

Musical Creativity: Measures and Learning

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Abstract

Herein, we examine the development and measurement of musical creativity. Musical creativity has been valued in what students bring with them and develops as students' mature, and yet to an educator this development mode remains tacit and phenomenological. Past studies of creative musical behaviors encompassed spontaneous behaviors, composition, and improvisation. Musical creativity resides in Children's early songs which show a sense of ownership with creative experiences, inventive notation, and composition. However, developing musical creativity measurements have lead researchers to examine the relationship between musical creativity and various individual difference variables such as general creativity, music aptitude, and academic achievement. The result has been limited success as the construct of musical creativity remains ill-defined and tenuous.

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Musical creativity research has been tethered to research focused upon general creativity by the very nature of musical creativity measurement which has been largely dependent upon theories of general creativity. Although studies of musical creativity have evolved significantly since their beginning in the 1970's, it is thought that more dedicated research and elaboration is still necessary (Hounshell, 1985; Kratus, 1995; Webster, 2003).

Even though the word creativity has been used in many different contexts, several writers have suggested that musical creativity needs to be more accurately described. For instance, Hounshell (1985) examined how the term creativity was used in the *Music Educators Journal* from 1914 to 1970 and reported that it was challenging to find agreement regarding its definition; in fact, Hounshell noted how "the term tends to be used in a casual, unnecessary, and sometimes gratuitous manner. The word creativity is used as an authoritative term to encourage the acceptance of ideas regarding music education" (p. vi). Additionally, Swanwick (1985) discovered that 'creative' activities were usually "regarded as art activities or as activities that focus on imagination and compositions that children make by themselves" (p.12). More recently Regelski (2000) suggested creativity is valued for what students bring with them and develops students' 'general musicianship [techne, theoria] ... mentally and physically' (p. 81). In sum creativity remains difficult to define causing some to suggest it is really "imagination successfully manifested in any valued pursuit" (Odena & Welch, 2009, p. 417).

Theories of Musical Creativity

Vaughan (1973) recommended a developmental sequence of musical creativity. The first stage was acquisitional, in which students acquired images and materials to think with, such as rhythm, melody, and notation. This level might be described as procreative. The second stage is combinational, in which children try to use the basic materials from the acquisitional stage in different contexts. At this stage, divergent thinking emerges within children. The third stage is the developmental level, and it is here Vaughan distinguishes between productivity and creativity. According to Vaughan, "the creative development means not merely increasing productivity but increasing insight, and intuitive feel for the significance of certain relationships and for the expressive possibilities inherent in certain ways of displaying ideas" (p.36). The last level refers to evaluation and is called the

synergistic level. In this stage, the creative product functions within the context of the requirements of society.

Webster (2003) provided a comprehensive conceptual model of creative thinking in music. Figure 1.1 illustrates Webster's model of creative thinking in music. Early versions of the creative thinking model were influenced by Wallas (1926), Guilford (1967), and Gordon (1979).

Composition, performance/improvisation, and listening analysis were considered the *Product Intentions* and the final *Creative Products* at the top and bottom of the model. In the center of the model is the *Thinking Process*, which included divergent and convergent thinking (Guilford). The Wallas stages reused connected Divergent and Convergent thinking. Enabling skills and conditions facilitated the *Thinking Process*. *Enabling Skills* consist of aptitudes, conceptual understanding, craftsmanship, and aesthetic sensitivity. *Enabling Conditions* included motivation, subconscious imagery, environment, and personality.

When creators start thinking in music, they typically have some intention related to composition, performance/improvisation, or analysis (Product Intention). With the intention established, the creator uses needed skills, which are influenced by conditions, as the thinking process takes place (Enabling Skills and Condition). The creator goes through various stages at the center of the model derived from the Wallas stages, moving between Divergent and Convergent Thinking, and finally reaches the final product (Webster, 1990). Stating that the model has not been empirically verified, Webster (1987a) suggested three types of research needed to validate the model: (a) further development of measures of musical creativity, (b) use of ethnographic techniques, and (c) use of technology as a tool for music creation and measurement.

Creative Musical Behaviors

Studies of creative musical behaviors encompass spontaneous behaviors, composition, and improvisation. Children in early childhood discover various ways to produce and manipulate sounds. These behaviors indicate one of the earliest stages of creative thinking with music according to (Hickey & Webster, 2001; Moore, 1990).

