	.02	.30	.09
Conduct	.05	.12	.16	.27	.18
Ability to imagine	.14	.34	.17	.23	.26
Ability to adapt	-.11	-.02	-.02	.07	-.03
Confidence	.09	.18	.25	.38*	.27
Self-esteem	.15	.15	.21	.35*	.25
Peer respect	-.07	.07	.19	.41*	.18
Shyness	-.13	-.25	-.39*	-.44**	-.36*
Aggression for work	.00	-.02	.12	.16	.08
Original ideas	.11	.46**	.23	.38*	.35*
Quickness of response	.00	.22	.11	.38*	.21

*p < .05 ** p < .01

have contributed to the content validity of the measure. Construct validity has been supported by some factor analysis data and by the use of widely endorsed psychological factors that are defined in musical terms. There is some empirical validity data in the form of music teacher ratings (Webster, 1983) as well as a good deal of inverse relationship with general classroom teacher ratings and traditional music aptitude.

Table 21.5

Mean Comparisons Across Grade and Gender

	Grade				Gender		
	1st	2nd	3rd	*F*	M	F	*t*
ME	205.8	183.9	241.7	.44	228.7	192.5	.73
MF	23.5	25.8	28.3	.72	27.1	24.6	.74
MO	7.5	7.8	8.7	.33	8.3	7.7	.53
MS	3.4	3.6	3.3	.07	3.3	3.6	-.41
ZT	–.1	-.04	.16	.29	.08	-.07	.47

Table 21.6

Coefficients of Correlation Between Scores on the PMMA and the MCTM-II, n = 32

	Factors				
	ME	MF	MO	MS	ZT
Rhythm test	.24	.14	.02	.00	.12
Tonal test	.00	.15	.23	.18	.17

In terms of reliability, there is evidence of acceptable inter-judge reliability for the MO and MS factors (.57 and .72 in earlier studies and .78 and .67 in later work). Cronbach alpha data indicates improving levels of internal task reliability. No studies have been made of test retest reliability, nor of predictive validity.

Perhaps a more pressing question is the measure's practicality. It requires a good deal of time to administer and certainly to score. Will professionals be interested in investing the time required? Probably not. Can the measure be shortened further or made less complicated without endangering its quality? Perhaps so. Research will continue, particularly for those of us who are convinced that such study reveals a vital part of the musical mind that has been all but ignored.

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References

Bamberger, J. (1974). *What's in a tune?* Boston: MIT Artificial Intelligence Laboratory. (ERIC Document Reproduction Service No. ED 118 369).

Feinberg, S. (1973). A creative problem solving approach to the development of perceptive music listening in the secondary school music literature class. *Dissertation Abstracts International, 34*(2), 806A. (University Microfilms No. 73-18, 722).

Flohr, J. (1979). Musical improvisation behavior in young children. *Dissertation Abstracts International, 40*(10), 5355A. (University Microfilms No. 8009033).

Gorder, W. (1976). An investigation of divergent production abilities as constructs of musical creativity. *Dissertation Abstracts International, 37*, 171A. (University Microfilms No. DCJ7616136).

Gordon, E. (1979). *Primary measures of musical audiation*. Chicago: GIA Publications.

Hull, C.H., & Nie, N.H. (1981). *SPSS update 79*. New York: McGrawHill.

Kratus, J. (1985). *The musical contents of children's original songs*. Unpublished doctoral dissertation, Northwestern University, Evanston, IL.

Moorhead, G., & Pond, D. (1941/44). *Music of young children* (Vols. 13). Santa Barbara, CA: Pillsbury Foundation for Advancement of Music Education.

Pfeil, C.I. (1972). Creativity as an instructional mode for introducing music to non music majors at the college level. *Dissertation Abstracts International, 33*, 2415A. (University Microfilms No. 7230028).

Vaughn, M.M. (1971). Music as a model and metaphor in the cultivation and measurement of creative behavior in children. *Dissertation Abstracts International, 32*, 5833A. (University Microfilms No. 7211056).

Webster, P. (1977). A factor of intellect approach to creative thinking in music. *Dissertation Abstracts International, 38*, 3136A. (University Microfilms No. DCJ7726619).

Webster, P. (1983). An assessment of musical imagination in young children. In Tallarico, P. (Ed.), *Bowling Green State University Symposium on Music Teaching and Research*, Vol. 2 (pp. 100-123). Bowling Green, OH: Bowling Green State University.

Winner, E. (1982). *Invented worlds: The psychology of the arts*. Cambridge, MA: Harvard University Press.

Description of the Measure of Creative Thinking in Music - II

Description of the Measure

Equipment and setting

The Measure of Creative Thinking in Music (MCTM) uses three sets of instruments: (1) a round "sponge" ball of about 4" in diameter that is used to play tone clusters on a piano (either in a rolled fashion or as individual clusters), (2) a microphone that is suspended in front of the piano and is attached to an amplifier and speaker, and (3) a set of five, wooden resonator blocks (temple blocks) that produce different pitches when struck by a mallet. The instruments are all in easy reach and can be played easily by children who have had no musical training. There is a brief warm up period that is not scored and is designed to familiarize the children with the simple techniques necessary to play the instruments. All activity takes place in a private room with only the child and the administrator. All tasks are video taped unobtrusively and scored at a later time. It requires about 20 to 25 minutes to administer per child.

MOVIE 3.1 Webster administering the *MCTM*

Additional equipment required includes: (1) a set of line drawings depicting space travel (included in these materials), (2)

three pieces of blank paper, (3) (optional) an audio cassette player and blank cassette tape (re-usable for each child), and (4) a video camera and recorder with blank video tape in quantities suitable for the number of children to be tested.

Diagrammed in Figure 1 is a suggested arrangement of the instruments and camera (seen from above). Other arrangements are possible as well.

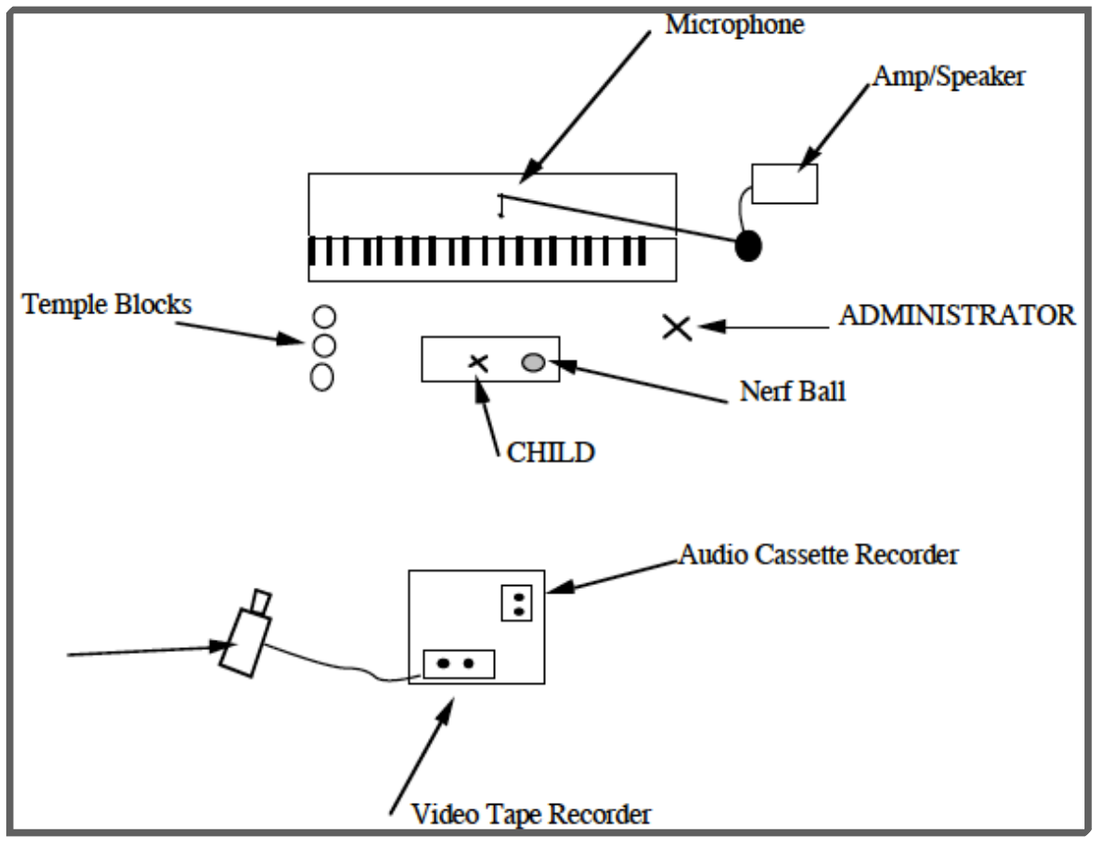

Figure 1. *Set-up for the administration of the MCTM II*

Content

The measure consists of a series of 10 scored tasks, divided into three parts: exploration, application, and synthesis. The tasks begin very simply and progress to higher levels of difficulty in terms of divergent behavior. The atmosphere is game-like in nature, with no indication that there are any right or wrong answers expected. The text used by the administrator is standardized for all children and few models of performance behavior are given.

The *exploration* section is designed to help the children become familiar with the instruments used and how they are arranged. The musical parameters of "high/low", "fast/slow",and "loud/soft" are explored in this section, as well as throughout the measure. The way the children manipulate these parameters is, in turn, used as one of the bases for scoring. Tasks in this section involve images of rain in a water bucket, magical elevators, and the sounds of trucks.

The *application* tasks ask the children to do more challenging activities with the instruments and focus on the creation of music using each of the instruments singly. Requirements here ask that the children enter into a kind of musical question/answer dialogue with the mallet and temple blocks and the creation of songs with the round ball and the piano and with the voice and the microphone. Images used include the concept of "frog" music (ball hopping and rolling on the piano) and of a robot singing in the shower (microphone and voice).

In the *synthesis* section, the children are encouraged to use multiple instruments in tasks whose settings are less structured. A space story is told is sounds, using line drawings as a visual aid. The final task asks the children to create a composition that uses all the instruments and that has a beginning, a middle, and an end.

Specific text for the administrator and directions for administration is available upon request (pwebster@northwestern.edu).

Scoring

Individual factors

The scoring of the video tapes involves both objective and subjective techniques. The scoring must be done by a professional who understands the factor meanings and can identify them in musical behavior. There are four factors used, each derived from theoretical literature and from content analysis sessions with a panel of experts from the fields of music composition, music education and psychology:

> *Musical Extensiveness* – the amount of clock time involved in the creative tasks
>
> *Musical Flexibility* – the extent to which the musical parameters of "high"/"low" (pitch); "fast"/"slow" (tempo) and "loud"/"soft" (dynamics) are manipulated
>
> *Musical Originality* – the extent to which the response is unusual or unique in musical terms and in the manner of performance
>
> *Musical Syntax* – the extent to which the response is inherently logical and makes "musical sense"

The factors of Musical Extensiveness (ME) and Musical Flexibility (MF) are measured objectively by either counting the actual seconds of time a child is involved in a task (ME) or by observing the manipulation of musical parameters (MF). This objective work can be done with a stop watch and direct observation of the video tape. In most cases, one observation is sufficient. However, if a response is a complex one, a second observation is sometimes necessary for proper scoring of MF.

Musical Originality (MO) and Musical Syntax (MS) should be evaluated by a panel of judges for best results, however one observer is certainly possible. Rating scales based on carefully developed criteria are used for these factors. Some practice is necessary at first to achieve a sense of the proper rating categories. Once this is achieved, the scoring process becomes straight forward. In most cases, a rating for MO and MS can be assigned after two viewings.

Inexperienced evaluators are urged to view a random sample of children's performances in order to achieve an overall sense of the behavior patterns. This is especially important for proper evaluation of MO and MS. A careful review of the scoring sheets themselves will also help to direct the evaluator to key points of observation.

For new evaluators, the scoring time necessary for one student performance might be as much as a full hour. However, with experience, forty to forty-five minutes is often the norm. Of course this time varies greatly with the length of the child's performance and the particular equipment used for playback.

One technique that seems to work well is to first score all children for the objective factors (ME and MF). This will take one complete observation of the tape(s). During this scoring, also note the point on the tape where the rating tasks occur. Rewind the tape(s) and view only those tasks that require the ratings and score those sections.

Scoring summaries

The SUMMARY SCORING SHEET (displayed at the end of this document) indicates which tasks are scored for which factors. The user simply adds the scores in the factor columns for the total factor scores. These individual factor scores can be compared to normative tables which can be developed locally.

The measure is design to yield a set of scores -- a profile that can be used in identifying strengths and weaknesses. A total score is possible, however the user must convert each total factor score to a standard score and compute an average standard score across the four factors.

Reliability and Validity

Reliability and validity data have been collected in a number of studies (Webster 1983, 1987, 1988, 1990 and Swanner, 1985). MCTM has also been used in a study of cognitive style by Schmidt and Sinor (1986). In terms of inter-scorer reliability for the factors of MO and MS, coefficients range from .53 to .78 with an average of .70. Internal reliability, measured in the form of Cronbach Alpha coefficients range from .45 to .80 with an average of .65 (.69 for the most recent version). Test-Re-test reliability indicates a range between .56 and .79 with and average of .76.

Content validity was established with a panel composed of music educators, composers, and psychologists which met on four different occasions to review the measure, audit pilot tapes, critique scoring procedures, and offer suggestions for improvement. To help establish construct validity, the scoring factors from the first administration of the measure in 1980 (Webster, 1983) were studied to determine feasibility of factor reduction. Factor analysis showed each factor significantly contributed to two global factors which represented the theoretical existence of convergent and divergent thinking. Continued study of the factor structure is represented by work by Baltzer, 1990 and by Webster, 1990. Some empirical validity exists in the form of significant correlations between music teacher ratings of divergent thinking and scores on the MCTM, although this has not been investigated extensively. All of the studies have shown a lack of correlation between measures of music aptitude and the MCTM, thus establishing a certain inverse validity.

References

Baltzer, S. (1988). A validation study of a measure of musical creativity. *Journal of Research in Music Education. 36* (4), 232-249.

Baltzer, S. (1990). *A factor analytic study of musical creativity in children in the primary grades*. Dissertation Abstracts International. 51 (07), 2306. (University Microfilms No. 90-29114).

Schmidt, C., & and Sinor, J. (1986). "An Investigation of the relationships among music audiation, musical creativity, and cognitive style," *Journal of Research in Music Education. 34* (3), 160-173.

Swanner, D. (1985). *Relationships between musical creativity and selected factors including personality, motivation, musical aptitude and cognitive intelligence as measured in thirdgrade children*. Dissertations Abstracts International. 46 (12), 3646. (University Microfilms No. 86-01941)

Webster, P. (1983). An assessment of musical imagination in young children. In Tallarico, P. (Ed.) *Contributions to Symposium/83: The Bowling Green State University Symposium on Music Teaching & Learning*. (pp. 100-123). Bowling Green, Ohio: Bowling Green State University.

Webster, P. (1987). Refinement of a measure of creative thinking in music. In C. Madsen and C. Prickett (Eds.), *Applications of Research in Music Behavior* (pp. 257-271). Tuscaloosa, Alabama: The University of Alabama Press.

Webster, P., Yale, C. & Haefner, M. (1988). *Test-retest reliability of Measures of Creative Thinking in Music (MCTM) for children with formal music training*. Unpublished paper presented at the MENC National Conference, Indianapolis, Indiana.

Webster, P. (1990). *Study of internal reliability for the Measure of Creative Thinking in Music (MCTM)*. Unpublished paper presented at the MENC National Conference, Washington, D.C.

SCORING GUIDELINES PARTS I AND II

Measure of Creative Thinking in Music

SUMMARY SCORING SHEET

TASK	Musical Extensiveness (ME)	Musical Flexibility (MF)	Musical Originality* (MO)	Musical Syntax* (MS)
1 Rain Bucket		_____		
2 Elevator		_____		
3 Truck		_____		
4 Robot Song	_____	_____	____	
5 Talking Blocks (Responses)	_____	_____	____	
6 Talking Blocks (Stimuli)	_____	_____	____	
7 Frog Music	_____	_____	____	____
8 Space Pictures	_____	_____		
9 Space Voyage	_____	_____	____	____
10 Free Composition	_____	_____	____	____
Raw Totals	_____	_____	_____	_____
Standard Score	_____	_____	_____	_____

Standard Score Average _____

*If more than one judge is used, enter average rating for each task

Reflection by Betty Anne Younker

Dean and Professor of Music Education at the University of Western Ontario, Canada.

The sailor carefully monitors the winds, checking to see if the speed and direction are conducive to another day of sailing. Another day, another sail as the sailor and his partner move closer to their summer cottage off the coast of Maine. Pierre and Katarina have been on the water for a week now, moving north from South Carolina where they own a home on the coast. Both are New Englanders and have spent their professional careers mainly in the Midwest, and now retired (well, retired from their formal jobs) have relocated to the eastern seaboard, fulfilling a wish and dream.

Pierre and Katarina have enjoyed sailing over the years and acquired a substantial boat, spanning approximately 40 feet. Their skills and knowledge have increased, both of which have been put into practice over the years. They have learned that sailing requires much skill but that it also requires a fluidity as one examines weather and wind conditions, monitors one's level of energy and focus, and imagines the possibilities of how the boat could be piloted throughout the day, while keeping the goal in mind, that is, to reach a pre-determined site by nightfall and ensure a 'course made good'.

Part of their experience is to think creatively about options when planning the trip and completing the sail. Their intention is clear, to have a safe passage as well as to enjoy the process of sailing as they make their way up the coast, both of which is valued by each. This intention is not unlike that of a young composer whose intention is to compose a piece of music that is novel, and valued by her and hopefully others. Thus, the intention is to bring a product to completion and to think creatively about possible routes while using skills and knowledge throughout the piloting of their sail. Some conditions are externally imposed, constraints if you will (i.e., weather, wind conditions which affect sail setting and heeling, sea marks, and landmarks all of which require various visual references used in pilotage). Other constraints could be the level at which Pierre and Katarina currently sail, which informs them with each sail what skill (e.g., specific sailing maneuvers such as tacking and gybing) and knowledge (e.g., understanding about the position, distance, direction, time as well as navigational tools) needs to be acquired, particularly if their intent is to sail in more chal-

lenging spaces. The freedom, however, is experienced while navigating the course and exploring ways to 'right the course' when they converge on decisions and implement for further evaluation.

During the process, Pierre and Katarina will converge on a solution, implement it, assess, and if necessary, explore other options. This process is recursive, fluid and dynamic; active and involved; and relies on knowledge that is tacit and articulated. There is an immediacy of relying on and honing their craft, and conceptualizing and reflecting before and after decisions have been made, implemented, and evaluated. Continuous assessment occurs in and on the action, that is, during, before and after decisions are made. They will journal in their log throughout the trip and use those reflections for their next sail, whether it includes the same trip, a less challenging course, or one that will require the next level of skills and knowledge.

Pierre smiles, actually he is tickled pink, knowing that the approach to sailing has allowed him to think about his own research, specifically, creative thinking and the creation of his Measurement in Creative Thinking in Music, a process that began with his own dissertation work. He reflects on the influence of Torrance's work, the *Torrance Tests of Creative Thinking* (1966) as well as Wallas's (1926) stages. Torrance's tests consist of one verbal and three nonverbal (figural) and they are scored for fluency, flexibility, originality and elaboration. In his own dissertation (Webster, 1977), Pierre based his work on Torrance's measurement, which resulted in a measurement of creative thinking in music. At the center are the kinds of thinking that occur–imagining, identifying, diverging, converging, and evaluating (recursive in nature), as well as dispositions that include willing to take risks and leaps of faith (that is having the faith to leap!), commitment, focus, and discipline. One brings what one knows and is able to do, and continues to construct understanding through the creative process. Those who take the measurement are scored for extensiveness, flexibility, originality, and syntax. Since then, he has continued to refine the measurement (e.g., Webster, 1987). As a beginning point, Pierre defined creative thinking in music as "a dynamic process of alternation between convergent and divergent musical thinking, moving in stages over time, enabled by certain skills (both innate and learned), and by certain conditions, and resulting in a final product" (Webster, 1989, p. 66).

In addition, Pierre notes the stages (i.e., preparation, incubation, illumination, and verification) experienced as he and Katarina begin thinking about the trip and throughout the implementation of the trip. In their preparation, they begin charting out their course, noting weather and wind conditions, examining routes recommended by their fellow sailors, imagining variations on those routes as well as different routes that could take them into different ports. They identify the issues they

imagine and know will be faced while on the water. They examine the various towns and cities, and begin to compile a list of local attractions, including restaurants that offer fine food, wine and scotch. This process occurs over time as decisions are made and re-visited, some of which will change. Between those planning sessions, both are involved in multiple projects and day-to-day responsibilities. As they return to their plans after a day or few days, they comment that time away from the task has been helpful, that incubating about their plans has provided time to reflect and to let their minds' focus on other things. It contributes to those 'aha' moments (illumination). They then proceed to verify that which they have synthesized and applied.

For fun, Pierre and Katarina decide to measure the nature and extent of their creative thinking while preparing for a trip and during the sail. Why not completely fold in Pierre's research with their sailing? They will measure how extensive the time is when preparing for the trip, flexible each is when planning the trip and during the actual sail as various decisions have to be made in and on the various actions required to ensure the sail was a 'course made good'. Measured will be how original each is when charting out a schedule for the actual trip, creating happy hour snacks at dock to be shared with other sailors, and the actual piloting of the boat during the trip. Finally, the syntax of decisions made, particularly those during the sail will be measured. Pierre and Katarina will examine the level of skill revealed during the sail, such as piloting and dead reckoning, and determine choices made while using those skills as positioning of the boat occurs and the route mapped, initially and during the trip. They might need to call upon objective observers to carry out the measurement–perhaps some former PhD students whose dissertation was advised by Pierre! I can think of a few who would be more than happy to accompany them on the trip.

During this productive planning time for their trip, Pierre and Katarina reflect on their years at Northwestern and how they were most touched by the farewell dinner, which included tributes from those who could and could not attend. The words of former students revealed the depth and breadth of his influence on each of their work.

For me, I still remember the sense of being 'at home' during the Creative Thinking class at NU. I was struck by the fact that there could be an entire course on creative thinking! From that and other courses at NU, I took knowledge that fueled my curiosities about what occurs in the black box when engaged in music. As a public school teacher, I knew that the students could perform well and listen intelligently, but I was curious about what occurred in their musical processes when creating original music, that is, composing. What were the strategies and thought processes while engaged in compositions? Did musical tuition in performance make a difference? Did age make a difference? With the knowledge gained

in the creative thinking course, my questions continued to grow: What did thinking creatively in composition look and feel like? How do we know when students are thinking creatively? Can it be identified and mapped? What does it mean to be creative? Are there certain dispositions, attributes, or aptitudes that characterize one who is creative, and if so, what are they? Once measured, is there a relationship between one's level of creativity and I.Q? Armed with many questions, it became clear to me that an exploratory, descriptive study could be useful, one in which students were observed in composition, asked to talk aloud while composing, and asked about what they did after each composing sessions.

With careful guidance from Dr. Webster, I embarked on the dissertation project. From that project grew multiple others in which students of various ages were studied in varying situations. Students composing with and without technology, with and without parameters, as individuals and in groups were studied. Their creative thinking was identified and mapped. In student group composition experiences, the artifacts, their roles, and the relationships that evolved were examined to determine effects on the process of composing. As students explored, identified musical problems, diverged and converged, implemented and evaluated, revised as necessary and further identified their musical problems, evidence accrued that verified students' potential to compose and to think creatively during the process. Students often moved through decision making in a recursive and dynamic fashion while fewer moved in a linear fashion, finishing a product and practicing for performance. Their knowledge and skills were utilized, thus a notion of transfer was evident. What I have been most struck by, however, is the level of creative thinking that occurs as students create their own music, and expressing their value of the process, and suggesting that it is like knowing music '"from the inside out."

So as with the sailor, we set our sails and chart our course. The decision to go to Northwestern was a valuable sail and influenced much of my subsequent course. Thank you, Peter, for your endless energy, humor, belief, intelligence, and rich insights, all of which have guided me, as well as the field, about this much-needed topic of creative thinking. I look forward to your continuing contributions; may your sail be one that is 'made good'.

References

Torrance, E. (1966). *Norms-technical manual: Torrance tests of creative thinking*. Bensenville, IL.: Scholastic Testing Service.

Wallas, G. (1926). *The art of thought*. New York: Harcourt, Brace, and World.

Webster, P. (1977). A factor of intellect approach to creative thinking in music. *Dissertation Abstracts Inter-*

national, 38, 3136A. (University Microfilms No. DCJ7726619).

Webster, P. R. (1987). Refinement of a measure of creative thinking in music. In C. Madsen and C. Prickett (Eds.), *Applications of research in music behavior* (pp. 257-271). Tuscaloosa, AL: University of Alabama Press.

Chapter 4

Assessment

Reflection by John Kratus

Research on creative thinking in music: The assessment literature

Webster, P. R. (1992). In R. Colwell (Ed.), *Handbook of research on music teaching and learning: A project of the Music Educators National Conference* (pp. 266-280). Reston, VA: MENC.

Background

The systematic study of creative thinking in music and its meaningful assessment is a relatively new concern for researchers. With the exception of a few early descriptive studies, the most useful work has been completed in the last twenty years. This lack of an extensive research tradition for such an important topic has most certainly not been caused by little interest in the professional as a whole. Many have endorsed the importance of encouraging children to work creatively with music and have written extensive curricular materials (Coleman, 1922; Morgan, 1947; CMP 3, 1966; Thomas, 1970). For over thirty years, approaches to elementary school music education such as those based on the thinking of Orff and Dalcroze have encouraged certain kinds of improvisation and composition. As will be noted below, the reasons for the lack of research tradition have a great deal to do with the enormous problems of definition and assessment validity. It might also be fair to say that, until most recently, researchers in music education have been somewhat conservative in their approaches to assessment research and have chosen to study topics of narrow scope.

Reasons for new research interest

Contemporary research interest in the topic of creative thinking ability in children can be explained by factors both inside and outside the profession. It has been clear for some time that traditional measures of music aptitude and achievement are useful only to a point. A broadening of our conception of what constitutes musicality is long overdue (Webster, 1988b). There is also a growing desire to know more about the generative process in music, both in music education circles and in related fields of music psychology, psychomusicology and music theory (Hargreaves, 1986, pp. 143-178; Sloboda, 1985, pp. 102-150; Sloboda, 1988; Reimer, 1989).

Music researchers have also been influenced by the general psychology literature, particularly the heritage of multiple intelligence theories such as those of Guilford (1967) and more recently, Gardner (1983). Certain measurement strategies by psychologists such as Torrance (1966) have influenced music researchers who have been interested in a psychometric approach to creative thinking in music.

Recent interest in more varied research techniques such as ethnographic methodology, extended case studies and proto-

col analysis have given new life to the assessment of creative processes in music. For example, Davidson and Welsh (1988) reported data on working styles and strategies of young adults by systematically observing a music composition task. John-Steiner (1985) has collected the results of self-reports and interviews with adults known for creative thinking ability. The aim of such work is not to develop a psychometric measure, but rather to observe the cognitive process and report intelligently about it. Such research is in line with the current thinking in cognitive psychology and the interdisciplinary spirit of cognitive science (Gardner, 1985).

There also exists a fresh, new trend in assessment as an educational enterprise aimed at broadening the base of what is considered for evaluation. For example, Wolf (1988) has reported on the use of portfolios, extended student projects and interviews as a means for evaluating student growth in the arts. Such shifts from exclusive reliance on single grade report systems to more varied mechanisms has effected and will continue to effect the research on creative thinking in music.

Problems that face the researcher

There are two fundamental problems that continue to trouble researchers in the field. The first is confusion about creativeness as a concept and what it means in terms of assessment in music teaching and learning. The second, stemming directly from the first, is the more technical problem of achieving valid assessment.

Just what does "creativity" mean? In a study of the term's use in the *Music Educators Journal* from 1914 to 1970, Hounchell (1985) concluded that no clear definition arose and that the term was used largely to encourage acceptance of music education in a general sense. Oehrle (1984), in a study of elementary music textbooks in this country and in England, cited the inconsistency between the relative absence of genuine creative activities and the philosophical endorsement of such activities. This may suggest that the profession confuses generative, divergent music behaviors such as composition, improvisation and creative listening with convergent skill development (Webster, 1990). This problem is compounded by the selection process for special educational programs for the "gifted" or "talented" which often confuse performance ability in music, high scores on traditional music aptitude tests and high general intelligence with ability to think creatively in music.

This problem extends to the more systematic literature on assessment. As in general psychology, there is no commonly accepted definition of "creativity", although there is a tendency to use "creative thinking" or "creative ability" for more specificity. Definitions are based on either: (a) the creative product as evidence of creative thinking, (b) the mental process during creative activity, (c) cognitive or personality traits of the creator such as flexibility of thought or openness to risk, (d) environmental conditions that encourage creative thinking or (e) some combination of all four. There are common elements among these definitions both in the music and general litera-

tures which help to clarify the problem. These include reference to a problem-solving content, stages in the creative process, convergent and divergent thinking abilities, some aspect of novelty in the product and a product that makes contextual sense within a domain. However, even with these commonalties, researchers who may be searching for a "clean" problem to study often discard the field as too troublesome.

This complex conceptual base has contributed to problems of valid assessment for both psychometric measurement as well as more descriptive, content analysis techniques. Problems of definition naturally lead to problems with construct validity. This was a common circumstance in early research efforts when researchers used general creativity measures to assess creative thinking in music -- making the questionable assumption that creative ability is generalized across all domains.

The nature of the data itself must be considered carefully and special techniques must be used. As Sloboda argues, "It is always easier to collect one's data in the form of responses from a limited and pre-ordained set (for example yes-no decision, same-different decisions) than it is from relatively unconstrained and multidimensional behavior." (1988, p. vii.) This kind of assessment is time consuming, not only for data collection itself but also for the scoring and interpretation of data. Instrumentation is often complicated. Traditional statistical techniques may not always be appropriate or desirable. Because evaluation design is often a one-on-one affair with the notion of group testing being antithetical to the task at hand, large scale use of these assessment schemes is a major problem.

Finally, each data collection scheme has weaknesses in scorer reliability. Schemes have typically included: (a) audio and/or video recording of creative behavior for post-analysis by judges, (b) auditory transcriptions of audio tape performances into conventional or graphic notation for expert analysis, (c) verbal protocol analysis and (d) classic ethnographic description. Although each approach has decided advantages over traditional paper and pencil tests, problems of scorer bias, numerical coding and scorer consistency plague such research.

Chapter focus

Despite these problems–or perhaps because of them, recent systematic study of creative thinking in music offers an interesting literature to review and a challenging field of inquiry for the new and the seasoned researcher. After a brief review of the important bases in the general literature, the chapter will provide an introduction to many of the important studies in music teaching and learning. Studies that offer special meaning for assessment will always be stressed.[1] The chapter will conclude with some thoughts on future directions.

Bases in the non-music literature

A chapter of this sort cannot be complete without some attention to the large and complex literature in psychology on creative thinking and its assessment. Several excellent summaries and anthologies of this writing exist, including those by

Bloomberg (1973), Rothenberg and Hausman (1976), Amabile (1983), Davis (1986) and Sternberg (1988). Many of the landmark studies from this general literature are important to note because of their influence on current and future research in music.

It is quite clear that serious interest in creative thinking research began following Guilford's 1950 presidential address to the American Psychological Association (Guilford, 1950). Psychological research flourished for the next two decades, then became more sporadic. Within the last few years, however, fresh perspectives have emerged (Sternberg, 1988, p. viii.), especially with the growing interest in cognitive science, social psychology and mental development. This renewal of research activity parallels that in music education and shares some similar characteristics.

A close study of the content in both the early and the latest general research literature reveals the following categories:

(a) *psychometric research* which uses both intellectual and personality traits as a basis for the design of measurement tools,

(b) *cognitive research* that centers on identifying mental processes and underlying mental structures and

(c) *environment research* that focuses on the interaction of the creator with the setting in which the creative work occurs.

Psychometric research was the dominant characteristic of the early work in psychology. It has also had the most influence on music research. Studies of cognitive process and structure are somewhat newer in the general literature. Work of this sort is just now developing in music education and represents some of the most exciting and challenging research that faces the profession. Finally, research that focuses on the interaction of the creator with the environment is quite new in the general literature. It has not had an effect on music research to date, but has potential to do so as more music researchers speculate on global theories of creative thinking.

Psychometric research

The psychometric approaches of Guilford (1967), Torrance (1966) and Barron (1969) are all important here. Guilford's Structure of Intellect (SI) model and the resultant factor analytic work are representative of studies of individual difference in creative thinking and their correlation with other mental characteristics. Important are the notions of divergent vs convergent thinking abilities as individuals are asked to perform various tasks. Divergent thinking abilities help individuals generate many possible solutions, while convergent thinking relates to abilities which help the mind focus on the best answer. Divergent thinking concepts include: (a) fluency (sheer number of responses), (b) flexibility (different classes of responses), (c) originality (index of novelty of response) and (d) elaboration (extended content of response). These traits are used as the basis for scoring schemes in many stan-

dardized measures. Researchers in music have been greatly influenced by these studies as will be seen.

Studies focused on personality traits of individuals generally known as creative have identified certain common threads (MacKinnon, 1965). Often cited are such traits as confidence, curiosity, humor, risk-taking, openness and interest in wide ranging activities. Tardif and Sternberg (1988, p. 434) list other traits and include personal abilities and styles of thinking common to creative people. This line of inquiry has led to the development of personality inventories which are used to identify creative individuals. There is no evidence that the music assessment literature has been influenced by this approach as yet. Examples of both standardized measures and personality inventories are summarized below.

Published measures and inventories[2]

The most well-known and researched measure of general creative ability is the *Torrance Tests of Creative Thinking* (TTCT) (Torrance, 1966). Both verbal and figural content tests are available and each of these has parallel forms.

In the verbal measure, subjects are presented with common objects (e.g. boxes, stuffed animals) and situations (sometimes improbable situations) and asked for the solution to tasks. The tasks are timed and require paper and pencil responses if administered in the normal manner. The responses are measured according to fluency, flexibility and originality. Elaboration can also be scored. A similar approach is taken with the figural content measure. The link between these measures and those originally designed by Guilford and his associates for the validation of the SI model is quite clear.

Other published measures include the Wallach and Kogan (1965) tests which take a similar approach to problem solving, but are un-timed and administered in a game-like atmosphere. Torrance has also published two other measures -- one that uses audio sounds and words as stimuli (Torrance, 1973) and one especially designed for preschool children that uses movement (Torrance, 1981).

Personality and biographical inventories

Inventories take a descriptive approach by presenting the subject with statements about themselves and asking for a rating of extent to which the statement seems true. For instance, one item might be worded, "I am very curious", to which the subject must respond either: "No", "To a small extent", "Average", "More than average" or "Definitely". The profile of responses is then validated against a set of criteria that might include teacher ratings or evidence or real-life creative achievement. These inventories often return sub-scores for imagination, independence or confidence, as well as an overall creative index. A good example of this kind of inventory is the *Group Inventory for Finding Talent* (Rimm and Davis, 1980). Other inventories are designed to be used by teachers or parents in rating children.

Cognition research

Researchers interested in this approach are much less driven by a desire to construct formal measurement instruments. Here, the importance is placed on process and how the mind operates during creative activity. For example, based on the testimony of creative thinkers, Wallas (1926) postulated the existence of four stages during the creative process: (a) *preparation*, when problems are first considered; (b) *incubation*, time away from active consideration of the problem; (c) *illumination*, the moment(s) of insight and (d) *verification*, the time when solutions are tested and refined. This theory has been confirmed on a number of occasions and in a number of disciplines, although Winner (1982, pp. 39-42) points to the incubation time and its underlying subconscious processes as the most controversial aspect and Weisberg (1986) argues for caution in over-romanticizing illumination. Other stage theories of creative thinking have been offered by scholars, including writings by Maslow and Kris[3].

In a more developmental vein, Gardner believes that the "roots of creativity lie in children's early symbolic products" (Gardner, 1989, p. 114) and in the merger of this with adult understanding of the domain in which the creator operates. Drawing in part on the theory of symbol systems advanced by Goodman (1976), Gardner's theories and research agenda have been devoted to a "developmental portrait" of creative mental processes rather that a "trait" view as found in the psychometric literature.

In terms of intelligence theory, Sternberg (1988, pp. 125-147) has argued for a three-facet model of creativity. He cites (a) cognitive skills (drawn from his triadic theory of intelligence) such as the ability to recognize and define problems; (b) intellectual style, which might be "legislative" in nature for creative individuals and (c) certain personality traits as important in understanding creativity from a cognitive perspective.

Finally, recent interest in creative thinking from an artificial intelligence perspective can be noted in writings by Johnson-Laird (1988) and Shank (1988). The role of memory and memory storage is important in this approach and computational mechanisms involving elaborate computer models and computer programs are frequently used.

Environment research

This literature considers the role of culture and cultural expectations. Amabile's work with reward systems, motivation (external and internal) and social interaction is noteworthy (Amabile, 1983). Her conceptual definition of creativity is largely based on the creative product -- its novelty and appropriateness. Her approach to assessment uses expert judges to evaluate products, thus relying on a consensus of opinion. (It is interesting to note that music education researchers have used similar techniques to evaluate creative work in music, although have not taken as much care in the training of judges as Amabile's research suggests.) Using data from this approach and from other more psychometric work, she draws

conclusions regarding the social aspects of the creative experience.

Others interested in social issues include Feldman (1986) and Bloom (1965) who investigated child prodigies and their interaction with the environment. Also of primary interest is Csikszentmihalyi (1986) and his system view of creativity which includes the notions of "person", "domain" (symbol system) and "field" (social organization of the domain).

Readers of music education literature will likely note the relationship between many of these topics and the issues discussed at the third Ann Arbor Symposium (Documentary Report, 1983). Assessment research in music has been slow to react to this more general environmental view[4], although this is likely to change as empirical study increases and as more theory is generated.

Assessment literature in music education

Figure 17-1 displays an organizational scheme for the assessment literature on creative thinking in music. This represents a section from the larger category of empirical studies found in the literature on creative thinking in music.[5] Each study included in this diagram: (a) involves the study of individuals from pre-school to college age (literature on the systematic study of creative adult musicians is not included), (b) is principally concerned with assessment and (c) presents empirical evidence. Specialized improvisation literatures such as those in jazz and ethnomusicology are not included.

