A Comparison of Music Compositional Process and Product of Two Groups of Secondary Students: Using Only Acoustic Instruments Versus Using Acoustic Instruments and iPads

by

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ABSTRACT

The purpose of this study was to explore compositional process stages, determine aptitude score changes, and examine differences in two groups of secondary-level general music students who composed music over eight composition sessions. One group of students used iPads and acoustic instruments and/or voices (technology group) to compose, whereas the other group used only acoustic instruments and/or voices (non-technology). The two groups of students were compared using (a) mean scores on pre and post music aptitude testing, (b) mean scores of self-reported time engaged at different levels of the creative/composition process, and (c) four music experts' creativity ratings of students' final composition project. The results indicate that the technology students had several advantages over the non-technology students. The technology group's mean pretest score was lower than the non-technology group, however their posttest mean score surpassed the non-technology group. There were no statistically significant differences between the technology and non-technology students in regards to music aptitude scores. There were no differences between the technology and non-technology groups for sessions 1 and 2, and sessions 7 and 8 of the compositional process. However, there was a statistically significant difference (at least $p < .03$ and below) for sessions 3, 4, 5, and 6. The non-technology group spent more time in rehearsal and production, while the technology groups spent more time in exploration and development. Overall, the expert judges rated the technology groups' compositional products higher than the non-technology groups. The compositional

products for the non-technology groups resembled the previous learning experiences in the music

classroom.

ever known. She molded countless lives throughout her career. The most fortunate life she

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CHAPTER I

INTRODUCTION

Since the 1960s, the music education community has continually espoused that students should be provided with opportunities for creative development (Choate, 1967). Through programs (Contemporary Music Project, Composers in Schools Project), initiatives (Tanglewood, The Goals and Objectives Project), and the development of the National Standards for Music Education the larger music education community sought to infuse creative experiences into music education programs (Andrews, 1970; CMP, 1972; MENC, 1994). These programs and initiatives set ambitious goals for the scope of music programs and outlined what every learner should know and be able to do within different musical roles. Although there has been emphasis for the past fifty years on developing the creative capacities of students, implementation has received little but lip service (Byo, 1999; Orman, 2002; Strand, 2006). Authors have suggested that implementation of creative experiences in music education may be staled due to lack of understanding what is and is not a creative experience (Hickey, 2013; Odena, 2012; Webster, 2002). In basic terms, creativity is a process of convergent and divergent responses to a problem that produces a product that is original, novel, and appropriate to solve the problem (Amabile, 1996, 2012; Csikszentmihalyi, 1996; Gardner, 1993; Hickey, 2003; Webster, 2002). Webster (1987, 2003) argues that creative thinking in music is a cognitive process that can be applied to many different musical roles such as listening, analysis, performance, improvisation, and composing.

Music education philosopher Bennett Reimer (2003) noted that, since the implementation of the National Standards for music education in 1994, the standards that deal specifically with creative endeavors (Standards 3, 4, and 6) are often neglected in the music curriculum. There is concern that by neglecting creative experiences, music educators are failing to provide a complete education in music (Webster, 2002). Teachers and administrators have listed a myriad of reasons for not including creative experiences including lack of time (Strand, 2006; Webster, 1994), lack of resources (Hickey, 1997; Odena, 2001; Strand, 2006;), and lack of training (Byo, 1999; Odena, 2001; Strand, 2006; Webster, 2002).

Focusing on the merely the performance aspect of school music experiences led the members of the Tanglewood Symposium in 1967 to call for music to be placed at the core of the curriculum and to provide experiences for all students (Mark, 1999). Furthermore, one of the basic declarative statements from the Tanglewood report states, "We believe that education must have as major goals the art of living, the building of personal identity, and nurturing creativity" (Choate 1968, p. 139). As mentioned earlier, the focus of music education has not been on creativity development, but performance development. This is not to say that students have not been engaged in creative endeavors, but they have not been the focus of music instruction.

Surely, the music education community has changed this trajectory since the 1960s? Unfortunately, studies conducted by Byo (1999) and Orman, (2002) both found that instruction in composition is occupying very little of the instructional time. In Orman's (2002) study, video recordings of 30 elementary music teachers' lessons showed 1.03% of class time focused on composing or arranging. Orman also found teachers dedicated more time composing in lower grades, but as the students progressed past the fourth grade, composition experiences diminished. Byo (1999) surveyed music teachers and elementary classroom teachers about ease in

implementing the National Standards for Music Education. Both groups of teachers indicated that the standards dealing with composition and improvisation were difficult to implement.

Strand (2006) surveyed music teachers in Indiana about their beliefs related to the inclusion of compositional tasks in their music curricula. Overwhelmingly, respondents voiced concerns over taking away from preparing for performances. One respondent stated that, "Performance has to come first" (Strand, 2006, p. 7). It is not surprising that music teacher's instructional emphasis would be focused on performance. With the demands providing performances for the community, music teachers are forced to focus on the product and not the process of learning (Mark 1996).

Former MENC President and chair of the National Standards Committee Paul Lehman (2000), acknowledged that the focus of performance classes should be performance. However, music teachers should use the other standards to strengthen the performance. An informal survey of articles published in the Journal of Research in Music Education (JRME) during the past decade yields 112 of 221 studies focused on performance in some way (singing or playing instruments); only 3 of 221 studies dealt specifically with composition. Making the focus of music instruction only the attainment of performance and technical skills will not help music students develop creative and critical thinking skills that leads to aesthetic judgment (Webster, 1994). Research has shown that performance does not suffer when instructional goals focus on creative endeavors (Riley, 2006).

There is a growing body of literature that indicates students engaging in music composition are able to experience music in ways that are not available to them in performance or analytical study (Burnard, 2006; Kachub & Smith, 2009; Hickey, 2013). Composition in the music classroom can be a powerful tool for students to apply and demonstrate what they know

(Burnard & Younker, 2002; Wiggins, 2003). When students compose, they are actively engaging with music to show that they do not only know about music, but that they know within the music (Reimer, 2003). Past research indicated students engaging in music composition experiences use the experience to create meaning and establish an artful narrative (Burnard, 2006; Gromko, 2003). Engagement in the composition process allows students to think in sound to solve musical problems (DeLorenzo, 1989; Hickey, 2003; Webster, 2002; Wiggins, 2002).

With school systems striving to prepare all students to be college and career ready, music education that focuses only on performance skills may become obsolete. The original Tanglewood Symposium reported that only 20% of America's students were participating in performing ensembles (Choate, 1967). Thirty years later, Williams (2007) reported very similar numbers, indicating that little has changed. By focusing only on the 20% that take performance classes rather than the masses, the music education profession risks making performance based music teaching and learning a frill that could be considered non-important in belt-tightening economic times (Mark, 1996). In the current economic and educational climate, music instruction has been cut, total instructional time has been lost, and schools have moved to a more integrated curriculum to reinforce math and reading skills (Beveridge, 2010). While composition may not be the solution to these decades long problems, it can provide an alternate basis for music education in schools.

Technology

While not a panacea, several authors indicated that technology would provide teachers with the tools to adequately provide varied music experiences to all students (Crow, 2006; Airy and Parr, 2001; Webster & Hickey, 2006). In general education research, Hew and Brush (2006) examined research from 1994-2006 and found that several barriers still remain to technology

4

integration in classrooms, including resources, knowledge and skills, institution attitudes and beliefs, assessment, and subject culture. Music education researchers (Jinright, 2003; Taylor, 2003) reported similar results in surveys of music teachers. Taylor (2003) surveyed music teachers throughout the Untied States and found that 60% percent of music teachers indicated that they could not use technology in their classrooms. Jinright (2003) surveyed music teachers in Alabama, Georgia, and Florida and found that 80% of teachers indicated that they could not use technology in their teaching. However, 93.9% of respondents in Taylor's study were willing to learn about technology integration. It seems that if teachers had the skills and equipment they would probably use technology in their teaching. Furthermore, Taylor reported that 80% of the teachers in his study indicated that technology could definitely be used to teach learning to compose, listening to music, learning to perform rhythmic patterns, learning to read music notation, and learning music terms.

Even with barriers to integration, researchers repeatedly reported that technology is useful in musical experiences that lead to creative development (Folkestad, *et al*, 1997, 1998; Hewitt, 2006, Hickey, 1995, 1997, 2013; Reynolds, 2005; Seddon & O'Neill, 2001; Stauffer, 2001, 2003). Specifically, using technology in music composition provides students with experiences that mirror their musical world (Airy & Parr, 2001; Mellor, 2008). Airy and Parr (2001) reported that students with limited formal musical experiences indicated that using technology allowed them to make musical decisions and feel like musicians. Mellor (2008) observed similar findings and reported that the technology enabled students to create music that more closely resembled the music they chose for listening.

Technology enables students who are not enrolled in performance ensembles to fulfill musical roles (Hewitt, 2009; Hickey, 1997; Seddon & O'Neill, 2003; Webster, 2003). As

reported earlier, the Tanglewood Symposium (Choate, 1967) reported that performance

ensemble only served 20% of secondary students in the 1960s. In a presentation at the

Technology and Music Education Symposium at the University of Minnesota, Williams (April,

2007) described non-performance students as:

> "…a student in grades 7-12 who does not participate in a school's traditional performing
>
> ensembles, may have a music life completely independent of school music, may or may
>
> not play an instrument (if so, it will most likely be drums, guitar, or singing), reads very
>
> little if any music notation, and may be unmotivated academically or a source of
>
> discipline problems" (Williams, 2007, p. 2).

This description adequately describes the majority of secondary general music students in the

United States. The course offerings for students not enrolled in a performance-based class is

very limited. Often the courses offered to students not enrolled in band, choir, orchestra have no

relationship to the musical world students engage in outside of school (Airy & Parr, 2001;

Williams, 2012).

Ironically, general music students without performance education training may be at an

advantage in creative composition endeavors. In several studies, instrumental music training has

been observed as detrimental to the composition capacities of secondary-level students (Hewitt,

2009; Seddon & O'Neill, 2001; 2003). The students who received specialized instrumental

training in music spent less time in the exploration of the composition process and the

compositions they created were bound by their perception of musician roles, which were based

on their performance-based education (Seddon & O'Neill, 2003).