In the past Moorhead and Pond (1978) who observed and documented children's self-initiated music play in a nursery setting, profiled three children who enrolled in the Pillsbury Foundation School. They observed Carl, who was three

years and eight months old, for four months; Roy who was 4 years and two months old for three months; and Jay, who was four years and seven months old for 6 months. The musical instruments used at the Pillsbury Foundation School were chosen for simplicity, variety, intrinsic worth, and adaptability for the children, including world music instruments such as drums, gongs, cymbals, flat bronze bells, and sarongs. Other instruments included piano, toy piano, marimba, guitar, ukulele, violin, maracas, and sand blocks. The researchers reported deep, broad and thick descriptive observations of the children, including the natural and intuitive behaviors the three children demonstrated.

The three children explored instruments differently and later produced music different from the music of other children. However, each child was interested in the others' playing. Their continued interest and deep satisfaction in making music became a kind of communication in their group. Their experimentation gradually became more purposive and controlled and produced music with simple pattern and form. The children showed abilities to express their ideas and feelings in spontaneous music making. The researchers emphasized that instrumental music making could be an integral part of a music program, because the interaction with instruments encourages natural vocal expressions and rhythmic movement (Moorhead & Pond, 1978).

Influenced by the methodological model of the Pillsbury studies, Cohen (1980) also conducted long-term observations on kindergarten children's self-initiated music making using instruments. She chose two children for two case studies (one child played mungo drum, the other played piano). From these two case studies, she categorized three phases of music making: exploration; practice, or effect towards mastery; and production of musical gestures. Cohen argued that kinesthetic gestures are the fundamental factor of young children's music making on instruments.

Young (2003) investigated preschoolers' spontaneous musical interaction with percussion instruments. The subjects were 95 children from three nurseries. The xylophone was selected as the focus instrument of this study. The children's activity in the music area was recorded on videotape, and the video data were reviewed and transcribed. Based on an analysis of the observational data, Young found three structural characteristics of children's music making. Children usually extend their ideas by repeating, clustering, and chaining. A steady striking on bars of the xylophone with both hands was observed frequently. This repetitive playing continued for a while and could often be found among children who played alone. Clustering indicates a single action that was repeated in a musical grouping. Young

commented that it was difficult to recognize clustering in children's musical performance, however, some children showed a characteristic number of repetitions as the evidence of clustering. For example, a few children presented groups of 6 or 7 notes, such as pitches that seemed to come from the melody "Twinkle Twinkle Little Star." The last feature that children showed was chaining. After making different kinds of clustering, children started to group a few clusters into longer chains. Young claimed these three strategies were similar to the manner in which adult musicians compose music.

Other researchers have investigated spontaneous vocalizations as a specific kind of creative musical behavior that occurs among other spontaneous behaviors in the free play of children (Moog, 1976; Mang, 2005). In an analysis of the singing of 2- to 4-year-old children, Moog (1976) categorized three spontaneous song forms: imaginative, narrative, and potpourri songs. Imaginative songs were not related to a known song, and were performed by humming or singing a syllable. Narrative songs had characteristics of stories, a series of nonsense words, or resembled learned songs, but were not intended for an audience of specific listeners. Potpourri songs included learned songs, words, melodies, and original improvisations.

Suggesting that observations of a young child's early songs can help understanding of early childhood musical creativity encoded in vocal behaviors, Mang (2005) investigated early songs of 6 children between the ages of 2 and 4 in a longitudinal study. Each subject was visited every 4 to 6 months over 42 months to record vocal development, including singing favourite songs and child-adult interactions. Three judges' analyzed subjects' singing responses, resulting in three categories: learned song, performance, self-generated songs, or other novel forms of vocalization.

The children at age level 2-3 demonstrated primarily self-generated song that appeared to stem from fragments of learned songs or combine fragments of learned songs and improvised songs. They usually began singing a learned song with a single syllable or nonsense words. When they forgot the words of a learned song, they typically failed to recall the melody. The diatonic melody and metric rhythm appeared more typically of the learned songs than self-generated songs. At age level 3-4, there was a remarkable increase in the number of learned songs. The children at age level 3-4 showed correct melodic and rhythmic pattern performance. Although a sense of tonality appeared at the beginning of a song, the children often moved through several modulations within a song. However, they seemed to be influenced by the words of song; when only the words were forgotten, the entire song was often

forgotten. The self-generated songs at age level 3-4 consisted of integrated narration, adaptation of learned song, improvised movements, playing musical instruments, or features of singing games.