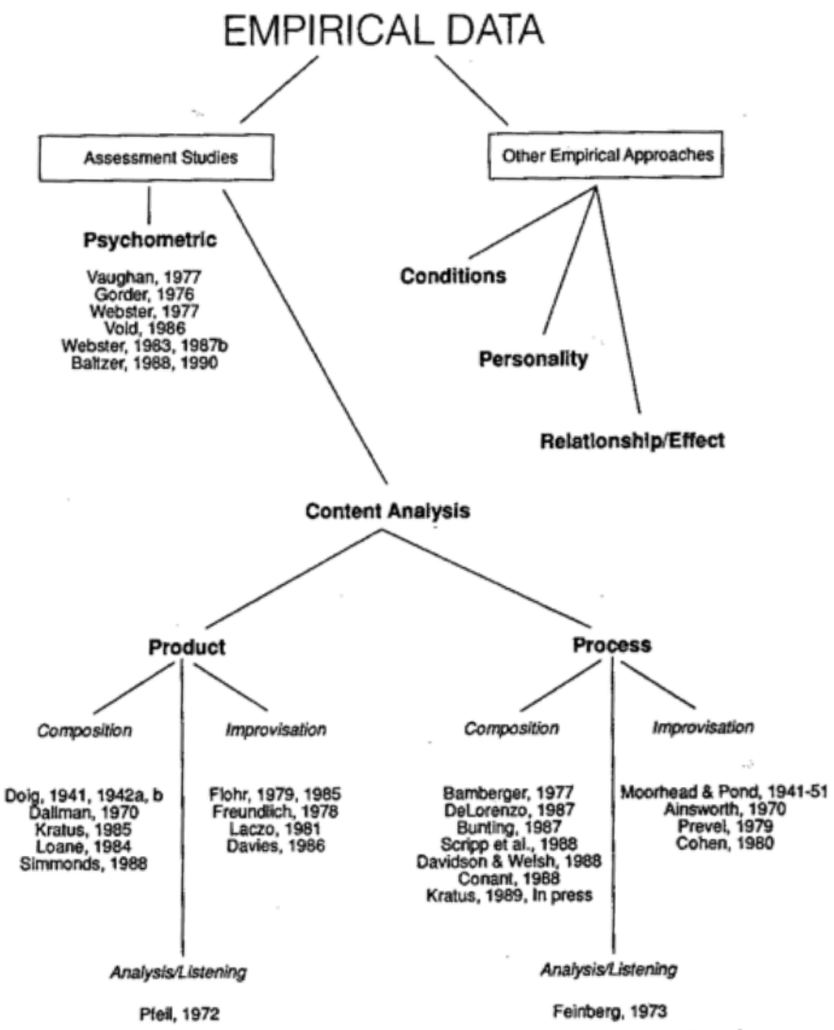

Figure 17-1. *Literature model for empirical studies.*

The major categories have clear parallels with the general literature and many characteristics of the music studies in each category relate directly to the research summarized above. As with many schemes of this sort, overlap is common and readers should not be surprised to find studies that might be grouped in more than one subdivision. Some studies contain content that might also be placed in theoretical or practical categories as well as the empirical. The placement decision was based on what the major thrust of the work seemed to be.

Within the content analysis category, a distinction is made between studies that have concentrated on assessment of *process* as opposed to *product*. Research strategies for process studies focus on observable behaviors or reported thought processes during the creative act. Assessment techniques employing this kind of research tend to be quite descriptive and include case study and naturalistic studies. The product studies, on the other hand, involve work on the end result of the creative act. Findings often center on the nature of musical characteristics as a clue to mental processes.

A final distinction is drawn between studies in the product and process categories that are concerned with composition, improvisation and analysis/listening. There is some discussion in the literature about the differences between composition and improvisation, especially as one considers the musical products of young children. The distinction made here is quite simple. If subjects are given the opportunity to revise their work in some way before it is considered finished, the product or process is considered more compositional in nature. If the product or process is not reconsidered for change, it is more improvisatory.

Space restrictions in this chapter will not allow a detailed review of each of these studies. What follows is a description of selected works that are key to understanding the contemporary trends in the field.

Psychometric studies in music

Currently there are no published, standardized norm-referenced measures of creative thinking in music. This fact is, in part, a reflection of the measurement problems noted above and the youthfulness of this line of research in traditional music education circles. There is a group of published research studies on measurement development, however, that suggest this will soon change. The work summarized below typically engage subjects in musical tasks and score the process and/or products using a measurement scheme that is related to approaches taken in the general literature. Criterion factors such as musical fluency or musical originality are defined, as are factors of musical relevance or syntax. Multiple judges are often used for more subjective judgments.

Vaughan's early work

Vaughan (1977) completed the first significant attempts to measure creative thinking in music–a series of four studies from 1969 to 1976 which used a set of six tasks designed for grade school children. These tasks were quite simple is design, asking children to improvise: (a) rhythm patterns as a re-

sponse to a given stimulus and another set of patterns simultaneously with a given ostinato, (b) melody patterns in a similar manner and (c) a "piece" showing how the subject feels during a thunderstorm. The final task allowed subjects to use melody bells, tom-tom and any vocal sounds desired. The scoring scheme used a panel of judges to evaluate factors of musical fluency, rhythmic security and ideation. Although interjudge reliabilities of .67 to .90 are reported for the various studies using the test, little other validity data is reported for the research.

By contemporary standards, the Vaughan work would be considered incomplete. Its significance, however, is that it represents the first studies to construct *musical* tasks to evaluate creative thinking in music, basing the tasks on established theories in both music and the general literature. Many of the approaches taken to scoring would be repeated in future studies by other researchers.

Research with high school musicians

Gorder (1976) and Webster (1977) completed the first studies of high school aged students using purely musical assessment tasks. Working at the same time but without knowledge of each others' work, both researchers designed tasks that were scored on the Guilford and Torrance principles of fluency, flexibility, originality and elaboration. Gorder added a factor called "musical quality" which is significant because it represented the notion of worthiness or relevance of a product to a particular domain. Many contemporary definitions of creativity include this dimension.

Gorder's measure was validated by a panel of musical experts and construct validity was established in part by factor analysis. Test-retest and split-half reliabilities ranged from .69 to .90. He scored all tests himself, however a panel of three trained judges scored a sample of the subject records and interjudge reliability was acceptable. The sample for the main study numbered 81, drawn at random from 542 junior and senior high school band students from eight different schools. Subjects were asked to improvise in four tasks using either their own instruments or by whistling or singing. The tasks themselves were represented as skeletal music notation and subjects were asked to improvise using the motives, note heads or contour markings as guides. The approach taken for evaluation used a music content checklist -- 78 items relating to melody, rhythm, plus/tempo, style, dynamics, timbre, expressive devices and form. The four tasks were scored for number of phrases (fluency), shifts of content character (flexibility), extent of content beyond the minimum expected (elaboration), unusual content (originality) and musical appeal (quality).

Webster's work also included improvisation, asking 77 high school instrumental and choral subjects to perform on melody bells in order to control for performance ability. No notation was used, but subjects were asked to complete tasks of increasing difficulty with the bells. The penultimate task involved a performance of the simple nursery tune "Twinkle" followed by

an opportunity to perform the same tune in variation three more times, each time moving further away musically from the original. In the final task, subjects were asked to compose an original tune short enough to play from memory without error but not so so short as to be simply a motive or figure. This tune was then to be merged with "Twinkle" in an original composition.

Unlike Gorder, Webster asked the same sample to complete a set of take-home composition and analysis tasks. The composition tasks used a technique similar to Gorder's skeletal improvisation guides, presenting subjects with an outline of a short musical phrase for triangle and some other instrument or voice part. Reference points in the phrase were indicated by note heads and subjects could use traditional or invented musical notation to complete the phrase. Other tasks used a similar approach, but added more freedom of choice.

The analysis tasks were probably the most unusual aspect of the study. It is rare to find attention paid to the notion of creative listening/analysis and this style of assessment is often not explored. The first activity asked subjects to make as many imaginative and original observations as possible about the structure and design of a fourteen measure melody extracted from Volume 1 of Bartok's *Mikrokosmos*. Although the melody did contain many obvious structural components, there were many that were less obvious relating to tonality, diminution of note values and melody range. The second and third activities included other musical scores from which a number of observations about musical structure and content could be made. These included a comparison of two duets from the *Mikrokosmos* and a clever twelve-tone composition by Milton Babbit entitled "Play on Notes." The Babbit piece was constructed from two hexachords with a number of permutations and the text was written as a retrograde that makes sense when read in either direction.

Scoring approaches to each set of tasks were similar to Gorder, translating notions of fluency, flexibility, originality and elaboration into musical terms. Scorer reliability ranged from .81 to .93 and interjudge reliability ranged from .70 to .90. A panel of musicians helped establish content validity.

Both the Gorder and Webster studies are important in the literature because of their success in defining the qualities of creative thinking assessment in music both theoretically and statistically. Correlations of creative thinking scores in music with traditional music aptitude and general intelligence measures were low and not significant -- a tendency that has been shown repeatedly in research on creative thinking in music.

Baltzer's work with Wang's Measures of Creativity in Sound and Music

Psychometric research with younger children has been of recent interest to Baltzer, Wang and Webster. To date, Baltzer has published two studies that use Wang's *Measures of Creativity in Sound and Music* (MCSM) (Baltzer, 1988 and 1990). Designed for children ages three to eight, this measure is modeled after Torrance's preschool measure (Torrance, 1981) and consists of four activities that provide data on musical fluency

and musical imagination. Baltzer describes the measure as follows:

> In Activity 1, the child is asked to produce as many different examples of steady beat as possible using two plastic containers and lids as sound sources. The second activity requires the child to imitate, with rhythm instruments, a series of six described events described by the test administrator (thunderstorm with lightning, a giant walking, a horse in motion, popcorn popping, a small river flowing, and someone typing). In Activity 3, the subject is asked to demonstrate as many different ostinatos as possible, given two notes, C and G, on a bass Orff xylophone, and in Activity 4 the subject is asked to move in appropriate ways to six selections of recorded music. (1988, p. 237.)

The musical fluency score is determined by adding the number of responses in activities one and three. The musical imagination score is a total of the appropriateness ratings in activity two and the quality of movement rating in activity four. Baltzer (1988) administered the Wang measure to 32 second grade subjects. Two judges were used to evaluate the tests, with interjudge reliability ranging from .90 to .99. Preliminary data on concurrent validity, expressed in terms of correlations with a music specialist's ratings of creative ability, were moderate to low (.14 to .43). However, such a result must not necessarily be viewed as evidence for poor test validity, since the music specialist's view of student creative thinking in music is often confused with their convergent achievement skills. This is a classic measurement problem in the literature. Baltzer's most recent study of MCSM was part of an elegant factor analytic investigation of creativity tests in music that involved 90 subjects (Baltzer, 1990). Interjudge reliability results were similar and factor analysis did help to confirm the construct validity of the fluency and imagination factors.

Wang, herself, has not published data on her work with MCSM as yet. The measure awaits more extensive research and a clearer description of its scoring rationale and theoretical base.

Webster's Measure of Creative Thinking in Music

The *Measure of Creative Thinking in Music* (MCTM) (Webster, 1987b), designed for children aged six to ten, has been used in a number of recent studies. Although it follows many of the traditional approaches outlined above, it does differ in its use of instruments, diversity of tasks and scoring scheme.

The MCTM uses three sets of instruments: (a) a round "sponge" ball of about 6" in diameter that is used to play tone clusters on a piano, (b) a microphone that is suspended in front of the piano and is attached to an amplifier and speaker and (c) a set of five, wooden resonator blocks. There is a brief warm up period that is not scored and is designed to familiarize the children with the simple techniques necessary to play the instruments. All tasks are video taped unobtrusively and

scored at a later time. The measure requires about 20 to 25 minutes to administer per child.

There are 10 scored tasks, divided into three parts: *exploration*, *application* and *synthesis*. The tasks begin very simply and progress to higher levels of difficulty in terms of divergent behavior. The *exploration* section is designed to help the children become familiar with the instruments used and how they are arranged. The musical parameters of "high/low", "fast/slow" and "loud/soft" are explored in this section, as well as throughout the measure. The way the children manipulate these parameters is, in turn, used as one of the bases for scoring. Tasks in this section involve images of rain in a water bucket, magical elevators and the sounds of trucks.

In the *application* tasks, children are asked to do more challenging activities that focus on the creation of music with each of the instruments singly. Certain tasks have children enter into a kind of musical question/answer dialogue with the tester using a mallet and temple blocks, while other activities involve the creation of sound pieces with the round ball and piano or with voice and microphone. Images used include the concept of "frog" music (ball hopping and rolling on the piano) and of a robot singing in the shower (microphone and voice). In the *synthesis* section, children are encouraged to use multiple instruments in tasks whose settings are less structured. A space story is told is sounds, using line drawings as a visual aid. Finally children are instructed to create a composition that uses all the instruments and that has a beginning, a middle and an end.

The scoring of the video tapes involves both objective and subjective techniques. There are four factors used: (a) musical extensiveness -- the amount of clock time involved in the creative tasks, (b) musical flexibility -- the extent to which the musical parameters of "high"/"low" (pitch); "fast"/"slow" (tempo) and "loud"/"soft" (dynamics) are manipulated, (c) musical originality -- the extent to which the response is unusual or unique in musical terms and in the manner of performance and (d) musical syntax -- the extent to which the response is inherently logical and makes musical sense. Musical extensiveness and flexibility are measured objectively by counting the actual seconds of time a child is involved in a task and by observing the manipulation of musical parameters respectively. For best results, musical originality and syntax are evaluated by a panel of judges, however one observer is certainly possible. Rating scales based on developed criteria are used for these factors.

Reliability and validity data have been collected in a number of studies (Webster 1983, 1987b; Swanner, 1985; and Baltzer, 1990). MCTM has also been used in a study of cognitive style by Schmidt and Sinor (1986). In terms of interjudge reliability for the factors of MO and MS, coefficients range from .53 to .78 with an average of .70. Internal reliability, measured in the form of Cronbach Alpha coefficients, range from .45 to .80 with an average of .69. Test-re-test reliability indicates a range between .56 and .79 with and average of .76.

Content validity was established with a panel composed of music educators, composers and psychologists. To help establish

construct validity, the scoring factors from the first administration of the measure (Webster, 1983) were studied to determine feasibility of factor reduction. Factor analysis showed each factor significantly contributed to two global factors which represented the theoretical existence of convergent and divergent thinking. Some concurrent validity data exists in the form of significant correlations between music teacher ratings of divergent thinking and scores on the MCTM, although this has not been investigated extensively. All of the studies have shown a lack of correlation between measures of music aptitude and the MCTM, demonstrating that MCTM is not assessing the same abilities as those shown by musical aptitude tests. Baltzer's work (1990) confirmed much of this information, but did not find factor analysis results that supported the presence of the two global factors of convergent and divergent behavior in the MCTM. As with the Wang measure, more research and revision is needed with MCTM in order to improve its ease of use, scoring scheme, construct validity and overall reliability before publication is warranted. MCTM is made available in unpublished form to any researcher or practitioner who is interested in its use.

Content Analysis

Composition–Product

The formal assessment of children's composition and their musical characteristics has received surprisingly little attention. What work we do have is limited to largely monophonic composition. Advances in computer and sound technology as well as software development may well change this situation dramatically in coming years.

Doig. Doig's work (1941, 1942a, 1942b) has historical significance for its systematic reporting of experiments in group composition long before any heritage of such research. Working with children between the ages of six and sixteen, she was interested in how children compose music before formal training. In classes arranged by age group, Doig encouraged children to generate melodic phrases individually and then asked the group to vote on those that seemed best -- a kind of composition by committee. For the three research reports, the songs were notated by Doig, then analyzed in terms of rhythmic, melodic and structural characteristics. Tabular data on intervals, non-harmonic tones, phrase structure, key, mode and range used were presented in each of the three studies, as well as musical examples. She made general conclusions about developmental patterns across ages, but it is difficult to interpret these results given that the music was constructed in groups rather than individually. Doig was also the only judge of the compositions and it is unclear exactly how she might have influenced the final products as a teacher. Nevertheless, the assessment techniques used are of interest, especially to present day practitioners who may be interested in experimenting with group composition.

Kratus. A key research study on children's compositional products was reported by Kratus (1985). Subjects included 80 children aged five to thirteen drawn from a sample of volunteers that represented a variety of school settings. Kratus was

interested in the developmental nature of children's original compositions, in this case melodies composed on a hand-held electronic keyboard. Of special interest were the rhythmic and melodic patterns, rhythmic and melodic motives and phrase characteristics of music of five, seven, eleven and thirteen year olds. Kratus engaged subjects individually and used a game-like format. After a period of experimentation with the small keyboard, he asked each subject to create a "song" that sounded good to them. The restrictions were that the melody use only the white keys and that the first pitches be "C", "D" and "E". Kratus reasoned that, although the restrictions did place some constraints on the subjects' creative materials, some framework such as this was needed for initiating the task and for helping to structure meaningful assessment. Such an approach is also consistent with many tasks designed by professional composition teachers and by many classroom teachers who work with children. The subjects in this study were given ten to twelve minutes to complete the melodies. If any finished early, the researcher would encourage continued work, but did not force the subject to go on. At the end of the time period, the melodies were tape recorded. Subjects were asked to perform the melody once and then a second time in order to determine whether the work was really composed or improvised.

Analysis of the data involved measurement of task variables such as the ability to replicate the melodies and melody length, as well as the assessment of twenty-one music content variables that related to the use of rhythm, melody, motive and phrase. Examples included: (a) motivic strength, (b) tonal strength, (c) melodic and rhythmic motion and (d) phrase repetition and development. The definition and justification for these variables were supported by a review of important writings in music theory and the psychology of music. A mixture of five-point rating scales (with each point defined separately) and dichotomous scales was used. Two independent judges rated those variables which demanded subjective judgment. Transcriptions of the melodies (pitch levels only) and the audio tapes were given to the judges. Interjudge reliability ranged from .55 to .88. The results demonstrated significant developmental differences on ratings of tempo stability, metric strength, tonal stability and finality, melodic motivic development and rhythmic motivic repetition.

Such systematic work is important for understanding children's musical thinking and its development over time. Research of this sort helps practitioners understand what to expect in the classroom and provides benchmarks for comparison. This, in turn, adds to our ability to assess musical growth more completely than if one were to use only standardized tests of convergent musical ability.

Loane. Before leaving this category, mention should be made of a report in the British literature by Loane (1984)[6]. This study presented an analysis of music composed by 11 to 14 year old children with a variety of musical backgrounds. Nine compositions are discussed and an accompanying audio tape--an impressive inclusion by the publishers of the journal--provides original performances of the children's mu-

sic to supplement the notation in the study. The compositions discussed are of varying lengths and complexities.

Although a detailed analysis according to predefined musical constructs as noted in Kratus' work was not in evidence here, the author did offer many thoughtful comments on the musical structure in relation to the cultural environment of the children. For example, the influence of pop and rock music was noted in the use of musical materials and text choice. Because Loane was also the music teacher of the children, he was able to comment on the use of musical materials in terms of his own teaching strategies. This allowed a level of descriptive analysis that is at once rich with musical detail while revealing of idiosyncratic approaches. Loane's descriptions were also marked by their speculation about the affective state of the music. Because he was in a position to know the children themselves as well as their creative efforts, he was able to observe what he understands to be the embodiment of feeling in their musical gestures. This feature makes the report quite unusual in the literature and, as some might see it, ahead of its time in its attention to both cognition and affect.

Composition–Process

Doig, Kratus, Loane and others have completed studies on the actual product of composition. There also has been recent work on the assessment of process, largely using observational data and interview. Much of this work is oriented toward case study, although some studies have been done with larger groups. A few research efforts in this category, such as the one by DeLorenzo (1987), share important implications for the growing literature in critical thinking in music and the reader is referred to the chapter on this subject elsewhere in this Handbook.

Bamberger. Bamberger (1977) experimented with a computer-based composition system (long before current technology) as a means for studying decision-making processes in melody writing. Using two untrained, college-aged students as subjects, she was interested in how an individual's mental representation of a melody was created and changed during the creative process. The subjects "wrote" melodies by typing characters on a computer keyboard which, in turn, played five "tune blocks" on a small synthesizer next to the subject. No visual cues were used. Each tune block contained no more than six diatonic pitches, had simple quarter and eighth note rhythms and ventured no larger than an interval of a perfect fourth. The task was simply to experiment with the serial order of the tune blocks and arrive at a suitable melody. The blocks could be arranged in any order and used more than once.

Bamberger provided a detailed description (protocol analysis) of all the actions made and words said by the two subjects as they arrived at their preferred order. An analysis was given of what the actions might mean in terms of mental function. For example, she noted differences in composing strategies, with one student using careful exploration while the other was very impulsive in exploring sound. The way each student used the keyboard also revealed the ability of each to internally repre-

sent or "think in sound." Bamberger was also able to draw several conclusions about the underlying rhythmic structures that were peculiar to each solution by noting the changes made in the use of each tune block.

This use of computer technology as an aid to the assessment of mental processes in composition is remarkable for its time. Recent advances in technology should make this kind of study commonplace in coming years.

Kratus. In addition to his work on products, Kratus (1989) has also completed work focusing on process. In this study, 60 children were tested using the same hand-held keyboard under similar testing conditions. Kratus recorded not the resultant composition, but the actual 10 minute experimentation which led to the composition. The purpose of this study was to examine how the rehearsal time was used in terms of exploration, repetition and development of musical materials. Amount of silence used was also of interest. The assessment technique required independent judges to evaluate each five seconds of elapsed time in the 10 minute time period in terms of how it was used by the subject. Interjudge reliabilities ranged from .76 to .99. Results indicated distinct differences in the use of musical material with respect to age. This research represents an interesting and meaningful application of assessment techniques used in time management and teaching style research to content analysis in composition. Similar approaches can be imagined with improvisation as well.

In a most recent study, Kratus (in press) studied the compositional strategies used by children to compose a melody. Again, sixty children between the ages of 7 and 11 were asked to compose melodies on an electronic keyboard. Two judges listened to tapes of subjects' melodies and rated the "success" of the melodies on a seven-point scale. Success was defined by musical craftsmanship and the ability of the child to replicate the melody. Another set of three judges listened to tapes of the composing periods for the 10 highest and 10 lowest rated songs and completed a content analysis of compositional strategies. This analysis involved the evaluation of each 2-minute interval according to 11 compositional strategies. Strategies included the use of stepping and skipping movement, changes in pitch and rhythm patterns, and repetition of musical ideas. Interjudge reliabilities for all assessment tasks ranged from .77 to .88. Results indicated that children who composed the most successful songs were found to use a variety of exploring, developing and repeating strategies and also tended to converge on a final solution early in the 10 minute period. Such results are intriguing and hold special promise for a developing theory of creative aptitude in music and for the teaching of compositional process.

Bunting. Another descriptive study from the British literature is important to include. Bunting (1988) presented a detailed account of three composition projects by two of his fifth year high school students. The assessment approach here was to present final products together with sketches and fragments that led to the final products. Bunting focused on the musical

development of each student while engaged in composition and includes details regarding his interactions with the students and the effect on the compositional process.

For instance, Bunting described the first extended composition assignment of one student who chose to complete a work for bass guitar. The author kept audio records of each sketch and intervened if any phase of the composition process required encouragement. Bunting explained that, at one point, the student's choice of chords was quite limited and not necessarily in context with the key structure. It was unclear if this was because of some desired effect or because the more likely chords were harder to play on the instrument. He described his process of suggesting and teaching the newer chords and notes the results on the final project. It is clear from his descriptions that students made the final choice and that the teacher's suggestions were just that. Again, the journal in which the article appeared published an accompanying tape recording which provided the reader with a clearer picture of the compositions and the creative process that led to them. Bunting concluded his article by asking the following questions which might aid in the assessment of students' creative work:

- what resources of skill and musical experience has the pupil drawn on in composing?
- to what extent has the pupil learned to recognize and avoid mechanical responses, to find the expressive meaning of his materials?
- what exploratory composition processes has the pupil learned to use and with what results?
- to what extent has the pupil learned to articulate his own musical style?
- to what extent can the pupil control the process of individual composition independently of the teacher?
- to what extent can the pupil appraise his own work, development and future needs? (1987, p. 52)

Although Bunting is not a professional researcher in the traditional sense, his work is worth noting. It is also a model of how research can be significantly enhanced by practitioners who are willing to write thoughtfully and carefully about what they observe.

Improvisation–Product

Research designed to study improvisation is often difficult to categorize as product or process oriented and, with younger children as subjects, tasks often resemble those in psychometric research. Product studies have used audio tape and independent judges in similar fashion to composition research.

Flohr. Flohr has reported two studies on the systematic evaluation of children's improvisations. The first work (Flohr, 1979) involved four, six and eight year old children in an analysis of improvisations using a two-octave Orff xylophone with a pentatonic scale. Twelve subjects (four children from each age group) met with the researcher for 10 individual, 15 min-

ute sessions. The subjects were allowed to: (a) freely explore the instrument; (b) participate in guided exploration involving a series of tasks which used melodic and rhythmic echoes, imitation of concrete sounds, given emotions, and musical dialogs; and (c) improvisations in which subjects created a melody while the researcher played a simple ostinato on another xylophone. Data analyzed included audio recordings of the sessions, descriptive notes of the researcher and musical transcriptions of the improvisations. The study was not designed for generalizability and was presented as a series of 12 case studies. The second reported study (Flohr, 1985) was similar in method, but included data on 10 children between the ages of two and five over a four year period. Valuable longitudinal results were reported, leading the author to speculate on developmental stages of improvisational ability.

Results of this work and other studies in this category point to a measurable change in the treatment of musical materials. It seems clear that carefully documented study of improvisations can lead to a better understanding of the musical mind, especially if merged with the more specialized findings in jazz and ethnomusicology. All of the findings are quite tentative and require replication with larger samples.

Improvisation–Process

Study of the processes used by children to improvise generally involve careful observation of how materials are manipulated during improvisation and interviews with subjects after the improvisation to determine thought processes involved. There is a strong tendency to endorse naturalistic research techniques in this category, using audio and/or video recordings, field notes, structured and unstructured interview techniques and other records as sources of assessment.

Pond and the Pillsbury Foundation School. Perhaps the most well-known series of studies in this category are those associated with the Pillsbury Foundation School in Santa Barbara, California which operated from 1937 to 1948. These studies are often cited, not so much for their quality of research technique or the richness of their findings, but because they were executed long before the current interest in ethnographic research and in the systematic study of creative thinking in music. The original studies were published from 1941-1951 and were reprinted more recently (Moorhead and Pond, 1978). Pond, who was a major force behind the research itself, has reported in retrospect on the studies (Pond, 1981). The School's archives were donated in 1977 to the Music Educators National Conference History Center at the University of Maryland (Wilson, 1981).

In today's terms, the School would likely be described as a kind of day care center with a strong music curriculum. According to Wilson's evaluation of records and oral history data (Wilson, 1981, pp. 16-19), its enrollment numbered between 10 and 20 students ranging in age from one to eight years. Some children stayed for only a short time, while others were in residence for a year or two. There was a minimum of structured activity, leaving a great deal of time for free exploration

of whatever materials were at hand including much attention to music.

Pond, a composer by training and disposition, was employed for eight years (1937-1944) as the school's music director. He began his work with no defined procedures, equipped only with an intense desire to see how children naturally developed musically. His notion was simply to put the children together with a number of unusual oriental, musical instruments (bells, xylophones, gongs, drums) and watch what occurred. He intervened only to answer questions or to participate in music making if asked by the children. Pond reported:

> Everything about this research was completely *ad hoc,* completely empirical. It had to be. I had to live, as the saying goes, from hand to mouth. When the researcher knows precisely what he wants to find out (whether, for example, a child can tell the difference between a major and a minor third) he can devise testing procedures. But although I knew there were many things I wanted to learn, I could only learn them from the children, from their spontaneous behaviors; because had I created any kind of artificial situation to inveigle them into telling me something, what they told me would itself had been artificial, and therefore useless. So, carrying on this research was rather like putting together a jigsaw puzzle without knowing what the completed picture was supposed to look like. Such a project takes persistence, acuteness of perception and ability to reason, and, perhaps above all, creative imagination. (1981, pp. 6-7)

Conclusions drawn from this research included: (a) observations about timbre and its triggering of curiosity about sound; (b) distinctions between original song and chant, each with its own musical characteristics; (c) and observations about rhythmic complexity and formal properties. By contemporary standards, the reporting of both the methodology and results seem at times to be unclear and difficult to interpret. The spirit of the research, however, is clear and the approach to the assessment of creative thinking serves as an important model.

Cohen. One modern study that used Pond's work as a point of departure was reported by Cohen (1980). Using many of the naturalistic techniques of Pond but with modern video tape technology, Cohen observed a kindergarten setting which featured a "music center" that was open for children to visit during certain times of the day. Cohen spent three years observing this activity, both through actual participation with the children and by video taping behind one-way glass. From this work, Cohen focused attention on two children for more intensive interaction and observation. Her data included observational data as well as personal interviews. She formed conclusions that center around: (a) exploration of instruments, musical elements and relationships between sounds; (b) practice toward the mastery of certain skills and (c) what Cohen called the production of musical gestures.

Unlike the Pond work, Cohen provided rich detail about the behavior of the children and did so with an overview as to where the behavior might fit in the mosaic of mental representation and process. The assessment approach was clearly enlightened by more than just behavioral reporting. Her many video tape observations of children producing sounds on instruments, for example, suggested that the experience was not just aural but visual, kinesthetic and tactile as well and that meaningful evaluation of children's work must include this fact. In reporting on the mastery concept, Cohen described fascinating sequences in which children try to match or recreate the musical utterances of their peers -- working doggedly at the task with unusual determination until the exact pitches and rhythms were found. One can sense the child's mind struggling with the mental sound image that was retained in memory.

A most important part of Cohen's work was the discussion of musical gesture -- a musical idea that may comprise a few notes or a longer musical entity. She attempted to document these gestures and to tie them to evolving mental schemata. In so doing, the researcher brought to the study of musical play in children the very ideas that drive some of the contemporary theories of adult music, including such concepts as surface and deep structure. What is important for this chapter is that she accomplishes this thoughtful assessment of creative thinking by intense observation and interaction with the improvisation process.

Analysis/listening–Product and process

The concept of "creative" analysis and listening has not been developed in the research literature to any extent, although the practical and theoretical literature often refers to notions of imaginative or divergent listening skills and creative approaches to written analysis (especially in terms of 20th century musical languages). Two studies are worthy of close attention, however, and each is candidate for extension in future research agendas. Each has much to offer assessment.

Feinberg. The Feinberg study (1973) and a later practical article (1974) argued for an application of creative assessment concepts such as fluency and flexibility of thought to the context of music listening. He presented a theoretical platform for considering music listening in a problem solving context and included a three phase model that has close ties with the stages of creative thinking first suggested by Wallas (1926) (see above). The concluding section of Feinberg's study demonstrated the application of these ideas to real examples of creative listening. For example, considering the notion of flexibility in music listening, Feinberg writes:

1. After listening to the following composition ["Chester" from Schuman's *New England Triptych*], make up a series of questions that you think relate to what you heard.

   Remember, the more areas you touch on in your questions, the more flexibly you are thinking.

2. While listening to the following work [the second movement of Hindemith's *Symphonic Metamorphosis of Themes by Weber*], place a check after any of the music

qualities listed on your "Aural Flexibility List" . . . whenever they reappear in the music. Each section will be indicated to you. Don't get "stuck" on any one quality.

3. After listening to two different recordings of the same composition [the finale from Bartok's *Concerto for Orchestra*], describe what you think the second conductor did that was different from what the first conductor did. Which version did you find more satisfying? Why? (1974, p. 56).

The "aural flexibility list" that is mentioned in task two above is simply a list of musical qualities such as "change in tempo" or "thick dissonant chords" next to which are several boxes that represent sections of music in serial order. Other example tasks are explained and accompanying worksheets are included. The implication for assessment is clear for both research and practice.

Pfeil. The other study in this category focused on both the process and product of creative listening and analysis, but has special meaning for product. Dealing primarily with college-aged students in a "music appreciation" class setting, Pfeil (1972) held firmly to the belief that traditional courses on this topic attempt to develop listening and analysis skills by the acquisition of a vocabulary of musical elements and events. Students' progress is often tested by their ability to supply a detailed commentary on these events, without much real thinking about them. Pfeil maintained that the fallacy here is the limitation of student experience and expression and the channeling of the listening activity to encourage passivity and discourage questioning and doing. The encouragement of divergent thinking, self-evaluation of one's own ideas, sensitivity to one's environment and openness to elaboration and discovery should more clearly be the goals.

Pfeil describes several interesting exercises which attempted to involve students in creative thinking on many levels. For example, one improvisation activity which led to creative analytical thinking included:

> *Situation*: the class members sit in a circle surrounding a tape recorder. Each person decides on one body or voice sound as his property. The piece is performed by the class members making their sounds in rotation once around the circle.
>
> *Purpose*: to make an interesting collage of sounds. The piece was taped and played back, and the question posed: how can this be made more interesting? The students, who had become acquainted with the principles of deferred judgment suggested many problems and solutions. Problems were listed first, then each problem was considered in turn for solutions. (1972, pp. 91-92.)

Other exercises suggested ways that concepts of notation might be approached. Great use was made of original notation in a number of tasks. Still other experiments involved students with compositional activities surrounding specific musical elements such as timbre and articulation. One large-scale project took the form of a notated composition for orchestra.

Simple, verbal descriptions were made more accurate and translated to score for actual performance by an ensemble.

Of special interest was the inclusion of a test of creative thinking in sound which employed no traditional notation. The purpose of the measure was to help evaluate the effectiveness of the creative approach to listening and analysis that the author had advocated in class. With the "real world" assessment of the products of meaningful listening/analysis in mind, Pfeil designed the measure using the Guilford factors of intellect for scoring. Task I, for instance, presented a three-stave composition using graphic notation together with the following task description:

> Imagine that you have a small band with very limited abilities. . . Following is a score for your ensemble. The sax player reads left to right across the top space, the trumpet player across the middle space, and the drummer across the bottom space. Each one plays his instrument when a line appears in his space, but is silent when no line appears. As you can see, the piece begins with the saxophone and trumpet playing together, and the drummer silent. Then for a short time, every one is silent. The piece lasts about 25 seconds.
>
> A. Study the score, try to imagine how it sounds, then list as many things about it that you do *not* like as you can.
>
> B. In the blank score below, write a new piece observing the previously mentioned limitations of your band. (1972, pp. 156-157.)

These tasks are evaluated for sensitivity to problems (defined as a function of the ability to sense a musical problem in a given notational structure), elaboration and originality. Another task presented the subject with an electrical wiring diagram and asks the subject to imagine it as a score and to comment on what it might sound like.

Although the measure is based in large part on imagined sound combinations in a composition framework, it attempts to assesses the actual result of both divergent and convergent thinking in a music listening/analysis context. It clearly can be applied and adapted to other settings and can be used as a criterion-referenced measure.

Future considerations

This chapter has summarized important studies in the music education research literature that seem representative of this vital topic. It is relatively young work -- tentative, experimental, in need of replication and expansion. It can be said with some confidence that creative thinking in music is a definable and measurable entity that should not be confused with traditional music aptitude, performance achievement, general intelligence or academic ability. Although there are multiple approaches to these definitions and assessment techniques, few would argue that this is necessarily bad. There is a common core of ideas that unifies this young literature, including: (a)

focus on mental abilities such as divergent and convergent thinking, thinking "in sound" and mental schemata, (b) personality traits and personal styles of thinking, (c) developmental trends during growth from the young child to the young adult and (d) stages of thought during the creative act.

What is needed to do to go further, to build on what we have accomplished so far? Certainly the ties to the general literature should be maintained and, in some unexplored areas, expanded. For example, personality and biographical inventories might well be investigated with music criteria, and new research on the environment including cultural and social influences should certainly be considered. The work with psychometric materials should be solidified with the publication and distribution of workable measures that can help in research design and in refining measurement and evaluation efforts in the schools. The content analysis work should continue, with special attention to joint research efforts between practicing teachers and professional researchers as they study the actual products and mental processes of our children. Certainly there is little doubt that the computer, with peripheral sound devices and imaginative software, will need to play an increasing role. Examples of such studies include those by Conant (1988) and by Scripp, Meyaard, and Davidson (1988) which use the computer in a composition setting to study the processes of composition and relate what is observed to the emerging literature on creative thinking. This approach needs to be expanded to include systematic study of improvisation and listening/analysis and needs to be applied to the psychometric literature as an option for test administration.

Finally, the most important need that faces researchers interested in this topic is the development of better theory. Working theories of creative thinking give focus to assessment efforts, bring order to the many approaches to definition and technique and aid in assessment validity. Theoretical work is already in progress that has important implication for assessment. For instance, Swanwick and Tillman (1986) reported a theory of creative musical development based in part on their empirical work with children engaged in musical improvisation and on the writings of other developmental psychologists. Stages related to age were suggested, together with the belief that there is an internal movement within each stage from personal, egocentric thinking to more social, conventional thinking. Pressing (1988) published a complex theory of improvisation process that is more adult-oriented and less developmental. He postulated the existence of "event clusters" that are strung together and that interact with certain cognitive structures. Lastly, Webster (1987a) speculated on creative music process and proposed a conceptual model that includes the interaction of enabling skills and conditions within a framework of divergent and convergent thinking driven by a product intention.

These theories, and others that may follow, are vital if any lasting progress is to be made. Any work in this field, whether it be theoretical, empirical or practical, presents unusually difficult problems for the researcher and practitioner, yet a quest

for solutions to these problems brings us to the very heart of our art form. Quite simply it will demand the best efforts from the finest, most creative minds in our profession.

Notes:

1. Readers interested in a broader review of the literature on creative thinking and music should consult the article by Richardson (1983) and the chapter by Webster (1988a). Richardson outlines the historical perspective by highlighting important writings before 19890 and provides an excellent review of the literature on instruction and its effect on creative ability. Webster provides a general overview of the entire field, including the practical literature. The chapter also contains a literature model that may be helpful for new readers to the field.

2. For a more extensive treatment of these evaluation tools and others, see Davis (1986) or Amabile (1983).

3. For additional information on stage theories and other theoretical writings on creative thinking, see Baltzer, 1990, pp. 18-23.

4. One possible exception to this is the work by Simonton on adult composers. One study (Simonton, 1980) investigated thematic fame (common occurrence in literature about music) and melodic originality (unusual use of musical material) of 10 classical composers as it might relate to such factors as biological stress and age. Although of interest to music education, this research does not directly deal with the issues of creative thinking in children and its meaningful assessment.

5. Readers interested in a more expanded literature model that includes other empirical study as well as the theoretical and practical literature should see Webster, 1988a. It should be noted that a number of studies in the empirical category include works that explore relationships between variables, study the effect of creative teaching strategies, describe personality studies or explore conditions of creative thinking. These studies employ assessment tools but the main focus of the research lies elsewhere. For example, see Schmidt and Sinor, 1986.

6. This study, and those by Swanwick and Tillman (1986), Davies (1986), Bunting (1987), and Simmonds (1988), are examples of a long-standing interest in the British music education community with the topic of creative thinking in music and its assessment. Curricula initiatives which encourage creative teaching strategies have inspired practitioners and researchers in Britain to make important contributions to the literature.

References

Ainsworth, J. (1970). Research project in creativity in music education. *Council for Research in Music Education Bulletin*. (22), 43-48.

Amabile, T. (1983). *The social psychology of creativity*. New York: Springer-Verlag.

Baltzer, S. (1988). A validation study of a measure of musical creativity. *Journal of Research in Music Education, 36* (4), 232-249.

Baltzer, S. (1990). A factor analytic study of musical creativity in children in the primary grades. Unpublished doctoral dissertation, Indiana University.

Bamberger, J. (1977). In search of a tune. In D. Perkins & B. Leondar (Eds.), *The arts and cognition*. Baltimore: Johns Hopkins Press.

Barron, F. (1969). *Creative person and creative process*. New York: Holt, Rinehart & Winston.

Bloom, B. (1985). *Developing talent in young people*. New York: Ballantine.

Bloomberg, M. (ed.) (1973). *Creativity: theory and research*. New Haven: College & University Press.

Bunting, R. (1987). Composing music: case studies in the teaching and learning process. *British Journal of Music Education, 4*(1), 25-52.

CMP 3. Experiments in musical creativity. (1966). Washington, D. C.: Music Educators National Conference.

Csikszentmihalyi, M. (1988). Society, culture, and person: a system view of creativity. In: R. Sternberg (Ed.), *The nature of creativity* (pp. 325-339). New York: Cambridge University Press.

Coleman, S. (1922). *Creative music for children*. New York: Putnam.