Although research supports that technology can be used as a powerful tool in the

composition process, there has been very little work to show its effectiveness as a treatment to

determine if it would be better for composing versus a more traditional approach of paper and pencil. However, one study did investigate this. In a study of two groups of elementary students composing, Kuehne, Lundstrom, and Walls (2011) found no significant differences in the musical achievement between students who used technology to compose and students who used paper and pencil. Though there were no significant differences, one of their most salient findings was that the students that used technology rated their experiences higher on every level.

It may be a great benefit to music educators to engage their students with technology for every musical role found in the National Standards (Reimer 2003; Williams, 2012). Furthermore, the most recent addition of the National Core Arts Standards (NAfME, 2014a, 2014b) includes several key strands that make it apparent that music can be learned in a variety of different ways, including through music composition-music theory and music technology. Gardner and Davis (2013) label the current generation as digital natives because their lives encompass a use of technology that is unlike their teachers and parents. Modern students engage with music and technology in ways unimagined just a few years ago. Students no longer need to be in a community or school choir, band, or orchestra; they can use technology to create music that is relevant to their world (Airy & Parr, 2001; Mellor, 2008; Williams, 2012).

Statement of the Problem

The development of the National Standards for Music Education (1994) provided music educators a clear set of expectations for what every child should be able to do and know about music by high school graduation. The reality has been that several of the standards have been neglected in favor of standards that are performance oriented (Byo, 1999; Ormond, 2002; Reimer, 2003; Strand, 2006). The narrowing of the music education curriculum has also focused on only about 20% of the overall student population (Choate, 1967; Williams, 2007). It appears

through the new National Core Arts Standards (SEADAE, 2014), in conjunction with the National Association for Music Education (NAfME), there has been a push to change the ways music educators teach, and the ways students learn music. Through focusing on four main areas (creating, performing, responding, connecting), and including a variety of different learning environments in music (general music, composition-music theory, music traditional and emerging ensembles, music harmonizing instruments, music technology), these new core standards attempt to show students can learn music in many different settings, rather than only in ensembles or general music. Though the National Core Arts Standards are new as of March 2014, they support new and innovative ways for learning music.

Through the advancement of technology, music educators may have an avenue to explore neglected standards in new ways. In addition, students enrolled in a course not geared toward performance may be able to use technology to experience music in ways that were unavailable and ultimately impossible unless the student possessed technical facilities to play an instrument or sing in a choir. In response to this need and the promise of the newly developed core standards, the focus of this study is to examine how students compose when given two different mediums, using technological and acoustic instruments and/or voices versus using acoustic instruments and/or voices. In addition, a secondary focus is to provide ways technology might make it possible for students to compose music.

Purpose of the Study

The purpose of this study was to explore compositional process stages, determine aptitude score changes, and examine differences in two groups of secondary-level general music students who composed music over eight composition sessions. The first group was the non-technology group (control group) and they used acoustic instruments and/or voices. The second

group was the technology group (experimental group) and they used iPads (applications with instrument sounds) and acoustic instruments and/or voices. The non-technology group and technology group were each comprised of three sub-groups with 4-5 students in each group (a total of 6 groups). There were three non-technology groups and three technology groups. Each group of 4-5 students collaboratively worked together to compose music.

Data collected for this study included: (a) pre- and posttest scores using the Advanced Measure of Music Audiation (AMMA) (Gordon, 1989), (b) students' self-reported time engaged at different levels of the creative/composition process, and (c) four music experts' creativity ratings of students' final composition project. The data collection instruments are described in detail in Chapter 3. Finally, and more specifically, the three research questions for this study are:

1. What will students' AMMA tonal, rhythm, and total scores be before and after participating in eight compositional sessions using either acoustic instruments and/or voices or using iPads (applications with instrument sounds) and acoustic instruments and/or voices, and will there be significant differences in the following three areas?

   a. Control group's (non-technology) pre- and posttest tonal, rhythm, and total AMMA scores versus the experimental group's (technology) pre- and posttest tonal, rhythm, and total AMMA scores.

   b. Change in control group's (non-technology) pre- to posttest tonal, rhythm, and total AMMA scores.

   c. Change in experimental group's (technology) pre- to posttest tonal, rhythm, and total AMMA scores.

2. During eight composition sessions, what will students' self-report regarding their own and their groups' compositional process scores, and will there be any significant

differences between the control (non-technology) group's scores versus the experimental

(technology) group's scores?

3. Regarding specific music characteristics, global considerations, and overall reactions,

    what will expert music educators' rate compositions from the control group (non-

    technology) and the experimental group (technology), and will there be any significant

    differences in expert music educators' ratings of compositions from the control group

    (non-technology) versus compositions from the experimental group (technology)?

CHAPTER II

REVIEW OF LITERATURE

This section focuses on the literature that is most applicable for this study. While there is a large amount of creativity research, some of it does not relate to this project, or does not relate to music, or the musical compositional process. There is an abundance of research directly related to this study. This chapter presents this research.

Overview

This study compared the process and products of two groups of secondary students engaged in a composition experience using technology and acoustic instruments. This chapter focuses on several areas related to music composition. The first area, creativity, is an important one to understand, both conceptually and historically. Composition in its most concrete sense is a creative endeavor, though some may argue that not all compositions are creative (Barrett, 2003). Understanding this development is key. Another area covered is research on contexts of musical composition, which can be divided by type, age levels, and whether it was done with or without electronic or computer help.

Creativity

The literature on creativity encompasses many different fields of study and ultimately has led to confusion about what it means to be creative (Odena, 2001 & 2012; Hickey, 2012; Webster, 2002). One reason for this may be that the term creative can be used to describe personality traits, thinking styles, behaviors, a place or environment, or a product (Hickey,

2003). Authors generally agree that novelty and originality are distinguishing features of creative endeavors (Amabile, 1996; Csikszentmihalyi, 1996; Gardner, 1993; Reimer, 2003; Hickey, 2003; Webster, 2013). However, caution must be taken, especially when considering creative products. DeLorenzo (1989) and Wiggins (2003) both state that being different does not automatically equal creative; a product must be useful, valuable, and appropriate for the problem presented. According to Richardson (1983) and Running (2008), research and writing on creativity can fall into several different categories: historical, philosophical, theoretical, or empirical. This study is concerned with the creative process, specifically of secondary students during a music composition project. With this in mind, the literature reviewed will focus on creativity as applied to music composition.

Guilford Five-step Model

Guilford's (1950) keynote speech to the American Psychological Association is seen as a major turning point in the study of creativity and creative behavior (Hickey, 2003, 2013; Webster, 2002). Guilford argued that researchers and educators failed to emphasize divergent thinking's role in the process of creativity, and therefore the study of creativity was lacking. His keynote speech propelled researchers to systematically study creative behavior (Deliege & Richelle, 2006; Hickey, 2013; Webster, 2002).

Guilford developed a theory of creativity based upon the ability to solve problems using divergent thinking (Richardson, 1983). A cornerstone of his theory was divergent thinking or the ability to find an infinite number of answers to a problem (Guilford, 1977). His work studying intelligence and creativity lead him to develop a five step Problem-Solving Model. The five steps are (1) awareness of the problem, (2) structuring the problem to decide the kinds of information needed to solve, (3) fluctuation between convergent and divergent thinking to

develop ideas for a solution, (4) period of evaluation for the conceptualization of the problem's suggested solutions, and (5) archiving of information for later problems. The steps of Guilford's model do not happen in isolation. Motivation, temperament, and the environment constantly influence them.

Philosophical Views on Creativity

Bennett Reimer (1989 & 2003) places creativity as an important goal of music education. He agrees there are general characteristics of creativity such as imagination, originality, and divergence but they do not exist until "manifested in *some particular way"* [emphasis original] (Reimer, 2003, p. 109). For Reimer the number of musical roles in each culture determines the different musical creativities required. Each musical role necessitates its own creativity education. Reimer (2003) argues that music composition is a meaning making enterprise. This belief is consistent in the music education literature related to composition (Burnard, 1999, Stauffer, 2001, 2003; Wiggins, 2003). Music education should include composition experiences and students should be taught to employ composition creativity to other musical roles.

Webster (1987, 1990, 2002, 2003) also determines that creativity can be applied to different roles in music. Based on 30 years of work on creative thinking in music, Webster defines creativity from a music education frame as, "the engagement of the mind in the active, structured process of thinking in sound for the purpose of producing some product that is new for the creator" (2002, p. 26). He has developed a model for creative thinking in music that will be discussed further later. He notes in his writing of the influence of Csikszentmihalyi (1996) on his definition and application of creativity in music education (Webster, 2003).

The work of Csikszentmihalyi (1996) has been used in the music education literature as a basis for explaining creativity (Reimer, 2003) and the creative process (Webster, 2002).

Csikszentmihalyi (1996, p. 28) defines creativity as, "any act, idea, or product that changes an existing domain, or that transforms an existing domain into a new one…what counts is whether the novelty he or she produces is accepted for inclusion in the domain." The cultural rules the individual operates within and the social influence of peers is important to Csikszentmihalyi's view of creativity.

Csikszentmihalyi's Systems Model of Creativity (1986) draws on historical and sociological dimensions. He suggests that creativity is interplay of domain, field, and person. The domain (e.g. music) represents shared knowledge of a culture and is symbolic of the culture or humanity as a whole. The field includes, what Csikszentmihalyi calls, gatekeepers of the domain. The gatekeepers are the individuals that are trained in the domain such as music teachers, music critics, etc. He argues that something is only recognized as creative if the gatekeepers have selected it for inclusion in the domain. The person uses the symbols or language of the domain to create something novel, original, or new. The community and domain is the incubator of creativity.

Several authors have recognized that there are two primary views of creativity (Amabile, 1996, 2012; Elliot, 1996; Hickey, 2013; Odena 2012; Richardson, 1983; Reimer, 2003; Running, 2008). One view can be described as the traditional, historical, or Big-C creativity. This type of creativity focuses on products of creative behavior such as paintings or musical compositions made by composers or artists recognized by their community. These individuals have created works that are monumental and survived over time (Elliot, 1996; Gardner, 1986; Reimer, 2003). This type of creativity is much like Csikszentmihalyi's (1986) Systems Model of Creativity.