Based on the observations of children's vocalization, Mang (2005) confirmed that words of songs and a sense of tonality are the greatest challenge to young children and that young children use learned songs as referents for creating self-generated songs, supporting the hypothesis that interaction with the environment may abstract or distort novel sensory input into existing categories. Therefore the children's early songs show a sense of ownership with creative experiences.

Musical Notation

In order to investigate how children sense music, some researchers have studied the invented notations of children (Barrett, 1997; Davidson & Scripp, 1988; Gromko, 1996). In research on invented notation and representation of music, investigators typically ask children to write a song or their music on paper so that someone else who does not know the song could sing it or play it back. Davidson and Scripp (1988) organized musical representation types from drawings of musically untrained children. Thirty-nine children ages 6 and 7 were asked to reproduce the familiar song "Row, Row, Row Your Boat." Davidson and Scripp grouped the children's invented notations into five symbol systems: pictorial, abstract patterning, rebus, text, and combination/elaboration symbol system. They maintained, "what the children consider focal in their understanding [of music] is revealed by what they include and exclude in their notation" (1988, p.399).

Based on a study of 20 musically naïve children ages 4 and 5, Barrett (1997) suggested that children used five distinct types of notation: exploration, representation of instrument, representation of instrument with some reference to musical elements, representation of gesture, and symbolic representation. In the first category, exploration, children made random drawings in which they made a connection between the sound event and the act of symbolization. In representation of instrument, children's symbolization consisted of a pictorial representation of the instrument used, which was the most important feature of the music for these children. In the third category, representation of instrument with some reference to musical elements, children sketched the instrument a number of times, varying the size or level of the representation in order to record another musical dimension such as dynamics or pitch. The fourth category, representation of gesture, is a result of imitating on paper the gestures involved in performing the musical event. While

children who recorded in this way seemed to display an understanding of the differences in sound event, it was not clear if they focused on recording the musical dimensions of the sound or the actions by which the sounds were produced. In the final category, symbolic representation, children used an abstract symbol, which they varied in size in order to represent changes in musical dimensions. Children employed discrete symbols to record their compositions, indicating a progression of musical thinking. Barrett suggested that “children’s invented notation could be viewed as vehicles for conveying meaning and as precursors to the development of the culturally agreed symbol systems of the adult literature world” (p. 2), and that these symbols could be considered as an indication of children’s musical thinking and a representation of musical knowledge.

Compositional Processes

Kratus (1989) investigated the compositional processes of 60 children ages 7, 9, and 11. The subjects were asked to compose a melody. Their compositions were evaluated in terms of exploration, development, repetition, and silence. The 7-year-old children primarily spent time in the exploration process, in which music sounded unlike music played earlier in the session. On the other hand, the 9- and 11-year old children used a development process, in which their music sounded similar to music played earlier. The 11-year-olds used significantly more repetition than did the 7-year-olds. This result implies that the creative composition acts of 7-year-olds are similar to the characteristics of improvisation in that they used compositional time to explore new ideas rather than modify previous ideas.

Based on his results, Kratus (1989) categorized the creative characteristics of 7- 9- and 11-year-olds into process-oriented and product-oriented. The children (7-year olds) who were unable to replicate their songs did not use repetition. These children could be said to be process oriented, in which the exploration process of the new sounds dominates over the creation of a composed product. On the other hand, the 9- and 11-year-olds, who replicated their songs, seemed to recognize that the composing activity required a repetition strategy. These children can be said to be product oriented, in which the children are more focused on creating a product than on exploring new sounds. The results of the Kratus study implied that young children before age 7 need to have opportunities for informal and unstructured tasks and activity such as improvisation.

Measurements of Musical Creativity

Several researchers have developed measurements of musical creativity for students of various age levels (Vaughan, 1971; Gorder, 1976; Webster 1977; Webster, 1983; Wang, 1985; Vold, 1986). The Music Creativity Test by Vaughan was based on the Torrance Test of Creative Thinking (TTCT) and was utilized in studies to assess musical creativity of fourth-and fifth-grade students (Vaughan, 1971). Gorder (1976) and Webster (1979) developed tests for junior and senior high school students. Given that music aptitude stabilized around age nine, (Gordon, 1986), Baltzer (1989) suggested that instruments of musical creativity measurement for primary grades are necessary to assess the impact of various early musical experiences. Three instruments, those by Webster (1983), Wang (1985), and Vold (1986), are for primary aged children. Although these three instruments were designed for young children, some differences can be found. These instruments are described below.