Cohen, V. (1980). The emergence of musical gestures in kindergarten children. Unpublished doctoral dissertation, University of Illinois.

Conant, B. (1988). A study of cognitive processes of children creating music in a computer learning environment. Unpublished doctoral dissertation, University of Massachusetts.

Dallman, R. (1979). A survey of creativity in music through composition in elementary schools of Colorado. Unpublished doctoral dissertation, University of Northern Colorado.

Davidson, L., & Welch, P. (1988). From collections to structure: the developmental path of tonal thinking. In J. Sloboda, J. (Ed.), *Generative processes in music: the psychology of performance, improvisation and composition* (pp. 260-285). New York: Oxford.

Davies, C. (1986). Say it till a song comes (reflections on songs invented by children 3-13). *British Journal of research in Music Education, 3* (3), 279-293.

Davis, G. (1986). *Creativity is forever*. Dubuque, IA: Kendall/Hunt.

DeLorenzo, L. (1987). An exploratory field of sixth grade students' creative music problem solving processes in the general music class. Unpublished doctoral dissertation, Teachers College, Columbia University.

DeLorenzo, L. (1989). A field study of sixth-grade students' creative music problem-solving processes. *Journal of Research in Music Education, 37* (3), 188-200.

Documentary report on the Ann Arbor Symposium on the Applications of Psychology to the Teaching and Learning of Music: Session III, Motivation and Creativity. (1983). Reston, VA: Music Educators National Conference.

Doig, D. (1941). Creative music: I. Music composed for a given text. *Journal of Educational Research, 35*, 262-275.

Doig, D. (1942a). Creative music: II. Music composed on a given subject. *Journal of Educational Research. 35,* 344-355.

Doig, D. (1942b). Creative music: III. Music composed to illustrate given music problems. *Journal of Educational Research, 36,* 241-253.

Feldman, D. (1986). *Nature's gambit: child prodigies and the development of human potential.* New York: Basic Books.

Feinberg, S. (1973). A creative problem-solving approach to the development of perceptive music listening in the secondary school music literature class. Unpublished doctoral dissertation, Temple University.

Feinberg, S. (1977). Creative problem-solving and the music listening experience. *Journal of Creative Behavior, 11*(3), 158-164.

Flohr, J. (1979). Musical improvisation behavior of young children. Unpublished doctoral dissertation, University of Illinois.

Flohr, J. (1985). Young children's improvisations: emerging creative thought. *The Creative Child and Adult Quarterly, 10*(2), 79-85.

Freundlich, D. (1978). The development of musical thinking: case studies in improvisation. Unpublished doctoral dissertation, Harvard University.

Gardner, H. (1983). *Frames of mind: the theory of multiple intelligences*. New York: Basic Books.

Gardner, H. (1985). *The mind's new science.* New York: Basic Books.

Gardner, H. (1989). *To open minds.* New York: Basic Books.

Goodman, N. (1976). *Languages of art: an approach to a theory of symbols.* Indianapolis: Hackett Publishing.

Gorder, W. (1976). An investigation of divergent production abilities as constructs of musical creativity. Unpublished doctoral dissertation, University of Illinois.

Gorder, W. (1980). Divergent production abilities as constructs of musical creativity. *Journal of Research in Music Education, 28*(1), 34-42.

Guilford, J. (1950). Creativity. *American Psychologist, 5,* 444-454.

Guilford, J. (1967). *The nature of human intelligence.* New York: McGraw-Hill.

Hargreaves, D. (1986). *The developmental psychology of music.* Cambridge, England: Cambridge University Press.

Hounchell, R. (1985). A study of creativity and music reading as objectives of music education as contained in statements in the "Music Educators Journal" from 1914 to

1970. Unpublished doctoral dissertation, Indiana University.

John-Steiner, V. (1985). *Notebooks of the Mind*. New York: Harper & Row.

Johnson-Laird, P. (1988). Freedom and constraint in creativity. In R. Sternberg (Ed.), *The nature of creativity* (pp. 202-219). New York: Cambridge University Press.

Kalmar, M., & Belasko, G. (1987). "Musical mother tongue" and creativity in preschool children's melody improvisations. *Council for Research in Music Education Bulletin, 91,* 77-86

Kratus, J. (1985). Rhythm, melody, motive, and phrase characteristics of original songs by children aged five to thirteen.Unpublished doctoral dissertation, Northwestern University.

Kratus, J. (1985). The use of melodic and rhythmic motives in the original songs of children aged 5 to 13. *Contributions to Music Education, 12,* 1-8.

Kratus, J. (1989). A time analysis of the compositional processes used by children ages 7 to 11. *Journal of Research in Music Education, 37*(1) 5-20.

Kratus, J. (in press). Characterization of the compositional strategies used by children to compose a melody. Paper presented at the Thirteenth International Society of Music Education Research Seminar, Stockholm, Sweden (July, 1990). To be published in: *Canadian Music Educator: Special Research Issue*.

Laczó, Z. (1981). A psychological investigation of improvisation abilities in the lower and higher classes of elementary school. *Council for Research in Music Education Bulletin, 66-67*, 39-45.

Loane, B. (1984). Thinking about children's compositions. *British Journal of Music Education, 1*(3), 205-231.

MacKinnon, D. (1965). Personality and the realization of creative potential. *American Psychologist, 20*, 273-281.

Morgan, H., ed. (1947). *Music education source book*, Washington, D.C.: Music Educators National Conference.

Moorhead, G., & Pond, D. (1978). *Music for young children*. Santa Barbara: Pillsbury Foundation for Advancement of Music Education. (Reprinted from the 1941-1951 editions.)

Oehrle, E. (1984). A case for creativity in elementary music education. Unpublished doctoral dissertation, University of Natal (South Africa).

Pfeil, C. (1972). Creativity as an instructional mode for introducing music to non-music majors at the college level. Unpublished doctoral dissertation, Michigan State University.

Pond, D. (1981). A composer's study of young children's innate musicality. *Council for Research in Music Education Bulletin, 68*, 1-12.

Pressing, J. (1988). Improvisation: methods and models. In J. Sloboda (Ed.), *Generative processes in music: the psychology of performance, improvisation and composition* (pp. 129-178). New York: Oxford.

Prevel, M. (1979). Emergent patterning in children's musical improvisations. *Canadian Music Educator, 15* 13-15.

Reimer, B. (1989). *A philosophy of music education*. (Second Edition). Englewood Cliffs, New Jersey: Prentice-Hall.

Richardson, C. (1983). Creativity research in music education: a review. *Council for Research in Music Education Bulletin, 74*, 1-21.

Rimm, S., & Davis, G. (1980). Five years of international research with GIFT: an instrument for the identification of creativity. *Journal of Creative Behavior, 14*, 35-46.

Rothenberg, A., & Hausman, C. (1976). *The creativity question*. Durham, N.C.: Duke University Press.

Scripp, L., Meyaard, J., & Davidson, L. (1988). Discerning musical development: using computers to discover what we know. *Journal of Aesthetic Education, 22* (1), pp. 75-88.

Shank, R. (1988). Creativity as a mechanical process. In R. Sternberg (Ed.), *The nature of creativity* (pp. 220-238). New York: Cambridge University Press.

Simmonds, R. (1988). An experiment in the assessment of composition. *British Journal of Music Education, 5* (1), 21-34.

Simonton, R. (1980). Thematic fame and melodic originality in classical music: a multivariate computer-content analysis. *Journal of Personality, 48*, 206-219

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

Sloboda, J., ed. (1988). *Generative processes in music*. New York: Oxford University Press.

Schmidt, C., & Sinor, J. (1986). An investigation of the relationships among music audiation, musical creativity, and cognitive style. *Journal of Research in Music Education, 34*(3), 160-172.

Sternberg, R., ed. (1988). *The nature of creativity*. New York: Cambridge University Press.

Swanner, D. (1985). Relationships between musical creativity and selected factors including personality, motivation, musical aptitude and cognitive intelligence as measured in third grade children. Unpublished doctoral dissertation, Case Western Reserve University.

Swanwick, K., & Tillman, J. (1986). The sequence of musical development: A study of children's composition. *British Journal of Music Education, 3*(3), 305-339.

Tardif, T., & Sternberg, R. (1988) What do we know about creativity? In R. Sternberg, (Ed.), *The nature of creativity* (pp. 429-440). New York: Cambridge University Press.

Thomas, R. (1970). *Manhattanville music curriculum program: final report*. (Report No. BR6-1999) Purchase, New York: Manhattanville College of the Sacred Heart. (ERIC Document Reproduction Service No. ED 045 865)

Torrance, E. (1966). *Norms-technical manual: Torrance tests of creative thinking*. Bensenville, IL.: Scholastic Testing Service.

Torrance, E. (1973). *Thinking creatively in sound and words*. Bensenville, IL: Scholastic Testing Service.

Torrance, E. (1981). *Thinking creatively in action and movement*. Bensenville, IL: Scholastic Testing Service.

Vaughan, M. (1977). Musical creativity: its cultivation and measurement. *Council for Research in Music Education Bulletin, 50*, 72-77.

Vold, J. (1986). A study of musical problem solving behavior in kindergarten children and a comparison with other aspects of creative behavior. Unpublished doctoral dissertation, University of Alabama.

Wallach, M., & Kogan, N. (1965). *Modes of thinking in young children*. New York: Holt, Rinehart & Winston.

Wallas, G. (1926). *The art of thought*. New York: Harcourt, Brace.

Webster, P. (1977). A factor of intellect approach to creative thinking in music. Unpublished doctoral dissertation, Eastman School of Music, University of Rochester

Webster, P. (1979). Relationship between creative behavior in music and selected variables as measured in high school students. *Journal of Research in Music Education, 27*(4), 227-242.

Webster, P. (1983). An assessment of musical imagination in young children: Technical Report. In P. Tallarico (Ed.), *Contributions to symposium/83: the Bowling Green State University symposium on music teaching & research* (pp. 100-123). Bowling Green, Ohio: Bowling Green State University.

Webster, P. (1987a). Conceptual bases for creative thinking in music. In J. Peery, I. Peery & T. Draper (Eds.), *Music and child development,* (pp. 158-174). New York: Springer-Verlag.

Webster, P. (1987b). Refinement of a measure of creative thinking in music. In C. Madsen & C. Prickett (Eds.), *Applications of research in music behavior* (pp. 257-271). Tuscaloosa: University of Alabama Press.

Webster, P. (1988a). Creative thinking in music: approaches to research. In J. Gates (Ed.), *Music education in the United States: Contemporary issues* (pp. 66-81) Tuscaloosa: University of Alabama Press.

Webster, P. (1988b). New perspectives on music aptitude and achievement. *Psychomusicology, 7*(2) 177-194.

Webster, P. (1990). Creativity as creative thinking. *Music Educators Journal, 76*(9), 22-28.

Weisberg, R. (1986). *Creativity, genius and other myths*. New York: Freeman.

Wilson, B. (1981). Implications of the Pillsbury Foundation School of Santa Barbara in perspective. *Council for Research in Music Education Bulletin, 68*, 13-25.

Winner, E. (1982). *Invented worlds: the psychology of the arts*. Cambridge, MA: Harvard University Press.

Wolf, D. (1988). Opening up assessment. *Educational Leadership, 45*(4), 24-29.

Reflection by John Kratus

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The old captain was known far and wide for his sailing prowess. For many years he guided his sailboat safely through the treacherous waters off the North Coast. No blinding fog, no torrential rain, no hurricane winds could faze him. His bravery, his unerring sense of direction, and his ability to overcome nature's wrath were admired by his crew and fellow captains.

However, there was one quirk about this captain. Every morning he went through the same strange ritual. He would lock himself in his captain's quarters and open a small safe. In the safe was an envelope with a piece of paper inside. He would stare at the piece of paper for a few minutes, lock it up, and then go about his captain's duties.

For years this went on, and the crew's curiosity grew and grew. What was on the paper? Was it a treasure map? The key to the secrets of Atlantis? Everyone speculated about the contents of the mysterious envelope.

When it came time for the captain to retire, his crew arranged for a party on the sailboat. During the party the first mate passed by the captain's quarters, and she noticed that the door to his room and the safe door were open. She tiptoed into the quarters and gingerly took the envelope from the safe. Quivering with anticipation, she withdrew the paper from the envelope. On the paper were four words:

PORT LEFT

STARBOARD RIGHT

Now in full disclosure, the author of the essay you are reading does not know the front end from the back end of a boat, or a ship, or a sail craft, or whatever you call it. I thank the Gods of Google for supplying the previous story. And in complete and full disclosure, when I read the opening story to my wife, she told me that everyone already knows that old chestnut of a joke. That is, everyone but me. So that should give the reader some understanding of the author's woefully incomplete education regarding sailing and his exceptionally limited ability to

work clever nautical references into this paper. So ends my description of the "author's lens."

But what the opening vignette may lack in freshness, it makes up for in metaphoric power. That is, a good scholar, like a good captain, can distinguish between left and right, east and west, in order to make the right decisions about which way to sail. But what seems simple (port/starboard) is not. One has to sort through and analyze a great deal of information with clarity, knowledge, and wisdom in order to set an appropriate course.

A good example of this type of clear thinking is Peter Webster's chapter on creativity in the 1992 Handbook of Research on Music Teaching and Learning. The title of the chapter, "Research on Creative Thinking in Music: The Assessment Literature," is really a misnomer. Handbook editor Richard Colwell assigned Webster the task of writing a chapter summarizing the literature on assessment of creative thinking in music. But Webster, rightfully thinking that important creativity research in music education extended beyond the confines of "assessment" studies, expanded the chapter into a comprehensive examination of the state of creativity research in music education. The chapter stands today as the best single review of the topic ever written.

A Pre-"Google Scholar" scholar

To develop a full appreciation of Webster's contribution to the music education profession, one must understand two aspects regarding the context in which this chapter was written. First, by 1990 the number of studies done on creative functioning in music was dwarfed by the much larger bodies of research on music performance, music listening, music preference, music conducting, and music teaching. The classic studies on children's compositions by Moorhead and Pond (1941/50) and Doig (1941a, 1941b, 1942) had been published half a century earlier. The published research on music creativity in the major research journals in music education from the 1960s through the 1980s was sporadic at best. The major contributions from scholars in Great Britain and Australia were yet on the horizon. Webster's chapter was reporting on a field of study that was emerging rather than established.

The second factor to keep in mind is that Webster was writing this chapter in a pre-"Google Scholar" world. You can understand my meaning by trying this experiment: open Google Scholar (scholar.google.com), click on Advanced Google Scholar, and type the words "creativity" and "music education" in the section labeled "Find articles with all the words." When I did that I found 13,700 results. Bingo! I now have access to thousands of valuable articles (and thousands of useless articles) on the topic. Thanks to Google Scholar, I can be an instant authority on the creativity literature in music education. I can even see which articles have been cited the most and have been most influential in the field. Webster's Handbook chapter was written in an era when being an authority on a subject meant carrying the knowledge of the subject's literature in one's head. He sought out the sources himself, and his hands turned the pages of the journal articles and disserta-

tions. That is what it meant to be a scholar, an expert in one's field.

There are four characteristics of Webster's chapter that I have found to be particularly valuable.

(1) The section "Problems That Face the Researcher" provides an overview of the difficulties faced by creativity researchers in the areas of semantics (what is creativity?), measurement, and data collection. All researchers embarking on a study of music creativity should read it. A doctoral advisor of mine once cautioned me against attempting a dissertation on creativity by saying "studying creativity is like chasing smoke." In a way he was right, and Webster highlighted the problems of objectifying the Muse. But I am glad that many people have chosen to chase the smoke.

(2) It is impossible to understand creativity in music education without acknowledging the contributions of the psychological community: Guilford, Barron, Wallas, Torrence, Amabile, Gardner, and Sternberg. In the section "Bases in the Nonmusic Literature," Webster provides a fine overview of these seminal authors' theories and research.

(3) Webster's "Literature Model for Empirical Studies" is the first and best taxonomy of creativity research in music education. The model is divided into three sections: assessment studies, content analysis, and other empirical approaches. Content analysis is divided into process and product, and then divided further into composition, improvisation, and analysis/listening. The section on other empirical approaches is divided into conditions, personality, and relationship/effect. This model of the research literature in music education creativity was the first to highlight differences between process and product, and provides valid guidelines for future researchers.

(4) Webster's chapter took an unabashedly psychological, and not sociological, stance. This was reasonable, given the time when it was written, a time when sociological issues in music education were rarely studied. Since that time, much of the research on children's musical creativity has focused on such things as friendship, collaboration, and in-class activities. Missing from much contemporary research on children's creativity in music is actual musical thinking. Research findings from this line of research suggest that young composers never revise their work, and that when one group of students composes an A section and another group independently composes a B section, they always fit together perfectly. Given these results, one would think that George Gershwin must have been helpless without Ira in the room. Webster examined music creativity as a psychological phenomenon, one that could be shared and collaborated upon with others, but one that emanated from a musically creative mind.

It is for these reasons that I have a deep appreciation for Webster's chapter in the Handbook of Research on Music Teaching and Learning. He provided guidance for a generation of music education scholars.

Personal reminiscence

Peter Webster and I taught on the music faculty of Case Western Reserve University from 1981 to 1984. During that time we had nearly daily discussions about our work, and one semester we even team-taught a seminar on creativity to five eager, but somewhat bewildered, graduate students. As he was leaving CWRU to move to Northwestern University, Peter gave me a gift. The gift came wrapped in two thick, brown legal document holders bound with elastic bands. Inside were hundreds of stapled, photocopied articles on creativity in music education. In order to stay current in the field of creativity, he had collected the articles over many years to use as a reference. The bulging document holders contained research articles, theoretical papers on creativity, articles describing activities for the classroom, and anything else on creativity that caught his fancy. This collection was his parting gift. He had made a copy for me of every article he had ever saved. Many of these articles later found their way into his 1992 Handbook chapter.

To me, a young assistant professor studying children's compositions, receiving this gift was like inheriting a gold mine. I eagerly poured over the articles, immersing myself in such topics as the Manhattanville Music Project, found sound compositions, research on improvisation, and pedagogical ideas for using the personal computer for composition! The articles were not in any particular order, but that was part of the fun. Truth be told, I never did read every article in the Webster collection, but I made a good stab at it. Page by page, the gift contributed greatly to my understanding of music creativity.

Now, twenty-eight years later, the pages of the articles have yellowed and become brittle; the black ink has smudged and turned to gray. But the two thick, brown document holders are still with me and reside in my campus office at Michigan State University. They are where I can readily reach them, behind a door in a cupboard built into a bookshelf. When I have the need to get something from the cupboard, I see the pile of articles resting there and inwardly smile.

As I was writing this essay and reflecting upon Peter Webster's gift, I wondered why I had kept these old articles with me all this time. My office is small and cramped, and the document holders take up a good deal of valuable space. Many of the articles, especially those on creative ideas for the classroom, seem dated and quaint, products of a time before iPad ensembles, indabamusic.com, and GarageBand. Much of the content in those articles I have already assimilated into my own thinking. . Besides, I have nearly instant access to all of the articles via an Internet connection to my campus library. It is far easier for me to retrieve a 1974 MEJ article on my laptop than it is for me to rifle through the hundreds of smudged yellow pages of the unordered articles in the brown document holders. So why didn't I pitch the articles years ago?

In the midst of writing this essay the answer came to me. Those articles contributed to the foundation of everything I know about creativity and music education. Yes, the world

and I had traveled far past the homey confines of the photo-copied articles, but they represented to me the enthusiasm with which I read Peter Webster's collection of articles and the beginnings of my own development as a scholar. As I once again opened the door to the cupboard, I understood that the real meaning of the contents of the two old document holders can be summarized in four words: Port left, starboard right.

References

Doig, D. (1941). Creative music: I music composed for a given text. *Journal of Educational Research, 35* (4), 263-275.

Doig, D. (1942a). Creative music: II music composed on a given subject. *Journal of Educational Research, 35* (5), 344-355.

Doig, D. (1942b). Creative music: III music composed to illustrate given musical problems. *Journal of Educational Research, 36* (4), 241-253.

Moorhead, G., & Pond, D. (1978). *Music of young children*. Santa Barbara, CA: Pillsbury Foundation for the Advancement of Music Education. (Reprinted from the 1941-1951 editions.)

Webster, P. R. (1992). Research on creative thinking in music: The assessment literature. In R. Colwell (Ed.), *Handbook of research on music teaching and learning (*pp. 266-280). New York: Schirmer.

Chapter 5

Revision

Reflection by Sam Reese

What do you mean, make my music different?

Webster, P. R. (2003). In M. Hickey (Ed.), *Why and how to teach music composition: A new horizon for music education*, (pp. 55-68). Reston, VA: MENC

Scene: Middle school general music classroom. Miss Williams is a music teacher working with a sixth grade class on a composition assignment. Students are engaged in small groups with the aid of computer-based music workstations. Miss Williams has asked the students to create some opening music for an act in a school play and she hopes to have each group present their pieces for class discussion. She has given her students some general parameters for length and form, but has left much of the music decision making up to the groups. This is a class that has composed music many times before so she is comfortable with this freedom, and so are the students. The music must be two minutes in length and have a recurring timbre designed to organize the music. It also must start softly and build to the end. Megan, one of the leaders of a group in a far corner of the room, has been working her group for the last 10 minutes of so, but now the group looks bored and off-task. Miss Williams decides to investigate.

Miss W: "Megan, how is the piece coming?"

Megan: "We're done."

Miss W: "Done? Really? Could I hear it?"

Megan: "I guess."

Miss Williams dons the headphones and clicks "play" on the music sequencing software. The music plays. It has a short ascending melody line played by the flute timbre that ends in loud symbol crash. The music is followed by a series of many more symbol crashes and then a brass timbre enters in the very low register with a growling sound. In less than 30 seconds, the music is over, falling far short of the intended parameters. Actually, much of the music in Megan's group in the last several projects has had the same instruments timbres, melodic patterns, and rhythms.

Miss W: "Well, this seems like a nice start, Megan, but it is a bit short and seems a good deal like the last piece you created. Can you make your music different by . . . ." (Megan looks confused and a little hurt and quickly interrupts:)

Megan: "What do you mean, 'Make my music different?'"

This chapter is about the wisdom of actively encouraging young composers to revise and extend their work and to do so with carefully crafted suggestions by the teacher. By "revision," I have in mind the "return to exploration in which composers test ideas that they previously accepted against new ideas while refining their finished product." (Kaschub, 1997, p. 24). By "extension," I mean a more specialized revision that either adds new musical ideas to existing work or expands an existing musical idea or set of ideas vertically or horizontally (Folkstead, 1996).

In the vast and still emerging literature on children's composition, it has been demonstrated over and over again that music teachers have good initial success when they ask children to compose. Reports from the field for a number of years have shown that children love to compose and that they enjoy listening to their music and the music of others (Moorehead and Pond, 1978; Upitis, 1992; Glover, 2000). What is far less clear is just what music teachers do with all this creative energy, besides celebrating its core presence in the minds and actions of those they teach.

Initial music gestures, or what I have come to call "primitive gesturals" (PGs), are very easy for children to create, especially with technological support (Greshiw-Nardi, T., 1994). A series of PGs can be strung together easily by children, creating a wide variety of timbral effects, spatial distance, and textural diversity. I have personally seen and heard hundreds of these pieces created rather effortlessly by children, with or without the use of computer-based technology. However, the question that is naturally formed in teachers' minds by these important examples of initial creative thinking is: "what do I do next in my teaching strategy?" Once these primitive gesturals are formed, how can we guide children to a more complete and extensive compositional experience? Or, indeed, should we?

Ignore, perhaps encourage, but never insist: Arguments against revision and extension

One obvious approach to the issue of revision and extension is not to mention it at all or to only encourage such activity without ever insisting upon it. Teachers that take this perspective believe that revision and extension when suggested by an outside force is not in the best interest of the child. Three classic arguments are often advanced.

The first relates to the rights of the child. To do anything more than suggest a process of revision or extension is to impose the teacher's thinking upon the creative process of the individual child. To insist children revise and extend their work is a violation of their rights as composers. Revision and extension will probably happen naturally as the child gets more experience, anyway. Research that has documented the composition process as it naturally occurs suggests that children are indeed happy with their initial ideas and do not see the need for revision (Kratus, 1989). Other work has documented that children naturally do some revision without being told to do so (Carlin, 1998).

Certainly if a teacher suggests a musical procedure or a change in a given melody, harmony, rhythm, timbre, dynamic, or other musical element, the teacher is going well beyond the bounds of creative integrity. It is argued that the child is not making aesthetic decisions but is being told what to do, thus increasing dependency on the teacher. Besides, if the child says the piece is done, then it is done.

A second argument centers on the teacher competency issue. Because teachers of music have likely not studied composition personally, asking children to revise and extend is not based on any substantial personal experience with doing it. "How can I do much more than give my kids a chance to compose? I can't really teach composition." Part of this attitude is conditioned by our years of traditional music theory that included the study of tonal part writing and analysis work centering on the surface and deep structures of large masterworks. We have come to think of music understanding in terms of highly technical knowledge that seems necessary to apply to a child's composition when we imagine ourselves as leaders of change.

A third argument is much more subtle and may not be spoken out loud. It has to do with the messiness and unpleasant reaction that naturally follows from a request for revision and expansion. In the scene above, Miss Williams understands that she may be in for some hard work with Megan. Revision and possible expansion of an first set of ideas is not always easy. The initial gesture is often quick to find, but it is the working out and expansion of the idea that requires real effort. This effort not only taxes the convergent and divergent thinking (Webster, 1990) of the child, but also of the teacher. For some, this ruins the fun of introducing composition in the first place and adds still more time to the activity in the context of a busy classroom, studio, or rehearsal hall.

These arguments, and ones related to them, are reasonable and worth careful study. Certainly a teacher cannot dominate the thinking process to a point that causes a creative child to become discouraged. Just as the over-bearing band, chorus, or orchestra director robs children of a sense of creativeness in performance settings, so too must the teacher of composition guard against a dictatorial posture. But is there a balance between dictating creative content and guiding creative discovery? If Miss Williams asks Megan to consider three other ways to use the crash symbol sound, is that crossing the line of individual freedom?

It certainly is so that music teachers without composition experience may not initially have the ability to do what a composer or composition teacher might do for a young composer. It is reasonable to believe that feedback to a young composer might lack the expertise that might be so in the music teacher's more comfortable performance venue, but is that as important as we make it to be? We all have instincts about sound designed to be expressive; we all can react with levels of craftsmanship and aesthetic sensitivity (Webster, 1990) that can help a young composer think in sound with new perspectives. Cannot Miss Williams sense a rhythm or textural pattern that can be highlighted and built upon in Megan's work? Is not Miss Williams skilled enough in the formation of her di-

rections that Megan might discover this quality herself and perhaps expand it in a new way that might teach something totally unexpected about music's power to express the ineffable?

Finally, creativeness is a messy business. Time taken to insist on revision and extension is time taken away from other valuable music experiences. But is what is learned about music absolutely worth the trouble? Children clearly do not like to revise, in part, because they feel that what they have initially done is seen as substandard and they are being asked to fix it. But does this mind set about revision and expansion need to always be seen this way? It is possible to design revision activities early and often enough to make this kind of activity a natural part of musical thinking? Group activity has been demonstrated to be conducive to the revision process (Kaschub, 1997), so might Megan's group become re-energized by some council from Miss Williams?

Why revise and extend?

I believe there are four convincing reasons why we should consider asking children to revise and extend. In describing these four, I hope to convince teachers to encourage children to routinely work beyond the first ideas and think more deeply about sound formed to express feeling.

The Core of What Music Is as Art. First, and perhaps the most important of all, is the notion that revision is part of how music is made. In the second edition of his classic text on music education philosophy, Reimer argues that:

> ...the artist works on the material, the material immediately works on the artist [author italics], and the artist, with her sensitivity and imagination and craftsmanship, responds and decides and carries the act forward... The art work grows and develops through the guidance of the artist's sensitivity to the feelings she recognizes, and imagination of their further potentials, and craftsmanly shaping of the material in which the expressive encounter is being embodied. (1987, p. 62)

Of importance here is Reimer's point that, at the core of creative work, the interaction of material initially created by the artist and the artist's continued work on this material becomes critical for the creative process. Revision is not only desirable but also necessary for creative expression.

In presenting a perspective on creative thinking, Elliott reflects on the need for creators to consider their material:

> Creative achievement requires that one be continuously on the look out for promising musical ideas and plans. This positive, inquiring mindset is another aspect of supervisory musical knowledge. It develops when students are guided and encouraged to reflect in, on, and about the originality, significance, and creative promise of the musical ideas they are generating and selecting. (1995, p. 226).

Supervisory musical knowledge, in Elliott's thinking, is part of musicianship. It relates to the metacognitive aspect of musical thinking where musicians "…monitor, adjust, balance manage, oversee, and otherwise regulate one's musical thinking…" (p. 66.) It seems clear that the thoughtful review of musical ideas is necessary for real musical thinking to occur.

Many other theorists have placed the notion of revision as part of creative thinking either implicitly or explicitly. For example, Wallas spoke of a verification phase in his famous process model (Wallas, 1926) where creative ideas were "worked out." His model was based on anecdotal evidence from many artists as they described their processes, and has been verified since by many professionals as they speak about their creative processes.

A more modern treatment of this notion can be found in the work done at Harvard's Project Zero (Gardner, 1989). The model of perception, production, and reflection forms the theoretical heart of this important project. The "reflection" piece, carried forth not only in music but in other arts as well, plays an important role in the thinking process.

In my own work, I have included revision as a key part in a model of creative thinking in music. Figure 1 displays the most recent version of this model. In the core, placed between divergent and convergent thinking, I have included the "working through" aspects in context with other steps in the creative process. Key here are the notions of revising, editing, and new idea formation that might be associated with extension. Other researchers have included similar endorsements of revision and extension in models that have flowed closely from actual observation of composition (Carlin, 1998).

Naturally Present in Children's Actions. The second reason to consider revision and extension as a required step in teaching children to compose is that it naturally happens to some extent as we observe free periods of compositional process. Several empirical studies have focused on compositional process and most have reported something about periods of "exploration" or "reflection." The well-known work by Kratus (1989) on time use by children demonstrated reliably the presence of exploration and development. In more qualitatively based studies, Younker (1997) and Younker and Smith (1996) showed how inexperienced and more experienced composers worked with musical ideas by naturally using revision and extension techniques. Folkstead (1996) reported similar behaviors in his subjects when working with technology.

The point of all these studies was not to examine the effect of revision or even to study its presence directly. In fact, a review of the music literature on creative thinking in music reveals not a single study that isolated revision or extension as a focus of study. But what these studies do tell us is that children spend at least some time working through musical material with being asked explicitly to do so. If a teacher can devise clever ways to build on this behavior without being too dominant, children may well feel that this is a natural part of learning how to compose.

Educational Value. A third reason to consider is what the child can learn about music. As Megan and her group of composers begin to experiment with that rising flute line by (1) extending if into the body of the composition, (2) creating a contrasting line in a new timbre that moves downward, (3) interrupting the movement with something unexpected, (4) adding the low brass sounds earlier in the work, (5) or any of a thousand similar extensions or revisions, she learns about music. This knowledge is not just surface understanding of how melodies or textures or timbres work, but she is learning about the power she has a composer to manipulate the sonic materials of music to create a sense of meaning otherwise unavailable to her. Miss Williams understands that, by encouraging the group to look beyond what they are comfortable doing, learning happens. Once the children understand that such a request is not about something being "wrong" with the music in the first place, but rather it is about taking the initial ideas further for the sake of a deeper music experience, the whole idea of revision and extension will seem logical and very important.

One example of this a study reported by Kaschub (1997). This research profiles the processes of two composition projects, one with six sections of sixth grade general music and one with a high school choir. In each project, a composer worked with the groups to create works cooperatively. The article is rich with examples of how the children gained a stronger understanding of music by participating in the composition project with revision and extension strategies. This is one example from the high school project:

> Once the high school students began to gain confidence in their ability to generate melodic material, the guide [composer] challenged them to think in layers. He began by suggesting that the students sing the opening melody and then to try it as a canon. As students experimented with different compositional techniques they began to offer ideas that were developed beyond just the melodic frame. Students began to sing in duets and trios …and presented multiple ideas until idea generation had to be put on hold so that the ideas already offered could be explored. Several students mentioned that their confidence in their ability to generate musical material grew rapidly. (p. 21)

In the conclusion section of this study, Kaschub points to the great benefits that come from engagement in composition in learning music. Studies by Christensen (1992) and Auker (1991) have demonstrated this empirically.

On a practical level, the classic books by Paynter (1992) and Schafer (1979) provide the music teaching profession with literally hundreds of teaching strategies for encouraging individual and group projects that surround revision and extension. These books are based entirely on the idea of encourage the music teacher, regardless of composition background, to en-

courage children to experiment with sounds as a way to express and understand music better.

Basis for Assessment. This last reason is a compelling one as we strive to assess compositional thinking. Since the spotlight has been placed on compositional thinking as an important part of the standards for music teaching content (National Standards for Arts Education, 1994), music educators have struggled with how to assess composition product and process.

The article by Hickey (1999) and the book by Brophy (2000) are good starting points in thinking about the design of rubrics, checklists, and rating scales for providing assessment of the revision and extension process. By creating such instruments and by sharing them with those that are being assessed, the emphasis is placed more on the process than the product. Overall product assessment, of course, is possible and may be important to use at key points in a teacher's work with children; however, by recognizing the importance of the manipulation of musical materials, the teacher is placing value on the creative thinking process.

How might this work for Megan's group? Miss Williams might have set up the assignment to reflect the need for more than just a product at the end. In addition to the project parameters dealing with length and overall form, the children might be provided with an evaluation rubric that could be completed by the children at the end of the time period. The children would be responsible for showing evidence of melodic extension, rhythmic variety, development of form, and many other possibilities. Another possibility would be journal reflections about what the compositional process was and how the group arrived at final solutions. Such reflections can be very strong evidence of who is engaged in the musical thinking and how it has transpired.

The point here is that the insistence on "working through" the potential of a musical idea and the documentation of this process is a major advantage for both the teachers and the children involved. The focus for quality shifts from not just the final product but to the journey to get there—which is often where the real learning occurs.

Making revision and extension happen practically

Very little is known about how best to teach compositional thinking. Even the literature on adult pedagogy for composition is very limited. One way to think of how to interact effectively with young composers is to consider stages based on where the composer is developmentally. A first stage might be a formative period where a child is discovering how to engage and work with initial musical ideas. A second stage could be more related to craftsmanship where individuals are looking for help in just how to accomplish a task. The third stage might be a more expert stage where a person is able to metacognitively understand the measured process of composition and to experiment with more holistic techniques related to thinking and feeling in order to find a personal voice.

Stage One: Formative. This stage requires care on the part of the teacher in offering structure versus freedom. In her excellent article on teacher control and creativity, Wiggins (1999) warns about the delicate balance in teacher feedback between being too directed and offering little structure for improvement and growth. She raises legitimate concerns about the music becoming the teacher's idea of good music rather than the product of the children's own aesthetic decision process. She writes:

> When teachers use expressions like, "I want you to do _____ with your piece," students can be overheard saying, "He doesn't want it like that. He wants us to do _____." They are more concerned about what will please the teacher than what will serve their own purposes. Teachers also need to think about how they respond when students make their work public by sharing their finished products or works in progress... Criticizing and altering students' work can give students the impression that they are composing for the teacher and not for themselves. They tend to lose ownership of the work, which is a critical part of engaging in the composition process in the first place. (p. 35)

Wiggins continues by suggesting that if the teacher senses that the pieces being composed lack, say, dynamic contrast, an acceptable approach might be to do class activities that focus on this concept before continuing on with another set of composition assignments. She encourages the teacher to praise the last set of pieces in general terms, but point to the fact that they were all one dynamic level and that now we intend to study music that has marked contrasts in hopes that you might include that in the next set.

Although this approach has clear merit in preserving the sense of whole that comes from children's "final" compositions while attempting to broaden the vocabulary by example, I worry about the missing of a "teachable moment" in reacting to student work this way. When children have the materials close at hand and "in their heads," teachers ought not to worry so much about insisting that young composers try out revised and extended patterns in the music. This is especially true if there is no evidence that a child or a group of children has actually thought in these terms.

Comments like: "I want you to add some contrast in dynamics here in measure 5 so that it sounds better," are clearly inappropriate and dictatorial; however, consider the following as a more meaningful approach:

> **Megan**: "What do you mean, 'Make my music different?'"
>
> **Miss W.**: "Well, are you completely happy with your music."
>
> **Megan**: "It's ok I guess"
>
> **Miss W.**: "What do you like least about your music?

Meagan: I guess it's kind of boring to me.

Miss W.: What can you do to make it more interesting?

Megan: I can make it longer I guess by adding a bunch more notes

Miss W.: Yes, you could do that—like we talked about the other day when we changed that melody in class, remember? Or you could add another voice if you wanted to, or you could play around with the dynamics.

This is a very different kind of interchange that can lead to further experimentation without dictating content. Of course, Megan and her group may still not revise and extend this particular music enough to make it more interesting to all parties concerned, but at least the way of dealing with music materials is established somewhat more than before.

Stage Two: Craftsmanship. As children become more experienced with working past initial musical ideas and moving on to the revision and extension process, the teacher's role might change. Instead of a watchdog to be sure revision and extension happens and balancing ones approach between dictator and simple facilitator, the teacher becomes more of a coach or a consultant. In this stage, the child is completely comfortable with the revision and extension idea, but has moved on to the need for practical help in solving sticky problems with the music.

For example, a high school student is participating in an online distance learning project with composing as a focus. The student's MIDI-based composition is submitted for review online and a teacher/critic offers comment on the piece. Perhaps the young composer has indicated a section in the music for which he or she has major concerns and hopes someone can offer a solution. In this case the teacher/critic can use a different kind of approach to revision and extension, focusing on a specific music problem. Here the intent for improvement and growth is the same as in Stage One, except the level of musical understanding is different and there is less concern that the teacher is dominating.

Stage Three: The Expert. Here, the teacher becomes a mentor and an engineer for helping the student discover his or her complete potential as a composer. The student is aware of this expert phase and actively seeks alternative approaches to composing music. For example, the student chooses to enter a composition program at a college or university and studies with a composition teacher. The teacher continues to function in roles similar to be Stage One and Two, but in this stage more subtle relationships between approaches emerge.

In a most interesting article from the adult literature on the pedagogy of composition, Carbon (1986) proposes four approaches as possible entry points into compositional work: thinking, feeling, intuition and sensation. In this article, he explores how each of these approaches to pedagogy can be tried with different students depending on what is needed at the time. The "thinking" approach is the most obvious, with

experiments in serial writing or other systems of composition that place a fair amount of attention on a system to create initial ideas and their revision. "Sensation" is approached with improvisation as a major way to generate content, demonstrating the close relationship between this form of music making and composition that has intrigued many music educators (Burnard, 2000s). Improvisation plays a role in the "feeling" approach too as Carbon suggests short improvisatory sequences based on an emotion such as rage or fear. "Intuition" is approached by having students create works that are more "streams of consciousness" pieces. (Carbon, p. 119). It is interesting to speculate about whether this particular system of helping a expert fully explore his or her potential as a composer might also take some form in Stages One and Two.

Concluding thoughts

Regardless of level, the issues surrounding revision and extension are fundamental to how we teach music composition, perhaps all music teaching. In preparing this chapter, I became very aware of one stunning fact: we desperately need more evidence from practice and from research on the roles revision and extension play in developing musicianship. The Megans of our world require nothing less.

References

Auker, P. (1991). Pupil talk, musical learning and creativity. *British Journal of Music Education, 8*, 161-166.