Gardner (1993) has also written extensively about Big-C creativity. He based his ideas of creativity on the small group of creative geniuses, "who regularly solves problems, fashions

products, or defines new questions in a domain in a way that is initially considered novel but that ultimately becomes accepted practice in a particular cultural setting" (p. 35). Through examining works and writings by historical figures such as Mozart, Einstein, and Darwin, Gardner examined the social and historical changes they contributed to their domains. Gardner (1993) writes, "There is a sense—for which I do not apologize—in which this study of creativity reflects the 'great man/great woman' view of creativity," (p. 37).

Elliot (1996) also espouses a great man/great woman creative framework in his paraxial music philosophy. His view of creativity is what he calls a "head and shoulders approach," (p. 215) where the present stands on the shoulders of the greats that came before. He uses work by Csikszentmihalyi (1986) to validate his view of creativity. Elliot (1996) ascertains that there is no such thing as the creative process. Creativity does not move in a linear fashion and can only develop while building musicianship. Teachers help develop musical creativity concurrently with music performance as coaches and mentors at the earliest stages of development (Barrett, 2005). Elliot determines that, "musical creativity and musicianship are mutually interdependent and interactive" (p. 227). Teaching environments should be designed to model real music cultures of the adult musical world. In Elliot's view competent or proficient musicianship is a prerequisite before someone can be creative or create a creative product (Barrett, 2005). Children are incapable, in Elliot's view, to be creative because they have not attained proficient levels of musicianship (Barrett, 2005).

A second view of creativity has been called, new, ordinary, or Little-c creativity (Amabile, 1996, 2012; Csikszentmihalyi, 1986; Hickey, 2013, Odena, 2012). This type of creativity focuses on imaginative thinking, displayed in a variety of situations (Hickey, 2003). Little-c creativity is a problem solving process that creates a product in the form of a solution

(DeLorenzo, 1989). Like Big-C creativity, Little-c creativity manifests novelty and originality but often it does not change the domain (Amabile, 2012). This creativity is related to the psychological construct of imaginative thinking and can be displayed in any pursuit, including within the classroom (Odena, 2012). Caution must be advised against comparing Little-c products against Big-C rules (Odena, 2012; Reimer, 2003). It is unreasonable to compare creativity espoused by experts to the creativity demonstrated by students (Barrett, 2005; Odena, 2012).

Burnard (2006) suggests there is an explicit qualitative difference between the creativity of a child than there is for an adult. The milieu of the classroom is a place where Little-c creativity can flourish. Students engaged in the creative process are working and making meaning of their world and work (Stauffer, 2001). Interacting with children and giving them the opportunity to verbalize their thinking will provide a window to their creativity (Burnard, 2006). Understanding children's engagement with the creative process and products is an important first step in developing Little-c creativity.

Amabile (1996, 2012) has focused her work on studies of creative thinking in various domains with children and adults. She developed the Componential Model of Creativity to provide a comprehensive view of creativity. She does not negate Big-C creativity, but finds similarities between her model and historical creativity (Amabile, 2012). The heart of her model is a continuum of creativity that spans minimum creativity as observed in everyday tasks to optimal creativity that is exhibited in historically significant examples (Amabile, 1996). The difference between the creativity of the greats and ordinary creativity exists in the degree and not the kind of creativity. The model includes five processes that individuals move through, (1) task identification, (2) preparation, (3) response generation, (4) response validation, and (5) outcome.

Amabile suggests that the creative thinking in any domain involves the intersection of motivation, domain knowledge and skills, and creative relevant skills.

Hickey (2003) adapted Amabile's (1996) model to reflect musical creativity. Hickey proposes that Amabile's Componential Model of Creativity is attractive for music educators because the model does not focus on creativity that is outside of the realm of a normal music classroom. The classroom can be viewed as a culture consisting of teachers, students, administrators, parents, and other community members. The field is the music shared and created in the classroom setting. The Componential Model of Creativity has also been used as the theoretical basis of several research studies in music education (Hickey, 1995, 1997, 2001; Hickey and Reese, 2001; Hickey and Webster, 1996; Priest, 2001).

Reimer (2003, p. 107) states, "It should be made clear that I reject the notion that creativity—true creativity—is incapable of being achieved by all people, children included." Reimer seems to agree with Amabile's (1996) Componential Model of Creativity, that the difference between the greats and ordinary exists in degree and not the kind of creativity. He further mentions that by focusing on the degree it democratizes creativity and allows all people to be able to be creative. For Reimer (2003), creative education should be a focus of all music educators and music education as a whole. Each musical role a student engages within should provide opportunities for authentic creativity. The mistake that music educators often make is to focus only on emulating the masters or Big-C creativity. Reimer argues that students should first experience Little-c creativity. Only a fraction of our students will ever experience Big-C creativity, but even they must begin with the Little-c creative experiences before they can accomplish Big-C creativity.

Deliege and Richelle (2006) cautions that creativity in the domain of music must be viewed differently from other disciplines for one key reason. Creativity in music is different than other artistic disciplines due to the transmission of the creative product. In literature and visual arts, the creative product is birthed from the creative individual directly to the receiver. In music, there is generally a three-fold transmission process: composer, performer, and then audience. The addition of the performer can change the creator's initial intent before the product is received. Deliege and Richelle (2006) advocate that creative behavior takes place on all three levels.

Research on The Creative Process

There is no magical formula for what constitutes the creative process (Hickey, 2013). Research examining people engaged in creative tasks have observed several enabling skills in the creative process. The use of convergent and divergent thing processes and problem solving ability has been cited in the literature (Amabile, 1996; Hickey, 1995; Webster, 1990/2003).

A hallmark of the creative process seems to be problem finding/solving (DeLorenzo, 1989; Hickey, 1995, 2003, 2013). Hickey (2013, p. 10) defines problem finding as, "behavior that includes manipulating, exploring, and selecting elements of a problem, and shaping the parameters of the problem itself." Specifically, problem solving in music education contexts require students to think in sound to make musical decisions to a musical problems (Delorenzo, 1989, Webster, 2002; Wiggins, 2003). Hickey (1995) observed when studying qualitative and quantitative relationships of children's music thinking process that there is a relationship between problem finding behavior and creative output. Studies in visual arts have observed similar findings (Hickey, 2002).

The majority of conceptual models of creativity in music education have focused on the creative endeavor and left the product as a byproduct of the process of creation. Graham Wallas (1926) was one of the first theorists to develop a model to identify stages of the creative process. Although his model is more descriptive in nature and he did not empirically test it, several researchers use his model to explain the process of creativity (Burnard & Younker, 2002, 2004; Hickey, 1995; Kennedy, 2002; Kratus 1989, 1994; McCord, 1999, 2002). In his model, Wallas outlined four distinct stages of the creative process: (1) preparation, the person gathers information and materials; (2) incubation, reflecting on the problem subconsciously; (3) illumination, formation of a possible solution; and (4) verification, formulation, assessment, and refinement of the solution.

Webster (2002; 1994; 1990; 1987) has written consistently over time about the process of creative behavior in musicians. Earlier representations of Webster's (1987) model more closely resembled Wallas' (1926) original four stages. Webster (2002) argues that the term creativity has been misused in music education contexts. Webster and others (Burnard & Younker, 2002, 2004; Hickey, 2003, 2013; Stauffer, 2003) use the phrase creative thinking in music to describe his vision for creativity. According to Webster (2002, p. 26), creativity applied to music is "the engagement of the mind in the active, structured process of thinking in sound for the purpose of producing some product that is new for the creator." This process of creative thinking alternates between convergent and divergent thinking that can move in stages over time, facilitated by intrinsic and learned skills, and by conditions that result in the creation of a final product.

Webster's (2002) latest Model of Creative Thinking in Music Education has four stages within the creative process: (1) preparation, (2) time away, (3) working through (reflective and in the moment thinking), (4) and verification. The interplay of individual stages occurs in a circular

motion that can move in any direction. This allows the individual engaged in the creative

process to move between stages, as their work requires. Webster (2002) notes that he

purposefully abandoned Wallas' notion of illumination because he ascertains that illumination is

a qualitative event that occurs several times throughout the process and not an isolated stage.
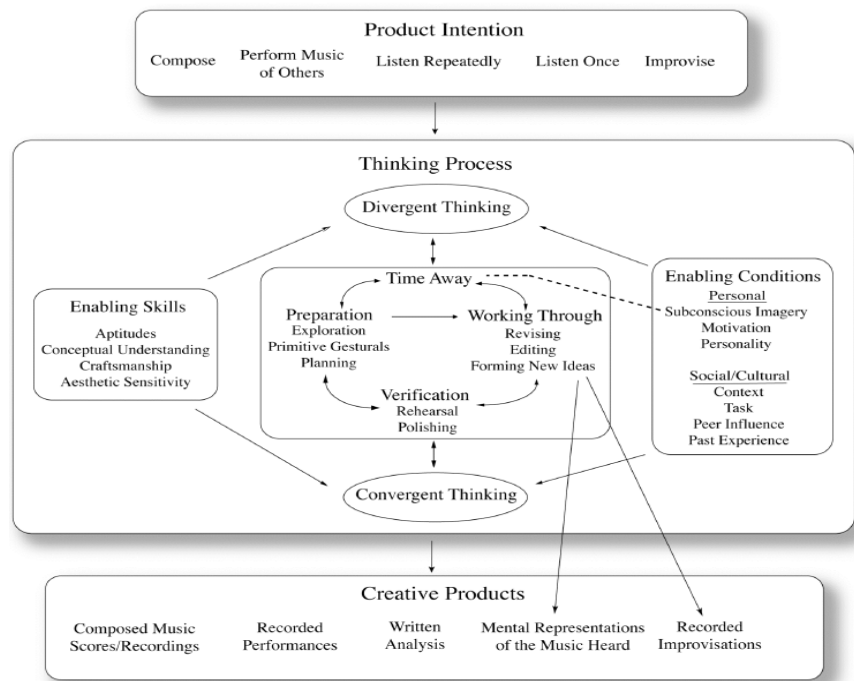
Figure 1. Webster (2002) – Model of Creative Thinking in Music

Wallas' model focuses on creativity in a general sense and can be applied to many

different products. Webster's model (2002) is designed to encourage creative thinking in music

that will lead to a variety of musical products including composition, analysis, improvisation, or

mental representation of music. The result of both models is a tangible product. Both of these

models have served as the basis of research in music education that led to the creation of process

models for musical compositions (Burnard & Younker, 2002, 2004; Kratus, 1989, 1994; Hickey,

1995, 1997; Wiggins, 2003; Younker & Smith, 1996). The following section will discuss several models designed to conceptualize the process of musical composition.