The Measure of Musical Problem Solving (MMPS)

The MMPS is a researcher-constructed measure of musical problem solving behavior in kindergarten children by Vold (1986). The measure consists of three sections. The first section requires the child to find as many as he or she can produce sounds with six materials: a hand drum, sand blocks, a triangle, a pair of rhythm sticks, a 10 inch cymbal, and a microphone. The responses, measured by two scores were described by Vold as divergent thinking: musical fluency (the number of sounds produced) and musical flexibility (the number of variations in timbre, duration, and intensity).

The second section examines the child's ability to create sounds in given situations that might stimulate children's feeling states. Examples of the five situations include, "Can you play some sounds that show how it feels to be all alone in a dark house at night and to see a stranger outside your window? Can you play some sounds of how it feels when you first wake up in the morning and it's snowing outside?" (Vold, 1986, p. 70). Children's responses in the second section are scored by how much the sounds the child created are representative of the feeling on a scale from 0 to 2 points. Vold was particularly interested in this second situation, which was described as sensitivity to the expressive properties of music (Baltzer, 1989).

In the third section of the MMPS, children are asked to improvise as many sounds as possible on a set of pentatonic song bells. This score for this activity is the number of responses. Vold called this activity Musical Convergence, while other researchers regard this as fluency (Baltzer, 1989).

Vold (1986) reported the reliability of MMPS based on the scores of 30 kindergarten children. The reliability analysis for the total MMPS had an overall Cronbach alpha coefficient of .91. The Musical Fluency and Music Flexibility components had high internal consistency with overall reliability coefficients of .88 and .87. The inter-rater reliability analysis for Sensitivity to Expressive Import showed a high level of consistency between three judges (alpha of .52 to .72). The final component, Musical Convergence resulted in an extremely low coefficient of .09 (Vold, 1986).

Measure of Creative Thinking in Music – Version II (MCTM-II)

Webster (1987b) developed the Measure of Creative Thinking in Music II (MCTM-II), a refinement of the MCTM (Webster, 1983); to assess musical creativity of children ages six to nine. His intention in developing the MCTM started from the idea that a musical creativity measure should assess different aspects of musicality than a music aptitude test. The MCTM-II is regarded as the first measure to assess musical creativity for children in the primary grades (Baltzer, 1989).

The MCTM-II assesses four musical factors (Webster, 1987b). According to Webster:

Musical Extensiveness, the actual clock time (in seconds) involved in a musical response; Musical Flexibility, the extent to which the three musical parameters low to high, soft to loud, fast to slow are demonstrated in responses; Musical Originality, the extent to which the child manipulates musical phenomena in a unique fashion; and Musical Syntax, the extent to which the child manipulates musical phenomena in a logical and inherently musical manner, with no attention to the shaping of the whole response and not just a single part. (p.264)

MCTM-II consisted of 10 tasks divided into three sections: exploration, application, and synthesis (Webster, 1987b). According to Webster:

The exploration section is designed to help the children become more familiar with the instruments used and how they are arranged. The application tasks require 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 see multiple instruments in tasks whose settings are the least structured. (p. 266)

The tasks of the MCTM-II require children to use three materials: tempo blocks, a round sponge ball on a piano or keyboard, and their voices with a microphone. The test is administered to children individually. In the exploration section, the child is asked to use the three materials to make the sound of rain falling into a bucket (slow/fast), the sound of voice on a magical elevator (low/high), and the sound of a truck coming toward the child (soft/loud). In the application tasks, the child enters into a kind of musical question/answer dialogue with the administrator for some tasks, and more elaborate creative experiences for others. For example, the administrator shows a picture of a frog jumping, and the child gets the following questions:

What is happening in this picture? Can you show me with your hand the way a frog moves? Using this sponge ball on the piano, can you make up some frog music that begins soft and, little by little, gets louder and louder? How can you make some smooth, rolling sounds with the ball? (Webster, 1994, p.11)

The administrator continues with the test instructions for frog music.