Brophy, T. (2000). *Assessing the child musician: A guide for general music teachers*. Chicago: GIA Press.

Burnard, P (2000). Examining experiential differences between improvisation and composition in children's music-making. *British Journal of Music Education, 17* (3), 227-245.

Carlin, J. (1998). *Can you think a little louder? A classroom-based ethnography of eight- and nine-year olds composing with music and language (eight year olds)*. Dissertation Abstracts International. 59 (5), 1503.

Christensen, C. (1992). *Music composition, invented notation and reflection: tools for music learning and assessment*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey.

Elliott, D. (1995). *Music matters*. New York: Oxford University Press.

Folkestad, G. (1996). *Computer based creative music making*. Goteborg, Sweden: Acta Universitatis Gothoburgensis.

Gardner, H. (1989). Project Zero: An introduction to "Arts Propel." *Journal of Art and Design Education, 8* (2), 167-82.

Glover, J. (2000). *Children composing 4-14*. London: Routledge.

Greshiw-Nardi, T. (1994). Creativity with instant feedback. *Teaching Music, 2* (3), 36-37, 55.

Hickey, M. (1999). Assessment rubrics for music composition. *Music Educators Journal. 85* (4), 26-33,52.

Kaschub, M. (1997). A comparison of two composer-guided large group composition projects. *Research Studies in Music Education, June/July,* (8), 15-28.

Kratus, J. (1989). A time analysis of the compositional processes used by children ages 7 to 11. *Journal of Research in Music Education, 37* (1) 5-20.

Moorhead, G., & Pond, D. (1978). *Music for young children*. Santa Barbara: Pillsbury Foundation for the Advancement of Music Education. (Reprinted from the 1941-1951 editions.)

National standards for arts education. (1994). Reston, VA: Music Educators National Conference.

Paynter, J. (1992). *Sound and structure*. London: Cambridge University Press.

Reimer, B. (1989). *A Philosophy of music education*. (2nd Edition). Englewood Cliffs, NJ: Prentice-Hall.

Schafer, R. (1979). *Creative music education*. New York: Schirmer.

Webster, P. (1990). Creativity as creative thinking. *Music Educators Journal, 76* (9), 22-28.

Upitis, R. (1992). *Can I play you my song?* NH: Heinemann Educational Books, Inc.

Wallas, G. (1926). *The art of thought*. New York: Harcourt, Brace and Company.

Wiggins, J. (1999). Teacher control and creativity. *Music Educators Journal. 85* (5), 30-35, 44.

Younker, B., & Smith, W. (1996). Comparing and modeling musical thought processes of expert and novice composers. *Bulletin of the Council of Research for Music Education. 128*, 25-36.

Younker, B. A. (1997). *Thought processes and strategies of eight, eleven, and fourteen year old students while engaged in music composition*. Unpublished doctoral dissertation, Northwestern University.

Reflection by Sam Reese

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While happily re-reading Peter Webster's chapter "What Do You Mean, Make My Music Different?" (Webster, 2003), I vividly recalled the gray, chilly December afternoon in the early '90's when I received my first phone call from Peter. I was sitting in my school office in suburban Chicago where I served as middle school music teacher and coordinator of the district music program. As he invited me to attend a week-long seminar at Northwestern University on HyperCard software development, the day seemed to brighten and my temperature rose as I realized I was working nearby another technology enthusiast. I now had the chance to learn first-hand from two of the seminal leaders in music education technology – Webster, and his close associate and fellow seminar leader, David Williams of Illinois State University.

It is not hyperbole to say that phone call changed the direction and long-term focus of my professional career. It brought me inside a circle of professional associates who were not only progressive leaders in music education and music technology, but were also fascinated by student creativity and how to broaden and enrich our profession by integrating music composition into our already well-established performance-based approach to music education.

In the ensuing years, Webster and I worked increasingly closely as I wrestled to develop and refine strategies for guiding students to learn to compose using early MIDI music sequencing software and keyboards within the context of a general music classroom. In this endeavor, Webster was unfailingly encouraging to me to move forward in this rather oddball curricular pursuit at a time when very few other music educators were doing anything similar. At the same-time, he challenged me to think more deeply and carefully about the nature of creativity and how students learn while composing. In my eyes, Webster's "true colors" as a risk-taker and inventive mentor were "hoisted" as he prodded me to "shove off from shore" and explore new waters together, even though our destination was not altogether clear!

Chapter overview

"What do you mean, make my music different?" makes a convincing case that expecting students to revise and extend their initial compositional music ideas is a necessary and highly beneficial experience as they learn about music while compos-

ing. Even though some teachers resist this idea for fear that they will excessively control a student's creative development, Webster articulates how prompting students to move beyond primitive gesturals (initial musical ideas) and to take on the real work and effort of revising, and then extending, these initial ideas is what causes more complex musical thinking to occur. In other places (Reese, 2001), I have called this "what if" musical thinking. This is the kind of thinking that evolves into deep, lasting learning about how music works.

While articulating four reasons why revision and extension are beneficial for the student, he probes the question, "Is there a balance between dictating creative content and guiding creative discovery?" (Webster, 2003, p. 57). Answering this question in the affirmative, he clarifies how revision and extension are not only desirable but are necessary for an authentic experience of composing. He asserts, "…teachers need not completely avoid insisting that children revise and extend." (p.63).

Freedom vs. structure

Webster's chapter readily brings to mind the recurring enigma that all composition teachers face – how much to guide student thinking directly and how much to step back and facilitate gently. They face this dilemma both while designing composing assignments and while guiding students with feedback during the composition process. This is the issue that many of us have labeled the "freedom vs. structure" issue. There is a tendency among some teachers to think that any restriction or any specific expectation that students revise their musical ideas is to fail to honor the "student's own voice." In contrast, some believe that students must be given strict parameters in order to create music that meets traditional standards and expectations.

As a whole, American school music teachers are still quite inexperienced in teaching composition and largely come out of backgrounds as performance-group teachers, which is often a very directive style of teaching. Therefore, our thinking about this enigma of how much freedom or structure to provide students is not as nuanced as it ought to be. Webster wisely knows that this is a false dichotomy and that sensitive, experienced teachers are making constant, dynamic decisions about when to "help students find their own voice" or when to "teach and tell" as students move through the composing process.

In another chapter (Reese, 2003), I propose a continuum of 11 teacher responses and critiques of student work that range from facilitative (heuristic) to directive (didactic). These 11 response types were derived from analysis of a large number of actual teacher feedback responses to student compositions. Experienced teachers know that it takes sensitivity and judgment ("the art of teaching") to know when to be directive and when to nudge and suggest. These decisions often are based on the purpose of the composition within the larger music education of the student, as well as where the student is in the composing process itself. One common pattern I experienced was to be most facilitative at the beginning of a new piece when the student was just forming musical ideas – to allow the student's own intentions to arise and take shape. But, as

the piece takes form and individual character, I increasingly directly suggested improvements that fit with the style and improved the student's craftsmanship.

As in so many other aspects of teaching, there are no rules and few guidelines to help teachers make these on-the-fly-decisions. As Americans, we would do well to seek the guidance of our much more experienced colleagues in Britain and Australia. In the end, however, it is only experience that provides the insights to know when to push students and when to simply step back. This is why efforts by teacher educators like Hickey and Leon-Guerrero (2000), MacLeod (2012), and many others are so important to gradually build the number of teachers who have not only experienced composing as an ongoing part of their music education but who have also experienced the complexity and subtlety of giving constructive feedback to budding composers. Will American music education witness a real inclusion of composing as a normal part of what students experience in school, as a new generation of educators who have experienced composing begin to lead our programs?

Can students revise and extend?

Some teachers seem to doubt that young composers have the cognitive and technical abilities to revise and extend their initial musical ideas gradually – that somehow this process is just too sophisticated for students to carry out. That may have been more true in the past when composing was largely tied to Western European standards of musical style and when the composing process was carried out "by hand" -- notating musical ideas on hand-written, five-line staff paper -- and when musical ideas had to be tested by having musicians play them.

But today, of course, musical ideas are created, previewed and altered largely in software, which has become a playground for the musical mind and which Webster and Williams have tirelessly explained and promoted to teachers. For 17 years, the Vermont MIDI Project (about to change their name to Music Composition Online Mentoring Program) has proven beyond the shred of a doubt that young composers can create musical ideas with notation software, then go on to revise and extend those ideas – occasionally at surprisingly sophisticated levels. With the guidance of experienced composers and teachers in an online forum, young composers work though an iterative process of critique and reflection as they gradually shape their germinal ideas into finished compositions. Each step of this creation and interaction is documented, has been studied by researchers, and has been a source of rich insight into the teaching and learning of composition in school programs (Shin, 2011).

Students need recurring composing experience

"Make my music different" presumes that students actually have the opportunity for repeated, continuing composing experiences. While many teachers rightly celebrate the inclusion of even one-time composing experiences in their classrooms, far too often these are isolated, short-term activities without time for students to analyze, reflect, and add to their initial ideas.

They get to shove the boat off from the dock but never hoist the sail! That is not real composing and that is not real sailing!

Because of crowded curricula and very limited instructional time, ongoing composing experience in schools is rare and is a major reason why students with substantial composing skills are not more common. How much progress would we expect a young instrumentalist to make if she only got lessons and practice one week a year?! Again, Vermont MIDI has demonstrated that when middle and high school students get regular, ongoing guidance over a few years, they develop very impressive compositional abilities. Restricted instructional time also forces teachers to forgo giving students an important initial period of open-ended discovery, play and exploration. Instead, students have to jump immediately to the "real work" phase of the process, meeting short-term deadlines imposed by teachers.

Will teaching composing change beliefs about learning?

I sometimes say that my seventh grade composing students taught me about "real" learning and "real" teaching. That is, as I struggled to get students to create music they actually cared about and didn't think of as just an assignment to be completed, I began to realize that I had to control and direct learning processes much less and to trust students' individual pathways to learning much more. For a teacher who thought of good music teaching as precisely directing students in performance groups and leading large-group general music activities, this was a deeply personal transformation away from teacher-centered instruction toward a constructivist attitude toward learning. It sometimes felt as real as stomach acid!

As more of our profession experiences the opportunity to guide student composing, will our beliefs and attitudes about how students learn gradually evolve? Will we adopt a disposition that celebrates inquiry and creativity rather than seeking closure and judging by strict criteria? Will we develop greater respect for the musical awareness and skills that students bring to school with them, even though these are often veiled in informal language and popular culture? Will our awareness grow that each person learns in unique ways and must process experiences through his own sensibilities for deep learning to occur?

This kind of trust in individual creativity and learning is what Webster has enlightened us about through a career-long opus of teaching, research and writing. He has wisely prodded us to be more adventurous and more willing to leap into the unknown. He has followed the shrewd advice of the old sailor-adventurer who said, "No one discovers important new lands without being willing to lose sight of the shore for a very long time."

References

Hickey, M., & Leon-Guerrero, A. (2000, November). *A collaborative music composition project: Lessons learned from a two-year study*. Paper presented at the annual meeting of

the Association for Technology in Music Instruction, Toronto, Canada.

MacLeod, S. (2012) *Vermont MIDI Project, About us: Project overview*. Retrieved June 21, 2012, from http://www.vtmidi.org/aboutus.htm

Reese, S. (2001). Tools for thinking in sound. *Music Educators Journal, 88* (1), 42-46, 53.

Reese, S. (2003). Responding to student compositions. In M. Hickey (Ed.), *Why and how to teach composition: A new horizon for music education* (pp. 211 – 232). Reston, VA: MENC.

Shin, H. (2011). Enabling young composers through the Vermont MIDI Project: Composition, verbalization and communication. Unpublished doctoral dissertation, University of Illinois at Urbana-Champaign.

Webster, P. R. (2003). What do you mean, "Make my music different"? Encouraging Revision and Extension in Children's Music Composition. In M. Hickey (Ed.), *Why and how to teach composition: A new horizon for music education* (pp. 55 – 68). Reston, VA: MENC.

Chapter 6

Music Technology

Reflection by David B. Williams

Key research in music technology and music teaching and learning.

Webster, P. R. (2012). *Journal of Music, Technology, and Education, 4*(2-3), 115-130.

ABSTRACT

Research on the use of technology in music teaching and learning continues to grow in both quality and quantity. This article summarizes some of the important work since 2000, placing an emphasis on studies completed in the last few years. Both conceptual and philosophical publications are included as well as qualitative and quantitative work on technology in service to composition, listening and performance.One major conclusion is that we need more substantial studies on teaching strategies that use technology, issues of gender and technology, equity in accessibility to the best resources and the real effect of technology's use on long-term learning in music for professional musicians and the educated public as a whole.

The modern-day use of technology in music instruction and learning is a complicated confluence of music technology development in its own right, the varieties of music evident in our pluralistic societies, and an emerging pedagogy that favors individual expression, constructionist learning and creative thinking, while respecting the need for conceptual learning (Webster 2011).

Music, and its development as either a more formal art or as part of a practical cultural experience, has been influenced historically by technology of all sorts. This ranges from the design of instruments and the attendant issues of physics of sound (Miranda & Wanderley 2006) to the most recent ways that music is consumed and distributed across the world with the assistance of online technologies (Ruthmann 2007).

On the hardware side, digital devices such as personal computers,tablets, phones and personal music players all support music sound files. The development of hard disk storage, laser disc technology, sampled sound as hardware resources has had a major effect on how music teachers do their jobs. In2007, laptops were the most popular type of computer purchased and personal digital players like Apple's iPod, were among the most popular digital devices purchased by today's

youth. Today, the tablet computer is rising quickly in popularity. According to one recent market source (Sarno 2011) manufacturers are expected to sell over 50 million tablet computers this year, with the number rising to 100 million in 2012. Laptops continue to be large sellers, but the tablet is expected to overtake the sales of laptops in coming years. Steve Jobs, Apple's visionary leader whose life ended recently much too early, famously claimed that this is the era of 'post-PC'. The implications for what this means for schools is clear. At this moment, we see schools in the United States beginning to invest in tablets largely because of cost savings, ease of student and teacher use and the variety of low-cost or free applications that are designed to run on such devices.This trend will surely continue in coming years. For software, we note several commercial titles for the support of music production (digital audio editing, traditional notation and graphics-based composition programs, loop-based composition and arranging, CD/DVD creation, music video/podcast presentations) and new work for music teaching and learning (intelligent accompaniment, simulators for composition and improvisation and titles designed to teach music concepts ina game-like or guided instruction setting) (Williams & Webster 2008).

Complicating the background further is the moral imperative felt by many teachers to use the technology more democratically to represent a wider array of sonic landscapes other than the traditional 'western canon'. The cultural use of music technology by wider populations of music makers in many countries of the world present interesting and important challenges for the pedagogy of music technology and its use by all students in schools. It is no longer possible to discuss music technology in instruction and learning without careful consideration of social context. Still, further discussion in the literature of music teaching and learning centres on the use of technology as away to encourage explorative learning in creative music tasks that help the learner understand music less as a teacher-dominated 'do as I do' environment but more as a guided, construction of learning. Because the technology can be used as powerful tools for student-generated products, music teachers often see an interesting synthesis of technology tools with the adoption of new models of music learning. Recent development of interactive Internet resources, especially the sharing seen in social networking communities, adds still more flavour to this interesting topic. All of these trends are seen in the literature reviewed here. Burnard puts it well in the following:

> We know that technology is deeply embedded in the contemporary lexicon of young people's musical lives. The internet is their new playground and creates different social rooms for them. Its profound effect is conveyed in what sociologist Margaret Meade calls 'reverse heritage' –children encounter and familiarize themselves with innovations before their parents, and indeed teachers, do – a reversal of the usual hierarchical roles of parent and child and child and teacher.

This article builds on the reviews already published (Webster 2002, 2007).These reviews covered the majority of work from 1990 to 2005; I have canvassed the published literature since 2005 and include those studies thatI think provide useful additions. The first section describes work of a more general nature and then I proceed to more focused studies on technology and music performance, improvisation and composition.

Conceptual and philosophical writings

Beckstead (2001), in an article on transformation of music education by technology,suggested that technology plays not only an efficient function but also a transformative one. Increasingly, more conceptual writing about the role of music technology points to its power to re-conceptualize the traditional roles of composer, listener and performer. This is especially true for the compositional experience because of the ability of individuals at a very young age to manipulate sound and create compositions with hardware and software resources.

There continues to be strong interest in framing music technology in a constructivist context. Keast (2004) used constructivist techniques as a philosophical basis for an online graduate music education course. He studied the way students used the technology in preparing for a class presentation and the results were judged to be modestly successful.

A more extensive application of constructivist learning theory can be seen in the work of Buehrer (2000). Writing about the teaching of aural skills on the college level, he documents the history of constructivist thinking and describes how this approach can be applied to an aural skills curriculum in college by presenting a mock textbook unit that might be part of a typical theory sequence. Buehrer creates an excellent conceptual base for how technology plays a role in the recasting of traditional music theory pedagogy.

More recently, Crow (2006) writes persuasively for music technology as critically important for the encouragement of creative thinking in music. Writing from the British perspective and citing the early work of Schafer and Paynter, Crow reminds us of the power of recent advances in music technology.

> Powerful computers and fast Internet connections have become affordable and widely available. Technology's ability to manipulate audio has meant that many people, who up until now did not perceive themselves to be musicians, can handle, creative and communicate music using their computers. They employ inexpensive music software and hardware,which does not require 'traditional' musical skills or conceptual understanding. (2006: 123)

Crow also notes that such modern music technology may not prepare music students best for traditional theory and notation, performance and ensemble skills, or the music of western canon. He suggests that perhaps we need many music curricula: 'If music education of a generalist nature is to survive and flourish as a valid and worthwhile pursuit for pupils, then

teachers will need to recognize pupils' creative outcomes in a variety of genres, and learn to foster, develop and assess those outcomes' (Crow 2006: 128). Burnard (2007b) took a more philosophical position in arguing for a similar connection between creativeness and technology by consideration of sociocultural theory, including post-Vygotskian Activity Theory. She built her case on the basis of several framing points including: (1) creativity and technology in terms of issues of who, what, where, when, how and why,(2) educational environments that conform to the learner, (3) Activity Theory as a basis for studying adaptive learning environments and (4) researching pedagogic change in music education. To this last point, Burnard contends that we should consider: 'Consulting pupils (i.e. giving learners a critical and democratic or genuine say) about the acquisition of technologies and opportunities to create their own learning technologies' (2007b: 48).

Distance learning, social media/web 2.0 and online communities of learning

For an overview of distance learning, readers might enjoy the summary chapter by Rees (2002). In addition, a meta-analysis of the effectiveness of distance learning in the general literature (Bernard et al. 2004) is informative but inconclusive in terms of comparative data; however, serious work in distance learning in music education is just beginning and the results seem intriguing if not promising. For example, two research studies that use the Internet for mentoring include work by Reese (2001) and Bush (2001). Reese investigated the feasibility of integrating online mentoring of music composition into course for music teachers by asking seventeen university students (University of Illinois) to mentor 43 middle and high school students (Chicago suburban schools). The subject was music theory and composition using technology. University and secondary school students had experience with music technology and the Internet prior to the study. Mentors (university students)were paired with a middle or a high school student, with the responsibility of helping the school students with music composition assignments. Music files were exchanged as were e-mails about the music. Data included surveys,written assessments by and interview with the university students, review of exchanged data and other data sources including attitude assessment.Results suggested that mentoring of this sort is feasible and improvement was noted in university student feedback abilities and attitudes. The influence of the mentoring on the students was less clear because return dialog from the students to the mentors was not as forthcoming as expected.

Distribution of audio over the Internet for music instruction within restricted domains such as college campuses is now commonplace. Griscom (2003) summarized this development for college libraries. The article reviews digital audio preservation projects, streaming of audio and copyright issues.The effectiveness as an approach to teaching music in various class settings has not been researched.

Video conferencing with high-quality sound is a very promising recent development. Eberle (2003) has contributed a review article on the possibilities of video conferencing and

web-based instruction. She reviewed technical issues for establishing connections for music teaching, including dedicated ISDN lines and the newer approaches that use the Internet only.In that regard, Winzenried's (2002) writing in the Symphony magazine of theAmerican Symphony Orchestra League, documents the growing interests in partnerships between institutions like the New World Symphony in Miami and music schools like the Manhattan School of Music and the National ArtsCentre in Canada using Internet2 capabilities. Systematic research on the effectiveness of these video conferencing experiments await completion.

Several studies have been published recently regarding the impact of the so-called 'Web 2.0' phenomenon – social media and its attendant notion of sharing content. Also related to this are examples of more 'informal' learning facilitated by the Internet via distance learning. Salavuo (2008) pointed to the problems of traditional learning management systems like Blackboard and similar systems developed for high school (e.g. Edline) that establish a teacher as largely the main designer of content. Rather, he points to the rise in social sharing sites as more powerful tools for learning. The author makes the case for the power of online communities that share content in shaping music education and lists many examples of how this is currently taking place.In the same year, Draper (2008) contributed a similar perspective by reporting an action research study with college students in Australia that claimed to support the use of Web 2.0 methodologies in a traditional conservatory setting. Although reported in the context of higher education, the implications for high school students are easily imagined.

Online communities of practice are emerging in recent years and may effect music education outside of formal school. For example, Waldron and Veblen (2008) document music learning in an Irish traditional virtual music community called IrTrad. The authors note that the online community helps spread the knowledge and experience of this tradition outside of traditional geographic boundaries. IrTrad began in part as a listserv but now uses many other forms of media such as YouTube and wiki sites to expand its content.Waldron (2009) extended this line of thought in an article that explored online communities of learning for music. I include this work because it may seem to be a threat to music teaching in the schools to some, but a real powerful tool for expanding instruction more formally to others.

Technology and gender

Issues of gender and technology have occupied some researchers attention in recent years. There is a common belief that technology is a more masculine enterprise and that girls are less interested and less effective in the use of technology. Cooper (2007) used some qualitative and quantitative evidence to suggest that boys when composing with technology showed greater interest but that girls did equally impressive work in composition tasks. There appeared to be a preference amongst boys to work in single-sex groups but this was not always the case with girls. Armstrong (2008) offered a critical

perspective on this subject, indicating that much of the perceived difference between genders is culturally determined. Abramo (2011) in a recent study of gender differences within popular music production groups of different genders found evidence for different styles of operation. Boys and girls rehearsed and composed music differently, with boys combining musical gestures and non-verbal communication,and girls separating talk and music production demonstrating more consultation. Abramo concludes:

> But just as there is a danger of putting students' processes into a priori categories, there is a danger of reducing gender in popular music practices to a simple 'boys do this and girls do that' dichotomy. A social constructionist framework of gender would suggest that these practices are not essentialist and are not necessarily or completely outcomes of one's gender or sex.(2011: 38)

Attitude, self-efficacy, and self-concept

Matters of student and teacher attitude towards the use of technology in teaching are investigated as secondary concerns in many of the research studies reviewed here; however, several studies published have concentrated primarily on attitude as well as feelings of self. Ho (2004), for example, found high levels of confidence among boys and girls for using the Internet and music technology in Hong Kong schools. Primary school children seemed more positive than secondary, and few gender differences in attitude were found.

In a far different population studied, Legette (2002) investigated the effect of technology-assisted music instruction on the general dimensions of self concept such as behaviour, intellectual and social status, physical appearance and attributes, anxiety and happiness, and satisfaction. The sample included 119 fourth-grade students in two predominately African American populated schools in a high-crime area of the southeastern United States. A pre-test/post-test design was employed with a control group that did not receive technology-assisted instruction in music. After a seventeen-month period of instruction, no difference in general self-confidence scales were shown, however academic achievement in language skills showed a significant gain.

Airy and Parr (2001) using semi-structured interviews, found New Zealand tertiary students' attitudes towards the use of MIDI sequencing software to be generally positive, particularly because such software gave a voice to those previously excluded from composition. The quality of MIDI sound was an issue because of the lack of realism and certain keyboard controllers were thought to be inferior.

Bauer (2001) investigated attitudes towards web-enhanced learning in a music education methods class. General attitudes towards this instruction was positive, but did vary somewhat based on whether the student had a home computer and the nature of their past experience with web-based learning.

Glenn and Fitzgerald (2002) studied attitude, motivation and self-efficacy amongst college-level applied music students and their use of the computer based accompaniment software, *SmartMusic*. Comparing questionnaire results between groups of students that used such accompaniment software versus a group that did not revealed that students in the accompaniment software group felt that their overall musicianship improved because of the software and that the technology was most effective in terms of repetitive practice.A study by Barry (2004) investigated college-level students' comfort with the use of technology in the schools. Results revealed that students rated themselves as needing training in higher levels of music technology knowledge such as the creation of web pages, using a music editor and using music education software. The study used a well designed, self-evaluation measurement tool for assessing technology skills.

Fung (2003) and Bauer (2003) completed separate studies with pre-service teachers. Fung studied gender differences in familiarity with technology and Bauer evaluated both gender differences and ratings of computer self-efficacy. Fung discovered that there were few differences in the ratings of familiarity between male and female in terms of types of technology applications (n = 135). Bauer collected data from 114 college-level music education majors, using a measure of computer self-efficacy. Results showed the majority of the responders rated their self-efficacy as good,with strong, positive correlations between these ratings and past experience with computers, hours per week of computer use and number of software programs used. A significant difference between males and females in computer self-efficacy was found in favour of males.

Status studies

Finally, I will note some status studies that might bear on the role of technology in schools. Music teachers seem to use technology more for administrative tasks as opposed to music curriculum uses (Taylor and Deal 2000).This trend was supported in more recent times by Jassmann (2004) and Ohlenbusch (2001). Price and Pan (2002) reported results of a survey of college music education degree programmes in the southeastern United States. Of the responding institutions (n = 69) in states such as Florida, Georgia, Tennessee and six others, 39 per cent state that they had one to three technology courses for music education students and 64 per cent reported having at least one lab for music education technology. All responding institutions, except for one,indicated that knowledge of music technology was vital.

Meltzer (2001) completed a well-designed study of entering music freshmen in five, randomly selected, publicly supported schools of music in the mid-western United States. About 311 freshmen completed a survey (83%return rate) that sought to determine student experiences of, skills with and attitudes towards technology. Also of interest were the relationships between these variables and demographics and uses of technology by students' high school teachers. Findings suggested that the vast majority of entering freshmen music majors have experience with word processing software (97%) and with other

non-music applications such as e-mail and spreadsheet (20–46%).Use of music software was generally lower, with roughly a third of the sample having some experience with music software of various types.

A study concerning the quality of music technology integration in the schools was reported from the United Kingdom (Mills and Murray 2000). Based on an inspection of actual music teaching in 52 middle schools in England,data was provided about the overall rating of lessons and particular details about how the technology was used by the music teachers visited. The point of the survey was not to report about music teaching from a random sample of schools, but to study already identified 'good music teaching' schools in order to identify the nature of music teaching using technology. What is note worthy in this report are the summaries of detail about what constituted a 'good' music lesson among the 106 lessons rated highly. Descriptions of how the teachers used computers for composing, performing and many other music behaviours are offered in the report, based on the inspection of lessons at the schools. This level of description across many schools and music lessons is rare in the literature and should be replicated.

Internet as a major way to consume music (Field 2001). Barry (2003) studied the integration of web-based material into graduate music research teaching,documenting phases of integration that included supplemental links to resources, web-based teaching sequences and various media to support course content. Data sources included journal and field notes, student work and course evaluations. Students had positive attitudes about the web-based instruction and felt it improved the course. Ryder (2004) completed a study ofInternet-based teaching strategies for instruction in vocal anatomy, function and health with high school choral students. He reported statistically significant gains between pre- and post-test scores on attitude and achievement with over 200 students at three different high schools.

Lastly, Abril and Gault (2008) demonstrated that principals of secondary school programmes would like to see more technology course offerings made available. Principals survey seemed to lack specific knowledge of such courses.

Music listening/aural skills, performance and composition

This section includes summaries of empirical work, both qualitative and quantitative, in music teaching and learning since 2000 that addresses music technology directly. A study on preschool children's interaction with music technology was reported by Addessi and Pachet (2005). This study is one of the first to be published that deals with 3–5-year-old children interacting with technology of this sort. Using an interactive, computer-based music system called the Continuator that interacts with a piano keyboard, children can perform short gestures on the piano and have the computer-based system answer back with a gesture that is based on the child's. The study included video-based observations of 27 children interacting with the system singularly and in groups of two. Tasks

included working just with the keyboard and with the echoing interaction activated. The researchers also collected drawings from the children based on the experience and solicited questionnaires from the parents about musical taste and experience of the children. The study reported general trends for how the children interacted with the system and presented two case studies that explore the interactions in depth. The study's results were more about improvisation and creative interaction and less about the technology, but what makes this study important for this review is that the technology made possible levels of analysis not readily noted before.

Greher (2004) used a multimedia program with middle school students to encourage music listening. The program presented alternate music soundtracks to movie clips, encouraging students to make decisions about what were the best matches and why. In addition to provided music, students could create their own music and hear the original tracks meant for the films. Participants from three inner-city classes participated in the study, including certain bilingual students thought to be at risk. The point of the study was to encourage critical listening, group decision-making, as well as collaboration and literacy. Attitude surveys were used as evidence. Qualitative data from field notes based on observations, teacher interviews and the opinions of the students themselves were considered. Results suggested that the software created an environment that succeeded in encouraging active engagement with the music and deeply held convictions about the role of music.

Smith (2002) completed a study of the use of computer-assisted instruction and its effect on the development of rhythm reading skills with middle school students. Also of interest was the cognitive style variable of field independence/dependence (FDI). After controlling for FDI, students were assigned to a control vs experimental group with the experimental students receiving instruction on rhythm reading using the software Music Ace. Post-test scores on a measure of rhythm reading skills did not show a significant difference between groups but each group gained significantly from pre-test to post-test.Field independent students did perform better on the post-test than did field dependent students. Student attitudes were very positive about the use of the computer-assisted software.

Green (2003) studied computer-assisted instruction as an effect on guitar performance achievement and general music achievement. He also included groupings for high- and low music aptitude as measured by a test of audiation. The Interactive Guitar software was used in this study. No significant difference was found after five weeks on the music aptitude or guitar performance measures. Students that scored highly in the audiation measure also scored better in music achievement and guitar performance.

Interest in intelligent accompaniment continues. Glenn (2000) studied the use of the SmartMusic intelligent accompaniment program with students in applied oboe, clarinet and bassoon instruction at the college level. Control and experimental groups showed no significant difference when the intel-

ligent accompaniment program was used in experimental treatment. However,scores were higher for the experimental group and students in that group indicated on a questionnaire that they enjoyed the intelligent accompaniment software and that it contributed to their musicianship.

A new kind of category of study is emerging of late that takes advantage of new instrument creation and music performance. For example, Savage andButcher (2007) and Savage (2009) published work on engaging primary-aged and high school students in instrument design. Citing the development of popular instrument environments like *Wii Music* and *Guitar Hero* and their use in informal settings such as the household, the authors document experiments with the construction of custom instruments using the Playstation 2 and a personal computer. Case study methods were used to study how the students used these custom instruments. This work is similar to projects inspired by the MIT Media Lab in Boston with Tom Machover (http://opera.media.mit.edu/ToySymphony/musictoysmain.html); There, researchers have created toy instruments that can be played with ensembles, giving young students control over music expression in exciting new ways.

In addition to this, the development of 'smart' cell phone and laptop/tablet ensembles is beginning to be documented in the literature. Dammers(2010) provided one of the first such studies in music education with middle school children. Results indicated that compositions constructed within a band ensemble over a fourteen-week period showed the possibility of this approach to enhancing music learning.

The literature on music composition continues to profit from researchers using music technology to great advantage to allow students to think compositionally.In fact, of all the musical experiences, composition appears to be the most effected by the rise of technology use in terms of fundamental change in the way both researchers and practitioners study and teach music. Savage concluded his action research study with 11–16-year-old children composing with technology with this:

> In concluding this discussion on compositional processes with ICT it is important to remember the changing nature of evaluation and revision whilst working with technologies. An essential part of this process is the possibility for pupils to stand back from the activity of producing music(through playing instruments, singing or designing and engineering sound at the computer) and reflecting on what they are producing. The process of recording one's musical output is educative for any musician,whether performer or composer, but the opportunity to work interactively with technologies that accurately represent recorded sounds as compositional material demanded particular aesthetic qualities and judgments from pupils.(2005: 178)

Stauffer (2001) published qualitative work with one of her young composers –in this case, Meg. Stauffer begins by chronicling her joint development process with Morton Subotnick in the development of the Making Music software that was so instrumental in Stauffer's work. The remainder of the study describes in some detail the observations of Meg as she worked with the composition space in the program. Making Music uses a drawing metaphor for creating musical structures. The software allows for manipulation of timbre, tempo,texture, pitch space and many other musical manipulations – all using the mouse-controlled cursor as a pointer. The software allows for the user to save compositions to a 'Composition Book' space in the software. Throughout the study, the composition process is described for Meg in ways that make clear the power of the computer software to allow this kind of analysis.

Seddon and O'Neill published two studies (O'Neill and Seddon 2001;Seddon and O'Neill 2003) using computer-based compositions by children.The first study evaluated compositions by children (aged 10 years, n = 32) with and without prior experience in music study. The music was evaluated by music specialists and non-music specialists, the children themselves, and expert evaluation of rhythmic and melodic repetition and development. Technology used was a clever adaptation of a simple sequencing program so that students with and without musical experience could create a music composition 'that sounded good to them'. The adaptation presented some restrictions on timbre and composition length. The technology allowed recording the compositions for later analysis.

The second study used the same approach with a modified sequencing program, but used the computer to record student compositions in process. Students were 13–14 years of age (n = 48). This study's focus was on the creative thinking processes and the strategies adopted together with the influence of instrumental music training. With the use of a special video card, the composition sessions were recorded unobtrusively. Music in the form of MIDI files were routinely saved at key times and this allowed the researchers to study the music together with the video tape record of gestures. Technology of this sort is especially useful for studying real-time processes such as these.

Nilsson and Folkestad (2005) reported on a two-year empirical study of nine 8-year-old Swedish children composing music with a synthesizer and computer software. As with Seddon and O'Neill, MIDI files were collected systematically over the composition process development. As the researchers state:

> The synthesizer and the computer software represent powerful tools,which facilitate the participants in expressing their musical ideas without being formally trained in music. The digital tools used by the children represent a medium where planning, improvising and elements of contingency coexist.(Seddon and O'Neill 2003: 35)

McCord (2002) reported a study on children with special needs composing with music technology. In this observation study, the researcher used videotapes of compositional process, student interviews and reflections, the student compositions themselves, and on- and off-task behaviour to evaluate how the children used the technology. Elementary-aged children participating in the student had various special needs, including learning disabilities. Technology used included specially-designed software and commercial programs such asMusic Ace and Making Music. The specially designed software, Music Mania,records all MIDI data created by the children and also allows children to write reflections on their experiences. The study gives several descriptions of children and documents their use of the software so that other educators can gain an understanding of how to use technology in special settings. McCord argues that the technology provides an often-needed, multi-sensory approach to learning that is most valuable to special needs children.

Kennedy (2002) reported work with high school composers. Her work was similar in spirit to Stauffer in that she was most interested in the compositional processes of students. She focused her work on four high school students, two with strong backgrounds in music performance and theory/notation and two less experienced. The two tasks involved setting a poem to music for acoustic instruments and a free-designed composition using computers with attachedMIDI keyboards. 'Audio journals' were used in the form of cassette tape recordings to record work sessions that served, in part, as bases for interviews with the researcher. A CD was made of the final compositions and notated scores were created. Students spent more time on electronic pieces than on the acoustic task. Kennedy stressed the importance of music listening in her student profiles.

Pitts and Kwami (2002) summarized the results of a set of focused interviews with students and teachers in eight schools following questionnaires on this topic from eighteen schools in southeastern England. The study was important because it documented the difficulty faced by teachers new to technology and its integration into teaching and learning. The sociological,economic and pedagogical pressures that teachers face are documented in the study and some questions were raised regarding the trade-offs between teaching technology as opposed to teaching music. Technical problems with the equipment and software were reported as a frustrating part of using technology in schools, but the study did demonstrate the '… opening up of avenues of exploration: composing music pupils could note play reliably themselves,performing music with a control of detail not possible in "live" music, and listening to the merits of live and sequenced versions of a song' (Pitts and Kwami 2002: 70).

Savage and Challis (2001) published a report that documented the use of short sound recordings and digital audio, multi-track software to create a piece of original music to commemorate a town in England. This was a multi-class project involving several students and their recordings of speech and environmental sounds as well as instrumental and vocal

sound sources. Group collaboration was used to choose sound pieces to include in the composition.Mixing and re-mixing techniques were used in various aspects of the project.The authors report strong feelings of ownership by the students of the final products.

Other important studies on the use of technology for composition in both US schools and those of the United Kingdom include Gall and Breeze(2005), Bolton (2008), Mellor (2008), Ward (2009), Hewitt (2009) and Breeze(2009). Using both qualitative and quantitative techniques, these recent studies continue to demonstrate the important role that technology plays in the music experience of composition in the schools.

Conclusion

Reviews of research and music technology growth in the period from 1990 to2000 demonstrated significant growth in the power and availability of hardware and software for music teaching and learning, but in-service teachers lagged behind in their application of these resources. There seems to be no major evidence that this has changed dramatically in the recent five years of research. There is some evidence that students come to college better prepared to use computers, but not necessarily for music software. We still lack real compelling evidence about how committed music teachers are in the integration of technology into music instruction. What is also lacking is extensive dialog about the conceptual bases for including music technology, with few major efforts to develop a philosophy of technology use.

The study of more exploratory, multimedia and creative-based software has increased in the last five years; however, our ability to evaluate the effectiveness of the newer titles remains a major challenge. A real positive development has been the greater number of qualitative study have resulted in better understanding of the subtleties of learning, but much further evidence across many research methodologies is necessary. New interest in studying technology's role in in-service for teachers and undergraduate education is noteworthy. Additional attention in the last five years to studies that address distance learning and to the use of the Internet are noteworthy and will likely continue.

Most significant is that music technology research in the last five years continues at a pace faster pace then ever before. Substantial studies have been reported in many of the categories and research interest is growing as evidenced by work in professional associations worldwide. We need more substantial studies on teaching strategies that use technology, issues of gender and technology, equity in accessibility to the best resources, and the real effect of technology's use on long-term learning in music for professional musicians and the educated public as a whole.

References

Abramo, J. (2011), 'Gender difference of popular music production in secondary schools', *Journal of Research in Music Education*, 59: 1, pp. 21–43.

Abril, C. and Gault, B. (2008), 'The state of music in secondary schools: The principal's perspective', *Journal of Research in Music Education*, 56: 1,pp. 68–81.

Addessi, A. and Pachet, F. (2005), 'Experiments with a musical machine:Musical style replication in 3 to 5 year old children', *British Journal of MusicEducation*, 22: 1, pp. 21–46.

Airy, S. and Parr, J. (2001), 'MIDI, music and me: Students' perspectives on composing with MIDI', *Music Education Research*, 3: 1, pp. 41–49.

Armstrong, V. (2008), 'Hard bargaining on the hard drive: Gender bias in the music technology classroom', *Gender and Education*, 20: 4, pp. 375–86.

Barry, N. (2003), 'Integrating web based learning and instruction into a graduate music education research course: An exploratory study', *Journal of Technology in Music Learning*, 2: 1, pp. 2–8.

Barry, N. (2004), 'University music education student perceptions and attitudes about instructional technology', *Journal of Technology in Music Learning*,2: 2, pp. 2–20.