The Composition Process

In an effort to understand what children do when they are engaged in composition, several researchers designed conceptual frameworks to guide teachers' understanding (Kaschub & Smith, 2006; Kennedy, 2002; Stauffer, 2001; Wiggins, 2003; Younker and Smith, 1996). When students compose, they are thinking in sound and attempting to solve a musical dilemma (Wiggins, 2003). One must be cautioned that there is no one way or right way to compose, but the frameworks can aid teachers by revealing more about what students understand as they compose.

Based on data collected in nine different elementary classrooms, in six different studies, and over ten years, Wiggins' (2003) frame is a synthesis of themes she observed while children composed. Wiggins observed students composing vocal and instrumental music individually, as a whole group, and in small groups. The frame she proposes has students working alone and with others in layers of context that is influenced by shared understanding and interactions.

According to Wiggins (2003), composing alone or within groups begins with establishing working roles in the composition process. Students must decided who is responsible for each instrument/voice part, where that instrument/voice and or person will fit in the overall design of the work, and if there is text what will be the subject matter. Wiggins (1994, 1999/2000) observed that when students compose in groups, their social standing in the group heavily influences the independent work of each composer. Once the roles are established and the sound sources are identified, students begin inventing the initial musical materials. Wiggins (1999/2000) also observed that students usually approach the composition process as a holistic

journey toward a final performance. The students generally conceive the finished product before they perform it. Interestingly, even when they compose in groups, conceptions of initial musical motives are more of an individual act (Wiggins, 1994). Finally, Wiggins (1999/2000) notes that in group composition evaluation takes place throughout the process because of shared understanding of what the final product will sound like.

Once students are satisfied with a musical idea, they begin placing it in the context of the whole (Wiggins, 2003). Again, social influence plays a role; students must negotiate with their peers and work with one another to place their parts into the whole. If the group is not happy with the result they often will help rewrite or redirect. The process of organizing, evaluating, revising, and refining continues until there is shared understanding that the product is coming together as the group intends. Once the group has decided that the parts meet their shared vision, they then move to a rehearsal phase. The students will continue to rehearse until they are satisfied with the piece or they will move back into other phases of the process. When the students are finished with rehearsing, they move to a phase of performance. Usually, the performance is shared with others outside of the group. Wiggins (1999/2000, 2003) found that when students have unlimited time, they will finish the composition to their satisfaction and not necessarily the satisfaction and musical criteria of the teacher.

Stauffer's (2001, 2002, 2003) extensive work studying the process of composition has been exclusively with children. Using a case study approach, Stauffer (2001) focused on how one participant (Meg) in a longitudinal study composed using a software program, Making Music, installed on a desktop computer. Making Music is a graphic based program that allows the user to manipulate a mouse to draw musical figures. As noted in earlier studies (Kratus, 1989, 1994; Webster, 1987), Meg began with a period of exploration. Instead of one long period

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of exploration, Meg utilized exploration at different times and in different ways throughout her composition process. At the beginning of her composition journey, Meg used exploration to become familiar with the multiple features of the software. As she gained more experience and comfort using the various features, she began exploring with short melodic fragments. Meg would listen to the fragments and then discard, change the timbre, or rewrite part of the fragment until what she heard was satisfactory. As she continued to grow in her composing abilities she began using cumulative exploration. Meg would listen to previous pieces and find inspiration for what she was going to do next. As she matured in the composition process, she was able to conceive musical ideas in their entirety.

After periods of exploration, Meg would begin developing the material she had created. Stauffer (2001) noticed that Meg had specific strategies that she used in the development phase. Meg would add to her music in a linear fashion. She would first listen to the music, then discard or accept what she had heard before moving on. The melodic line was often the anchor of Meg's pieces. Nothing was added or copied until it was confirmed that it worked with the melody. As Meg gained more experience with composing, she was able to work across different compositions and use similar musical gestures within multiple compositions.

Stauffer (2001) noticed several areas that the software aided and hindered Meg's compositional ability. In her early compositions, Meg limited the length of the composition to the visible size of the computer screen. Making Music allows the user to compose up to five screens worth of material. As Meg matured through the composition process, she began using all five screens. Stauffer wondered if Meg were not constrained by the software, would she be able to compose more material? In addition, Stauffer mentioned the importance of listening to Meg's development as a composer. Changes were only made after listening and then usually

only minor changes to background material. Stauffer also wondered if the 30 minutes time

constraint limited Meg's ability to compose. Meg's composition process showed a starting point

(exploration), a mid point (development), and an ending point (Kaschub and Smith, 2006).

Even though Stauffer's (2001) work only featured one student, Meg's compositions

showed that the more she composed the more she began to think in sound and make musical

decisions. The more time she spent composing she moved from more general musical comments

to specific. Later work by Stauffer (2002, 2003, 2013) showed similar results. Listening was

also an important factor in Meg's composition process. The computer allowed Meg to hear

material she created and then judge its usefulness to the overall design of her composition.

Based on research with student composers, Kennedy (2002) proposed a composition

process model with listening as the focus. She examined the compositional process of four high

school students. Two of the students were described as having strong backgrounds in

performance and music theory and the other two students were less experienced. Kennedy

provided the students with a poem to use for the basis of two different composition tasks. The

first task used acoustic instruments and the second task was a free form composition that used

computers with MIDI keyboards. Kennedy observed that the students spent more time on the

technology task than the acoustic and that music listening was an important factor in the overall

composition process.

Using earlier composition process models by Younker and Smith (1996) and Stauffer

(2001), Kennedy used her results to generalize a composition model with listening as the central

focus. Kennedy's model has six stages that students engage within while composing. During

the first stage, the composer engages with music by listening to a wide variety of music. The

second stage is a thinking time where the composer fleshes out ideas for their composition.

During this stage, the student is assigned their composition task. The third stage once again engages with music listening to stimulate the student's thinking and generate ideas. Kennedy proposes that this listening stage will greatly influence the piece they are composing. In addition, listening is encouraged immediately after each composing session. The fourth stage is an experimentation stage to allow students to explore initial ideas and sounds with the focus being to listen to more music and improvise as they compose. The fifth stage focuses on development and revision of the composition in progress. During this phase, the student is also encouraged to engage in reflective listening. The sixth phase has the students engage in reflective music listening to complete their composition for presentation.

Kennedy's (2002) model encompasses a starting point (exploration), a mid point (development), and an ending point. Both Kennedy (2002) and Stauffer (2001) observed the importance of listening to students during the composition process. However, differences were observed between the two studies in the types of listening. In Stauffer's study Meg listened to what she had created to evaluate and decided what to compose next. Kennedy's students used music listening to stimulate their thinking and glean ideas. Kennedy and Stauffer indicated that listening was important to the overall development of student's composition process.

Kaschub and Smith (2009) did not create their own composition process model, but rather examined the literature related to composing with students to find similar themes. One area they identified centers around within group interaction. As students work with others to compose, several styles emerge including concurrent (working side-by-side), collaborative (working together in all phase), and executive (leader and followers). They indicate that each these composition styles affect both the process and the product.

Another area Kaschub and Smith discuss is the overall composition process. They suggest the composition process is mystified due to similar steps being reported and receiving emphasis. Kaschub and Smith (2009, p. 36) state that, "one generalization is abundantly clear: the process of composition has a starting point, a midpoint characterized by great activity, and an end point marked by the presence of a piece." The artistic dialogue between the composer and the music being created will impact future decisions in the process, therefore they suggest it is difficult to develop one all encompassing composition process model.

Kaschub and Smith (2009) present a process model with sixteen segments that the composer moves in and through. Initial idea generation often comes as an impulse or inspiration based on everyday activities (Barrett, 2001). After the initial impulse to compose presents itself, the student is ready to enter a planning phase. Often planning is a pre-compositional endeavor where composers develop a composition holistically before designing each individual part (Folkestad, Hargreaves, & Lindström, 1998; Wiggins, 1994). During the planning phase composers will decide on instrumental or vocal sound sources, how the music will be heard, and group composition roles and assignments (Wiggins, 2003).

Another component of planning is selection of supporting tools and materials. Several researchers have mentioned that this is a key component in the composition process (Burnard, 1995; Kratus, 2001; Stauffer, 2001; Upitis, 1989). Tools are usually selected to make composing more personally accessible to the composer (Kaschub & Smith, 2009). The use and type of tools is different from novice to expert composer. The more experience a student has with composing the more deliberate they are in selecting tools that will fit their purpose.

Once roles have been established and tools have been selected, students enter an exploration phase to try out sounds. To the untrained observer, this phase may just seem like off

task behavior (Kratus, 1989). Several researchers have found that exploration is essential to the composition process (DeLorenzo, 1989; Kratus; 1989; Stauffer, 1999, 2001; Wiggins, 1994). Exploration leads to a phase of idea generation. During this phase, the composer is working out problems and finding solutions (DeLorenzo, 1989; Hickey, 1997). Webster (2003) notes that this is a time where divergent and convergent thinking processes are sorted out. The ideas that students contribute during this phase are extremely important and allow the students to take ownership of the process (DeLorenzo, 1989; Ruthman, 2005; Stauffer, 2001).

The composer then enters a phase of idea testing and selection. Working out ideas during this phase often relies on repetition of musical ideas (Kratus, 1999). By hearing ideas repeatedly, students utilize active listening to make decisions (Kennedy, 2002; Stauffer, 2001). Students composing in groups will use this time to confirm or reject musical ideas and also decide what is recycled and reworked (Kaschub, 1997; Wiggins, 2003).