Now it's time to make some more frog music! I would like you to make up a piece of music that has jumpy sounds and smooth sounds, soft and loud sounds, and fast and slow sounds. Feel free to use all the keys on the piano and to make your piece as long as you want. Now think about your frog music for a while, and when you think you're ready, I would like to hear it. (Webster, 1994, p.11)

For the Synthesis section, the child is asked to make sounds that tell a story based on a trip into outer space, and to create a composition that used all the instruments and that has a beginning, middle and an end.

Measures of Creativity in Sound and Music (MCSM)

The Measure of Creativity in Sound and Music by Wang (1985) was designed to measure the musical creativity of children aged three through eight. The MCSM is modeled on Thinking Creatively in Action and Movement (Torrance, 1981). Similar to the TCAM, the MCSM focuses on the fluency and imagination factors of divergent thinking skills, and consists of four activities. Activities one and three measure musical fluency by counting the number of responses provided by the child who is asked to produce steady beats and ostinati (maintain a simple pattern). Activities two and four measure musical imagination; subjects are asked to portray described events with rhythm instruments and more move appropriately to recorded music.

Baltzer (1988) reported the reliability and validity of the MCSM. Inter-item reliability coefficients ranged from .83 to .92 and inter-judge reliability coefficients were .99, .72, and .96 for four activities. Concurrent validity between MCSM and ratings of student creativity by the music teacher was .43 for fluency and .14 for imagination.

Measurements of musical creativity can be characterized as open-ended task formats that aim at measuring divergent thinking (Kiehn, 2003). Two kinds of open-ended tasks are evident in the three musical creativity tests for primary grades described above. The first kind of task is one in which the child transfers the images for feeling presented to musical instruments (Vold, 1986; Wang, 1985; Webster, 1987b). The second kind of task requires the child to demonstrate a steady beat or to respond melodically or rhythmically to a given stimulus (Wang, 1985; Webster, 1987b).

Summary of Musical Creativity and Related Factors

When developing musical creativity measurements, researchers have examined the relationship between musical creativity and various individual difference variables such as general creativity, music aptitude, and academic achievement (Baltzer, 1988; Kiehn, 2003; Schmidt & Sinor, 1986; Webster, 1979). Webster (1979) compared MSTM scored with teacher rating scores of creative behavior and Gordon's *Primary Measures of Musical Audiation* (1986). Correlations were found between musical creativity and general creative characteristics ($r = .34, p < .05$). However, Webster concluded that the MCTM measured different characteristics than the PMMA, which he described as measuring rhythmic and melodic discrimination ability.

In a study to investigate the relationship among musical creativity, music aptitude, and cognitive styles, Schmidt and Sinor (1986) administered the MCTM, PMMA, and the Matching Familiar Figures Test (Kagan, 1964) to 34 Second-grade subjects. While significant negative correlations were found between flexibility and syntax scores of the MCTM and PMMA rhythm scores ($r = -.30, < .05$; $r = -.33, p < .05$), PMMA tonal scores were found to be related to any dimension of MCTM. The researchers concluded that there is no positive relationship between musical creativity and music aptitude.

Baltzer (1988) compared musical creativity with academic achievement and teacher ratings of creativity. Scores on the MCSM for musical creativity (Wang, 1985), the Stanford Achievement Test (1982) of academic achievement, and a researcher-constructed instrument of teacher rating were dependent variables in this study. Baltzer found that teacher ratings of student creativity were correlated more highly with SAT scores than with MCAM scores. While teacher ratings of creativity were significant predictors of musical fluency in MCSM, none of the variables were a significant predictor of musical imagination in MCAM, pointing to the difficulty of assessing musical originality. Fluency seems to be more easily observed than imagination.

Baltzer (1989) stated that a definition and theories of musical creativity should be refined through empirical research and valid instruments were needed to identify the components or factors of musical creativity. He expected that such instruments would examine the relationships among musical creativity, music aptitude, music achievement, intelligence, and other variables.

Baltzer (1989) investigated factors of three musical creativity measures and the relationship among musical creativity, music aptitude, and music achievement. Baltzer administered the following measures to ninety first, second, and third graders: Measures of Creative Thinking in Music II (Webster, 1987b), Measure of Creativity in Sound and Music (Wang, 1985), a Song Completion Measure in which the researcher constructed a test to measure one's ability to improvise simple songs, the Intermediate Measures of Music Audiation (Gordon, 1986), and a researcher-constructed Music Achievement Measure. The degree of internal consistency of each musical creativity measure was generally high.