Bauer, W. (2001), 'Student attitudes toward web-enhanced learning in a music education methods class: A case study', *Journal of Technology in MusicLearning*, 1: 1, pp. 20–30.

Bauer, W. (2003), 'Gender differences and the computer self-efficacy of pre-service music teachers', *Journal of Technology in Music Learning*, 2: 1,pp. 9–15.

Beckstead, D. (2001), 'Will technology transform music education?', *Music Educators Journa*l, 87: 6, pp. 44–49.

Benson, C. (2002), 'The effects of instructional media on group piano student performance and attitude', *Journal of Technology in Music Learning*, 1: 2,pp. 38–55.

Bernard, R., Abrami, P., Lou, Y., Borokhovski, E., Wade, A. and Wozney, L.(2004), 'How does distance education compare with classroom instruction?A meta-analysis of the empirical literature', *Review of Educational Research*, 74: 3, pp. 379–439.

Bolton, J. (2008), 'Technologically mediated composition learning: Josh's story', *British Journal of Music Education*, 25: 1, pp. 41–55.

Breeze, N. (2009), 'Learning design and proscription: How generative activity was promoted in music composing', *International Journal of MusicEducation*, 27: 3, pp. 204–19.

Buehrer, T. (2000), 'An alternative pedagogical paradigm for aural skills: An examination of constructivist learning theory and its potential for implementation into aural skills curricula', Dissertation Abstracts International,61: 4, p. 1210.

Burnard, P. (2007a), 'Creativity and technology: Critical agents of change in the work and lives of music teachers', in J. Finney and P. Burnard (eds), *MusicEducation with Digital Technology*, London, UK: Continuum International Publishing Group, pp. 196–206.

Burnard, P. (2007b), 'Reframing creativity and technology: Promoting pedagogic change in music education', *Technology and Education*, 1: 1, pp. 37–54.

Bush, J. (2001), 'Introducing the practitioner's voice through electronic mentoring', *Journal of Technology in Music Learning*, 1: 1, pp. 4–9.

Cooper, L. (2007), 'The gender factor: Teaching composition in music technology lessons to boys and girls in year 9', in J. Finney and P. Burnard (eds), *Music Education with Digital Technology*, London, UK: Continuum International Publishing Group, pp. 30–40.

Crow, B. (2006), 'Musical creativity and the new technology', *Music EducationResearch*, 8: 1, pp. 121–30.

Dammers, R. (2010), 'Laptop based composing in a middle school band rehearsal', *Journal of Technology in Music Learning*, 4: 2, pp. 3–15.

Draper, P. (2008), 'Music two-point-zero: Music, technology and digital independence', *Journal of Music, Technology and Education*, 1: 2/3, pp. 137–52.

Eberle, K. (2003), 'Video conferencing and web based instruction over theInternet', *Journal of Singing*, 59: 3, pp. 241–45.

Field, C. (2001), 'Music at the speed of light: Sheet music on the Internet',*Teaching Music*, 9: 3, pp. 32–35.

Fung, V. (2003), 'Gender differences in pre-service music educators' familiarity with technology', *Journal of Technology in Music Learning*, 2: 1,pp. 31–40.

Gall, M. and Breeze, N. (2005), 'Music composition lessons: The multimodal affordances of technology', *Educational Review*, 57: 4, pp. 415–33.

Glenn, S. (2000), 'The effects of a situated approach to musical performance education on student achievement: Practicing with an artificially intelligent computer accompanist', Dissertation Abstracts International, 61: 8,p. 3098.

Glenn, S. and Fitzgerald, M. (2002), 'Technology and student attitudes, motivation,and self-efficacy: A qualitative study', *NACWPI Journal*, autumn,pp. 4–15.

Green, B. (2003), 'The comparative effects of computer-mediated interactive instruction and traditional instruction on music achievement in guitar performance', Dissertations Abstracts International, 64: 12, p. 4337.

Greher, G. (2004), 'Multimedia in the classroom: Tapping into an adolescent's cultural literacy', *Journal of Technology in Music Learning*, 2: 2,pp. 21–43.

Griscom, R. (2003), 'Distance music: Delivering audio over the Internet', *Notes – Quarterly Journal of the Music Library Association*, 59: 3, pp. 521–41.

Hewitt, A. (2009), 'Some features of children's composition in a computer based environment: The influence of age, task familiarity and formal instrumental music instruction', *Journal of Music, Technology and Education*,2: 1, pp. 5–24.

Ho, W. (2004), 'Attitudes towards information technology in music learning among Hong Kong Chinese boys and girls', British Journal of MusicEducation, 21: 2, pp. 143–61.

Jassmann, A. (2004), 'The status of music technology in the K-12 curriculum of South Dakota public schools', Dissertation Abstracts International, 65: 4,p. 1294.

Keast, D. (2004), 'Implementation of constructivist techniques into an online activity for graduate music education students', Dissertation AbstractsInternational, 65: 8, p. 2932.

Kennedy, M. (2002), 'Listening to the music: Compositional processes of high school composers', *Journal of Research in Music Education*, 50: 2,pp. 94–110.

Legette, R. (2002), 'The effect of technology-assisted music instruction on the self-concept and academic achievement of fourth grade public school students', *Contributions to Music Education*, 29: 1, pp. 59–69.

McCord, K. (2002), 'Children with special needs compose using music technology', *Journal of Technology in Music Learning*, 1: 2, pp. 3–14.

Mellor, L. (2008), 'Creativity, originality, identify: Investigating computer based composition in the secondary school', *Music Education Research*,10: 4, pp. 451–72.

Meltzer, J. (2001), 'A survey to assess the technology literacy of undergraduate music majors at big-10 universities: Implications for undergraduate courses in music education technology', Dissertation Abstracts International,62: 8, p. 2709.

Mills, J. and Murray, A. (2000), 'Music technology inspected: Good teaching in key stage 3', *British Journal of Music Education*, 17: 2, pp. 129–56.

Miranda, E. and Wanderley, M. (2006), *New Digital Musical Instruments: Control and Interaction Beyond the Keyboard*, Middleton, WI: A-R Editions, Inc.

Nilsson, B. and Folkestad, G. (2005), 'Children's practice of computer-based composition', *Music Education Research*, 7: 1, pp. 21–37.

Ohlenbusch, G. (2001), 'A study of the use of technology applications byTexas music educators and the relevance to undergraduate music education curriculum', Dissertation Abstracts International, 62: 3, p. 957.

O'Neill, S. A. and Seddon, F. A. (2001), 'An evaluation study of computer based compositions by children with and without prior experience of formal instrumental music tuition', *Psychology of Music*, 29: 1, pp. 4–19.

Pitts, A. and Kwami, R. (2002), 'Raising students' performance in music composition through the use of information and communications technology (ICT): A survey of secondary schools in England', *British Journal ofMusic Education*, 19: 1, pp. 61–71.

Price, H. and Pan, K. (2002), 'A survey of music education technology at colleges in the southeastern USA', *Journal of Technology in Music Learning*, 1: 2,pp. 56–66.

Rees, F. (2002), 'Distance learning and collaboration in music education', in R. Colwell and C. Richardson (eds), *The New Handbook of Research on Music Teaching and Learning*, New York: Oxford, pp. 257–73.

Reese, S. (2001), 'Tools for thinking in sound', *Music Educators Journal*, 88: 1,pp. 42–45, 53.

Ruthmann, S. A. (2007), 'Strategies for supporting music learning through on-line collaborative technologies', in J. Finney and P. Burnard (eds), *MusicEducation with Digital Technology,* London, UK: Continuum International-Publishing Group, pp. 131–41.

Ryder, C. (2004), 'The use of Internet-based teaching strategies in teaching vocal anatomy, function, and health to high school choral music students,and its effect on student attitudes and achievement', Dissertations AbstractsInternational, 65: 6, p. 2130.

Salavuo, M. (2008), 'Social media as an opportunity for pedagogical change in music education', *Journal of Music Education and Technology*, 1: 2/3,pp. 121–36.

Sarno, D. (2011), 'Table sales rise', St. Augstine.com, 14 May, available at: http://staugustine.com/national-news/2011-05-13/tablet-sales-rise. Accessed 19 June 2011.

Savage, J. (2005), 'Working toward a theory for music technologies in the classroom: How pupils engage with and organize sounds with new technologies', *British Journal of Music Education*, 22: 2, pp. 167–80.

Savage, J. (2009), 'Hand2Hand and Dot2Dot: Developing instruments for the music classroom', *Journal of Music, Technology and Education*, 2: 2/3, pp. 141–57.

Savage, J. and Butcher, J. (2007), 'DubDubDub: Improvisation using the sounds of the World Wide Web', *Journal of Music, Technology and Education*, 1: 1,pp. 83–96.

Savage, J. and Challis, M. (2001), 'Dunwich revisited: Collaborative composition and performance with new technologies', *British Journal of Music Education*, 18: 2, pp. 139–49.

Seddon, F. and O'Neill, S. (2003), 'Creative thinking processes in adolescent computer-based compositions: An analysis of strategies adopted and the influence of instrumental music training', *Music Education Research*, 5: 2,pp. 125–35.

Smith, K. (2002), 'The effectiveness of computer-assisted instruction on the development of rhythm reading skills among middle school instrumental students', Dissertation Abstracts International, 63: 11, p. 3891.

Stauffer, S. (2001), 'Composing with computers: Meg makes music', *Bulletin of the Council for Research in Music Education*, 150: autumn, pp. 1–20.

Taylor, J. and Deal, J. (2000), 'Integrating technology into the K-12 music curriculum: A national survey of music teachers', poster session presented at the annual meeting of the Association for Technology in Music Instruction, Toronto, Canada.

Waldron, J. (2009), 'Exploring a virtual music "community of practice": Informal music learning on the Internet', *Journal of Music, Technology and Education*, 2: 2/3, pp. 97–112.

Waldron, J. and Veblen, K. (2008), 'The medium is the message: Cyberspace, community, and music learning in the Irish traditional music virtual community', *Journal of Music, Technology and Education*, 1: 2/3, pp. 99–110.

Ward, C. (2009), 'Musical exploration using ICT in the middle and secondary school classroom', *International Journal of Music Education*, 27: 2,pp. 154–68.

Webster, P. (2002), 'Computer-based technology and music teaching and learning', in R. Colwell and C. Richardson (Eds.), *The New Handbook of Research on Music Teaching and Learning*, New York: Oxford University Press, pp. 416–39.

Webster, P. R. (2007), 'Computer-based technology and music teaching and learning: 2000–2005', in L. Bresler (Ed.), *The International Handbook of Research in Arts Education*, Dordrecht, The Netherlands: Springer, pp. 1311–28.

Webster, P. R. (2011), 'Constructivism and music learning', in R. Colwell and P. Webster (Eds.), *MENC Handbook of Research on Music Learning*, vol. 1, New York,NY: Oxford University, pp. 35–83.

Williams, D., & Webster, P. (2006). *Experiencing music technology* (3rd ed.). Belmont, CA: Thomson/Schirmer.

Winzenried, R. (2002). The next big step? Long-distance learning via Internet2 [Electronic Version]. *Symphony*, http://www.symphony.org/news/room/sym3.shtml

Reflection by David B. Williams

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The Webster iBook is a wonderful tribute to the many contributions Dr. Peter Webster has generously shared with the profession over his career. I am honored to contribute a reflection on the occasion of his retirement from Northwestern University based on Webster's lead article in a recent volume of the *Journal of Music Technology & Education* (Webster 2011) entitled, "Key research in music technology and music teaching and learning." This important issue of *JMTE* is dedicated to an international perspective on technology research in music education and Webster's contribution, appropriately so, serves as the lead article.

While reflecting on my task at hand, I found myself playing with relationships between music technology and Peter's love of sailing. Enjoy the diversion for a moment. Sailing reflects on our species' inherent desire to travel, explore, and migrate; music reflects on our species' inherent desire to express ourselves creatively through varied forms of music making and participation (Williams 1987). The one depends on mastering wind and water; the other, on mastering sonic vibrations to move air (the musician's wind) in subtle, creative, and expressive ways. Both have a deep tradition of skills and knowledge passed through enumerable generations and cultures. Technology has influenced both traditions. Harrison's clocks (Sobel, 1995) enabled sailors to accurately determine longitude, critical for determine place and time when sailing the globe. Cristofori's research led to the pianoforte, Adolphe Sax the saxophone, and Robert Moog his analog synthesizers—all instruments that provided new tools for navigating music expression. There is a beautiful symbiosis between sailing and music with technology interwoven throughout their respective histories.

Peter Webster has excelled at both the traditions of music and sailing. For music, he has helped the profession navigate advances in technology and quantitative and qualitative examinations of its impact on music teaching and learning (cf. Webster, 2002, 2007). For the *JMTE* article, he has classified his overview of key contemporary research into six topic areas or, to continue the sailing metaphor, six "voyages." I propose that these voyages provide to a useful framework of six or more domains for our research. Our course will highlight salient features of the research Webster reports along with personal reflections. Given the significance of the companion research reported in the special *JMTE* issue, I will reinforce Webster's do-

mains with selected studies from the *JMTE* issue. These provide a goodness-of-fit to validate the "domains" that Webster used to structure his overview of key research in music technology and music teaching and learning.

Voyage 1. Conceptual and philosophical writings ("Deep water sailing")

Webster's first voyage takes us into "deep water" research pertaining to conceptual, philosophical, and theoretical underlying issues to music learning, teaching, and creativity. The keywords here are transformative, constructivist, and adaptive learning environments and the scope of these studies spans school aged to graduate music students. Beckstead[1] develops the transformative function of technology in music education through creative activities that "re-conceptualizes the traditional roles of composer, listener and performer" (p. 117). Keast examines constructivist strategies in graduate music teaching while Buehrer applies constructivist theory to teaching aural skills. Crow and Burnard inquire into creative thinking strategies with Crow arguing that "we need many music curricula" to meet varying instructional needs and a broad spectrum of music genres and Burnard embracing sociocultural theory "as a basis for studying adaptive learning environments" (p. 118) that give learners more choice in framing their learning and creative experiences.

What research from the *JMTE* special issue supports this domain? Rees (in Webster, 2011)[2] argues for a more comprehensive definition of music technology and interdisciplinary research, while Welch (in Webster, 2011) examines the premise behind the STEM (Science, Technology, Engineering, and Mathematics) curriculum model and builds advocacy for integrating the "Arts" into the framework to create an enriched STEAM curriculum.

Landy (in Webster, 2011) and Brown and Dillon (in Webster, 2011) extend our thinking about the dimensions of online communities and the composing process. Landy argues for aesthetic awareness and aural, as well as written, pathways into the music curriculum. Brown and Dillon propose an "eBILITY" model where the "e" "refers not only to the electronic nature of computing systems but also to the ethical, enabling, experiential and educational dimensions of the creative relationship with technologies" (p. 201).

Voyage 2. Distance learning, social media/web 2.0, and online communities of learning ("Circumnavigating the globe")

Our voyage now goes "global" and embraces online learning and social networking with key research embracing the interactive nature of Web 2.0 technologies. Webster discusses three directions: online mentoring, videoconferencing, and the use of social sharing sites. The online mentoring study (Reese) used easily accessible technology of email and file exchanges with college music students mentoring secondary school students on composition and music theory instruction. The video conferencing studies (Eberle; Winzenreid) employed connectivity over commodity Internet and Internet2.

With ten years since these studies were conducted, much has changed in video delivery and compression alternatives with such options as *Skype, Facetime*, and *WebEx*. Videoconferencing is now almost ubiquitous within computing devices and most recent education initiatives such as "flipped classrooms" (Bergmann & Sams, 2012; "Flipped Network," 2012) and "open courseware" ("OCW," 2012) elevate the research need above connectivity and delivery of distance learning to the more substantial issues of teaching strategy, curriculum design, and the social and economic needs of the learner. Edmundsen (2012, p. A19), in a recent New York Times editorial, argues that the key challenge to online, distance education is confronting the weakness of "Internet courses as monologues" in delivery while "true learning is a dialogue" between instructor and student. As Webster notes, "…serious work in distance learning in music education is just beginning" (2011, p. 118).

Webster continues this voyage by sharing three studies that examine the use of social sharing websites and online communities of learning (Salavuo, Draper, Waldron & Veblen,). Social sharing technologies other than YouTube were not noted in Webster's examples, but examples now include SoundCloud for audio sharing, various wiki installations like PBWorks, Facebook, among others. A subtle comment by Webster that social sharing sites, "…may effect music education outside of formal school…" (p. 119) deserves to be a banner research issue within this domain and a number of the studies in the *JMTE* issue encouragingly fit this need.

Burnard (2011), Waldron (2011), and Savage (2011) examine online learning and online communities of learning. Waldron, in a study employing YouTube video, builds her inquiry on Wenger's (1998) Community of Practice or CoP model, where the focus is on "learning as social participation" through four components: meaning, practice, community, and identity. Burnard (2011) using narrative examples examines methods and challenges of Internet collaboration and the use of digital technologies. And, Savage (2011) looks in depth into informal music learning and the power of online communities for music learning. A key issue for Savage is what it takes to transport informal learning into formal curriculum and teacher development, initiatives that are inextricably tied.

Going beyond Web 2.0, Leong (2011) and Landy (2011) in their *JMTE* articles suggest we need to be atuned to the emergence of Web 3.0 and even 4.0 where "technology and human become one" (p. 235). Landy elaborates that, "It is often said that the development from Web 2.0 to Web 3.0 is one from folksonomies, based in the effort of a community of shared interest, to me-onomies, where technology serves individual needs" (p. 184). Landy shares the Education 3.0 model designed by CISCO (2008) that incorporates the prophesied world of Web 3.0 and "young people's ability to build their 'personalized learning space'" (p. 237).

Voyage 3. Technology and gender ("Women on board")

Just as superstition that surrounds sailing had a tradition of naming sailboats with a woman's name to ensure smooth seas or considered a woman on board creating angry seas and crew, music and technology have their own gender superstitions. As Webster notes, there is a long-standing common belief that boys are more attracted to technology in general. Webster offers three studies (Cooper, Armstrong, and Abramo) that suggest that, though boys prefer single-gender groups and non-verbal communication for music composition and production, and girls prefer more talk and consultation during these activities, culture and personal styles may be a better determinant than gender for composing, recording, and production. Under Voyage 4, Ho, Fung, and Bauer investigate gender while examining ratings of computer attitude, confidence, and self-efficacy. Ho found few gender differences in attitude. Fung found few gender differences in self-efficacy among pre-service teachers while Bauer found higher ratings among college music education males.

Consideration should be given to expanding the domain of "technology and gender" to include the variable of age. Ho, as reported by Webster, found that primary school children seemed more positive than secondary in their attitude using the Internet and music technology as one case in point. Music education, both formal and informal, is a lifelong pursuit. Examining the effectiveness of technology on a continuum from birth to senior years would provide valuable data for more sophisticated and sensitive design of music instruction on a more progressive age continuum. Since Webster and I are now both retired, we have a special interest in viewing music learning and creativity from the far side of this continuum.

Voyage 4. Attitude, self-efficacy, and self-concept ("The joy of sailing")

Research in this domain is certainly one of the most exciting on the one hand, and one of the most difficult to design and interpret on the other. The variables addressed in the studies Webster notes are among some of the most complex of human behaviors to measure and interpret: anxiety, attitude, happiness, satisfaction, motivation, self-concept, self-confidence, self-efficacy, and comfort with using technology. The subjects involved in these studies range from primary and secondary grades to college applied music students, music education majors, and pre-service teachers. As Webster's review suggests, those wading into this domain of research find it challenging to find definitive results. What one may take away from these reports, however, is that, in varied learning environments, incorporating technology in some form leads to positive outcomes in attitude, motivation and self-efficacy.

Many examples of research in this domain are intertwined throughout the *JMTE* research. Williams (2011) in building a model of attributes to characterize "non-traditional music students" and their use of music technology, examines motivational and attitudinal issues. Savage (2011), also noted by Webster for earlier research, examines the roles of attitude and self-efficacy in a young boy's learning to play the guitar

with Web-based informal music learning. Leong (2011), Brown & Dillon (2011), Landy (2011), and Burnard (2011), all previously noted, touch on the role these variables play in the mix of technology and music learning.

Voyage 5. Status studies ("The value of a sailor's log-book")

Webster looks at three general issues in terms of what he terms "status studies": software use and experience, course offerings and lab facilities, and music technology curriculum integration.

Software use and experience. In the early days of personal computer use in schools, teachers primarily used one computer application: a word processor. One would like to find this trend changed over 30 years. The Taylor & Deal and Ohlenbusch research that Webster shares found that music teachers predominantly continue to use computers for administrative tasks. Meltzer also found that entering freshman music majors were most conversant with word processing, email, and spreadsheets; only a third of the freshman had some experience with music software. Fast forward to 2012 and replicating and updating these studies would likely find the administrative skill set to include web-browsing, social networking sites, twitter, and text messaging with music application skills still unrepresented in teacher and student repertoires.

Course offerings and lab facilities. Two studies are offered as examples of status research on this topic (Price & Pan; Abril & Gault). Extrapolating from the results suggests that at the turn of the new millennium, some 40% of colleges offered music technology courses (one to three) and some 60% had at least one music lab facility. Both college music programs and secondary schools (through the eyes of their administrators) appear to value knowledge of music technology and support course offerings. The statuses of music technology facilities are a moving target and demands annual replication. Tablet computers are now challenging the desktop PC and music labs are giving way to portable carts of iPads with music applications being rolled into classroom and media spaces.

Music technology curriculum integration. Webster points the way on a mission critical topic. The U.K. study (Mills & Murray), identifying and collecting "good music lessons" from middle schools that successfully integrate technology, is, as noted, "rare in the literature and should be replicated" (p. 121). The other studies reported (Field; Barry; Ryder) support the value of web-based instruction. Ryder's pre- and post-test results provide strong support for benefits in attitude and achievement with web-based instruction for high school music students. Further examination of the research of Barry, Ryder, and the earlier reported Salavuo study raises the need for future research comparing more formally structured web-based instruction with informally structured instruction through social sharing sites.

The *JMTE* issue offers little research that falls into the domain of status studies. Rees (2011) does examine interdisciplinary research where music and music technology are partners and several articles tangentially offer status information

about music programs specific to a country. My own research (Williams, 2011) in *JMTE* falls clearly into this domain. I examined data from a variety of sources to determine the percentage of students in U.S. secondary schools who were non-participants in traditional music ensembles to validate that this percentage is and has been 80 percent consistently since the 1970s.

Voyage 6. Music listening/aural skills, performance and composition ("Basic sailing skills and taking the helm")

Voyage 6 packages a good deal of research material under one title. I suggest creating two if not three domains: music learning environments (Addessi & Patchet; Greher; Smith; Green), performing and accompanying (Glenn; Savage & Butcher; Savage 2009), and composing (Dammers; Stauffer; Sedden & O'Neil; Nilsson & Folkestad; McCord; Kennedy; Savage & Challis).

Under music learning environments, the Addessi & Patchet and the Greher studies are the more interesting as they use technology in very innovative ways to assess more complex music learning and with unique populations. The others (Smith; Green) follow the more traditional research model for evaluating commercial software and grapple with understanding the lack of a significant differences in a control group design; a not uncommon outcome from such studies historically. Examination of variables of cognitive style, attitude, and music aptitude do provide interesting data relevant to Voyage 4.

We increase the intrigue of studies in this domain with performance and accompanying. With the every growing use of SmartMusic to offer intelligent accompaniment there is value in studying, as Glenn did, its effectiveness in rigorously controlled settings. Studies on student instrument design with game stations—as well as cell phone and tablet instruments—are also creative and promising. With software like GarageBand for the iPad and its impressive live software instruments, those of us who have been around music technology for far too many years savour the phenomenal progression from the first MIDI instruments, to the MIT Media Lab projects Webster notes, to the commercially mature GarageBand instruments and a host of other iPad virtual instrument apps. The Harmonica, Thereminator, Wivi Band, and the Korean Janggu drum apps are on my iPhone.

Technology to enhance music composing. Are we surprised to find the extensive number of research studies Webster offers given his lifelong interest and contributions to music creativity? The wealth of studies reported here points to one conclusive outcome: technology has democratized music composition. WYSIWIG (What You See Is What You Get) software revolutionized desktop music publishing and notation. What I've come to call (WYHIWIG or WeeWig!) (What You Hear Is What You Get) software has in the same way revolutionized and democratized music composition. As Webster affirms, "of all musical experiences, composition appears to be the most effected by the rise of technology use in terms of funda-

mental change in the way both researchers and practitioners study and teach music" (p. 123).

Look at the research studies that Webster offers up as evidence. We have Stauffer successfully working with young Meg using a graphic composing metaphor in the Making Music software, Nilsson & Folkestad creating MIDI composition with 8-year-old Swedish children, and Seddon & O'Neil, in one of the more innovative research designs and methodologies, enabling 10- to 14-year-old children, in two subsequent studies, to create music compositions "that sounded good to them." McCord is successful using commercial programs (Music Ace, Making Music, and Music Mania) to guide special needs children in composing. And, with older students, we have Dammers' students creating middle school band compositions, students of Savage and Challis creating music to commemorate an English town, and Kennedy studying the compositional process of her high school students as they create a setting of a poem for acoustic instruments and a free-design MIDI keyboard piece. Impressive!

This final section of the Webster overview includes research by Pitts and Kwami. They studied many of the underlying issues that music teachers face when implementing music technology and integrating it into their curriculum. This work makes a nice endnote to the research reported herein and it fits comfortable within the "status study" domain of research as well.

Of all the research reported in the *JMTE* volume those that deal with the creative process of composing reinforce the excellent presentation of research provided by Webster. Three studies may be offered as cases in point. Collins (2011) draws on the work of Malcolm Ross to propose a model of the compositional process with four iterative functions: initiating, acquainting, controlling, and structuring. The jam2jam interactive music system provides the technology for Brown & Dillon (2011) to examine collaborative online music making and the foundation for their eBILITY model discussed earlier. And, my research (Williams, 2011) examines evidence collected from teachers and students involved in secondary school music technology classes in order to validate a set of attributes that help to define the "non-traditional music student," students that find success at expressing themselves creatively through WYHIWYG technology.

Concluding thoughts ("View from the pier")

It is time to conclude our voyages through six domains for music technology research and bring Commodore Webster's sailboat into port. What I find most valuable and rewarding from Webster's overview of music technology research is that it clearly denotes through six domains (possibly expanded as suggested to seven or eight) the ever expanding scope and depth of research inquiry ongoing internationally. Over my 50 years working with music technology, I have participated in and witnessed the longstanding desire to use technology to find more efficient ways to learn music skills. This need can be seen in the Darwinian evolution of music education re-

search back to the earliest programmed instruction efforts (Carlsen & Williams, 1978), evolving through computer-based instruction for mini computers, then personal computers and PCs with multimedia, then web-based CAI and now tablet and smartphone CAI (cf. Williams & Webster, 2008). Much of this research falls under "music learning environments" noted within Voyage or Domain 6.

While we continue to explore more efficient ways to learn and teach music skills, we seek to do so with a much broader mindset. We now embrace informal as well as formal modes of learning, virtual modes of interaction through technology, new populations of learners from special needs to those disenfranchised from traditional school music to students of all ages, as well as recognize the need to consider motivational, attitudinal, and personality factors that are key concomitant variables in the study of music learning and the integration of technology into the process. It dramatically affirms the power and potential of using music technology to enable anyone with a creative desire to express themselves through music making in its many forms.

Sitting on the pier reflecting on these voyages, there is one closing point I would like to make in the interest of ensuring the highest quality of research in our field. Underlying our research are key elements of research design, measurement and data collection tools, and models that express the theoretical framework for our thinking.

As any boat builder worth his/her salt would do, considerable effort is put into designing a model for a new boat, a model that draws on the deep history of boat design. Model building for music research is just as critical as it is to the boat builder. As a reviewer for several journals, I find many studies lacking in this respect, studies that seem to jump from a review of the literature to methodology without the requisite foundation of theory development and model building that support questions or hypotheses proposed for the research. As we teach music education research, it is critically important to stress the importance of theory and model building. For our individual research efforts and results to contribute to the larger body of knowledge, our research must be grounded in theory be it quantitative or qualitative research.

Good examples of this may be found in Webster's overview of research, from studies in the *JMTE* special volume on technology, and elsewhere. In Webster's review there is note of post-Vygotskian Activity Theory (Burnard) as well as constructivist theory (Keast). From the *JMTE* studies we have Waldron's work based on Wenger's Communities of Practice (1998), the eBILITY model of Brown & Dillon (2011), and my own attempt to build a model to characterize the non-traditional music student (Williams 2011). The several studies dealing with self-efficacy owe the geneses of this concept to Bandura's (1986) model of social cognitive theory. And, as Rees (2011) encourages us in his *JMTE* article, there is considerable value using models from outside our discipline and interdisciplinary research. An excellent example of using models from educa-

tion is the TPACK model developed by Mishra & Koehler (2006). This model provides a working basis for examining the relationship between Technology, Pedagogy, Content and Knowledge (TPaCK) in designing instruction, thus ensuring that technology is used in support of the other three integral components. The "pedagogy" element in this model fits nicely with Webster's closing plea for "more substantial studies on teaching strategies that use technology" and emphasizes "integration" as the best laid course for any technology implementation in education.

Peter Webster's contributions during his career have contributed much of value to our profession. We wish Peter well as he sets out on the high seas with new adventures either within music scholarship and academe or piloting his sailboat and dancing the wind and waves with Mother Nature.

Notes:

1. References for all studies from the Webster article are indicated by author name only without dates. If a page number is indicate for a direct quote, that page number refers to Webster unless otherwise indicated. The reader should refer to the original Webster article included in this iBook publication for reference details.

2. All research references to the JMTE special issue that includes the Webster article are noted with a 2011 date and appear in the Reference list for this reflection publication.

References

Carlsen, J. C., & Williams, D. B. (1978). *A Computer annotated bibliography: Music research in programmed instruction* (1952-72). Reston, VA: Music Educators National Conference.

Bandura, A. (1986). *Social foundations of thought and action: A social-cognitive view*. Englewood Cliffs, NJ: Prentice-Hall.

Bergmann, J., & Sams A. (2012). *Flip your classroom: Reach every student in every class every day*. Eugene, OR: International Society for Technology in Education.

Brown, A.R., & Dillon, S. (2011). eBILITY: from tool use to partnerships. *Journal of Music, Technology and Education, 4*(2/3), 201-215.

Burnard, P. (2011). Educational leadership, musical creativities and digital technology in education. *Journal of Music, Technology and Education, 4*(2/3), 157-171.

CISCO (2008). *Equipping every learner for the 21st century*. San Jose, CA: CISCO Systems, Inc.

Collins, D. (2011). Getting there: Do we need to study how people compose music? *Journal of Music, Technology and Education, 4*(2/3), 173-179.

Edmundson, M. (2012, July 21). The trouble with online education. The New York Times. Retrieved from

http://www.nytimes.com/2012/07/20/opinion/the-trouble-with-online-education.html?_r=1

The Flipped Class Network (2012). http://flippedclassroom.org/

Landy, L. (2011). Discovered whilst entering a new millennium: A technological revolution that will radically influence both music making and music education. *Journal of Music, Technology and Education, 4*(2/3), 181-188.

Leong, S. (2011). Navigating the emerging futures in music education. *Journal of Music, Technology and Education, 4*(2/3), 233-243.

Mishra, P., & Koehler, M. J. (2006). Technological Pedagogical Content Knowledge: A new framework for teacher knowledge. *Teachers College Record, 108* (6), 1017-1054.

OCW: OpenCourseWare Consortium (2012). http://www.ocwconsortium.org/

Rees, F. J. (2011). Redefining music technology in the United States. *Journal of Music, Technology and Education, 4*(2/3), 149-155.

Savage, J. (2011). Tom's story: Developing music education with technology. *Journal of Music, Technology and Education, 4*(2/3), 217-226.

Sobel, D. (1995). *Longitude: The true story of a lone genius who solved the greatest scientific problem of his time*. New York: Walker Publishing.

Wenger, E. (1998). *Communities of Practice: Learning, meaning, and doing*. New York: Cambridge University Press.

Waldron, J. (2011). Conceptual frameworks, theoretical models and the role of YouTube: Investigating informal music learning and teaching in online music community. *Journal of Music, Technology and Education, 4*(2/3), 189-200.

Webster, P. R. (2002). Computer-based technology and music teaching and learning. In R. Colwell and C. Richardson (Eds.) *The new handbook of research on music teaching and learning* (pp. 416-439). New York: Oxford University Press.

Webster, P. R. (2007). Computer-based technology and music teaching and learning: 2000–2005. In L. Bresler (Ed.). *The international handbook of research in arts education* (pp. 1311-1328). Dordrecht, The Netherlands: Springer.

Webster, P. R. (2011). Key research in music technology and music teaching and learning. *Journal of Music, Technology and Education, 4*(2/3), 115–130.

Welch, G. F. (2011). The arts and humanities, technology and the "English Baccalaureate": STEAM not STEM. Journal of Music, Technology and Education, 4(2/3), 2-3.

Williams, D. B. (1987). Do our models for music research and teaching reflect our human social nature? *Bulletin of the Council for Research in Music Education, 90*, 65–73.

Williams, D. B. (2011). The non-traditional music student in secondary schools of the United States: Engaging non-participant students in creative music activities through technology. *Journal of Music, Technology and Education, 4*(2/3), 131-147.

Williams, D. B., & Webster, P. R. (2008). *Experiencing music technology* (3rd ed. updated). Boston: Schirmer Cengage Learning.

CHAPTER 7

Charting a new course for music teaching and learning: Difficult but rewarding waters.

by Peter Richard Webster

Presented May 19, 2012 at Peter's retirement celebration in Guild Lounge, Scott Hall, Northwestern University.

My thanks to Dean Toni-Marie Montgomery and to the Bienen School for this opportunity to address you tonight. I was delighted to hear of the many music performance events connected with my colleagues and fellow retirees Robert Harris, Fred Hemke and Wally Kajala. I was a little jealous and considered performing a few pieces on my trumpet for tonight's festivities. Of course this would send all of you scrambling for the exits rather early since my best trumpeting has long since past. Despite my serious goal of returning to playing in coming months, it makes much more sense for me to do something else.

I asked the Dean if I might offer a few words based on the scholarship in my field of music teaching and learning – something I feel I am a little better at doing. I do this in part to reinforce the idea that a comprehensive school of music not only celebrates music making in all of its glorious ways but also the study of music theoretically, historically, and certainly pedagogically at the same time. To do less would make Northwestern's Bienen School a vastly different place. I have been so privileged all my life to be associated with institutions that hold this ideal as central to their mission.

John Beattie, the music educator and administrator whose endowed chair I have been privileged to hold these many years, shared my enthusiasm for schools like Northwestern. Beattie was dean of this school from 1934 to 1950, having joined the faculty in 1925 after several years of public school music teaching in Ohio and Michigan (Curtis, 1956). Interestingly he also was supervisor of Evanston school's elementary music program for a time, concurrently with his professorship here. This was during an age when the connection between higher education and the public schools was very chose. Beattie was a quiet and unassuming man from the research I have read (Rebstock, 2002). He was a true leader of the faculty, seeking to continue the cause of a comprehensive music school serving performers and composers as well as theorists, historians and certainly educators. In my years here, I have tried to represent this tradition. In many real ways, the Beattie Chair symbolizes the best ideals of this school and of our profession and I look forward to news of the newly appointed Beattie Chair holder in the exciting days ahead for the Bienen School.

I have chosen the title of this talk with some care. For the members of the prestigious Chicago-area boating community that are in the audience tonight, fantastic people who have become a cherished part of the Websters' lives, you will enjoy the rather obvious metaphor that this title provides. For anyone spending even a little time cruising the waters of Lake Michigan, the great joys and amazing challenges that such a pastime provides are well understood. So too it is with music teaching and learning. I know of few experiences more rewarding than seeing the eyes of young people come alive with understanding under the spell of our great art and knowing that we as teachers are, in part, responsible for making this magic happen. It is a feeling that keeps underpaid and undervalued music teachers going home at night looking forward to the next day. We also know that to do this work well is some of the hardest work there is. Education done well is indeed

hard. Aspiring to teaching young people requires the highest levels of commitment to being better. That is at the heart of my talk tonight.

Difficult Waters

So what do I mean by charting a new course in difficult waters? The "difficult waters" part of this title might be suggestive of the hard times we face in schools due to lack of support. With funding challenges in our economy and the climate in K-12 schools leaning radically toward "testable" subjects such as those related to science, technology, engineering, and mathematics, time and resources devoted to arts education can be and often is challenged (Holcomb, 2007). But these challenges are common for arts educators and over the years, we have become familiar with fighting for our rightful place in schools (Mark & Madura, 2013).

In this talk, however, I am speaking of a different set of obstacles that confront music teaching and learning at all levels -- central to ourselves and not to outside forces. I have in mind the lack of interest of many in our field with what might be called the BIG IDEAS of music teaching practice and the unwillingness to consider changes based on the implications of these big ideas. One of the biggest tragedies we face in teaching today is complacency – a lack of interest in any sort of new idea or change (Jorgensen, 2010). Change is work, change might end in failure, change is threatening (Cuban, 2003). It's like the tired and misguided mariners who sits on the docks, hooked to power cords and cable TV, and consider their boats as floating RVs. No charting of new courses for those folks—even with the promise of amazing experiences beyond the pump out pier.

What I would like to suggest in the next few minutes are seven BIG IDEAS in music teaching and learning that have the potential to inspire our music teachers to think differently about music education – thinking that can change practice for the better. My big ideas may not be yours so bear with me; I am going to list mine and then maybe we can talk about the ones I have missed over a good wine as the evening progresses. At the risk of stretching the boating metaphor too far, I will add that each of these big ideas contain navigational hazards in the form of rocky ideas, sandy bottoms, and high winds! But, if treated seriously and with care, they can result in a smooth and magnificent journey that can be part of a new and satisfying course.

Big Ideas in Music Teaching and Learning

Constructivist approaches

The first idea – and perhaps the most important since it strikes at the heart of one's philosophy – is the role of teacher and student and the magical tradeoffs of teacher-centered verses student-centered learning. I am talking about the epistemological notion of constructed learning that comes from each person's interaction with ideas, experiences, and social interaction with others (Webster, 2011a). It is the notion that real learning is constructed individually by each of us in our way by the experiences we have and not simply being "told"

and blindly accepting what is truth. These are notions that grow out of the work of people like Jean Piaget, John Dewey, Jerome Bruner and Howard Gardner to name a few scholars that you might know. Do we learn best by direct instruction with the teacher dominating all that we learn OR do we learn best by experimenting with ideas, problem solving, problem finding, and constructing our own meaning as we go? The answer for me is both – sometimes one – sometimes the other but never only one. So my first big idea is the notion of *adapted constructionism*. Great teaching for me happens when we work for an artful blend of student discovery (perhaps with a little tolerance for failure along the way) and strong teacher direction. I regret that music teaching may too often be dominated by top-down strategies with little allowance for student engagement for the purpose of personal discovery. This is for me just plain bad music teaching that leads to little real learning. Always telling a student what is wrong with their sound or telling students what to think and even feel while listening to music without allowance for personal voice is troublesome. Always conducing ensembles with no questioning, group problem-solving, or reflective wonderments about the music being played, composed or improvised leads to failure for life-long music understanding and participation. Think back on some of the great teachers in your life that have really made a difference and I am guessing that you can remember this balanced approach to encouraging your learning (Gardner, 1991).