Once ideas are worked out, the composer must preserve their ideas. Repetition is one method of preservation (Fautley, 2003; Kratus, 1994). If the composer possesses the skills to notate their work, they may use some form of standard notation. If standard notation is not part of the composer's skill set they may invent their own form of notation that reflects their thinking (Barrett, 1997, 2001; Gromko, 2003; Upitis, 1992). Computers have also made it possible to preserve compositions with and without notation (Airy & Parr, 2001; Folkestad, et al., 1997 & 1998; McCord, 1996, 2002; Kuehne, Lundstrom, & Walls, 2012; Reynolds, 2005; Stauffer, 2001, 2002, 2003).

With sounds explored, ideas generated, tested, and preserved the composer is ready to assemble the composition product. Kaschub and Smith (2009) equate this step to putting together musical blocks of sound. In concert with this phase is a phase of verification. With

each addition and evolution of the composition, the composer must evaluate where new material fit into the whole. Several researchers have noted that listening is essential to evaluate compositions because composers judge each part against where it fits in the whole (Barrett, 1996; Kennedy, 2002; Stauffer, 2001; Wiggins, 1992). Active listening begins a dialogue between the composer and composition (Reimer, 1989). This dialogue will continue until the composer determines their piece is complete (Kaschub and Smith, 2009).

The product will continue to be developed, extended, revised, and edited until the composer shares their composition for feedback or performance (Kaschub and Smith, 2009). Although Kaschub and Smith treat each of these as separate phases, other authors have suggested that they may be interrelated (Kratus, 1989; Webster, 2003). Stauffer (2001) advises that these individual phases may not be observable in novice composers. During group composition, the feedback is immediate and changes made are more direct (Wiggins, 1999/2000), therefore some phase of the process may not be observable. Composers that are also the performers of their composition make changes as they rehearse and experience the music from perspective of performance (Wiggins, 1992). Performance of compositions marks a phase of evaluation and receiving criticism (Kaschub and Smith, 2009). Composers will not only evaluate the performance and the composition, but also the experience of composing.

Each of the frameworks or models for composition attempt to describe a process that leads to a tangible product. Similarities where found between all the models even though some emphasized certain tasks over others such as listening (Kennedy, 2002). Some of the models described the process in micro stages (Kaschub and Smith, 2009; Kennedy, 2002) and others described the process in macro stages (Stauffer, 2001). It is clear that all the models have elements of the original model of creativity proposed by Wallas (1926) and the model of

Creative Thinking in Music proposed by Webster (1987, 2003). Simply, Kaschub and Smith (2009) have described the composition process as having a starting point, and midpoint, and an ending that leads to a composition.

Composition Contexts

The purpose of composing in music education settings has different meanings depending on the context. For some, teaching music composition is a way to gain and show musical understanding (Hickey, 2013; Stauffer, 2001; Wiggins, 2001). Researchers have found that music composition is attainable by a wide range of people and under different conditions (Hickey, 1997; Kaschub, 1997; McCord, 2002; Reynolds, 2005; Stauffer, 2001). Several areas must be considered when designing composition experiences in K-12 music classrooms. Areas including developmental characteristics, differences between novice and expert composers, the role of the teacher, the development of compositional identity, assessment of compositional products, and composing with and with out technology are all contexts that affect the compositional process and products in the music classroom. The following section will discuss the contexts for composing in music classrooms.

Developmental Characteristics of Students Composing

There is not a clear developmental model of creative or compositional development in music, but a few studies have specifically looked at children's compositions from a developmental lens (Hickey, 2003; Kratus 1989, 1994; Reynolds, 2005; Swanwick and Tillman, 1986; Wilson and Wales, 1995). Swanwick and Tillman (1986) collected 745 creative products from individual and group composition and improvisation tasks. The products were collected from 48 students, ranging from ages 3-14, over a four-year period. Through an analysis of the students' creative products, Swanwick and Tillman developed a developmental spiral consisting

of four levels of musical experience, (1) materials, (2) expression, (3) form, and (4) value.

These four levels are considered by Swanwick and Tillman (1986) to be fundamental to musical

activities and understanding. The levels begin with simplistic musical interaction and

manipulation and continue to deepen as the learner matures and engages in more complex

musician roles.

In addition to four fundamental levels of musical experience, Swanwick and Tillman

(1986) designate layers of music functioning within each level. At the materials level (ages 0-4),

students begin to experience sensory responses to music that leads to manipulation of sound to

create musical patterns and repetition (Swanwick, 2011). At the expression level (ages 4-9),

students begin to use sound as a way of personal expressiveness to create elementary phrases and

gestures (Swanwick, 2011). Students will begin to create mood and programmatic material that

eventual leads to composing within the vernacular of their other musical experiences. At the

form level (ages 10-15), students begin to compose and perceive expressive shapes and construct

relationships with elements of music (Swanwick, 2011). At the value level (ages 15+), students

begin composing to make symbolic and systematic decisions with the elements of music.

Student's compositions show personal identification and commitment to original and

independent musical thought (Swanwick, 2011). As students mature through the spiral, they

move in cycles of mastery, imitation, and imaginative play finally achieving meta-cognition.

The student begins each one of the levels with a personal response that transforms to a socially

shared response towards music (Swanwick, 2011).

Value

Meta-
cognition   Symbolic   Systematic   (15+)

Form

Imaginative
play   Speculative   Idiomatic   (10–15)

Expression

Imitation   Personal   Vernacular   (4–9)

Materials

Mastery   Sensory   Manipulative   (0–4)

Toward Social Sharing
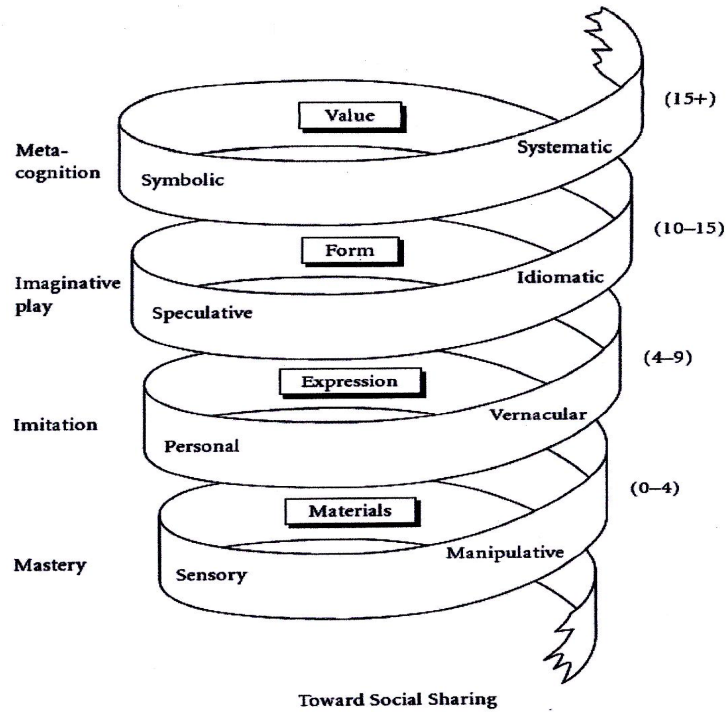
Figure 2. Swanwick and Tillman (1986) Developmental Spiral

Kratus (1989) designed a study to examine the use time spent in different levels of the compositional process. Students (N = 60; ages seven, nine, and 10; n =10 boys and n = 10 girls from each age group) in his study composed a short melody using an electronic keyboard. Specifically, he examined if age, gender, or music proficiency had any bearing on the use of exploration, development, repetition, and silence during composition. Students had 10 minutes to compose a melody that used only the piano's white keys, had a range of a 17th, and began on middle C. He individually recorded the students working through the composition task. Independent judges analyzed data and categorized each 5-second interval of the composition as being either exploration, development, repetition, or silence.

The results indicate that maturation has the most significant bearing on strategies in the composition process. The younger children spent the majority of their time in exploration of

musical material. Kratus (1989) suggests that 7-year-old students are not able to switch easily

between the different levels of the composition process and focus more on holistic composition.

He suggests that this may be due to their lack of enabling skills as suggested by Swanwick and

Tillman (1986) and Webster (1986, 2003). The older children spent their time fluctuating

between stages. This finding supports Webster's (1986, 2003) belief that students do not always

move in discrete stages, but as new problems arise, they may need to go back to an earlier stage.

The older students were more focused on the product and completing the task within the 10

minute time frame. Kratus suggests that as children mature they develop more enabling skills

that allow them to solve musical problems presented.

In another study by Kratus (1994), he sought to observe if there was a relationship

between children's music audiation score and the process and products of their compositions.

Kratus (1989, 1991) and Swanwick and Tillman (1986) had observed in earlier research that age

and musical experience had an affect the compositional process and product of children's

compositions. Kratus selected nine-year-old students ($N = 40$) to complete an individual

composition task. Earlier research by Kratus (1989) observed that the youngest age a child can

compose with meaning was nine. Each student was administered the Intermediate Measures of

Music Audiation (Gordon, 1982) to establish individual levels of audiation. The composition

task presented to the students mirrored the one he used in an earlier study (Kratus, 1989). Four

expert music educators evaluated each student's compositions. Two judges evaluated the

process used during the compositions in five-second intervals examining use of exploration,

development, repetition, or silence. Two judges evaluated the compositional product for metric

and tonal cohesiveness, pattern use, and extensiveness. Inter-judge reliability ratings were high

for both process (exploration $r = .88$; development $r = .83$; repetition $r = .90$; silence $r = .95$) and product (tonal cohesiveness $r = .90$; metric cohesiveness $r = .80$).

Further examination of the results indicates that there is a link between audiation and several aspects of creative musical behavior (Kratus, 1994). In this study, Kratus found that 63% of the time students were involved in exploration, which is in contrast to his earlier study that observed only 40% of student's time spent in exploration. Tonal audiation scores were positively correlated with the use of development ($r = .34$, $p < .05$), but negatively correlated with exploration ($r = -.34$, $p < .05$). Rhythm audiation scores also showed a negative correlation to exploration ($r = -.43$, $p < .01$). Kratus suggests that as a student develops greater enabling skills to audiate, time in exploration may not be needed. The development process in composition showed a statistically significant ($p < .05$) positive correlation between composite ($r = .33$) and tonal ($r = .34$) audiation scores. Kratus suggests that this finding is intuitive because often students must possess greater ability to hear or think in sound to fully develop musical ideas. Based on his findings, Kratus suggests three implications for music education, (1) early musical experiences that develop audiation may in turn develop compositional development, (2) teachers may be able to use audition scores to individualize student's compositional experiences, and (3) it may be more beneficial for students if teachers focus composition tasks on individual skills to improve composing production.