For the purpose of comparing the music improvisational creativity of students in grades 2, 4, and 6 (N=89), Kiehn (2003) administered the Vaughan Test of Musical Creativity (TMC) and the Torrance Tests of Creative Thinking-figural form (TTCT), and collected students' academic achievement data from school files. The TMC is a measure of music improvisational creativity, consisting of six open-ended improvisational activities, such as playing steady beats and creating answer rhythms or melody to rhythm or melody questions by an administer. The TTCT is a standardized test of divergent thinking, which measures figural creativity through pictorial drawing tasks. Although the correlation between music creativity and figural creativity was modest ($r=.22$, $p<.05$), there was a statistically significant relationship between the two. This result suggests that the ability to draw artistic shapes and figures may be related to the ability to create music improvisations. In

sum, academic achievement was not significantly related to either music creativity or figural creativity; which supports the previous results Baltzer uncovered. Figure 1.1

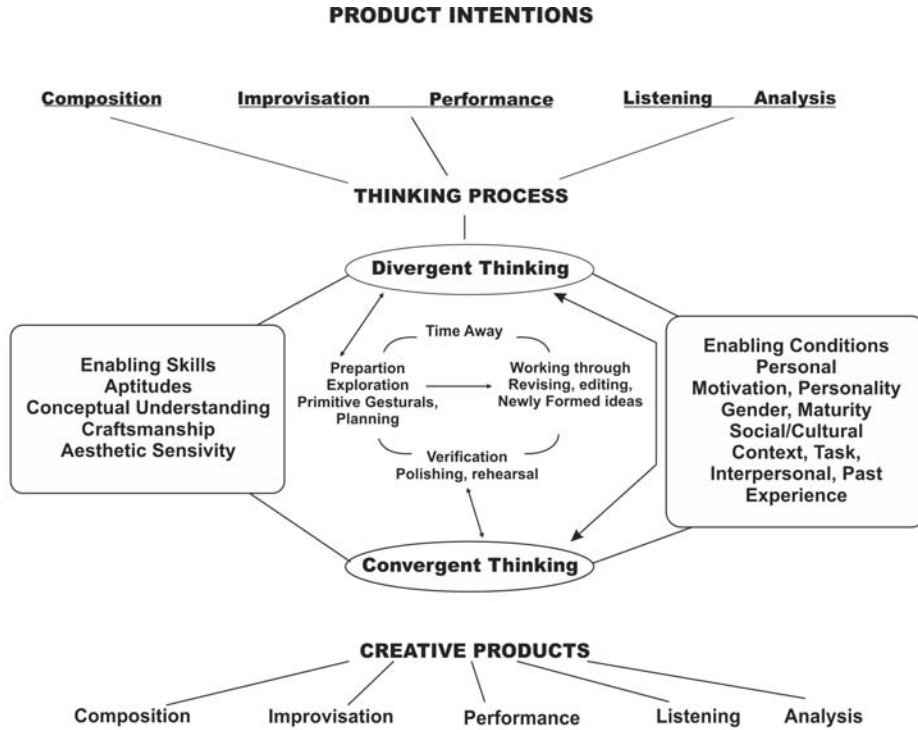


Figure 1.1 Model of Creative Thinking in Music
 Source: Webster, P.R. (2003). What do you means, "Make my music different?" Encouraging extensions and revision in children's music composition. in M. Hickey (Ed.) *Why and how to teach music composition: A new horizon for music education*, PP 55-65. Reston VA: MENC, The National Association for Music Education.

Conclusion

Over the past 40 years we have been unable to neither agree nor measure musical creativity in a manner that met the criteria of the masses. We have made attempts and even attempted to layout the development of creativity in stage, phases and modes only to be awakened to the fact that the trait is nebulous. Perhaps it is the educators preunderstanding of musical creativity that is really the issue herein. In theory, play and imagination lead to improvisation and eventually an outcome is achieved. One must ask: Do we need to measure something that is so elusive and

possibly immeasurable? Creativity remains difficult to define causing some to suggest it is really “imagination successfully manifested in any valued pursuit” (Odena & Welch, 2009, p. 417).

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