Creative thinking in music

A natural outgrowth of this first idea is one that has consumed me since my early days in graduate school: the nurturing of creative thinking in music. By this I mean the opportunity at every turn to allow students to imagine in sound, to create their own music as much as is humanly possible (Webster, 2002). For example, from the moment we teach a young trumpet player to being to play the most basic sounds, we should encourage some prototypical improvisation, composition, and creative listening. We should perhaps not be so concerned about notation and music reading, but rather concentrate on various kinds of creative music making as so many other cultures around the world do. In our beginning ensembles we must, from the very start, ask questions about sounds and encourage students to imagine and reflect about why the music sounds the way it does. I often speak of divergent and convergent thinking in my classes – of taking the time to play with ideas, to encourage creative projects that frankly, push the edges a little (Webster, 1990; Hickey and Webster, 2001). I also believe that the potential for creative work in music is measurable (Webster, 1987) and that creative achievement in music can be documented and embedded into the grades we award for musical progress in schools.

Further, I have grave concern about the single-minded direction of some music teachers – always chasing the endless goal of exquisite performance as if our school ensembles are only little versions of the Chicago Symphony instead of amazing laboratories for learning about music. I, of course, want our ensembles to perform musically and as error-free as possible,

but I also want music teachers to balance that with attention to a wider range of music learning that might come with better music listening, experiments with composing and improvising, and the encouragement of musical imagination (Graham, 1998).

Interdisciplinary thinking

My third idea is about music and its relation to other things that are of meaning in life. By this I mean interdisciplinary understandings that help to inform and even transcend the musical experience by connecting it to other art forms and to other events in history (Barrett, McCoy, and Veblen (1997). This is an idea that has not gotten the important attention that it should. Even within our own academies of music we find it so difficult to relate music learning in pedagogy, music theory, music history, and music performance. As colleges and universities, we rarely reconsider the ways we deliver our nationally accredited programs of study with an eye toward interdisciplinary synthesis. But even beyond this professional failure, we have not found adequate ways to encourage teachers in schools to collaborate actively with teachers of art, creative writing, theatre, chemistry, math, and reading–to note a few. This does occur from time to time and the results are often spectacular, but it hardly is common practice. It has always seemed ironic to me that we create systems where students move between these worlds every year as they take a variety of classes in school and we assume transfer and connections. We need to teach for this actively (Colwell, 2011).

Embedded and balanced assessment

My fourth candidate for a big idea is the use of embedded and balanced assessment. By this I mean the development of assessment strategies for learning that are built into the fabric of our teaching. We ought to give more thought to assessment that is meaningful for learning and that is designed as a springboard for change for both ourselves as teachers and our students. We need to expand assessment to include portfolios of evidence for student learning that have not only the usual paper and pencil tests, final exams and juries, but also the kinds of formative and summative assessment that students have a role in designing in some collaborative way. We should be supporting a system where students act as their own critics and take more ownership of their learning. I have in mind the more extensive and sensitive use of journals; Internet blogs; notebooks; portfolios of analog and digital projects; multi-media presentations, and creative products such music compositions and listening maps. All these can be constructed by students under our guidance and encouragement and discussed and evaluated in classes in constructive ways (Herbert, 2001). Good teaching for me leads each student to their individual paths of excellence in different ways using a variety of evidence to demonstrate learning.

I also think of assessment as not just about student learning, but also teacher learning. Teachers need to reflect on their practice on a regular basis in ways that help them improve; just as in fields such as engineering, law and medicine, this is part of what it means to be a “professional.” If our students

are not learning, teachers need to muster the courage to figure out why and to seek ways to improve (Conkling and Henry, 1999).

Another part of assessment for me is using research tools, both qualitative and quantitative, to find answers to important questions about music teaching and learning. The profession is often criticized for not using research findings to impact practice. If this is to change, the kind of systematic thinking about our praxis that assessment and research evidence requires should be built into the fabric of music teacher education at the undergraduate level. There is simply nothing mysterious about a correlation coefficient, a simple test of significance, or an embedded theme discovered by coding some complex interactions (Webster, 2012).

Expanding who we teach

Each of these four big ideas relate to the "how" of music teaching but my fifth notion relates to the "who." Just who do we teach? A great challenge that we face as music educators in the schools in our country today is engaging as many of our students in music as possible and not just the advantaged few that began an instrument at grade four or who have sung in their school choir from the very start. A large percentage of our high school students, for example, find considerable informal music-making experiences outside of formal instruction (Elpus and Abril, 2011). That is of course natural to expect but it is made all the more complex and unnecessary by our systems of music education curricular and instructional traditions that only see certain kinds of students (and certain kinds of music) as the focus of our efforts. We must find more effective ways to engage wider audiences of students in musical experiences that may not be focused on specialized performance experiences in bands, choruses and orchestras. We should consider what it would be like to engage a wider and more varied set of students in very different ensembles and in all kinds of different classes about music. We need to change our vision of what music teachers do in high school and elsewhere. This is a big idea for sure and one that challenges all of us (Williams, 2012).

What kind of music

This leads to my sixth big idea, and it relates to the question of "what." What kind of music should we teach? This is quickly becoming a kind of "third rail" in our discourse and among the hottest topics in professional circles these days. Vernacular music in our schools? Music of other cultures? These are wonderments that have been around for some time but have become more pronounced in today's contemporary society. Michigan State professor John Kratus, one of the distinguish alumni from our well regarded Ph.D. program in music education at Northwestern, has argued forcefully for several years for a dramatic change in music education (Kratus, 2007). For him we are, in Malcolm Gladwell's terms, at the tipping point in music education (Gladwell, 2002). Kratus is fond of displaying a graphic that represents the curriculum of the older conservatories of Europe and placing that beside the curriculums of today's music programs – noting little difference. He

advocates a new approach in our college curricula in the preparation of teachers. As part of this, he argues for a vastly different engagement of music in our schools – making the point that the music of today's youth is far removed from the music we do in schools. He makes an excellent case, a case that is reinforced by studies of youth musicality as it exists in varied ways and settings (Green, 2002; Burnard, 2012).

We need to open our ears to the fine examples of music from a variety of sources. For example, we are often out of touch with the stunning examples of students' remixes, mashups and covers of contemporary artists of all types. Such examples found in the social media are often examples of creative work indicative of excellent music skills not often celebrated in our academies (Tobias, 2012; Ruthmann and Hebert, 2012).

My own position on this big idea is tempered by a long standing love of Western art music. I do not want to loose the meaningful and long-standing objectives that our profession maintains for the hope that our students would find the music of Mozart, Beethoven, Brahms, Beethoven and Stravinsky some of the most exciting stuff ever. There is no doubt in my mind that music teachers need to listen to a wider spectrum of music and have Cold Play, Coltrane and Chopin mixes as part of their Spotify favorites. Perhaps the answer for this big idea is simply to strive for balance in our choice of repertoire in all the teaching that we do (Woody, 2007). In widening the breath of music taught, we should cover a variety of quality music and help students learn to explore what we have not covered on their own with the many musical outlets that form our social fabric today.

Music technology

This leads to my last big idea – the power of music technology. This is a big idea that has its greatest impact on the question of "where" music learning occurs. Technological advances in all aspects of the music experience has effected our work in ways not imagined in the generations before us. I need not list here the extraordinary technical advances in music creation, production, reproduction, and distribution that have occurred in our lifetimes. These are well documented elsewhere (Williams and Webster, 2009; Webster, 2011b). But I challenge you to think about not only technology's effect on music in schools or in our recording studios, concert halls, and rehearsal spaces, but on the music experiences outside the walls of formal institutions. I am thinking here of places such as community music venues, bathrooms, attics, train stations, mountain tops, yes even sailboats. Creating and learning about music has moved from not just rooms like the ones John Beattie taught in here at Northwestern but to any place there is electricity, battery power, and a strong wireless Internet signal. Because of technology, we find ourselves in an era where music itself and the opportunity learn about it are as bountiful as the air we breath (Thibeault, 2012).

Examples of the breathtaking changes in music education because of technology are plentiful. Here at Northwestern we have been in the forefront with our Internet broadcasts of our

fine ensembles (http://www.pickstaiger.org/video-library). Here and elsewhere we note the experiments with master classes done interactively over Internet2 (http://www.internet2.edu/arts/member-education.html). More and more courses in music are offered interactively on-line and whole degree programs in music and music teaching are appearing as realities.

As I present this talk (and as you read these words in this iBook), major changes in higher education are afoot with the development of companies designing Massive Open Online Courses (MOOCs). (http://net.educause.edu/ir/library/pdf/PUB4005.pdf). These courses are written by well known professors from prestigious colleges and universities. The offerings are open to anyone willing to register and do the work and some schools are considering sanctioning the successful completion of the work as credit toward a degree. This opening of learning experiences to online participants may usher in a new paradigm for education that will have dramatic effects on all of our education systems. Much of the work to date has been in the sciences, and as of now, I know of no music courses that are offered in this way. As technology improves and becomes even more pervasive than it is now, this may change.

Interestingly, one of the projects that will occupy my time in coming months is the development of my "Creative Thinking in Music" class for online delivery nationally. Working with a development team at the University of North Carolina at Greensboro, I hope to finish work on the course in January. The course may well be offered in part from the deck of our sailboat in whatever port we are in. Now that is a big idea that even I cannot quite grasp!

Closing thoughts

So there you have my list. I have tried to write and lecture about these big ideas in various ways in my lifetime and will pledge to you that I will continue to do so for as long as I can. I welcome your continued participation with me in these endeavors in ways that make sense to you.

Before concluding, I want to say something about my colleagues here in music education. Donald Casey and Bennett Reimer encouraged me in 1988 to consider teaching at Northwestern. Before coming I contacted Bernie Doborski at Oregon who was rumored to be coming here the next year. All of these folks did a persuasive job in convincing me to head west. I recall being very happy in Cleveland at Case Western Reserve and the Indians were starting to actually win some baseball games! I did not want to move. In retrospect, I will be forever grateful to these marvelous people for getting after me because it was the best decision I have ever made professionally.

In the last few years here, I have had the great fortune of working with some of the finest thinkers, teachers and human individuals a person could ever want. My two closest colleagues now, Maud Hickey and Janet Barrett are two of the most brilliant colleagues I have ever known. We share so much together and we work so well as a team that I cannot imagine my retirement getting in the way of our continued collabora-

tion and professional growth together for many years to come. They are, simply put, quintessential music education professors of the highest order.

But perhaps most of all, I treasure the many students I have had the pleasure of teaching in my years here. The many undergraduate and graduate students I have encountered through the years have taught me far more than I have given them. Of this group, I feel especially close to the doctoral students, both those working with me now and those that have graduated and established themselves in the major colleges and universities both here and abroad. I shall always and forever hold you close in my heart. I know that I speak for my colleagues when I say that you have made us so very proud. Many carry on and will carry on work in all these big ideas I have cited tonight; they are the treasures of our work and the whole point of what we do and why we do it. I hope that when we meet at some distant conference, you will buy the old guy at least the first cocktail.

I tell my students that this is perhaps the most exciting time to be a music teacher and when the history or our profession is written long after all of us are sailing in heaven or hell, this period now will be seen as a major time for change – a challenging time with some rough waters. I am an internal optimist. I really think history will show that we will have charted a new course for music teaching and learning in the next few years and that we will have avoided some of the rocks along the way. We will probably run aground for a short time along the way – all of us do. But we will have succeeded ultimately in making music the life changing experience that it has always been and will forever be.

I will stop talking now so that we may get on with the evening, but I want to recognize my family tonight for all the magnificent help and kindness they have shown me in my career. My son Greg could not be here tonight. He is traveling in Europe with his theater company. He teaches acting at the University of Connecticut and we are so proud of his achievements. My daughter Kathryn is with us tonight – a professor at Boston University in athletic training and sports medicine – a great teacher and a fine researcher and we are so proud of her too. And finally my lovely wife Connie has put up with all those classes, late nights, depressive states that I have been in and those times away from her when she probably would wish otherwise. I love you so very much for putting up with me and my many faults. I think tonight of the spirit behind Walden and the words of Henry David Thoreau -- we will do with a lot less, but we will go forth and live large.

Thank you all from the deepest part of my heart.

References

Barrett, J., McCoy, C., & Veblen, K. (1997). *Sound ways of knowing: Music in the interdisciplinary classroom*. Belmont, CA: Wadsworth.

Burnard, P. (2012). *Musical creativities in real world practice*. Oxford, UK: Oxford University Press.

Colwell, R. (2011). Roles of direct instruction, critical thinking and transfer in the design of curriculum for music learning. In R. Colwell and P. Webster (Eds.) *MENC handbook of research on music learning*, Vol. 1 (pp. 84-139) New York, NY: Oxford University Press.

Conkling, S., & Henry, W. (1999). Professional development partnerships: A new model for music teacher preparation. *Arts Education Policy Review, 100*(4), 19-23.

Cuban, L. (2003). *Why is it so hard to get good schools*. New York, NY: Teachers College Press.

Curtis, L. (1956). The versatile John Beattie. *Music Educators Journal, 43*(2), 22-24+26.

Elpus, K., & Abril, C. (2011). High school music students in the United States: A demographic profile. *Journal of Research in Music Education, 59*(2), 128-145.

Gardner, H. (1991). *The unschooled mind: How children think and how schools should teach*. New York, NY: Basic Books.

Gladwell, M. (2002). *The tipping point: How little things can make a big difference*. New York, NY: Little, Brown.

Graham, D. (1998). Teaching for creativity in music performance. *Music Educators Journal, 84*(5), 24-29.

Green, L. (2002). *How popular musicians Learn: A way ahead for music education*. Surrey: UK: Ashgate.

Hebert, E. (2001) *The power of portfolios: What children can teach us about learning and assessment*. San Francisco, CA: Jossey-Bass.

Hickey, M., & Webster, P. (2001). Creative thinking in music. *Music Educators Journal, 88*(1), 19-23

Holcomb, S. (2007). *State of the arts. neatoday*, (January). Retrieved from http://www.nea.org/home/10630.htm

Jorgensen, E. (2010). School music education and change. *Music Educators Journal, 96*(4), 21-27.

Kratus, J. (2007). Music education at the tipping point. *Music Educators Journal, 94*(2), 42-48.

Mark, M., & Madura, P. (2013). *Contemporary music education*, 4th ed. New York, NY: Cengage.

Rebstock, H. (2002). *Advancing music for a century: The first hundred years of Northwestern University's School of Music*. Evanston, IL: Northwestern University, Department of University Relations.

Ruthmann, S. A., & Hebert, D. (2012). Music learning and new media in virtual and online environments. In G. McPherson and G. Welch, (eds.), *The Oxford handbook of music education*, Vol. 2 (pp. 567-584) New York, NY: Oxford University Press.

Thibeault, M. (2012). Music education in the postperformance world. In G. McPherson and G. Welch, (eds). *The Oxford handbook of music education,* Vol. 2 (pp. 517-530) New York, NY: Oxford University Press.

Tobias, E. (2012). Let's play! Learning music through video games and virtual worlds. In G. McPherson and G. Welch, (eds.), *The Oxford handbook of music education*, Vol. 2 (pp. 531-548) New York, NY: Oxford University Press.

Webster, P. (1987). Refinement of a measure of creative thinking in music. In C. Madsen & C. Prickett (eds.), *Applications of research in music behavior* (pp. 257-271). Tuscaloosa, AL: University of Alabama Press.

Webster, P. (1990). Creativity as creative thinking. *Music Educators Journal, 76*(9), 22-28.

Webster, P. (2002). Creative thinking in music: Advancing a model. In T. Sullivan, & L. Willingham, (eds.), *Creativity and music education,* (16-33). Edmonton, AB: Canadian Music Educators' Association.

Webster, P. (2011a). Constructivism and music learning. In R. Colwell and P. Webster (eds.), *MENC handbook of research on music learning*, Vol. 1 (pp. 35-83) New York, NY: Oxford University Press.

Webster, P. (2011b). Key research in music technology and music teaching and learning. *Journal of Music, Technology and Education, 4*(2/3), 115-130, doi: 10.1386/jmte.4.2-3.115_1

Webster, P. (2012). There is nothing complex about a correlation coefficient. In G. McPherson and G. Welch, (eds). *The Oxford handbook of music education*, Vol. 2 (pp. 694-697) New York, NY: Oxford University Press.

Williams, D. (2012). The non-traditional music student in secondary schools of the United States: Engaging non-participant students in creative music activities through technology. *Journal of Music, Technology, and Education, 4*(2/3), 131-147.

Woody, R. (2007). Popular music in schools: Remixing the issues. *Music Educators Journal, 93*(4), 32-37.

Related Links

Big Ideas in Education

http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=99

http://oomscholasticblog.com/2009/12/decades-10-big-ideas-in-education.html

http://teaching.monster.com/benefits/articles/6928-big-ideas-for-education

http://www.ted.com/talks/ken_robinson_says_schools_kill_creativity.html?qtwh=true&utm_expid=166907-14

Constructivist Approaches

http://www.pbs.org/teacherline/courses/inst335/docs/inst335_brooks.pdf

http://www.thirteen.org/edonline/concept2class/constructivism/index.html

http://www.sedl.org/pubs/sedletter/v09n03/construct.html

Creative Thinking in Music

http://www.peterrwebster.com/

http://www.dana.org/news/cerebrum/detail.aspx?id=35670

http://brainposts.blogspot.com/2011/01/brain-and-musical-creativity-ted-talk.html

http://www.davidelliottmusic.com/praxial-music-education/musical-creativity/

http://www.artsci.wustl.edu/~ksawyer/groupgenius/excerpt.html

Interdisciplinary Thinking

http://artsedge.kennedy-center.org/educators.aspx

http://www.umaine.edu/sustainabilitysolutions/faculty_resources/pdfs/Ivanitskaya.pdf

http://www.art21.org/anythingispossible/resources/for-educators/case-studies/interdisciplinary-music-and-visual-art-project-part-1-septemberoctober-2010/

http://www-usr.rider.edu/~vrme/v3n1/visions/ioffredo-interdisciplinary%20arts%20education.pdf

Embedded and Balanced Assessment

http://musiced.nafme.org/about/position-statements/assessment-in-music-education/

http://www.youtube.com/watch?v=LZFc55n2SCQ

http://www.provost.wisc.edu/assessment/manual/manual2.html

http://www.mfaa.msde.state.md.us/source/PDF/Portfolio_Music.pdf

Expanding Who We Teach

http://www.musiccreativity.org/research.html

http://teachingmusic.tumblr.com/post/4848072631/whose-tradition-the-non-traditional-music-student

http://www-usr.rider.edu/~vrme/v22n1/visions/Bernard_Music_Educators_with_Non_Traditional_Backgrounds.pdf

What Kind of Music

http://www.duc.auburn.edu/academic/classes/ctmu/7970CMP/refs/hickey-rees-2002.pdf

http://www.ascd.org/ASCD/pdf/journals/ed_lead/el_199111_goodlad.pdf

http://www.youtube.com/watch?v=pWATmxeNZFY

https://soundcloud.com/groups/top-40-mashups-and-remixes

Music Technology

http://teachmusictech.com/resources.html

http://coach4technology.net/music_technology_tech4music/

http://musiced.about.com/od/musicschools/a/musicdegree.htm

http://www.insidehighered.com/blogs/hack-higher-education/top-ed-tech-trends-2012-moocs

CHAPTER 8

Peter Webster Biography and Curriculum Vitae

Biography

Peter Richard Webster retired in 2012 from the Henry and Leigh Bienen School of Music at Northwestern University in Evanston, Illinois where he held the John Beattie Chair of Music Education. He now holds an Emeritus appointment at Northwestern and works as an educational consultant, researcher, and online instructor. In the Fall of 2013 assumed an adjunct appointment as Scholar-in-Residence at the Thornton School of Music at the University of Southern California in Los Angeles. He continues to write about children's creative thinking in music and in the appropriate use of music technology for music teaching and learning. Webster holds degrees in music education from the University of Southern Maine (BS) and the Eastman School of Music at the University of Rochester (MM, PhD). He has taught in the pubic schools of Maine, Massachusetts, and New York; following fourteen years of teaching at Case Western Reserve University in Cleveland, he moved to Northwestern in 1988. He has held various administrative positions in his career, including a term as Associate Dean at the Bienen School. He served as Chair of the Department of Music Studies which includes the programs of music education, musicology/ethnomusicology, music theory/cognition, and composition/technology. His has recently taught courses in the philosophy of music education, graduate research, music technology, measurement and assessment, and creative thinking in music. He has supervised many doctoral dissertations in music education and has been the recipient of many grants, including a landmark award from the National Association of Music Merchants to study the influence of music experiences on adult creativity in non-music fields. Webster has presented at many state, national, and international meetings and is a frequent keynote speaker. His published work includes over 75 articles and book chapters on technology, music education practice, and creative thinking in music which have appeared in journals and handbooks in and outside of music. He is an editorial board member for several prestigious journals and has severed as an editor for several projects, including the new *MENC Handbook of Research on Music Learning* published by Oxford University Press. Webster is co-author of *Experiencing Music Technology*, 3rd edition Updated (Cengage, 2008), a standard textbook used in introductory college courses in music technology. He is the author of *Measures of Creative Thinking in Music*, an exploratory tool for assessing music thinking using quasi-improvisational tasks. He and his wife Connie Webster have

been avid sailors on the Great Lakes and now on the Pacific Ocean; they own *Maine Sail*, a 2009, 42-foot Catalina sloop.

Vitae

Education

Doctor of Philosophy, Music Education Eastman School of Music, University of Rochester, 1977

Dissertation: *A Factor of Intellect Approach to Creative Thinking in Music,* UM #77-2600-26619

Master of Music, Music Education Eastman School of Music, University of Rochester, 1971

Bachelor of Science, Music Education University of Southern Maine, 1969

Professional Positions and Administrative/ Teaching Responsibilities

1988-2012 **Northwestern University, Bienen School of Music** --Evanston, Illinois

- Department of Music Studies, Music Education and Music Technology Programs
- Department Chair (Music Studies), 2009 to 2012
- Appointed John W. Beattie Chair of Music Education and Technology, Fall 1998
- Full Professor with Tenure, 1994
- Associate Professor, 1988-1994
- Associate Dean for Faculty Affairs, Graduate School Liaison, 2007- 2009
- Associate Dean for Academic Affairs and Research, and Director of Doctoral Studies, 2002 to 2006
- Interim Department Chair (Music Studies), 2001-2002
- Coordinator of the Music Education Program, 1995 to 2002

Teaching and Administrative Responsibilities

- Graduate courses in music education research, measurement and evaluation, computer technology and music, creative thinking in music; doctoral dissertation advisement

- Faculty Member in the Center for the Study of Education and the Musical Experience
- Academic advisor for all Ph.D. students in music education, assist with summer masters advising

1974 - 1988 **Case Western Reserve University, Department of Music** — Cleveland, Ohio

- Chairman, Department of Music (1984 - 1988)
- Associate Professor with Tenure (1983 -1988)
- Assistant Professor (1977 - 1983)
- Instructor (1974-1977)

Teaching and Administrative Responsibilities

- Graduate courses in music education research, measurement and evaluation, computer technology and music, creative thinking in music, graduate remedial theory, psychology of music; masters thesis and doctoral dissertation advisement
- Undergraduate courses in music history, comprehensive musicianship, computer technology and music, instrumental methods, conducting, supervision of student teaching
- Department Chair: management of department budget; faculty development; evaluation of existing programs; establishment of new directions for the Department, including strategic planning with University administration; procurement of grants and other outside funding; chair of University-wide committees
- Director of music education program on graduate and undergraduate levels including supervision of curriculum, establishment and maintenance of clinical and field-based experiences with over 30 local schools systems, and administration of masters and doctoral examinations

Performance

- Guest conducting appearances with Case Western Reserve Wind Ensemble
- Trumpet performances with the University Brass Faculty Ensemble
- Free lance performances in local Cleveland area

Teaching

1973 - 1974 Wheatland-Chili Schools — Scottsville, New York

Directed seventh and eighth grade bands, responsible for private and group instruction for each student in band program; assisted the high school band director with high school concert and marching band programs (half-time position)

1972 - 1974 Nazareth Academy — Rochester, New York

Directed high school concert band (part-time position)

1970 - 1973 Eastman School of Music — Rochester, New York

Graduate assistantship which involved teaching responsibilities in instrumental methods and various conducting classes

1969 - 1970 Marshfield Junior High School — Marshfield, Massachusetts

Directed instrumental music program which included two large ensembles and group lessons; taught four classes of general music

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Summer Teaching at Northwestern University

- Teacher in the Four-Summer Masters Program, 1989-2010, 2012
- Director of the Four-Summer Masters Program in Music Education, 1989-1996
- Director of the *Summer Fellows Program*, 1994-1996
- Week-long Music Technology Workshop for the Chicago Area Music Teachers Association (CAMTA), August 2-5, 1999

Invited Teaching Appointments

Dissertation Advisor, Boston University School of Music, Music Education Department, 2012-present

Guest Instructor, Lebanon Valley College, "Encouraging Music Imagination in Ensembles and Classrooms," June 26-July 1, 2011

Co-instructor, Alumnae Class, "Anatomy of a Music Education: What Does It Take to Grow a Professional Musician?" Northwestern University, Fall 2006

Guest Instructor, College Music Society Technology Institute, Illinois State University, Normal, (seminar on music technology for college teachers), June 3-8, 2006; June 4-9, 2005; June 5-10, 2004; June 3-6, 2002; June 3-8, 2001; June 11-16, 1999; June 12-17, 1998.

Guest Professor, Polytechnic Institute, Porto, Portugal, (three-day intensive teaching in the Fall School for masters students in music education), September 27-29, 2000

Guest Professor, Central Connecticut State University, New Britain (week-long courses on composition in the schools and software design), July 2-6, 2001; July 19-24, 1999; July 21-25, 1997; July 8-12, 1996.

Guest Faculty Member for Music, Empire State Partnership Project, Summer Seminar, Sarah Lawrence College, Bronxville, NY, July 19-26, 1998.

Guest Instructor, Lascassas School/Middle Tennessee State University, Murfreesboro, TN (week-long workshop: "Integrating Technology and Music Instruction) June 16-20, 1997.

United States Information Agency, Academic Specialist Grant to lecture in Australia, Presentations in Hobart, Melbourne and Sydney, June 25-July 14, 1995.

Guest Professor, Eastman School of Music, University of Rochester (week-long seminar on multimedia design in music), July 11-15, 1994.

Guest Professor, School of Music, University of Washington, Seattle (two graduate courses in research and computer applications), July 19-23, 1993.

Guest Professor, Department of Music, Indiana University of Pennsylvania (graduate course in computers and music for the schools), Summer of 1988.

Guest Professor, Department of Music Education, Eastman School of Music (graduate seminars in philosophy of music education, research techniques, and computers), Summers of 1978 and 1984.

Instructor for a two-semester course sequence in the Psychology of Music, Cleveland Music Therapy Consortium, Baldwin-Wallace College, 1981-1982, 1982-1983, 1983-1984.

Publications

Books, CDs/DVDs, Websites

MENC Handbook of Research on Music Learning, Vols. I and II (jointly edited with Richard Colwell) Oxford University Press, New York, New York, 2011.

Experiencing Music Technology (jointly authored with David Williams) Cengage/Schirmer, New York, 2008. (3rd edition UPDATE) (with project-centered website: www.emtbook.net)

Experiencing Music Technology (jointly authored with David Williams) Thomson/Schirmer, New York, 2006. (3rd edition) [DVD included]

Experiencing Music Technology: Data, Software and Hardware (jointly authored with David Williams) 1999; Schirmer Books, New York. (2nd edition)

Resource and Study Guide: Experiencing Music Technology: (jointly authored with David Williams), Macintosh and Windows versions, Compact Disc, 1999; Schirmer Books, New York.

Experiencing Music Technology: Views of Data, Software and Hardware (jointly authored with David Williams) 1996; Schirmer Books, New York.

Resource and Study Guide: Experiencing Music Technology: (jointly authored with David Williams), Macintosh and

Windows versions, Compact Disc, 1996; Schirmer Books, New York.

Book in Preparation

Music Teachers as Guides for Learning: The 21st Century Music Educator. (An introductory textbook for music teaching and learning.) Publication Target: Spring, 2013

Chapters/Articles in Press

Webster, P. (2013). Music composition intelligence and creative thinking in music. In M. Kaschub and J. Smith (eds.), *Composing our future: Preparing music educators to teach composition* (pp. 19-32). *New York:* Oxford University Press.

Webster, P. (in press). Software to interrogate qualitative data in music education. In C. Conway (ed.), *Handbook of Qualitative Research in Music Education*. Oxford University Press

Randles, C. and Webster, P. (in press) Creativity in music teaching and learning. In E. Carayannis (ed.), Encyclopedia of Creativity, Invention, Innovation, and Entrepreneurship. Springer

Chapters/Sections in Books

Webster, P. (2012). Chapter 7.25. There is nothing complex about a correlation coefficient. In G. Welch and G. McPherson, (eds), *Oxford handbook of music education, Vol. II* (694-697). New York, New York: Oxford University Press.

Webster, P. (2012). Toward a Pedagogy of Revision: Guiding Middle School Students' Music Compositions. In O. Odena, (ed.), *Musical creativity: Insights from music education research,* (93-112). Ashgate Publishing: Farnham, Surrey, England.

Webster, P. (2011). Constructivism and Music Learning. In R. Colwell and P. Webster (eds.), *MENC handbook of research on music learning, Vol. 1,* (35-83). New York, New York: Oxford University

Webster, P. (2010) "Music Teachers as Guides for Learning," In M. Biasutti, (ed.), *Educarea educare: Ricerche sulla formazione delgli die musica*. (115-129). Lecce, Italy: Pensa Multitmedia.

Webster, P. (2009). Children as creative thinkers in music: Focus on composition. In: L. Hallam, I. Cross, & M. Thaut (eds.), *The Oxford handbook of music psychology*, (pp. 421-428). Oxford, UK: Oxford University Press.

Webster, P. (2007). Computer-based technology and music teaching and learning: 2000-2005. In: L. Bresler (Ed.),

The International Handbook of Research in Arts Education, (1311-1328). Dordrecht, The Netherlands: Springer.

Webster, P. (2007). Prelude: Knowledge, skills, attitudes, and values: Technology and its role in arts education. In: L. Bresler (Ed.), *The International handbook of research in arts education,* (1293-1295). Dordrecht, The Netherlands: Springer.

Webster, P, and Hickey, M. (2006). Computers and technology, In: McPherson, G. (Ed.), *The child as musician: a handbook of musical development,* (pp. 375-395). New York: Oxford University Press.

Webster, P. (2005). Creativity and music technology. In: F. Richmond, (Ed.), *Technology strategies for music educators*, 2nd Edition (pp. 69-77). Milwaukee, WI: Hal Leonard Publishing.

Webster, P. (2003). What do you mean, "Make my music different?" Encouraging revision and extension in children's music composition. In M. Hickey, (Ed). *Why and how to teach music composition: A new horizon for music education*. Reston VA: MENC: The National Association for Music Education.

Webster, P. (2002). Creative thinking in music: Advancing a model. In T. Sullivan, & L. Willingham, (eds.), *Creativity and music education* (pp. 16-33). Edmonton, AB: Canadian Music Educators' Association.

Webster, P. (2002). Building bridges: from research to the music classroom. In M. Campbell (Ed.), *On musicality & milestones: Selected writings of Marilyn Pflederer Zimmerman with contributions from the profession* (pp. 103-114). Urbana, IL: University of Illinois.

Webster, P. (2002). Music technology and the young child. In: L. Bresler & C. Thompson (Eds). *The arts in children's lives* (pp. 215-236). Dordrecht, Netherlands: Kluwer.

Webster, P. (2002). Computer-based technology and music teaching and learning. In R. Colwell & C. Richardson (Eds.), *The new handbook of research on music teaching and learning* (pp. 416-439). New York: Oxford University Press.

Webster, P. (2000). Curriculum development in music education. In D. Brown (ed.), *Interactive learning: Vignettes from America's most wired campuses* (pp. 215-216). Bolton: MA: Anker Publishing.

Webster, P. (1996). Creativity as creative thinking. In G. Spruce (Ed.), *Teaching music.* (pp. 87-97). London: Routledge. (Reprinted from *Music Educators Journal. 76* (9), May, 1990, pp. 22-28.

Webster, P. (1995) General music, school reform and technology. In S. Stauffer (Ed.), *Toward tomorrow, New visions for general music.* Reston, VA: Music Educators National Conference.

Webster, P. (1992). Research on creative thinking in music: the assessment literature. In R. Colwell (ed.), *Handbook of research on music teaching and learning* (pp. 266-279). New York: Oxford University Press.

Webster, P. (1992). Inspiration and creativity. In B. Reimer & J. Wright (eds.), *On the nature of musical experience* (pp. 254-258). Niwot, CO: University Press of Colorado.

Webster, P. (1988). Creative thinking in music: approaches to research. In J. Gates (ed.), *Music education in the United States: Contemporary issues* (pp. 66-81). Tuscaloosa: University of Alabama Press.

Webster, P. (1987). Refinement of a measure of creative thinking in music. In C. Madsen & C. Prickett (eds.), *Applications of research in music behavior* (pp. 257-271). Tuscaloosa: University of Alabama Press.

Webster, P. (1987). Conceptual bases for creative thinking in music. In C. Peery (ed.), *Music and child development* (pp. 158-174). New York: Springer-Verlag.

Book Reviews

Webster, P. (in press). [Review of *Music and the mind: Essays in honour of John Sloboda*. Edited by I. Deliège & J. Davidson]. *Music Education Research*.

Webster, P. (2002). [Review of *The science and psychology of music performance: Creative strategies for teaching and learning* by R. Parncutt & G. McPherson]. *International Journal of Education & the Arts*. 3(1). http://ijea.asu.edu/v3n5/

Webster, P. (2002). [Review of *musical development and learning: The international perspective* by D. Hargreaves and A. North]. *Music Education Research*. *4*(1), pp. 167-169.

Webster, P. (2002). [Review of *Teaching music musically* by K. Swanwick]. *Music Education Research*. *2* (2), pp. 224-228.

Webster, P. (1992). [Review of *MacWorld music and sound bible* by C. Yavelow].*Computers in Music Research*. *4*, 127-138.

Webster, P. (1980). [Review of *Handbook of music psychology,* edited by D. Hodges]. *Contributions to Music Education*. *10*, 43-48.

Webster, P. (1979). [Review of *Conducting educational research,* by B. Tuckman]. *Journal of Research in Music Education*. *27*, 271-273.

Webster, P. (1975). [Review of *Research in music behavior: Modifying music behavior in the classroom,* edited by C. Madsen, D. Greer & C. Madsen]. *Contributions to Music Education*. *4*, 116-120.

Articles Published in Refereed Journals

Webster, P. (2012) Technology in music instruction and learning. In N. M. Seel (Ed.), *Encyclopedia of the Sciences of Learning*. Retrieved from http://www.springerlink.com/content/j6qk79t23373w541/fulltext.html

Webster, P. (2011). Key research in music technology and music teaching and learning. *Journal of Music, Technology and Education*, *4*(2/3), 115-130, doi: 10.1386/jmte.4.2-3.115_1

Webster, P. (2009). Music technology as a servant to real music experience. *Orff Echo, XLII* (1), 9-12.

Webster, P. (2006). Some cautions about constructivism. *The Mountain Lake Reader*. Spring, pp. 92-93.

Webster, P. (2006). Sound thinking. *Keyboard Companion*. *17*(2)

Webster, P. (2003). Asking music students to reflect on their creative work: Encouraging the revision process. *Music Education Research*, *5* (3), pp. 243-248.

Webster, P. (2002). Historical perspectives on technology and music. *Music Educators Journal*, *89* (1), pp. 38-43.

Webster, P. (2001). Respensar o Ensino de Musica no Novo Seculo. *Revista*. pp. 5-16.

Hickey, M. & Webster, P. (2001). Creative thinking in music. *Music Educators Journal, 88* (1), pp. 19-23.

Webster, P. (2000). Reforming secondary music teaching. *Journal of Secondary Gifted Education*. *12* (1), pp. 17-24.

Webster, P. (2000). Where are we and where should we be going? *American Music Teacher*, *49* (6), pp. 35-37. (publication of an address given to the National Conference on Piano Pedagogy, 1993)

Hickey, M. & Webster, P. (1999) MIDI-Based adaptation and continued validation of the Measures of Creative Thinking in Music. *Bulletin of the Council of Research in Music Education*, *142*, 93-94 (Abstracts).

Webster, P. (1999). Preparing teachers of music for a lifetime. In: J. Richmond and P. Webster (Eds.) Musings: Arts Education Essays in Honor of Bennett Reimer, Special Issue of the *Journal of Aesthetic Education*, 33 (4), pp. 179-192.

Webster, P. (1998). Young children and music technology. *Research Studies in Music Education*, *11,* pp. 61-76.

Webster, P. (1998). Rethinking music aptitude and its assessment. *Sound Ideas*. *2* (2), pp. 6-16.

Webster, P. (1998). The new music educator. *Arts Education and Policy Review*, *100* (2), pp. 2-6.

Webster, P. (1998). (Contributor) The effects of music performance participation on the music listening experience:

a review of literature. *Bulletin of the Council for Research in Music Education, 136,* pp. 1-55.

Rodriguez, C. & Webster, P. (1997). Development of children's verbal interpretative responses to music listening. *Bulletin of the Council for Research in Music Education, 134,* pp. 9-30.

Webster, P. (1996). Thinking in music: encouraging the inner voice. *The Orff Echo*, *28* (4), pp. 10-11.

Webster, P. & Hickey, M. (1995). Rating scales and their use in assessing children's music compositions. *The Quarterly Journal of Music Teaching and Learning, 6* (4), pp. 28-44.

Webster, P. (1995). Creating your own multimedia software for music teachers. *Illinois Music Educator*, *56* (1), pp. 52-54.

Webster, P. & Hickey, M. (1995). Challenging children to think creatively. *General Music Today*. *8*(3), 4-10.

Webster, P. (1994). Qualitative methodologies in music education research conference, final session: reflections and predictions. *Bulletin of the Council of Research in Music Education, 122,* 108-111.

Webster, P. (1994) Time, technology, and the creative process. *Arts Education Policy Review, 96* (1), 32-36.

Webster, P. (1994) Beyond drill and practice. *American Music Teacher, 43*, (6), 16-19.

Webster, P. & Richardson, C. (1993). Asking children to think about music. *Arts Education Policy Review*. *94* (3), 7-11; also published in: *Research Studies in Music Education 2*, 1994, 8-14.

Webster, P. (1992). Custom-designed software in the arts: the educator as expert. *Design for Arts in Education, 93* (6), 37-44.

Webster, P. (1992). Music teachers as software authors. *SIGCUE Outlook Newsletter*. *21*, 87-98; also published in: *Cadenza: The Journal of the Saskatchewan Music Educators Association*, *25* , 1992, pp. 6-13, (includes an appendix of terms by S. Smith.)

Lapidaki, E. & Webster, P. (1991). Consistency of tempo judgments when listening to musical compositions of different styles. *Psychomusicology*, *10* (1), 19-30.

Webster, P. (1991). Creative thinking and the musical development of the young child. *The American Music Teacher,* June/July, 16-19.

Webster, P. (1990). "Higher level" thinking and instrumental music teaching. *New Ways*, *7* (1), 10-11.

Webster, P. (1990). Creative thinking, technology and music education. *Design for Arts in Education*, *90* (5), 35-41.

Webster, P. (1990). Creativity as creative thinking. *Music Educators Journal, 76* (9), May, 1990, pp. 22-28. [Google Scholar rated this article as the #1 most frequently cited article in *Music Educators Journal* as of June, 2010.]

Webster, P. (1989). Composition software and issues surrounding its use in research settings with children. *Psychomusicology*, *8* (2), 163-169.