The first study to examine developmental stages when composing using a desktop computer was conducted by Folkestad, Lindström, and Hargreaves (1997). Specifically, they wanted to examine if identifiable characteristics would emerge as students composed. Folkestad, Lindström, and Hargreaves (1997) found that all of the participants ($N = 14$; aged 15-16) were successful using the computer to compose music. The computer also provided them with an

opportunity to observe the process of composition without being intrusive. As the students

worked, they used the save-as function to preserve compositions over time. This allowed the

researchers to observe the composition process over time. The students created 139 individual

compositions over a three-year period. Analysis by the researchers found that the process of

composition was very different between the students. By analyzing of the composition process

over time, Folkestad, Lindström, and Hargreaves were able to categorize the compositional

products into two broad categories, either horizontal or vertical.

The terms horizontal and vertical refers to the strategies used during the composition

process and not the actual structures of the music. Horizontal compositions were holistically

conceived being composed from beginning to end. The composer treated composition and

arranging as two separate processes. Vertical compositions were completed section by section.

There was no predetermined idea of what was to come next in the composition. Each category

could be further broken down into discrete compositional strategies as shown in Figure 3.

HORIZONTAL COMPOSITION **VERTICAL COMPOSITION**

Horizontal 1		Horizontal 2	Vertical 1		Vertical 2
1a Composing at an instrument – arranging in front of the computer	**1b** Composing at an acoustic instrument – using the computer as co-musicians	Horizontal composition element by element in front of the computer	**1a** Vertical composition, section by section	**1b** Vertical composition, at sound composition (Soundscape)	Vertical composition, starting by defining the orchestra

Figure 3. Compositional strategies observed by Folkestad et al (1997)

Further analysis of the compositions showed that there were differences between the compositions related to gender and instrumental training. The way in which rhythm was constructed and utilized was different between males and females. Males tended to compose from the bottom up, focusing on rhythm first and then adding bass, chords, and melody. Females tended to compose from the top down, composing melody and chords first, and then adding bass and drums. Other gender differences occurred in the use of compositional strategies. Females only created compositions using strategy Vertical 1B. Males only created compositions using strategy Vertical 1A and Vertical 2. The males also produced more compositions than the females. Folkestad, Lindström, and Hargreaves (1997) observed that males worked more rapidly than the females. The females would work out their musical ideas in detail, whereas the males would try out ideas even if in an unfinished state.

Instrumental training was seen as a benefit and an obstacle by some of the students (Folkestad, Lindström, & Hargreaves, 1997). The participants that had previous instrumental training generally selected sounds that imitated acoustic instruments, usually starting with the sound that most closely resembled their own instrument. The participants with keyboard training felt that their training was a necessity to creativity and the ability to compose. The non-keyboard trained participants also indicated that keyboard training was important, although the researchers observed that piano skills might actually inhibit curiosity and creativity. Participants with keyboard training tended to rely solely on the keyboard to compose. They also produced compositions created horizontally and did not actively search and utilize the computer's other features for composition. Although previous training is seen as an asset to realize a musical idea Folkestad, Lindström, & Hargreaves (1997) noticed that it also inhibited exploration. This finding has been observed in other research (Seddon & O'Neill, 2001, 2003).

A study by Reynolds (2005) found that compositions using computers do not necessarily align with the sequence proposed by Swanwick and Tillman (1986). Examining the compositional products of 10 and 12 year old students (*N* = 7) over 20 weeks, Reynolds sought to observe the ways students would compose using a computer. Through analysis of students' completed and in progress compositions, interviews, and video and audio recordings Reynolds was able to examine the context of the student's compositional experience.

Reynolds (2005) argues that the computer frees students to compose and perform music without being constrained by instruments and the environment. The computer enabled students to create compositions that were not limited by their own performance ability and allowed them to operate at higher developmental levels than originally proposed by Swanwick and Tillman (1986). For example, Reynolds compared a compositional product by a student in the original Swanwick and Tillman (1986) study to a student in his study. The students were of the same age, but there is stark compositional difference. The Swanwick and Tillman student produced a composition consisting of one stave, whereas the Reynolds student produced a composition consisting of five staves. Reynolds also ascertains that the computer facilitated the students' ability to play with sounds and assume musical roles they normally could not fulfill. Reynolds does not discredit the Swanwick and Tillman (1986) model, but rather supports that the computer has the possibility to scaffold the compositional process in a ways that has not been possible.

Hickey (2004) suggests that technology is creating a new literacy that students are grasping and manipulating with and without the aid of their teachers. Technology allows researchers and teachers to gather and observe information in new ways (Webster, 2009). However, more research needs to be conducted observing students engaging in multiple musical roles as they work, create, and experiment with technology before making sweeping

generalizations (Webster & Hickey, 2006).

Expert versus novice composers. Younker and Smith (1996) examined the similarities and differences in the thought processes between adult and high school experts and novices during a composition task. Using a think-aloud protocol, recordings of the participants composing, and data from a MIDI sequencer, they sought to capture the composers' thought processes. Using a rhythmic guide, each participant composed a 14 measure tonal melody that started in C, modulated to A, and then modulated back to C. At the conclusion, all data were transcribed and examined using a qualitative comparative analysis.

The model developed by Younker and Smith (1996) showed similarities between all four composers in regards to forms of input. The composers utilized tactile, visual, and aural approaches to compose the melody. The adult and student experts used the keyboard in an exploratory manner to figure out how the melody might sound. They tended to compose their melody in a whole-part-whole manner. In contrast, the adult and student novice approached the composition in a sequential manner, working note by note. The novices' approaches were overall less holistic than the experts. Interestingly, age seemed to benefit both the adult novice and expert. Younker and Smith (1996) commented that this benefit may be because adults have had more lifelong musical experience than the high school students. They also theorize that the adults' life experiences may account for why they were quieter than the students during the composition task.

Burnard and Younker (2002, 2004) examined compositions from students of various ages and from different areas of the world for examples of different composing strategies. Based on verbal responses, verbal reports, interviews, observations, and examples of students' compositions they observed three distinctive pathways of composition: linear, recursive, and

regulated. The students' compositions were assigned to one of the pathways depending on how they moved through Wallas' (1926) and Webster's (2002) models.

Students that moved in a linear pathway showed very little convergent and divergent thinking as they moved through the stages (Burnard & Younker, 2002). Recursive pathway students moved across and within the four creative thinking stages (Burnard & Younker, 2002). These students showed greater use of convergent and divergent thinking. The students operating within regulated pathways showed the greatest amount of divergent thinking (Burnard & Younker, 2002). These students viewed composing as a holistic process where they generated possible solutions to musical problems and then evaluated and verified their musical choices.

Burnard and Younker (2002, 2004) observed that there was a definite relation of age and prior musical experiences to the pathway the student composed within. The youngest and least experienced students composed in a linear pathway. The students with the most musical experience composed in a recursive pathway. Though there was an observed relationship between the musical experiences of the students and their composing pathway, there was no relationship between prior music composition experiences. Burnard and Younker (2002) found that absence of formal composition instruction had no affect on the students' ability to utilize convergent and divergent thinking strategies.

Kaschub and Smith (2009) suggest that the absence of clearly designed stages of compositional development has led to a grounded theory approach towards composition development. Through their analysis of research, Kaschub and Smith observe that students have the capacity to compose on levels of intention, expressivity, and artistic craftsmanship. The age and enabling skills of the composer determines whether they are operating as a novice, intermediate, or advanced composer. Students that compose in the intention level are in the

beginning stages of being able to think in sound to create a musical idea or thought. Students composing in the expressivity level understand how a composition can invite and initiate an aesthetic or human response. Students composing with artistic craftsmanship are able to compose within a certain system and understand how to break and challenge the rules of that system meaningfully.

Student voice and identity. Often when examining the creative person, researchers have looked at historical creativity or Big-C creativity (Csikszentmihalyi, 1996; Elliot, 1996; Gardner, 1983). Examining the works, journals, observation, and conducting interviews has been one way to track the thinking process and product output of prominent composers (Burnard, 2006; Gardner, 1983; Barrett, 2003). Recent work has shown that music educators may gain insight of the composition process by examining the work of children or novices during and after the composition process (Gromko, 2003; Kennedy, 1999, 2004; Stauffer, 1999, 2001).

For children, composing is serious work that involves thinking in sound to showcase what they know (Gromko, 2003; Stauffer, 1999). Children use the music they compose to explain their feelings and emotions in addition to composing for an academic reason (Burton, 2003). The music created is valued because it was created by the child and becomes an extension of their personal agency (Gromko, 2003; Kaschub, 1997; Ruthman, 2008). As children are working on the composition, the composition is actively working on the child (Burnard, 2006; Reimer, 1989). Composing shows what students know and aids them as they construct new meaning (Burnard, 2006; Hickey, 2013; Wiggins, 2003).

Children primarily compose as a meaning making enterprise (Barrett, 2003; Burnard, 2006). Burnard (2006) utilized an ethnographic approach to observe twelve-year old children as they composed over a 21-week period. She interviewed the students as they composed and

utilized a protocol identified as talk-draw. Students created images to represent their experiences and discussed them with Burnard and their peers to further explain their composition process and finished compositions. Burnard observed a cyclical relationship between time to compose (time), prior knowledge (body), identity attributed to the composition (relations), and sense of object of involvement to past experiences (space) that formed the lived musical experiences of the students. The children demonstrated great satisfaction in discussing their compositions and receiving feedback from peers. Burnard (2006) suggests that observers should view children composing as a multidimensional and multilayered meaning making process.