Webster, P. (1988). New perspectives on music aptitude and achievement. *Psychomusicology*, *7* (2), 177-194.

Webster, P. (1988). Creative thinking in music education. *Design for Arts in Education*, *89*(5), 33-37.

Webster, P. (1985). Response: reflections on Reimer. *Bulletin of the Council of Research in Music Education, 83*, 31-39.

Webster, P. & Hamilton, R. (1982). Effects of peer influence, rhythm quality, and violin timbre on the musical preferences of fourth, fifth, and sixth grade children. *Contributions to Music Education*, *9*, 10-20.

Webster, P. & Zimmerman, M. (1983). Conservation of rhythm and tonal patterns in five through ten year old children. *Council for Research in Music Education Bulletin, 73*, 29-49.

Webster, P. & Schlentrich, K. (1983). Discrimination of pitch direction by preschool children with verbal and nonverbal tasks. *Journal of Research in Music Education*, *30*, 151-161.

Webster, P. (1982). Fact and imagination. *Triad*, May/June, 29.

Webster, P. (1979). The ivory tower, the trenches, and the gap that separates. *Contributions to Music Education, 7*, 68-73.

Webster, P. (1979). Relationship between creative behavior in music and selected variables as measured in high school students. *Journal of Research in Music Education*, *27*, 227-242.

Webster, P. (1976). Identifying the Creative Musician. *Triad*, May, 32-35.

Joint Projects in Preparation

(Center for the Study of Education and The Musical Experience)

- Adult Music Listening (research article)
- Popular Music in the Schools (research article)

Michael Burritt: The Complete Package (Book Chapter)

Rethinking Education and the Musical Experience (Edited Book)

Papers Published in Conference Proceedings

Webster, P. (2006). Measurement of Creative Potential in Music: Frontier or Foolishness, *Multidisciplinary Perspectives on Musicality: The Seashore Symposium*. (pp. 78-88). University of Iowa, Iowa City.

Webster, P. (2006). Creativity through the generations in arts and sciences: Creativity in music. *2006 Kellogg Family Business Conference*, Proceedings. (pp. 72-75). May 16-17, 2006, Northwestern University, Evanston, IL.

Webster, P. (2003). Asking music students to reflect on their creative work: Encouraging the revision process. *Curriculum Innovation in Music: Proceedings of the 4th Asia-Pacific Symposium on Music Education Research*, July 9-12, 2003, Hong Kong, China.

Webster, P. (2002). Encouraging creative thinking in music instruction: A basis for international collaboration in a technologically connected age. *Proceedings of the 2002 International Society of Music Education Conference*, Bergen, Norway, August 11-16, 2002, CD-ROM

Webster, P. (2002). Creative thinking and music education: Encouraging students to make aesthetic decisions, Short paper version published in: *Conference du 10e Anniversaire, Actes de la Conference*, European Society for the Cognitive Sciences of Music, April 5-8, 2002, Liege, Belgium. (Proceedings published on CD-ROM)

Webster. P. (1999) Measurement of creative potential in music: Frontier or foolishness? Abstract published in *Council for Research in Music Education Bulletin. 140*, 26-27. Paper presented at: Multidisciplinary Perspectives on Musicality: The Seashore Symposium. CIC Meeting. University of Iowa, Iowa City, October 18, 1997.

Webster, P. (1999) Technological Advances and Their Influence on Music Education, *Proceedings Report: 1997 Bowling Green Research Symposium on Music Teaching and Research*, September 27, 1997.

Webster, P. (1996). "Music Technology 101"—Building a basic course for the undergraduate music curriculum, *Technological Directions in Music Education,* Proceedings of the Third International Conference, San Antonio, TX. February 8, 1996.

Webster, P. (1996). Using affordable tools for creating multimedia—QuickTime video for integrating text, video, digital sounds and MIDI, *Technological Directions in Music Education,* Proceedings of the Third International Conference, San Antonio, TX. February 8, 1996.

Webster, P. (1995). Creativity, composition, and computers: Connections for the New Century, *Honing the Craft: Improving the Quality of Music Education*, Keynote Address in the Proceedings of the 10th National Conference of the Australian Society for Music Education, Hobart, Tasmania, Australia. June 29, 1995.

Webster, P. (1995). Thinking in sound: studying children's improvisation, *Musical Connections: Tradition and Change*, Proceedings of the 21st World Conference of the International Society for Music Education, Tampa, FL, July 22, 1994.

Webster, P. (1994). Encouraging interdisciplinary thought. *Proceedings, The 69th Annual Meeting, National Association of Schools of Music, 82*, 50-55.

Webster, P. (1993). Where are we and where should we be going? *1992 Proceedings of The National Conference on Piano Pedagogy,* (pp. 23-24). Los Angeles, CA: The National Conference on Piano Pedagogy.

Webster, P. & Richardson, C. (1991). Thoughts about children's thinking in music: implications for policy. *Proceedings of the CIC Conference, 1990* (pp. 114-128). Madison, WI: University of Wisconsin.

Webster, P. (1989). Creative thinking in music: the assessment question. *Proceedings of The Suncoast Music Education Forum on Creativity* (pp. 40-74). Tampa, FL: University of South Florida.

Webster, P. (1988). Curriculum length and sequence. *Proceedings, The 63rd Annual Meeting, National Association of Schools of Music, 76*, 60-65.

Webster, P. (1987). The magic synthesis: creative thinking in music and management. *Proceedings, The 62nd Annual Meeting, National Association of Schools of Music, 75*, 199-208.

Webster, P. (1986). Ethnographic techniques for music research. *Proceedings of The 1985 Research Symposium in the Psychology and Acoustics of Music*, (pp. 4-6). Lawrence, KS: The University of Kansas.

Webster, P. (1983). An assessment of musical imagination in young children. *Proceedings Report: 1983 Bowling Green Research Symposium,* (pp. 100-123). Bowling Green, OH: Bowling Green State University.

Webster, P. (1981). Openness to seek value. *Proceedings Report: The Fourth Loyola Symposium (1981) Music in Community Education,* (pp. 65-70). New Orleans, LA: Loyola University.

Webster, P. (1980). Music and brain asymmetry: some basic concerns and thoughts toward a model. *Proceedings Report: The Second Loyola Symposium (1979) Hemisphere Laterality and Music*, (p.28-40). New Orleans, LA: Loyola University.

Other Publications

Published Teacher's Guide

Hickey, M., Lipscomb, S., Webster, P., *LinkUp! Melody*, Curriculum materials, including audio CD, featuring Dvorak's

Symphony No. 9 (From the New World), Carnegie Hall Education Department: New York, New York.

Items Personally Published

Measure of Creative Thinking in Music (MCTMII), a set of standardized activities designed to assess the musical imagination of young children. MCTM is sent at cost to music teachers and researchers in this country and abroad. To date, over 40 copies of MCTM and its Manual have been shipped. In addition to my own research work with this measure, five independent studies have been published that use MCTM. Further details: http://www.peterrwebster.com

Annotated Bibliography on Music Education and Creative Thinking in Music. This document contains over 550 annotated citations and is categorized into subsections based on philosophical, practical, and empirical content. The bibliography is updated every two years and is distributed from my personal website: http://www.peterrwebster.com

Editorships and Editorial Board Memberships

Editorial Board, *International Journal of Music Education*, 2012 - present

Editorial Board, *Journal of Music, Technology and Education*, 2007 - present

Editorial Board, *Journal of Research in Music Education*, 2006 - 2012

Editorial Board, *Interdisciplinary Journal of Education and the Arts* (Online Journal), 1999 – present

Editorial Board. *Music Education Research International* (Online Journal), 2007 – present

Editorial Board, *Journal of Technology in Music Learning*, 1999 - present

Editorial Board, *Research Studies in Music Education*, 1995 - present

Editorial Board, *International Handbook of Research in Arts Education*, 2004 - 2006

North American Book Review Editor for *Music Education Research*, 2001 - 2003

Editorial Board, *The New Handbook for Research in Music Teaching and Learning*. 1999- 2002

Editorial Board, *Contributions to Music Education*, 1974 - 1985

Book Review Editor, *Contributions to Music Education*, 1974 - 1977

Editor-in-Chief, *Contributions to Music Education*, 1977 - 1982

Editorial Board, *Journal of Research in Music Education*, 1982 - 1988

Editorial Board, *Handbook for Research in Music Teaching and Learning*. 1989 - 1992

Editorial Board, *Bulletin for the Council for Research in Music Education* 1985 - 1998

Editorial Board, *Music Educators Journal*, 1997 – 2000

Special Editorial Assignments

Editorial Board, *International Handbook of Research in Arts Education*. (Kulwer). Edited section on technology in the arts, including a written Prelude. (2005-2006)

Editorial Board, *The New Handbook of Research on Music Teaching and Learning* (Oxford University Press, 2002). Worked with Nancy Whitaker to edit ten chapters for "Part II. Educational Content and the Curriculum."

Special theme issue of the *Journal of Aesthetics and Art Criticism* , J. Richmond and P. Webster (Eds.) *Musings: Arts Education Essays in Honor of Bennett Reimer* (Winter, 1999)

Editorial Board, *Handbook of Research on Music Teaching and Learning* (Macmillan Publishers, 1992). I edited nine chapters for "Section E. Teaching and Learning Strategies."

Special theme issue of the *Music Educators Journal* , May, 1990 on Creative Thinking in Music. I solicited and edited six articles and wrote the introduction.

Special theme issue of the *Psychomusicology* , 8 (2), 1989 on Personal Computers and Psychomusicological Research. I solicited and edited twelve articles.

Refereed Presentations

Papers

Webster, P. "A Further Examination of Doctoral Programs in Music Education," (co-presented with Joanne Rutkowski and Jason Gossett), 2012 NAfME National Conference, St. Louis, Missouri. March, 2012

Webster, P. "Music Composition Intelligence and Creative Thinking in Music," 2012 NAfME National Conference, St. Louis, Missouri. March, 2012

Webster, P. "Doctoral Programs in Music Education: An Examination of Degrees, Curricula, and Qualifying Examinations," (co-presented with Joanne Rutkowski), 2011 Symposium on Music Teacher Education, Greensboro, North Carolina, September, 2011

Webster, P. "The Role of Research and Assessment in Teacher Preparation," Research in Music Education Conference, University of Exeter, Exeter, England. April, 2011

Webster, P. "Tipping Over: The Literature on Music Teacher Education Redesign," (co-presented with Mark Campbell), 2010 Biennial Music Educators National Conference, Anaheim, CA, March 26, 2010.

Webster, P. "No Child Left Without Creative Thinking: Encouraging Imaginative Thought," Wisconsin State Music Conference, Madison, WI, October 28, 2009

Webster, P. "Research and the Undergraduate Music Education Major," CIC 2009 Conference, Ohio State University, Columbus, Ohio, October 16, 2009.

Webster, P. "Creative College Music Teaching: Issues of Definition and Assessment," 2009 International Conference , College Music Society, Split, Croatia, July 4, 2009

Webster, P. "Refining a Model of Creative Thinking in Music: A Basis for Encouraging Students to Make Their Own Aesthetic Decisions," 9th International Conference on Music Perception and Cognition, University of Bologna, Italy, August 22-26, 2006.

Webster, P. "Performance Teaching and Learning at a Distance: The Promise of Video Conferencing for Teaching Music," CIC Meeting, Indiana University, Bloomington, October 21, 2005

Webster, P. "Encouraging Creative Thinking in Music Instruction: A Basis for International Collaboration in a Technologically Connected Age," 2002 International Society of Music Education Conference, Bergen, Norway, August 11-16, 2002

Webster, P. "Creative Thinking and Music Listening: A Look at the Literature and the Future," National Convention, Music Educators National Conference, Nashville, April, 2002.

Webster, P. "Preparing Sound and Music Notation for Multimedia and the Internet," National Convention, Music Educators National Conference, Nashville, April, 2002.

Webster, P. "Double, Double Toil and Trouble; Where Doth Creative Thinking Bubble," The Second International Research In Music Education Conference, University of Exeter, Exeter, UK, April 3-7, 2001

Webster, P. "Music Composition Software for People from 6 to 60," Sixth International Conference on Music Perception and Cognition, Keele University, United Kingdom, August 9, 2000.

Webster, P. "Formal Approaches to the Evaluation of Music Compositions by External Judges: Rating Scales, Rubrics, and Other Techniques," Sixth International Conference on Music Perception and Cognition, Keele University, United Kingdom, August 9, 2000.

Webster, P. & Hickey, M. "Development and Refinement of a Computerized Version of the *Measure of Creative Thinking in Music*," National Convention, Music Educators National Conference, Washington, DC., March 2000.

Webster, P. "Using the Internet to Teach National Standards 8 and 9, Related Arts and Historical Context," National

Convention, Music Educators National Conference, Washington, DC., March 2000.

Webster, P. "Using Technology in Music Instruction, What Do We Really Know?" National Convention, Music Educators National Conference, Washington, DC., March 2000.

Webster, P. & Hickey, M. "MIDI-Based adaptation and continued validation of the *Measures of Creative Thinking in Music* (MTCM)." Cognitive Processes of Children Engaged in Musical Activities, A Conference Honoring the Contributions of Marilyn Pflederer Zimmerman, University of Illinois, Urbana-Champaign, June 3-5, 1999.

Webster, P. & Williams, D. "Connecting and collaborating with musicians over the Internet," National Convention, Music Educators National Conference, Phoenix, AZ, April, 1998.

Webster, P. & Kerchner, J. "The role of computer software in qualitative research: A review of available programs in a practical application," Qualitative Methodologies in Music Education Research Conference II, University of Illinois, Urbana-Champaign, May 1996.

Webster, P. & Kaschub, M. "Composition in general music and choral settings," National Convention, Music Educators National Conference, Kansas City, MO., April, 1996.

Webster, P. "Using affordable tools for creating multimedia, QuickTime Video and HTML," Technological Directions in Music Education Conference, San Antonio, TX. February, 1996.

Webster, P. "Music Technology 101—designing a basic course for the undergraduate music curriculum," Technological Directions in Music Education Conference, San Antonio, TX., February, 1996.

Webster, P. "Thinking in sound: studying children's improvisations," Twenty-first Biennial Conference of the International Society for Music Education, Tampa, FL., July, 1994.

Webster, P. & Williams, D. "Designing music technology labs in schools," National Convention, Music Educators National Conference, Cincinnati, OH., April, 1994.

Webster, P. "Composition and improvisation for all: rethinking K-12 music education," College Music Society National Conference/Association for Technology in Music Instruction, Minneapolis, MN. October, 1993.

Webster, P. & Williams, D. "Music Technology 101: designing a basic course for the undergraduate music curriculum," College Music Society National Conference/Association for Technology in Music Instruction, Minneapolis, MN., October, 1993.

Webster, P. "Music teachers as software authors: the real payoff for technology in the future," Suncoast Music Educa-

tion Forum on Futurism in Music Education and the Arts, Tampa, FL., March, 1993.

Webster, P. & Williams, D. "Designing exciting software in music: HyperCard and multimedia," National Convention, Music Educators National Conference, New Orleans, LA, April, 1992.

Webster, P. "Children's composition and technology: some suggestions for research and practice in teacher education curricula," College Music Society National Conference/ Association for Technology in Music Instruction, Washington, DC., October, 1990.

Webster, P. "Creative thinking in music and its development in children." National Conference, Music Educators National Conference, Washington, DC., March, 1990.

Webster, P. & Williams, D. "HyperCard concepts, resources, and application for college music instruction." College Music Society National Conference/Association for Technology in Music Instruction, St. Louis, MO., October, 1989.

Webster, P. "Approaches to the study of creative behavior in music: a literature model," National Conference, Music Educators National Conference, Chicago, IL., March, 1984.

Webster, P. "Effects of peer influence, rhythmic quality, and violin timbre on the musical preferences of fourth, fifth, and sixth grade children," National Convention, Music Educators National Conference, San Antonio, TX, February, 1982.

Webster, P. "An assessment of musical imagination in young children." National Convention, Music Educators National Conference, Miami Beach, FL., April, 1980.

Webster, P. "Discrimination of tonal direction on verbal and non-verbal tasks by four and five year olds," North Central Divisional Convention, Music Educators National Conference, Indianapolis, IN, April, 1979.

Webster, P. "A study of relationships between creative behavior in music and selected variables as demonstrated in high school-aged students." North Central/Southwestern Bi-divisional Convention, Music Educators National Conference, Kansas City, MO., March, 1977.

Research Posters

Webster, P. "The Role of Research and Assessment Knowledge in Teacher Preparation," 2009 Symposium on Music Teacher Education, University of North Carolina-Greensboro, September 10-12, 2009.

Webster, P. "Refining a Model of Creative Thinking in Music: A Basis for Encouraging Students to Make Aesthetic Decisions," National Convention, Music Educators National Conference, Salt Lake City, April, 2006.

Webster, P. "Broadening the Concept of Music Aptitude: New Approaches to Theory and Assessment" Sixth Interna-

tional Conference on Music Perception and Cognition, Keele University, United Kingdom, August 6, 2000.

Hickey, M. & Webster, P. "Rating scales and the assessment of children's compositions," National Convention, Music Educators National Conference, Cincinnati, OH, April, 1994.

Rodriquez, C. & Webster, P. "Development of children's verbal interpretive responses to music listening," National Convention, Music Educators National Conference, New Orleans, LA., April, 1992.

Webster, P. & Lapidaki, E. "Consistency of tempo judgments when listening to musical compositions of different styles." Illinois Music Educators Association State Conference, Peoria, IL., February, 1991.

Webster, P. "Study of internal reliability and construct validity for the *Measure of Creative Thinking in Music* (MCTM)," National Convention, Music Educators National Conference, Washington, DC., March, 1990.

Fodor, D. & Webster, P. "Measurement of visual/tactile ability in fifth grade percussion students," National Convention, Music Educators National Conference, Washington, DC., March, 1990.

Webster, P. "A model for creative thinking in music with implications for music education," National Convention, Music Educators National Conference, Indianapolis, IN., March 1988.

Webster, P. "Test-retest reliability for *Measure of Creative Thinking in Music*," National Convention, Music Educators National Conference, Indianapolis, IN., March 1988.

Webster, P. & Zimmerman, M. "Conservation of rhythmic and tonal patterns in five through ten year old children," National Convention, Music Educators National Conference, Minneapolis, MN., April, 1981.

Presentations/Workshops

"Music Technology Skills and Conceptual Understanding for Undergraduate Music Students: A National Survey," (co-presented with David Williams) College Music Society National Conference/Association for Technology in Music Instruction, Richmond, VA, October 21, 2011.

"Integrating eBooks, Tablets and iPads, and Smart Boards into the Music Classroom," (co-presented with David Williams) College Music Society National Conference/Association for Technology in Music Instruction, Minneapolis, MN, September 23, 2010.

"Can We Abandon Print Resources in the Music Classroom?," (co-presented with David Williams) College Music Society National Conference/Association for Technology in Music Instruction, Minneapolis, MN, September 23, 2010.

"Creative College Music Teaching: Imaginative Engagement of Students" and "Effects of Musical Experience on the Creative Thinking of Adult Non-Musicians: Architects, Chefs, and Industrial Designers, Preliminary Stages" International Society of Music Education, Conference, Beijing, China, August 1-6, 2010.

"Advancements in Technology: Impact on Music Teaching and Learning, Session I and II," (co-presented with David Williams) College Music Society National Conference/Association for Technology in Music Instruction, Portland, Oregon, October 24, 2009.

"Designing Music Technology Modules as a Supplement to Traditional Music Classes," (co-presented with David Williams; College Music Society National Conference/Association for Technology in Music Instruction, Atlanta, GA, September 26, 2008.

"Cross-Platform LMS Test Design and the Use of Respondus Software," Pre-conference Technology Boot Camp: Learning Management Systems and Social Computing, College Music Society National Conference/Association for Technology in Music Instruction (Co-presented with David Williams), Salt Lake City, November 14, 2007.

"Social Computing and Music Teaching and Learning: Roots, Realities, and Reasoned Speculation," (co-presented with David Williams; College Music Society National Conference/Association for Technology in Music Instruction, Salt Lake City, November17, 2007.

"A Distance Education (DE) Triptych: The Music Classroom, The Internet, and Video Conferencing," (co-presented with David Williams; College Music Society National Conference/Association for Technology in Music Instruction, San Antonio, Texas, September 14-17, 2006.

"The Underwear: Strategies for Enabling Student-Constructed Learning in Music Technology Courses: Parts I and II" (co-presented with David Williams; College Music Society National Conference/Association for Technology in Music Instruction, Quebec City, Canada, November, 2005.

"Student Technology Goes Mobile: Parts I and II" (co-presented with David Williams; College Music Society National Conference/Association for Technology in Music Instruction, San Francisco, CA, November, 2004.

"New Developments in Technology for Music Teaching: Encouraging Creative Thinking," Special Interest Group—Music Education, American Education Research Association, Annual Meeting, San Diego, CA, April 13, 2004.

"Twenty Years of MIDI, Parts I and II" (co-presented with David Williams; College Music Society National Conference/Association for Technology in Music Instruction, Miami, October, 2003.

"Music Computing Goes Mobile; Session I: Solutions for Teaching, Composing, and Performing; Session II: The Future of Music Labs and Classrooms" (co-presented with David Williams; College Music Society National Conference/

Association for Technology in Music Instruction, Kansas City, September, 2002.

“Creating Music Technology Courses; Part I, Designing Introductory Courses; Part II Music Multimedia Tech Courses and Performance Groups” (co-presented with David Williams; College Music Society National Conference/Association for Technology in Music Instruction, Santa Fe, NM, November 15-17, 2001.

“Getting Started Using Music Technology: Entry Points Across the College Music Curriculum, Parts I and II,” (co-presented with David Williams; College Music Society National Conference/Association for Technology in Music Instruction, Toronto, November 4, 2000.

“Design and Create the Ultimate MIDI and Computer Classroom,” National Convention, Music Educators National Conference, Washington, DC, March, 2000.

“Interactive Models for Using the Web for Music Instruction, Parts I and II,” (co-presented with David Williams; College Music Society National Conference/Association for Technology in Music Instruction, Denver, October 15-17, 1999.

“Transporting Music Documents to the Web, Parts I and II,” (co-presented with David Williams); College Music Society National Conference/Association for Technology in Music Instruction, Puerto Rico, October 22-25, 1998.

“Designing a MIDI Lab,” (co-presented with David Williams); National Convention, Music Educators National Conference, Phoenix, AZ., April, 1998.

“Demonstration of Multimedia Pedagogy in Action, Parts I and II,” (co-presented with David Williams); College Music Society National Conference/Association for Technology in Music Instruction, Cleveland, OH, November 13-15, 1997.

“On-Line and Off-Line Music Instruction Using Web Tools, the Internet, and CD-ROM,” (co-presented with David Williams); College Music Society National Conference/Association for Technology in Music Instruction, Atlanta, GA, October 24-26, 1996.

“Internet and Music Teaching, Session I: What is the Internet and How Does in Work? Session II: How Can I Use the ‘Net’ in My School Music Program” (co-presented with David Williams); National Convention, Music Educators National Conference, Kansas City, April 19-20, 1996.

“Poor Person’s On-Line and Off-Line Multimedia Music Tools,” (Two-session Workshop) (co-presented with David Williams); College Music Society National Conference/Association for Technology in Music Instruction, Portland, OR, November 10-11, 1995.

“Thinking in Sound: Studying Children’s Improvisation,” Twenty-First Biennial Conference of the International Society for Music Education, Tampa, FL, July 22, 1994.

"The Internet and its Use in Music and Arts Education," (Two-session presentation) (Co-presented with David Williams); College Music Society National Conference/ Association for Technology in Music Instruction, Savannah, GA, October 21-23, 1994.

"Designing Technology Labs for Music and the Arts," (Two-session presentation) (Co-presented with David Williams); College Music Society National Conference/Association for Technology in Music Instruction, Minneapolis, MN, October 14-17, 1993.

"HyperCard Workshop: Multimedia Resources," (Two-session presentation) (Co-presented with David Williams); College Music Society National Conference/Association for Technology in Music Instruction, San Diego, CA, October 29-November 1, 1992.

"HyperCard Skills for Music Application in Higher Education," (Four-session presentation) (Co-presented with David Williams); College Music Society National Conference/ Association for Technology in Music Instruction, Chicago, IL., October, 1991.

"HyperCard Skills for Music Application in Higher Education," (Four-session presentation) (Co-presented with David Williams); College Music Society National Conference/ Association for Technology in Music Instruction, Washington, DC., October, 1990.

Major Keynote Addresses

"Messy Minds: A look at Constructivism and Direct Instruction" Research in Music Education Conference, University of Exeter, Exeter, England. April, 2011

"Encouraging Imaginative Thought in Music with Students, "Music Software that Encourage Creative Thinking in Music," and "Advancements in Technology: Impact on Music Teaching and Learning" Three Keynote Presentations at the Music Education Conference at Taipei Municipal University of Education, Taipei, Taiwan. December 5-6, 2010.

"Music Teaching for Tomorrow," Presentation to the Music Teachers of Reykjavík, Iceland. Major address and day-long workshop on music technology, February, 5, 2008.

"The Role of Music Teachers as Guides for Learning: Today and Tomorrow," Technology In Music Education, National Meeting, Keynote Address, Columbus, Ohio, February 9, 2007

First Annual Pioneer Music Educator and Visiting Scholar Symposium, Campus-wide presentation on the future of music education. Western Michigan University, Kalamazoo, MI, March 13, 2007

"Contemporary Music Education: Guiding Musical Decisions and the Role of Technology," Cyprus Musicology Society National Meeting, Republic of Cyprus, November 22, 2006

"Beyond the Notes: Guiding Musical Decisions," Massachusetts Music Educators Association, State Conference Keynote Speech, Boston, March 16-18, 2006

"Creativity, Composition, and Computers: Connections for the New Century," Honing the Craft: Improving the Quality of Music Education, 10th National Conference of the Australian Society for Music Education, Hobart, Tasmania, Australia. June 29, 1995.

Invited Presentations/Workshops At Professional Meetings

"Getting Music Students and the Industries that Serve Them in Tune With a Future That We Can Only Imagine," College Music Society Summit on Music and Industry, Anaheim, CA, January 21, 2012.

"Encouraging Creative Spirit in Teaching Music," Florida State Music Association, College Music Educators Faculty and Students, Fall Conference, Stetson University, Deland, Florida, October 2011.

"Creating Music Projects for Students in General Music Class," New York State School Music Association, Regional Workshop, SUNY Potsdam, October 13, 2009.

"Common Tech Tips for Common Music Tasks," Workshop for college professors. Great Lakes Super Regional Conference of the College Music Society, Illinois State University, March 28, 2008.

"Music Teachers as Guides for Learning," Training of Music Teachers, Universita degli Sudi di Padova, Dipartimento di Scienze dell'Educazione, Padua, Italy, November 7, 2007

"Common Tech Tips for Common Music Tasks," Two-day workshop for college professors. Great Lakes Chapter of the College Music Society, Bowling Green State University, March 2-3, 2007.

Pre-meeting Presentation on Music Technology for Today's College Curriculum, (Co-presented with David Williams); National Association of Schools of Music, 82nd Annual Meeting, Chicago, November 17-21, 2006.

"PowerPoint Workshop," (Co-presented with David Williams), Great Lakes Chapter of the College Music Society, Northwestern University, March 31, April 1, 2006.

"Designing Music Teacher Preparation Programs for a New Age," Massachusetts Music Educators Association, State Conference, Boston, March 16-18, 2006.

"Teaching Software Breakout I: General Music," Massachusetts Music Educators Association, State Conference, Boston, March 16-18, 2006.

"Teaching Software Breakout II: Secondary Music," Massachusetts Music Educators Association, State Conference, Boston, March 16-18, 2006.

"It's All Going Soft! The Rise of Software-Based Music Technology," Massachusetts Music Educators Association, State Conference, Boston, March 16-18, 2006.

"Role of Technology in Today's Schools," and "Inexpensive Digital Audio." Kentucky Music Educators Association, In-Service Conference, Louisville, Kentucky, February, 2005.

"Performance Teaching and Learning at a Distance: The Promise of Video Conferencing and Teaching," CIC Meeting, Indiana University, Bloomington, October 20, 2005.

"Getting Started with Technology for Younger Children," "Twenty Year Birthday of MIDI: Past, Present, and Future," and "Reasons to Use Reason: The Birth of a New Kind of Sequencer," Georgia Music Educators In-Service Conference, Savannah, Georgia, January 2004.

"Encouraging Learners to Construct Their Understanding of Music: Creative Thinking in Sound," Central Michigan University Lecture Series, Mount Pleasant, MI., February 10, 2004

Response to the paper: *A Liberal Versus Performance-Based Music Education?* By Paul Woodford, June 6, 2003, 2003 Symposium of Music Education Philosophy, Lake Forrest College.

"Encouraging Students to Make Aesthetic Decisions," Tekno-Dida Conference, Sibelius Academy, Helsinki, Finland, November 13, 2003

"Asking music students to reflect on their creative work: Encouraging the revision process," 4th Asia-Pacific Symposium on Music Education Research, July 9-12, 2003, Hong Kong, China

"Creative Thinking in Music form a Network Perspective," Symposium for Network-Based Music Education, Kuopio, Finland, April 5, 2003

"Creative Thinking, Technology, and Constructionism: Crossing the Streams for Better Music Teaching," South Central Region Chapter Conference of the College Music Society, Baylor University, March 1, 2003

"Creative Thinking and Music Education: Encouraging Students to Make Aesthetic Decisions," Conference du 10e Anniversaire, Actes de la Conference, European Society for the Cognitive Sciences of Music, Liege, Belgium, April 5-8, 2002.

"Helping Kids Construct Their Understanding of Music: Encouraging Creative Thinking in Sound," Minnesota Music Education Association Conference, Minneapolis, MN, February 15, 2002.

"Music Software for Teaching Music," Minnesota Music Education Association Conference, Minneapolis, MN, February 16, 2002.

"Reactions to Reimer's 20/20 Vision Paper." Illinois Music Educators State Conference, Peoria, Illinois, January 24, 2002.

"Flashing Your Way to Cool Web Sites for Music Teaching," Illinois Music Educators State Conference, Peoria, Illinois, January 25, 2002.

"Encouraging Children to Think in Sound with Technology: A Key to Creative Thinking and Learning." Conference on Computer Aided Music Pedagogy for Children, Tempo Reale Institute, Florence Italy, October 5-6, 2001

"Creative Thinking, Technology, and Constructionism: Crossing the Streams for Better Music Teaching," Midwest Chapter Conference of the College Music Society, March 31, 2001.

"Encouraging Kids to Compose in General Music and Performance Curricula," and "Music Software for Creative Thinking," Wisconsin Music Educators State Conference, Madison, WI, October 25, 2000.

"Reinventing the Music Educator in the 21st Century," and "Music Software for Stimulating Creative Thinking in Music," Texas Music Educators Association, Clinic/Convention, San Antonio, Texas, February 10, 2000.

"Using a Computer for Music Education Research," Graduate Research Forum, Ohio Music Education Association Conference 2000, Cleveland, Ohio, January 27, 2000.

Five presentations on the assessment of musical thinking, music technology, and creativity. New York State School Music Association, Winter Conference, Rochester, New York, November 28-December 1, 1999.

"Music Technology Workshop," Mississippi Bend Area Education Agency Music Content Area Teacher Network, Bettendorf, IA, September 24-25, 1999.

"Setting Up a School Music Technology Lab," Illinois Music Educators State Conference, (co-presented with David Williams) Peoria, Illinois, January 29, 1999.

Pre-meeting Presentation on Music Technology for Today's College Curriculum, (Two-day presentation), (Co-presented with David Williams); National Association of Schools of Music, 75th Annual Meeting, Chicago, November 19-20, 1999.

"The 21st Century Music Educator," Pennsylvania Music Educators Association, In-Service Conference, Erie, PA, April 24, 1998.

"Music Education: Connecting, Collaborating and Creating Over the Internet," Illinois Music Educators State Conference, (co-presented with David Williams) Peoria, Illinois, January 29, 1998.

"Music Composition Software," Illinois Music Educators State Conference, (co-presented with Stephen Rohwer) Peoria, Illinois, January 29, 1998.

"Composition in the Schools: Getting Kids to Think in Sound" and "Music Composition Software for Kids: Using Technology for Creative Thinking," Iowa Music Educators Association State Conference, November 21-23, 1997.

"Measurement of Creative Potential in Music: Frontier or Foolishness," Multidisciplinary Perspectives on Musicality: The Seashore Symposium. CIC Meeting. University of Iowa, Iowa City, October 18, 1997.

"Creative and Critical Thinking With Links to Assessment and Technology," Six-hour Symposium. Massachusetts Music Educators Association Meeting, Danvers, Massachusetts, March 20-22, 1997.

"Music Software for Teaching, Learning, and Creativity," Suzuki Association of the Americas, 8th Conference, Chicago, IL, May 22-25, 1998.

"Here's My Song Teacher, What Now? Next Steps in Thinking Creatively with Music," New Jersey Music Educators Association Meeting, Cherry Hill, New Jersey, February 20-22, 1997.

"What Happens When I Push This? Music Software That Encourages Creative Thinking in Music," New Jersey Music Educators Association Meeting, Cherry Hill, New Jersey, February 20-22, 1997.

"The Internet and Music Education: How Can I Use the Net in My Music Classroom," " (co-presented with David Williams) Illinois Music Educators Conference, Peoria, Illinois, January 31, 1997.

"Creating Multimedia Music Programs with the Macintosh, Session I and II" (co-presented with David Williams) Florida Music Educators Association Meeting, Tampa, Florida, January 9-11, 1997.

"So What's New in Music Technology for Educators?" Encore '96, Ontario Music Educators' Association Provincial Conference, Niagara Falls, Canada, November 7-9, 1996.

"Assessing Music Creativeness in Children: Can it be Done?" Encore '96, Ontario Music Educators' Association Provincial Conference, Niagara Falls, Canada, November 7-9, 1996.

"Here's My Song, Teacher. What Now? Next Steps in Thinking Creatively with Music," Society for General Music, National Symposium, Chicago, Illinois, September 27, 1996.

"Experiencing Music Technology: New Instructional Resources for Understanding Computers, Technology and Music," (Commercial Showcase Presentation with co-author, David Williams), National Convention, Music Educators National Conference, April, 1996.

"Music and Technology: A Whitman Sampler for the Music Educator," Eighth Annual Music Symposium, Kansas State University, Manhattan, June 21, 1996.

"Stimulating the Inner Voice," Key Focus Session on Creativity. National Convention, Music Educators National Conference, April 17, 1996.

"A Whitman's Sampler of New Software for the College Music Curriculum," The North Carolina Music Educators Associa-

tion State Conference, Winston-Salem, NC. November 20, 1995.

"Using the Macintosh to Measure Creative Thinking in Music," 1995 Suncoast Music Education Forum: Assessment, University of South Florida, Tampa, October 14, 1995.

"Creativity, Composition, and Computers: Connections for the New Century," Symposium on research in General Music, University of Arizona, Tuscon, February 16-18, 1995.

Pre-meeting Presentation on Music Technology for Today's College Curriculum, (Two-day presentation), (Co-presented with David Williams); National Association of Schools of Music, 71st Annual Meeting, Chicago, November 17-18, 1995.

"Integrating Technology with Music Teaching" 10th National Conference of the Australian Society for Music Education, Hobart, Tasmania, Australia. June 29, 1995.

"Putting Together a Computer Lab to Support Music Experiences: Where the Heck Do I Start?" West Virginia Music Educators Association State Meeting, University of West Virginia, Morgantown, March 24, 1995.

"Teaching Composition in the Schools," Symposium on Research in General Music, University of Arizona, Tucson, February 18, 1995.

Pre-meeting Presentation on Music Technology for Today's College Curriculum, (Two-day presentation), (Co-presented with David Williams); National Association of Schools of Music, 70th Annual Meeting, Boston, November 18-19, 1994.

"Music Technology in General Music and School Reform," Toward Tomorrow: New Visions for General Music, Music Educators National Conference, Washington, D. C., September 30-October 2, 1993.

"Creative Thinking in Music Teaching," Fusion, '93, 29th Annual Conference of the British Columbia Music Educators' Association, Vancouver, BC, February 18-20, 1993.

"Creative Thinking in Music: Application to Performance Classes," "Creative Thinking in Music: Application to General Music Classes," and "Applications of Technology in Stimulating Creative Thought: HyperCard and Multimedia," Fusion, '93, 29th Annual Conference of the British Columbia Music Educators' Association, Vancouver, BC., February 18-20, 1993.

"Education for the Child Who Begins Piano Study in the Mid 90s," National Conference on Piano Pedagogy, Schaumburg, IL, October, 1992.

"We Can't Measure That! Or Can We?" Illinois Music Educators Association Conference, Peoria, IL, January, 1992.

"Technology in Instruction" CIC Conference, Michigan State University, East Lansing, October, 1991.

"Creative Thinking in Music, What Does It All Mean?" Wisconsin State Music Conference, October, 1991.

"Creative Thinking in Music: How Can We Put It Into Action?" Wisconsin State Music Conference, October, 1991.

"Creative Thinking in Music I: Some Theory and Measurement Ideas," "Creative Thinking in Music II: Extension into Practice with Observations about the Schulwerk Approach," and "Applications of Technology in Stimulating Creative Thought: HyperCard and Multimedia," National Conference, American Orff-Schulwerk Association, San Diego, CA, November, 1991.

"Creative Thinking in Music: The Assessment Question," The Suncoast Music Education Forum on Creativity, Tampa, FL, March, 1989

"New Perspectives on Music Aptitude and Achievement," Symposium on Music Development and Cognition, University of Rochester, June, 1988.

"Chorales, Clients, and Cursors," Convention of the Ohio Association of Music Therapy, October, 1987.

"The Magic Synthesis: Creative Thinking in Music and Management," National Association of Schools of Music, Annual Meeting: November, 1986.

"Creative Thinking in Music," The Alabama Project, The University of Alabama, November 1984.

"Approaches to the Measurement of Creative Behavior in Music," Sixth Annual Loyola Symposium, Loyola University, February 1983.

"An Assessment of Musical Imagination in Young Children," Bowling Green Research Symposium, April, 1983.

"Can We Measure Creative Behavior in Music?" National Conference, American Orff-Schulwerk Association, November, 1983.

"Openness to Seek Value," Fourth Annual Loyola Symposium, Loyola University, February, 1981.

"Creative Thinking, The Measurement Question," Convention of the Great Lakes Chapter of the National Association of Music Therapy, Cleveland, OH. April, 1981.

"Music, Kids and Creative Thinking: Some Thoughts on Evaluation" Conference of the Ohio Music Educators Association, February, 1980.

"Creative Thinking As a Bridge Between the Left and Right Hemispheres: Implications for Curriculum Design," Second Annual Loyola Symposium, Loyola University, February, 1979.

Invited Presentations/Workshops at College University Campuses

Boston University, School of Music. "Constructing Music Understanding and Valuing Creative Thought: Implications for Research," March 5, 2012.

University of Miami, Frost School of Music. "Constructing Music Learning and Valuing Creative Thought in Difficult Times," February 17, 2012.

The Illinois Institutes of Art—Chicago Campus. Day-long workshop on encouraging creative thinking in arts programs, January 6, 2012.

Westminster Choir College, Princeton, New Jersey. Presentations on technology and creativity to faculty and students, April, 2011

Keene State College., Keene, New Hampshire. Day-long workshop on music technology, August 29, 2008.

Berklee College of Music, Boston. Guest professor. Series of classes on music education and technology topics, March 26-29, 2007

University of Nebraska, Lincoln, School of Music, Music Education Program "Guiding Aesthetic Decisions," November 29, 2006.