Through her longitudinal research examining children composing using a computer, Stauffer (1999, 2001, 2002, 2003) has observed that students develop both voice and identity through composing. She defines identity as, "the unique qualities of sound that allow the informed listener to associate a work with its composer" (Stauffer, 2003, p. 91). Both novice and expert composers are able to develop essential characteristics and qualities that distinguish their work from other composers. Voice is defined as, "the uniqueness of a single composer's works" (Stauffer, 2003, p. 92).

Although the two terms may seem synonymous, Stauffer makes a distinction. Identity refers to the unique qualities of a composer's works whereas voice is related to the unique expression and meaning of a composer (Stauffer, 2003). The two concepts are interrelated, but they are independent. Stauffer (2003) suggests that student's compositional identity and voice are influenced by their varied musical experiences. The student's personal experiences of listening, performing, and other social factors enable them to create a web of significance from which their compositional capabilities are developed. When examining voice and identity,

Stauffer cautions not to look at one composition, but examine one example against the entirety of the composer's works.

Stauffer (2003) describes observing student's development of compositional voice and identity as they composed. Stauffer details the compositional creations of Hillary, a first year trombone player enrolled in band. Hillary composes music to demonstrate her technical ability on trombone and to show that she is bored in her beginning band class. Through interviews, Hillary indicated that the trombone part is often simplistic and other instruments have parts that are more interesting. Hillary chose to compose using a two-staff treble and bass clef system. Hillary's music varied from conventional thinking, the bass clef staff had a more interesting and technically challenging part. She drew upon her experiences as a performer to shape her compositions. As Hillary began to experience other roles as a performer, her compositions began to develop. She began composing works for ensembles that were more representative of her growing performance experience.

Framing her thoughts around on the work of psychologist Jerome Bruner, Gromko (2003) advocates that when students compose they are constructing an artful narrative representative of their lived experiences. Artful narrative can be considered a musical autobiography much like identify and voice. Gromko (2003) describes artful narrative as, "a temporal sequence of musical events with a beginning, a middle, and an end that is communicated through musical sound and recorded within the symbol system of music" (p. 69). Gromko observed, like Stauffer (1999, 2001, 2003), that age and the experience of the students play an important role in what and how they compose. Younger students base their compositions on their emotions, experiences, and construct musical stories for meaning. As students mature they begin to

compose based on past experiences, but the social interactions they have with their peers and other adults influence their compositions (Gromko, 2003).

The role of the teacher is important, according to Gromko (2003) in helping students construct and connect knowledge to develop their artful narrative. The teacher, in consultation with the student, uncovers the meaning of the composition. When the teacher structures the learning environment for deeper thinking and active discussion about what is being composed the students begin to ascribe meaning to their work. This will ultimately lead to the development of their compositional voice. If the teacher is seen as the only expert in the classroom, Gromko (2003) suggests that the student will see their contributions as devalued. The teacher should be seen as co-collaborator and co-composer in the process.

One experience that seems to have an affect on student's construction of compositional identity is the ability to play an instrument (Folkestad, et al, 1997, 1998; Seddon & O'Neil 2001, 2003; Stauffer, 2003, Webster, 1996). Webster (1996) suggests this may be due in part to the way teachers instruct beginning instrumentalists. The students may perceive that they are to operate as a composer within the specific parameters of a performance classroom.

Seddon and O'Neil (2001) observed that students with instrumental training were able to compose more complex melodic and rhythmic materials. A follow-up study by Seddon and O'Neil (2003) explored the creative thinking process of students during composition. They found that students with instrumental training were not able to produce as creative compositions as non-instrumental trained students. The students with instrumental training spent less time engaged in exploration during the composition process than their non-instrumental counterparts. This may be due to the instrumental students' having skills that enable them to spend less time in beginning phases of composition as suggested by Kratus (1994). Seddon and O'Neil (2003)

theorize that students with instrumental training have difficulty composing outside of their perceived performance roles. The students with instrumental training may already view themselves as a musician and feel they must operate within that role.

Teacher's role in composition. The role teachers assume in the process and product of students' compositions is difficult to generalize (Kaschub and Smith, 2009). Kaschub and Smith (2009) suggest that the teacher's primary goal is to find balance between thinking in music and thinking about music. Until recently, what has been discovered about the role of the teacher was gleaned from studies that sought to observe other issues in music composition (Dogani, 2004; Ruthman, 2008). However, as Hickey (2013), Kaschub and Smith (2009), and Wiggins (2003) point out, teaching composition is different from teaching performance or general music. Teaching in a performance or general music setting usually has a predetermined end result, whereas teaching composition may not always have a predetermined conclusion (Kaschub & Smith, 2009; Reese, 2003).

It bears to mention that teachers may not understand their role in teaching composition for a multitude of reasons. In a study of secondary teachers' views of teaching composition, Odena (2001) found that teachers have varying views on the concept of creativity in general and feel unprepared to teach composition. Similarly, Crow (2008) found that teachers' creative work was limited in undergraduate course work and focused mainly on performance. Crow also observed that the teachers in his study had two views of creativity: one that applied to non-classroom music and the other that applied to classroom music.

One way to combat the inadequacies that teachers report while teaching composition is for the teacher to compose along side the students (Dogani, 2004; Younker, 2000). Burnard (2006) and Gromko (2003) suggests that if the teacher is seen as the only expert in the

classroom, it may not be possible for children to view themselves as composers. If the students

observe the teacher's role as a guide instead of an expert, the possibility of more fruitful

composition experiences may exist (Ruthman, 2008).

Dogani (2004) sought to understand perspectives of elementary teachers engaged in

teaching composition to children. Using a case study approach, Dogani interviewed and

observed the teachers working with their students. She also asked the teachers to create a control

tape to record their thoughts and reflections as they were teaching. She observed that the

composition experiences where mostly teacher directed activities. The majority of the

instructional time was teacher directed and taken up by teacher talk. Furthermore, the teachers

viewed creativity as a constructive task that the students were engaged in, but ultimately the

teacher was responsible for the final production of a product. According to Dogani, the teachers

indicated that they felt uncomfortable and lacked confidence as creative musicians. Dogani

suggests that teachers should collaborate with students in the composition process by releasing

more instructional control. This could ultimately lead to more creative compositional products.

In contrast to Dogani's (2004) study, Bolden (2009) suggested that the teacher's role in

composition tasks should be a facilitator of learning. Using a case study approach, Bolden

describes the work of Jesse, a teacher in an urban setting teaching a music technology course.

The students composed using GarageBand, alone or in groups of two to three students. Through

observations, in class dialogues, and interviews with the principal of the school and Jesse,

Bolden describes how Jesse engaged students to solve problems and make connections to their

musical world. Jesse indicated that the teacher must structure composition assignments to be

authentic, with opportunities to solve student-centered problems. The act of musical

composition is a means for students to express their identity and individuality. Bolden observed

a collaborative culture of musical composition that he suggests should serve as a model for replication.

Teacher feedback and evaluation.   One essential role that the teacher must provide is that of feedback and evaluation (Barrett, 2006; Reese, 2003; Ruthman, 2008, Webster, 2003; Wiggins, 2000; Younker, 2003). Feedback and evaluation does not always mean attaching a grade to the product; several researchers have found that grades can be detrimental to creativity (Amabile, 1996; Hickey, 2013). Webster (2003) suggests that teachers offer feedback in the form of revisions and extensions. Revision is "the return to exploration in which composers test ideas while refining their finished product" (Kaschub, 1997, p. 33). Extension is "a more specialized revision that either adds new musical ideas to an existing work or expands an existing musical idea or set of ideas vertically or horizontally" (Webster, 2003, p. 56).

Hickey and Reese (2001) developed a form with input from expert music teachers, composers, and researchers to evaluate feedback provided by pre-service music teachers to children engaged composition projects. The form consists of 8 Likert-type items that range from 1 ("Not Evident") to 7 ("Evident"). The form was found to be a valid and reliable ($r = .94$) rating scale to judge compositional feedback. Four expert music educators used the form to evaluate feedback provided by pre-service teachers to students in an online composition environment. Based on the results, Hickey and Reese outlined several suggestions for the evaluation of compositional products. In particular, they observed that specificity was lacking in the assessment of the students' compositions. Hickey and Reese identified the following statements as traits of effective feedback:

- Positive feedback should be specific to the composition or composition process, rather than general (empty).

- The critique of any weak areas in the composition should be specific.

- Feedback should include clear analysis/description of the important musical elements of the composition.

- Feedback should provide musical (and/or technical) terms that are appropriate for the age level of the composer.

- Feedback should contain specific suggestions for change if necessary.

- Any suggestions for change should be musically appropriate for the composition.

- Suggestions for change should be appropriate for the age level of the composer.

- The feedback should contain effective devices to communicate imaginatively about suggestions or the piece as a whole, for example humor, metaphors, analogies, expressive language (Hickey, 2013, p. 28-29).

Reese (2003) further suggests that teachers should embody the role of coach or mentor in the composition process. Feedback should be frequent and non-judgmental often starting with open-ended questioning. The feedback should happen early in the process to avoid resistance later as the student may feel their earlier views were not important. Teachers should model musical material, but care must be taken that the student does not feel the teacher is taking over the composition process.

Ruthman (2008) examined the relationship between a student (Ellen) and her teacher (Mary) during a composition experience in a music technology lab. Through observation and interviews, Ruthman was able to observe the effect of teacher feedback on the agency of the student composer. Students were instructed to compose a soundtrack for a movie clip. Throughout the majority of the composition process Mary assumed the role of expert and teacher. At one point Mary took the mouse from a student's hand to make changes to her

composition. Ellen saw this as an exclusionary act. Throughout the process, Ellen indicated that she viewed herself as a composer and sought to make and show meaning through her composition. Ellen expressed that Mary was constraining her creativity and Ellen desired to have more freedom to make meaning through her compositions.

Ruthman (2008) suggests that teachers need to approach feedback with the student's intention at the center of the dialogue. Questioning the students about their intentions before providing feedback may be more effective. Ellen valued Mary's input, even though she disregarded the majority of her suggestions. Ruthman suggests that teachers should help students find their voice to develop their agency as a composer. Teachers may be more successful if their feedback starts from a place that is meaningful to the students. Ellen indicated that she wanted Mary to be a guide and not an expert. Ellen wanted Mary to help her solve musical problems. Meaningful feedback will only happen through open ongoing dialogue between student and teacher.