University of North Carolina, Greensboro, School of Music. Series of lectures on creative thinking in music and music technology. Consultation about laptop integration in the School of Music, November 1-3, 2006.

Kellogg School of Business, Northwestern University, "Creativity in Music," May 16, 2006.

University of Manitoba, School of Music Faculty and Students, "New Developments in Technology for Music Teaching: Encouraging Creative Thinking," Feb, 2006, (Videoconference presentation)

City University of New York at Queens, Major presenter for a one-day conference: New Directions in Music Technology, Flushing, New York, October 29, 2004

University of Southern Maine, Gorham, Maine. Lectures on Music Technology and Creative Thinking in Music, March 5-5, 2004.

University of Jyväskylä, Jyväskylä, Finland. Lecture on Music Education, April 7, 2003.

Northwestern University, Evanston, IL. Lecture on Music Imagination in Children, March 5, 2003 (Part of a University-wide series of lectures on imagination)

University of Maryland, College Park. Lectures on Creativity and Music Technology, April 25-26, 2002.

Hong Kong Institute of Education, Hong Kong. Three Lectures on Creativity and Two Hands-on Workshops on Music Technology. March 15-22, 2000

North Texas State University, Denton, Texas. Two Lectures on Music Creativity and Technology, October 25-26, 1999.

Baylor University, Waco, TX. Workshops on Music Technology, (co-presented with David Williams), February 12-14, 1999.

University of Northern Iowa, Cedar Falls. Workshops on Music Technology, October 17-17, 1998

University of Michigan School of Music, Ann Arbor. Presentation on Constructivism in Education and its Effect on Music Education, March 20, 1998.

University of Southern Maine, Gorham. Workshop on Composition Software in Music Education and Authoring Multimedia Projects in PowerPoint, March 5-6, 1998.

Southern University at New Orleans. Two-day Presentation on Music Technology, (co-presented with David Williams), October 23-24, 1997

"Teaching Music Educators to 'Go Long," Invited Lecturer in Honor of Charles Leonhard, University of Illinois, Champaign-Urbana, January 27, 1997.

Morningside College, Sioux City, Iowa. Presentation on the Internet and Music Technology, Feb. 28-March 1, 1997.

Nazareth College, Rochester, New York. Three-day Presentation on Music Technology, September 13-14, 1996.

Kansas State University, Manhattan. Presentations on the Internet and Creative Thinking in Music, June 12, 1996.

Case Western Reserve University, Cleveland, Ohio. Presentation on creative thinking, assessment, technology and music, October 7, 1995.

Lascassas School/Middle Tennessee State University, Murfreesboro, TN, Workshop on Technology and Curriculum, , June 14-16, 1995.

Furman University, Greenville, South Carolina. Two-day Presentation on Music Technology in the College Curriculum, March 30-31, 1995.

University of North Carolina, Chapel Hill. Presentation on Computers and Music. January 22, 1994.

Slippery Rock University, Slippery Rock, Pennsylvania. Workshop on Music Technology. January 17-18, 1994.

Michigan State University, School of Music, East Lansing. Presentation on Creative Thinking Research and Music Technology. March 23, 1993.

Boston University, School of Fine Arts, Boston Presentations on Creative Thinking Research, Assessment, and Technology, March 27-28, 1992.

Northwestern University, School of Music, "Northwestern University HyperCard Symposium in Music. II" (Three-day workshop) (Co-presented with David Williams) National event hosted by the School of Music. Taught several sessions and organized local arrangements, January 2-4, 1992.

University of Washington, School of Music, Seattle. Presentations on Creative Thinking Research, Assessment, and Technology, May 14-17, 1991.

University of Maine System, Departments of Music, Bowdoin College. Presentation to music faculties on the integration of music and technology within the college level. Presentation to elementary and secondary school teachers on technology in the schools. May 9-11, 1991.

University of Kentucky, School of Music, Lexington. Presentations on Creative Thinking Research, Assessment, and Technology, April 5-7, 1991.

Northwestern University, School of Music, “Northwestern University HyperCard Symposium in Music. I” (Three-day workshop) (Co-presented with David Williams) National event hosted by the School of Music. Taught several sessions and organized local arrangements, January 3-5, 1991.

University of Illinois, School of Music, Champaign-Urbana, Graduate Seminar in Music Education. Presentation on Creative Thinking Research. January, 1990.

State University of New York at Buffalo, Department of Music, Three-day workshop on Creative Thinking in Music, June 6-8, 1989.

University of Alabama, Department of Music, Tuscaloosa. Presentations on Creative Thinking and Technology. June, 1985.

University of California at Los Angeles, Department of Music. Presentation on Creative Thinking Research. May, 1982.

Invited Presentations/Workshops—Local/ State Venues

“Newest Trends in Music Software,” Chicago Area Music Teachers, Fine Arts Building, Chicago, IL, December 8, 2011

“Music Software That Encourages Creative Thinking in Music,” Terra Community College Music Technology Workshop, Northwestern University, Evanston. May 12, 2011.

"Encouraging Creative Thinking in Music: The Role of Music Technology," Grand Rapids Alumni Association, Grand Rapids, MI, March 4, 2010.

"Technology in General Music," Kenosha Public Schools, Kenosha, WI, August 27, 2009.

“Music Software for Teaching Music,” Music Teachers National Association, North Shore, Music Center of the North Shore, April 22, 2002.

“Music Software for Teaching.” Fine Arts Day, Elgin High School, Elgin, Illinois, June 15, 2001.

“The 21st Century Music Educator,” Institute Day 2000, Fine and Practical Arts, New Trier Township School District, Winnetka, IL, March 24, 2000.

"Using HyperStudio," Show Choir Camps of America, Heidelburg College, Tiffin, OH, July 16, 1999.

"Through the Looking Glass: Future Views of Music Technology," Presentation broadcast over the Internet to Florida State University hosting the Vision 20/20 Initiative of the Music Educators National Conference. (co-presented with David Williams). Illinois State University, April 9, 1999.

"Using the Internet for Your Choir Program," Show Choir Camps of America, Heidelburg College, Tiffin, OH, June 17, 1998.

"Assessment and Creative Thinking in Music," Full day in-service presentation at the Naperville Schools, District 204, Naperville, IL, February 27, 1998.

"Music Composition Software," In-service presentation at the Calumet City Schools, Calumet, IL, February 18, 1998.

"Technological Advances and Their Influence on Music Education," The Bowling Green State University Symposium on Music Teaching and Research, September 27, 1997.

"Mystery Composers 1, 2, and 3" Lectures presented during a Northwestern University Alumni Trip to the cities of Budapest, Vienna, and Prague, August 25 – September 6, 1997.

"New Applications in Music Technology," Show Choir Camps of America, Heidelberg College, Tiffin, OH, July 18, 1997.

"Building Your Own Web Page for Arts Education," Needham Public Schools, Needham, Massachusetts, March 19, 1997.

"Merging the Qualitative with the Quantitative," Qualitative Methodologies in Music Education Research Conference II, University of Illinois, Urbana-Champaign, May 1996.

"Multimedia in Teaching," Focus: New Visions, Wilmette Public Schools, Wilmette, IL, February 7, 1996.

"Music Software for Piano Teachers," Music Teachers National Association, Regional Meeting, Music Center of the North Shore, Winnetka, IL. November 27, 1995.

"Applications of Technology to Show Choral Teaching," Show Choir Camps of America, Milliken College, Decatur, IL, July 21, 1995.

"Multimedia, Networks, and the Arts," NU Day, Northwestern University, October 15, 1994.

"Applications of Technology to Show Choral Teaching," Show Choir Camps of America, Milliken College, Decatur, IL, June 24, 1994.

"Coding and Presenting Qualitative Data" and "Closing Remarks," Qualitative Methodologies in Music Education Research Conference, School of Music, University of Illinois, Urbana-Champaign, May 21, 1994.

"Applications of Technology to Show Choral Teaching," Show Choir Camps of America, Milliken College, Decatur, IL, June 25, 1993.

"Creative Thinking in Music Teaching: The Core of Our Art," and "Applications of Technology in Stimulating Creative Thought: HyperCard and Multimedia," Focus: New Visions, Wilmette Public Schools, Wilmette, IL, February 26, 1993.

"Technology and Music Education," Strongsville High School, Strongsville, Ohio. Day-long presentation to area music teachers on HyperCard and music technology. February 6, 1993.

"Applications of Technology to Show Choral Teaching," Show Choir Camps of America, Heidelberg College, Tiffin, OH, July 24, 1992.

"HyperCard and Multimedia," Elgin High School, Elgin, IL. Feb. 22, 1992.

"Creative Thinking and Technology in the Classroom," University of Wisconsin Center: Fox Valley, Menasha, WI. January 16, 1992.

"Music, Computers and Multimedia," The Role of Technology in Education XI Conference, St. Charles, Illinois, February 22, 1991.

"The Macintosh and Music," Apple Computer Seminar, Merrillville, Indiana, October 12, 1990.

"Creative Thinking and Kids," Cleveland Music School Settlement, October, 1987.

"Refinement of a Measure of Musical Imagination in Young: Children and a Comparison to Aspects of Musical Aptitude," University Lecture, Armington Seminar Series: Case Western Reserve University, December, 1983.

"Creativity in the Schools," East Cleveland Public Schools, East Cleveland, OH., October, 1980.

Panel Participation

Discussant, SRIG-Creativity Session. 2012 NAfME National Conference, St. Louis, Missouri. March, 2012

Participant, Preview of the forthcoming book, *Composing Our Future: Preparing Music Educators to Teach Composition*. Oxford University Press. 2012 NAfME National Conference, St. Louis, Missouri. March, 2012

Participant, "Guidelines for Student Music Technology Competencies at Colleges and Universities," College Music Society National Conference/Association for Technology in Music Instruction, Richmond, VA, October 21, 2011.

Participant, "Exploring Models for Music Technology Curriculum at the University Level," College Music Society National Conference/Association for Technology in Music Instruction, Portland, Oregon, October 24, 2009.

Participant, “Research in Music Technology,” Technology in Music Education Conference, Columbus, Ohio, February 9, 2007.

Participant, Panel responding to the paper: “Deep Listening,” CIC Meeting, University of Michigan School of Music, Ann Arbor, October 18, 2006.

Participant, “Thinking Out of the Box,” Great Lakes Chapter of the College Music Society, Northwestern University, April 1, 2006.

Participant, “Issues for Assistant and Associate Music Executives,” National Association of Schools of Music, National Meeting, Boston, MA, November, 2005.

Participant , “Intersections: Musical Creativity in Performance, Research, and Education,” CIC Meeting, Indiana University, Bloomington, October 20, 2005.

Participant, “Intersections: Musical Creativity in Performance, Research, and Education,” CIC Meeting, Indiana University, Bloomington, October 20, 2005.

Participant, “Historical Reflection on MENC and Research Support,” CIC Meeting, Pennsylvania State University, State College, October 24, 2003.

Participant, “The Arts in Early Childhood: Curriculum in Context,” SIG/Arts and Learning, American Educational Research Association, 2002 Annual Meeting, New Orleans, April 1, 2002.

Participant and Panel Chair, “Music Technology: Core Standards and Competencies,” National Association of Schools of Music, San Diego, CA, November, 20, 2000.

Panel presentation and workshop on music education and the national standards in the arts, National Conference on Improving Student Performance, NSSE, Arlington Heights, IL, June 26, 2000.

Discussant, “Issues in Arts Education: Contexts for Teaching and Perspectives of Learning” Paper reading session, SIG/Arts and Learning, American Educational Research Association, 2000 Annual Meeting, New Orleans, April 25, 2000.

Participant, “Curriculum and Technology I—So Much to Teach, so Little Time,” College Music Society National Conference/Association for Technology in Music Instruction, Denver, October 15-17, 1999.

Participant, “Mapping Music Education Research in the UK,” Roehampton Institute London, England, September 18, 1999.

“Creative Musical Thinking Over Time, Across Cultures, and in the Classroom,” SRIG—Creativity, National Convention, Music Educators National Conference, Phoenix, AZ., April, 1998.

“Writing for MEJ,” National Convention, Music Educators National Conference, Phoenix, AZ., April, 1998.

"Making Music Technology Work for You—Ask the Experts," National Convention, Music Educators National Conference, Phoenix, AZ., April, 1998.

"1998 Research Forum" Ohio Music Educator Association, Columbus, Ohio, January 22, 1998.

"Technology Chat Panel: How May We Help?" Florida Music Educators Association Meeting, Tampa, Florida, January 9-11, 1997.

"Establishment of an Electronic Journal in Music Education," Roundtable Discussion, American Educational Research Association Annual Meeting, Chicago, Illinois, March 24-28, 1997.

"Answering the Research Question: Quantitative Inquiry, Qualitative Inquiry, or a Blend?" 1996 CIC Music Education Conference, University of Michigan, Ann Arbor, October 16-18, 1996.

"Open Forum for Music Educators," College Music Society National Conference/Association for Technology in Music Instruction, Portland, OR, November 10, 1995.

"The National Standards and Implications for Research," CIC Conference, University of Indiana, Bloomington, October 19, 1995.

"Research Seminar: Creativity Research," 10th National Conference of the Australian Society for Music Education, Hobart, Tasmania, Australia. June 29, 1995.

"Open Forum for Music Educators," College Music Society National Conference/Association for Technology in Music Instruction, Savannah, GA, October 22, 1994.

"Future Curricular Issues II: Music and Other Disciplines," National Association of Schools of Music 1993 Annual Meeting, San Francisco, CA, November 21, 1993.

"Stimulus Competition in Multimedia Computer Music Instruction: Which Should Win—The Aural or the Visual?" College Music Society National Conference/Association for Technology in Music Instruction, San Diego, CA, October 29-November 1, 1992.

"Creative Thinking and Private Piano Instruction," The Seventh Biennial Conference on Piano Pedagogy, Committee on Learning Theory, Schaumburg, Illinois, October 24, 1990.

"Current Hardware and Software Technology in Music -- Q & A Interlude," College Music Society/Association for Technology in Music Instruction, Washington, DC., October, 1990.

Group Discussion Leader, *Ann Arbor Symposium III, Creativity and Motivation*, University of Michigan, August, 1982.

Guest Participant and Panelist, Ohio State Conference on Early Childhood and Music, Ohio State University, July, 1979.

Convention Program Chair Positions

College Music Society, Chair of the Pre-Conference on Music Technology, "Technology as a Bridge: Interdisciplinary Work in Music," Richmond, VA, October, 2011

Director of the "Mini-Conference on Composition and Music Education." Northwestern University. June 13-15, 2011

College Music Society, Chair of the Pre-Conference on Music Technology, "Teaching Music in a High-tech Music Environment," Minneapolis, MN, October, 2010

Association for Technology in Music Instruction, Annual Conference, San Diego, CA., October 29-November 1, 1992. Arranged for the blind review of papers, panels and software demonstration proposals; correspondence with all presenters and program officials; supervised all local arrangements, including equipment and laboratory setup.

National/International Offices

College Music Society, Member of the Publications Committee, 2011 – Present

College Music Society, Chair of the Technology Committee, 2010 - present

College Music Society, National Chair for Nominations Committee, 2007

Organizing Committee, 2004 CIC Meeting of Music Education Professors, Northwestern University, Evanston, IL, October 21-22, 2004.

Organizing Committee, 8th International Conference on Music Perception and Cognition, August, 2004

Board Member for Music Education, College Music Society (CMS), (1995-1998)

President, Association for Technology in Music Instruction (ATMI), (1995-2002)

Chair, Special Research Interest Group On Creativity (SRIG-C), sponsored by the Society for Research in Music Education, Music Educators National Conference, 1992-1996.

Consultant Work

Georgia Tech University, Program Reviewer for the Degrees in Music Technology, March 2012

NAMM, Sounds of Learning Project, Reviewer for Round 4, Milwaukee, WI., April 7-8, 2008.

NAMM, Sounds of Learning Project, Reviewer for Round 3, Washington, DC., February 22-23, 2007.

Schiller Park Public Schools, Schiller Park, Illinois. Teacher workshops on music technology integration. July 13, 2006.

NAMM, Sounds of Learning Project, Round 2, Greensboro, NC February, 2006.

University of Minnesota, School of Music, Minneapolis. Evaluator of Doctoral Program in Music Education, May 20-21, 2005.

University of Saskatchewan, Saskatchewan, Canada, Department of Music. Evaluator of music curriculum for internal program review, November 7-10, 2002

Northern State University, Aberdeen, South Dakota, Consultant for music technology integration into college curricula, October 27-28, 2000

Music Cognition Summit, University of Texas at San Antonio, San Antonio, TX, November 5-7, 1999.

International Baccalaureate Organization, Advisory Group: Design of a CD-ROM and Internet Site for Music, Santa Fe, NM, January 24-26, 1999

Illinois Music Educators Association, Judge for Composition Contest, January 30, 1999

McGill University, Faculty of Music, Outside Reviewer of Music Technology Program, Montreal, Quebec, Canada, March 3-4, 1997.

University of Wisconsin at Eau Claire, Department of Music, (co-presented with Stephen Syverud); Implementation of technology into music curriculum. February 8-10, 1995.

Highland Park School District, Highland Park, IL. Design of a new music curriculum system-wide, August 8-10, 1994.

North Park College, Chicago, IL. Implementation of technology in music curriculum. April, 1993.

New England Conservatory of Music, Boston, MA. Spoke to Conservatory faculty on the redesign of undergraduate theory curriculum, March 27, 1992.

Apple Computer, Inc., Workshops for higher education faculty on the topic of computers and music, September 1987 - June 1988.

Dickinson College, Carlisle, PA. Implementation of technology in music curriculum. January, 1987.

Guest Faculty for Apple Computer, Inc., Software Demonstration Sessions, EDUCOM Professional Conference, Pittsburgh, November 1986.

Grants Funded

EFFECTS OF MUSIC EXPERIENCES DURING SCHOOL YEARS ON PROFESSIONAL CREATIVE ACHIEVEMENTS AMONG A SAMPLE OF ARCHITECTS, CHEFS, AND ENGINEERS. Total Amount: $102, 282. Funds designed to study the long-term effects of music experiences on creative achievement of adults who are not in music. Awarded by the NAMM Foundation, May 2009.

INTERACTIVE WHITEBOARD FOR MUSIC TEACHING AND LEARNING. Total Amount: $5,997. Funds to purchase and install in the Music Administration Building an Interactive Whiteboard with projector and clicker response system.

System designed for classes that require high levels of interactive work. Awarded by the Northwestern Alumnae Association, 2008.

MUSIC TEACHING COMPUTER RESOURCES, Total Amount: $5,000. Funds to purchase laptop computers and music teaching software for the music education program. Funded by the Northwestern Alumnae Association, 2007.

DEERING MUSIC COMPUTER LABS, Total Amount: $132,452. Funds established two music computer labs in the University Library. Funded by University Libraries, Instructional Technologies, and School of Music, Northwestern University, 2003.

KOHL MUSEUM MUSIC EXHIBIT, Total Amount: $25,000 Funds used to support graduate students to help design and support a children's interactive music exhibit at the Kohl Children's Museum, Private Gift, 2000.

SMART CLASSROOM EQUIPMENT PURCHASE, Total Amount: $8,000. Funding from this grant provided for the installation of a multimedia projector and computer for a classroom in the Music Administration Building. (co-written with Richard Ashley). Funded by the Northwestern University Alumnae Association, 1998.

DISSERTATION AND ASSESSMENT MATERIALS PURCHASE, Total Amount: $2,000. Funding from this grant provided for the upgrading of published assessment materials in music education and the purchase of dissertations frequently used in instruction. Funded by the Northwestern University Alumnae Association, 1992.

PROPOSAL TO ESTABLISH A MUSIC COMPUTER LABORATORY AT THE SCHOOL OF MUSIC, NORTHWESTERN UNIVERSITY, Total Amount: $87,500. Funds raised from the Kemper and Wurlitzer foundations, and from private sources. Funds created the "Mac Lab" in the School of Music, 1989

INTERACTIVE COMPUTER VERSION OF *MEASURES OF CREATIVE THINKING IN MUSIC*, Total Amount: $6,000. Funding from this grant supported the purchase of a high capacity personal computer for the development of an interactive version of the author's Measures of Creative Thinking in Music. This version of the measure provided children an opportunity to create sound structures with a computer and also allowed the research to record and study this behavior. The HyperCard programming environment was used with a Macintosh II computer. Funded by the Office of Research and Sponsored Programs, Northwestern University, 1988.

SOUND EQUIPMENT ACQUISITION, Total Amount: $1,500. This grant was awarded to the Department in order to purchase compact disk players for the music library and large classrooms. Funded by the Mather Alumni Association, 1985.

COMPUTER MUSIC LABORATORY, Total award: $220,000. This major grant provided support for the establishment of a computers and music facility that provided technological needs for Department programs. Major expenditures were

made for faculty development as well as hardware and software needs. Students at both the Cleveland Institute of Music and the University benefited from computer-aided assistance in music theory, history, and music education. Music printing, composition, and sound synthesis were supported with the aid of MIDI synthesizers. Workshops for area teachers and high school students were given. Funded by the Cleveland Foundation and the Kulas Foundation, 1985-1988.

A STUDY OF CURRENT DEVELOPMENTS IN COMPUTER-ASSISTED INSTRUCTION IN MUSIC AND THEIR IMPLICATIONS FOR A COMPUTER CENTER IN MUSIC AT CASE WESTERN RESERVE UNIVERSITY, Total amount: $1,500. This grant supported a three-week residency at the Center for Music Research at Florida State University in order to: (1) study computer-assisted instruction and its potential in music instruction and (2) study behavior modification research and its methodology. Implications for further funded research were reported and a three-phase plan was written toward the goal of establishing a computer laboratory at the University. Funded by the Research Initiation Grant Fund, Case Western Reserve University, 1981.

AN ASSESSMENT OF MUSICAL IMAGINATION IN YOUNG CHILDREN and REFINEMENT OF A MEASURE OF MUSICAL IMAGINATION IN YOUNG CHILDREN, Total amount: $3,995. These projects both sought to investigate the nature of the creative imagination in young children using sound stimuli. A set of activities were devised and administered individually to a sample of six, seven, and eight year old children. Sessions were video taped for analysis. Each project funded by the Charles Reiey Armington Research Program on Values in Children, Case Western Reserve University, 1978-1979 and 1981-1983.

LOCKER ACQUISITION, Total amount: $1,000. This grant was used to purchase lockers for instrument storage for the benefit of music majors in the Department. Funded by the Mather Alumni Association, 1984.

Significant University and School of Music Service

Northwestern University Committees and Commissions of Importance

Program Review Committee for the Department of Art Theory and Practice, Winter, 2008

University Research Committee (2003 to 2010)

Chaired, Program Review Committee for the Department of Statistics, May 2001

Evaluation Committee for Graduate School, Group charged with the responsibility of evaluating Ph.D. programs at Northwestern (1999-2001)

McCormick Review Committee for Outstanding Teaching University-wide, (1999-2001)

Program Review Committee for the Slavic Languages Department (1997)

Information Technology Coordinating Council (1992 - 1999)

University Committee on Information Systems (1993 - 1999)

Coordinating Council on Instructional Computing (1993 - 1995)

Vice President for Research and Dean of Graduate School Search Committee (1992)

University Teaching Committee (1990-1991)

Northwestern University School of Music

Bienen School of Music Strategic Planning Committee, 2011

Chair, Various Search Committees, 2006 to 2012

Strategic Plan Committee, Department of Music Studies, Fall, 2007

Faculty Executive Committee (Fall 2006 to Spring 2009)

Deans Council, (Fall 2002 to 2006, 2007- 2009)

Chair, Curriculum Conference Committee (Fall 2003 to 2006, 2007 to 2009)

Chair, Faculty Executive Committee, 2001-2002

Strategic Plan Committee, Committee helped the Associate Dean at Northwestern design a long-term strategic plan for the School of Music (2000)

School Tenure Committee, Consider applications for tenure and promotion from within the School of Music. Verify that School procedures have been followed and evaluate dossiers. Chair of this committee in 1996 and in 2000. (1995 - 1997), (1998-2001)

Associate Dean for Budget and Finance, School of Music, Search Committee (2000)

Chair, Search Committees for Music Education Personnel (1998-present)

Cognitive Science Committee, Advisory group that guides the activities of the Cognitive Science Program at Northwestern (1998 - 2001)

Curriculum Conference Committee, Review initiatives between the Department of Academic Studies and Composition and the Department of Music Performance Studies (1997 - 1999)

Director of Macintosh Music Lab, Oversee the day-to-day operation of the Macintosh Computer Music Laboratory. Order equipment and software, oversee budget, maintain daily schedule by setting hours and organizing student help, help other faculty and staff with computer-related problems and questions. (1988 - present)

Director of School of Music Networking Project, Major architect for the Music Internet Project -- a major initiative with the Northwestern Telephone Group and Academic Computer

and Network Services to inter-connect all music buildings on the Northwestern University, Evanston Campus with Local-Talk and Ethernet connections. (1991-1997)

University Courses Taught

Courses in italics denote personal additions to course offerings

Theory

1. Introduction to Theory for Non-Majors (CWRU)
2. *Comprehensive Musicianship* (CWRU)
3. Graduate Remedial Theory (CWRU)

Music History and Literature

1. Historical Survey (music majors) (CWRU)
2. Introduction to Music Listening (non-majors) (CWRU)
3. *Seminar in Music Listening (adult program)* (CWRU)

Music Education - Undergraduate

1. Trumpet Class (CWRU)
2. Brass Class (CWRU, NU)
3. Arranging for Voices and Instruments (CWRU)
4. Elements of Conducting (CWRU)
5. *Instrumental Conducting, Materials and Methods* (CWRU)
6. *Introduction to Research for Undergraduates* (CWRU, NU)
7. *Contemporary Media in Music Education* (CWRU)
8. Foundations of Music Education (CWRU, NU)
9. Secondary Methods in Music Education (CWRU)
10. *Psychology of Music* (CWRU)
11. Seminar in Music Teaching (CWRU)
12. *Composition and Improvisation in the Schools* (NU)
13. Philosophy of Music Education (NU)
14. *Research and Evaluation in Music Education* (NU)

Music Education-Graduate

1. Research in Music Education (CWRU)
2. *Measurement and Evaluation in Music* (CWRU, NU)
3. Seminar in Music Teaching (CWRU)
4. *Creative Thinking in Music* (CWRU, NU)
5. *Seminar in Psychology of Music* (CWRU)

6. *Psychology of Music Teaching and Learning* (NU)

7. *Design and Implementation of Research* (NU)

8. Curriculum Development in Music (NU)

9. *Composition and Improvisation in the School Curriculum* (NU)

10. *Paradigms and Processes in Music Education Research* (NU)

11. Quantitative Research in Music Education (NU)

12. Philosophy of Music Education (NU)

Technology

1. *Computers and Music* (CWRU)

2. *Technology for the Music Educator* (undergraduate and graduate versions) (NU)

3. *Software Development in Music* (CWRU)

4. *Multimedia Software Development* (NU)

Doctoral Dissertation Advisement

Major Advisor for Completed Dissertation

Kenneth Elpus, *Justifying Music Education: Econometric Analyses of Issues in Music Education Policy*, June, 2011.

Lois Guderian, *Effects of Applied Music Composition and Improvisation Assignments on Sight-Reading Ability, Learning in Music Theory and Quality in Soprano Recorder Playing*, August, 2008

Kelly Roberts, *Participation in Musical Theater as a Vehicle for Understanding of Interdisciplinary Work in the Arts, Improvement of Self-Concept, and Music Achievement Among Fifth-Grade Students*, June 2007.

Jay Dorfman, *Learning Music with Technology: The Influence of Learning Style, Prior Experiences, and Two Learning Conditions on Success with a Music Technology Task,* December 2006

Janice Smith, *Music Compositions of Upper Elementary Students Created Under Various Conditions of Structure*, December, 2004

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Michele Kaschub, *Student Descriptions of Their Individual and Collaborative Music Composition Processes and Products in Grade Six,* Northwestern University, May, 1999

Betty Anne Younker, *Students' Thought Processes While Engaged in Musical Composition,* Northwestern University, December, 1997

Margaret Berg, *Social Construction of Musical Experience in Two High School Chamber Music Ensembles,* Northwestern University, June, 1997

Jody Kerchner, *Mental Representations of Perceptual and Affective Components of the Music Listening Experience as Evidenced in School Children's Verbal Reports, Visual, and Kinesthetic Representations*, Northwestern University, December, 1996

Eleni Lapidaki, *Musical Tempo as a Measure of the Time Experience in Music Listening,* Northwestern University, December, 1996

(NOTE: This dissertation awarded the Most Outstanding Dissertation Award in Music Education for 1996 by the Council of Research in Music Education and the Music Educators National Conference)

Louis Daignault, *A Study of Children's Creative Musical Thinking Within the Context of a Computer-Supported Improvisational Approach to Composition,* Northwestern University, December, 1996

Maud Hickey, *Qualitative and Quantitative Relationships Between Children's Creative Musical Thinking Processes and Products,* Northwestern University, December, 1995

(NOTE: This dissertation awarded the Most Outstanding Dissertation Award in Music Education for 1995 by the Council of Research in Music Education and the Music Educators National Conference)

Carlos Rodriguez, *Children's Perception, Production, and Description of Musical Expression,* Northwestern University, June, 1995

Steve Werpy, *Relationship Between Selected Factors of Motivation for Participation in High School Band and General Motivation for Musical Experience in Students in Montana,* Northwestern University, June, 1995

Robert Dunn, *Perceptual Modality and Children's Music Listening Processes*, Northwestern University, July, 1994

(NOTE: This dissertation awarded the Most Outstanding Dissertation Award in Music Education for 1994 by the Council of Research in Music Education and the Music Educators National Conference)

Judy Bundra, *A Study of the Music Listening Process Through the Verbal Reports of School-Aged Children*, Northwestern University, May, 1993

(NOTE: This dissertation was a finalist for the Most Outstanding Dissertation Award in Music Education for 1993 by the Council of Research in Music Education and the Music Educators National Conference)

Scott Johnson, *A Description of Selected Aspects of Musical Experience From the Students' Perspective Within the Context of a Secondary Orchestra Rehearsal: a Qualitative Case Study,* Northwestern University, December, 1990

Douglas Bartholomew, *A Phenomenology of Music: Themes Concerning the Musical Object and implications for Teaching and Learning,* Case Western Reserve University, May 1985

(NOTE: This dissertation awarded the Most Outstanding Dissertation Award in Music Education for 1985 by the Council of Research in Music Education and the Music Educators National Conference)

Diana Swanner, *Relationship Between Musical Creativity and Factors of Personality and Motivation in Third Grade Children,* Case Western Reserve University, August 1985

Rosemary Forsythe, *The Stabilization of Music Aptitude as a Function of Formal Music Training,* Case Western Reserve University, December 1983

Wesley Ball, *A Philosophical Study of Qualitative Movement: Implications for Early Childhood Music Programs,* Case Western Reserve University, May 1983

Joyce Bogusky-Reimer, *A major for a Comprehensive Arts Program with Interdisciplinary Arts Lessons as Unifiers,* Case Western Reserve University, May 1979

Major Advisor for Dissertations In Progress at Northwestern

Susanna Guthman, Cycles of Revision: A Study of Middle and High School Students' Music Compositions

Professional Organizations

INTERNATIONAL SOCIETY FOR MUSIC EDUCATION

MUSIC EDUCATORS NATIONAL CONFERENCE

SOCIETY FOR RESEARCH IN MUSIC EDUCATION

ILLINOIS MUSIC EDUCATORS ASSOCIATION

COLLEGE MUSIC SOCIETY

CHAPTER 9

Tying Up: With gratitude for Peter Webster

by Bennett Reimer, Professor Emeritus of Music Education at Northwestern University, Evanston, Illinois.

It's 1973. I've been Chair of the Music Education Department at Western Reserve University (later to become Case Western Reserve University) since arriving there in 1965. We have advertised our need for an instrumental music education specialist to join our department faculty at the Instructor level, and I'm swamped with applications from high school band directors eager to move up to their first position in higher education. Many of them are impressive in their teaching accomplishments.

I have a hidden agenda for this hire. My own appointment at WRU, in addition to chairing the music education department and running its bachelors and masters degree programs, was to add a Ph.D. program. I have done so within a few years of my arrival and am now intent on expanding its opportunities for wider and deeper research and scholarship achievements. The applicants, none of whom have attained the doctorate, are not qualified to satisfy this desire, and I am advised by the rest of the music education faculty to let the new position focus entirely on the quality of instrumental music instruction.

But I'm greedy. Can I have my cake and eat it too?

One applicant catches my attention. He has the requisite band experience, is a trumpet major so can help with brass offerings, and, curiously, speaks with ardor about his interest in creativity. He plans to do a dissertation on it when he gets to that task in his doctoral study at Eastman, and to develop his professional interests in it in the future.

Curious in several ways. First, that he emphasizes this in an application for a very different opening, and that he is already getting his feet wet in that topic and intends to carry his interest to the dissertation level of scholarship. More curious, even, in that the topic of creativity in music education has not been high on anyone's list at that time, whether theoretically or practically. It just seems to be too unwieldy, kind of peripheral to other seemingly more central matters needing to be pursued. A bit frivolous given all the other more pressing issues that had begun to be paid attention to at the doctoral level of the profession.

Yet very exciting to me, recognizing creativity as a foundational concept for much of the research and scholarship needing to be pursued. Also with powerful relevancy to our work as music education practitioners. About time, I sense, to take it seriously. Maybe this young man might help us do so.

Some arm twisting with my faculty, some wooing of the Dean of Humanities to get his support, the ready enthusiasm of the Chairman of the Music Department within which my department is situated, all allow me to do the deed.

Peter Webster joins our faculty.

And with great success. Not only professionally but personally as well, not surprising to all who have gotten to know this devoted, open, honest, fun-loving, and warm-hearted man. At WRU, he rises from Instructor in 1974, to Assistant Professor in 1977 with his award of the Ph.D. from Eastman that year (his dissertation:"A Factor of Intellect Approach to Creative

Thinking in Music"), to Associate Professor in 1983, and to the Chairmanship of the Music Department in 1984. An admirable record of growth, one might say. And an impressively good hire, if I may say so myself.

I leave Case Western Reserve University in 1978 to take the chairmanship of the music education department at Northwestern, along with the John W. Beattie endowed chair in music education. My relationship with Peter becomes sporadic with my move, of course, but we get together now and then to renew our friendship and to share our complex experiences of the chairmanship.

In 1987 I am given the go-ahead to add a faculty member in instrumental music who can also contribute importantly to our Ph.D. program in areas of quantitative research and additional topics. My mind immediately zeroes in on Peter. His dissertation was quantitative while also being incisive about the nature of musical creativity and its cultivation. By then he has made excellent contributions to the profession in a variety of ways, including our need to pay due attention to creative teaching and learning. Clearly he is ready to build dramatically on his growing reputation as a leader in our field, and NU can provide a strong platform from which to do so while also gaining from his widening contributions. With the quick approval of the Dean and the music education faculty I hatch my plan to hire him.

An MENC national conference is scheduled at that time and I know that Peter will be presenting there, something he has been doing prolifically. I meet him in a hallway, we greet each other happily, and I say "Peter, I need to talk with you. It's important. Can we set a time?" He looks at me curiously, recognizing by my earnestness that something more serious is up than just a shared drink or dinner.

"Ummm, sure," he says."Can we do it now?"

We find a couple of chairs in a quiet spot and settle in.

"Peter, I know you're enjoying your work at Western Reserve and have been terrifically successful there. And I know that you're also enjoying Cleveland, which I did too when I was there. But it's time for you to make a significant move. I want you to join the music education faculty at Northwestern."

He sits there, motionless, a hundred thoughts no doubt racing in his brain. Then "Jeez, Bennett, I'm in shock. This is a big thing you're asking. I don't know what to say."

"Don't say anything. Just let the idea percolate in your mind. The program at Northwestern is in good shape and we want to enrich the doctoral offerings. You'd be able to develop a course or several in creativity and related issues. You'd play a role in the Big Ten consortium of music education departments, which you'd enjoy a lot and add to a lot. The faculty is anxious to get you. I'm anxious to get you. I know the Dean will make you a good offer. And, hey, nice as Cleveland is, Chicago is something else entirely. A great city, with pleasures unlimited, right on Lake Michigan so your boating can be as devoted as you want it to be, restaurants you would die for, and

the weather is, well, what can I say, no worse than Cleveland's. Northwestern would represent a big step up for you in professional clout. And you're ready to take that step. Talk to Connie, who I'm sure would love Chicago also. Sleep on it. Call me with any questions. It would be so great to have you with us."

Long story short, he does the right thing (I'm prejudiced) and a new chapter in his life and career begins. As it does for me, for the music education program, and for the entire School of Music.

Not surprisingly, Peter fits into the new job like a glove. His excellent teaching at each degree level wins him popularity and respect by students and faculty. In addition, his level-headedness in faculty/administration issues and governance, focused intently on the health and welfare of the entire School of Music, leads him to assume an important role at the Associate Dean level in addition to his teaching and continuing involvement in the music education department.

His contributions to the music education profession as a whole burgeon in both depth and breadth, especially in his influence on bringing attention to the realm of creativity as a foundational component of its mission. Also, equally influential, is his pioneering work on the utilization of emerging music and educational technologies as a necessary component of successful musical learning at every level and every musical specialization.

His stature as a leading thinker and activist spreads quickly from Northwestern to Illinois to the United States and the world. Check out his resume on line: Peter Richard Webster Resume. You will be staggered by his seemingly endless accomplishments. All this sheer hard work balanced, admirably, by his being a person who models what a humane, mature, reliable and thoughtful professional needs to be. In addition, with an effervescent sense of humor bubbling up often, sometimes when you least expect it.

By the way, I suspect that others in this celebration volume may have mentioned that Peter is a devoted boater. Let me add a few comments.

Typically for him, he is not only recognized as a member in good standing in that culture of sea-faring fanatics (excuse me, I meant to say enthusiasts) but is regarded with a combination of respect for his expertise in a sphere where the lack of it can be truly perilous, and also the affection his cohort sailors/boat captains so strongly feel for him. While I have experienced sheer terror on boat rides with him in rough waters (for me"rough waters" means anything beyond a few ripples) I can only marvel at this versatility, both of competency and sociality.

When I make the decision to retire, the issue of what will happen to the John W. Beattie endowed chair I hold becomes a matter for deliberation. Very quick deliberation. Clearly Peter is in line for this appointment, and I am delighted that he achieves it with unanimity. In the years he holds it, 1997 to the present, he brings to it the distinguished record it was intended to propagate. I feel honored by his carrying forward

the wishes and prestige of the important music educator who established it. A cherry on top of the ice cream sundae of Peter's career, as it was for mine.

Time passes, and now it is Peter's turn to retire from the work aspect of life and to devote more of his efforts to what some would regard as play, despite the many challenges entailed in his particular endeavor of seamanship (or in his case, lakemanship). We can only feel sorrow for this great loss to music education, although we can hope that he will find time now and then to revert to his music education role, adding, again, his wisdom to our field. (Are you reading this, Peter?)

With very mixed feelings we wish him well while feeling deprived by his defection. How can he do this to us? Envy by all still plowing the many fields of music education, welcoming to the community of those for whom age or exhaustion or dilapidation account for their retirement, not that Peter suffers from any of them. Mostly, gratitude for his extraordinary gifts professionally and for the fullness of his humanity. Time, we must acquiesce, for him to tie up the former and to revel in the latter. We wish Peter many years of bon voyages, and Connie standing with him at the helm.