In a case study to explore the beliefs and practices of an eminent composer-teacher working with a student-composer, Barrett (2003) also indicates that feedback should center on the intentions of the student. Barrett (2003, p. 201-202) observed twelve teaching strategies emerge. She suggests that these strategies may be of value to teachers as they structure compositional learning experiences:

1. Extended thinking, provided possibilities;

2. Referenced work to and beyond the tradition (signposting);

3. Set parameters for identity as a composer;

4. Provoked the student to describe and explain;

5. Questioned purpose, probed intention;

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6. Shifted back and forth between micro and macro levels;

7. Provided multiple alternatives from analysis of student work;

8. Prompted the student to engage in self-talk;

9. Encouraged goal setting and task identification;

10. Engaged in joint problem finding and problem solving;

11. Provided reassurance;

12. Gave license to change.

Although, other studies (Barrett, 2006; Barrett & Gromko, 2007; Burnard & Younker, 2002; Dogani, 2004) have found that is important for the teacher to be seen as a co-creator or composer along with the students. Barrett's study (2003) examined the relationship between one composer and one student. The strategies presented may have to be altered to reflect a classroom environment of one teacher that is responsible for many students.

There have been a few studies that have examined the use of experts' subjective assessment of compositions as basis for providing feedback. Utilizing a technique developed by Amabile (1996) called Consensual Assessment, researchers measure creative output by using experts' global and subjective assessments. Experts' use their own subjective understanding of a product instead of using clearly defined objective definitions. Amabile (1983) argues that it is impossible for objective criteria to be applied to a creative product, but rather it is more appropriate for expert observers to independently assess creative products.

Webster and Hickey (1995) designed two separate rating forms for compositional products based on Amabile's (1996) Consensual Assessment technique. They created the Judgment of Music Compositions form to examine if the use of explicit or implicit items would yield a more reliable measure of compositional products. Both versions of the Judgment of

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Music Compositions form were identical in content consisting of two subscales (global considerations and specific music characteristics). Both forms ask experts to rate compositions on craftsmanship, creativity/originality, and aesthetic value. The difference between the forms was the way in which the questions were asked. The implicit form asked raters to rely on their expert knowledge base to make decisions. In contrast, the explicit form provided definitions and explanations for each question and asked the raters to make judgments based on the information provided.

To test the reliability of each form, four expert music educators evaluated ten compositions created by sixth and fifth grade students. The judges listened to each composition, waited and hour, and used both forms to evaluate the compositions. The judges listened to all of the compositions and then rated each composition with the implicit version of the form. They were instructed to seal the implicit forms in an envelope and wait one hour before evaluating the compositions with the explicit form. Results indicated that inter-judge reliability for both musical and global items of the implicit (implicit global $r = .82$; implicit musical $r = .80$) form was higher than that of the explicit form (explicit global $r = .62$; explicit musical $r = .78$). There was a statistically significant difference between the global items on the implicit form and the explicit form (paired t test, $t = 9.1$, $p < .05$, $df = 5$). One expert judge mentioned that the subjective nature of the implicit form allowed them to make artistic judgments because they were not locked into a specific definition of each item. Other judges commented on their preference for the implicit form. Webster and Hickey (1996) suggest that rating scales that have global and implicit items are better at predicting originality, creativity, and aesthetic value. These results suggest experts can more reliably evaluate compositions based on their own understanding of the terms presented.

Hickey (2001) designed a study to examine if experts could adequately assess children's compositional products using Amabile's (1996) Consensual Assessment technique. She questioned who would be the most adequate raters of children's creativity, students and teachers or professional musicians. The experts selected for her study were composers ($N = 3$), music teachers ($N = 17$), music theorists ($N = 4$), seventh grade children ($N = 13$), and second grade children ($N = 24$). Using Amabile's procedures and a form used in previous research (Hickey, 1995) the experts were instructed to rate 12 compositions against one another instead of an absolute standard. The judges also rated compositions for craftsmanship and aesthetic appeal, but only the creativity score was utilized in her analysis.

Hickey's results indicate that the context in which the composition was created should determine who is considered an expert. The most reliable experts to assess children's compositional products are experts that not only understand the domain, but the conditions and daily operations of the classroom. For instance, the composers as a group showed no relationship in their creativity ratings ($p > .05$; .04) or when compared with all other experts ($p > .05$; .04). Inter-judge reliability calculated for all groups was $r = .48$, but when the composers were removed and inter-judge reliability was recalculated it was $r = .78$. The highest agreement among all groups was between the general music teachers ($r = .81$). There were significant correlations found between all music teachers and music theorists ($p < .01$, $r = .90$) and the two groups of children ($p < .01$, $r = .83$). The composers showed no positive correlations, but several negative correlations were observed between individual composers and the other groups of experts.

It seems the most reliable experts when rating children's compositions are the children and the teachers that work with them. Hickey (2001) notes another interesting finding related to the children's ability to separate the construct of creativity from their personal likes. There was a relationship between the ratings children gave for liking a composition and if they considered it creative. Hickey's suggests that this may account for why there was not a stronger relationship between the teachers' ratings and the two groups of children's ratings.

Priest (2001) used Consensual Assessment technique to evaluate compositions of undergraduate students ($N = 54$) enrolled in music fundamentals for elementary education majors. The students completed three composition assignments using soprano recorder. The first composition had to be at least 20 seconds, demonstrate breath control, articulation, and use at least three different pitches. The second composition assignment had the students compose a melody using the rhythm of a poem and using at least five different pitches. The third assignment had the students compose in e minor, using triple or compound duple meter, and using at least five different pitches. One week before each composition assignment, the students assessed five model compositions using a Creativity and Craftsmanship Assessment (CCA) based on Amabile's (1996) Consensual Assessment technique. Priest thought that by having students rate model compositions specifically for creativity and craftsmanship it would influence their personal compositions. Approximately one week after evaluating the model compositions, the students recorded their own compositions. The students also assessed their personal compositions for craftsmanship and creativity using the CCA.

To make comparisons between compositional skills and analytical listening skills, Priest (2001) developed the Consensual Musical Creativity Assessment (CMCA). The CMCA rates compositions on (a) creativity, (b) melodic interest, (c) rhythmic interest, and (d) personal

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preference using Amabile's (1996) procedures for Consensual Assessment. A professional musician recorded all 54 of the students' third composition assignments. Priest had eight independent judges, who had taught music courses to elementary education majors listen to all 54 melodies and rate them using the CMCA. After evaluating all of the melodies, the students were grouped by mean scores into high, medium, and low creativity groups. Priest then took the students' written statements about their third assignment and categorized them into 20 descriptors. A Chi-square analysis of creativity grouping and written descriptors showed that that the students in the high group were more likely to cite temporal factors to explain their melodies. In contrast, the students in the low group were more likely to use language consisting of metaphors and similes to explain their melodies.

Priests' (2001) notes as other researchers (Hickey 1996; Webster, 1987) that performance is not linked to compositional creativity. He also mentions that students and teachers should talk more about what they hear and create in the composition process. This suggestion is in line with several researchers (Barrett 2003; Gromko, 2003; Hickey & Reese, 2001; Wiggins, 1999; Younker and Smith, 1996) that have indicated that talking about the process of composition is beneficial. Hickey and Reese (2001) suggested that teachers use specific comments when discussing student's compositions. Priest further suggests that teachers should encourage students to use various means (movement, visual, etc.) to connect the global and temporal attributes of music. He suggests this will help students be more descriptive about their compositions, which in turn will help their growth as composers.

Environment and task design. Teachers are crucial to creating an environment and composition tasks that fosters student engagement (Barrett, 2006; Bolden, 2009; Gromko, 2003; Younker, 2002). Kaschub and Smith (2009) indicate that task ownership cannot solely rest with

the teacher. The student must take ownership of the learning process, with the teacher understanding the students' needs. Well-designed tasks show knowledge about the student, music, and artistic craftsmanship that leads to the creation of new music. There is no one-size-fits all approach to composition, but teachers can provide students with skills and tools for optimal learning (Kaschub & Smith, 2009). Wiggins (2005) suggests that the classroom should be a social community of learners that fosters collaboration instead of an environment of teacher and students being separate and unequal.

Music composition tasks should not always be a graded activity, but structured as an ongoing activity that stimulates musical thinking (Hickey, 2003). Structuring composition tasks as a problem-solving endeavor has shown to be beneficial (DeLorenzo, 1989; Hickey, 2013; Sullivan, 2003; Wiggins, 2003). Hickey (2013) suggests that if teachers provide musical problems for the students to solve they will begin composing on their own. Children compose as a meaning making process and therefore problem-solving tasks should encourage students to express what is meaningful in their lives (Burnard, 2006; Hickey, 2013; Wiggins, 2003).

DeLorenzo (1989) examined the creative problem solving processes of sixth grade students ($N = 82$) at four different schools. As the students worked in groups to solve musical problems, she began to observe similarities between students. The more invested a student appeared to be in solving the musical problem presented, the more invested they were towards the final product. Students that exhibited highly engaged problem-solving techniques, explored and organized musical materials for expressiveness. Students that were less engaged made decisions rarely based on musical criteria. DeLorenzo suggests that students need more opportunities to explore and think about the music as a doing process. Facilitating discussions between teachers and students about musical problems and possible solutions may lead to

higher-level thinking. DeLorenzo advocates that through dialogue teachers can foster persistent inquiry in creative tasks.

Wiggins (2003b) suggests that when teachers are designing problem-solving tasks they should take into account students' holistic conception of musical ideas. In a study of compositional solutions to three different musical problems, Wiggins (1994) found that students tend to work form whole to part and back to whole. Many times, students approach the problem as a game or puzzle to be solved (Sullivan, 2003). Novice composers need to think of the musical problem in a holistic manner rather than focusing on solving one isolated musical concept (Wiggins, 2002).

The amount of freedom and constraint placed on a composition task has an effect on the product as well as the motivation of the student (Amabile, 1996; Barrett, 2003; Hickey, 1997; Wiggins, 2002). The attachment of a grade has also been shown to diminish intrinsic motivation for the task and affect the overall creative process and product (Amabile, 1996; Hickey, 1997 & 2013). In her study of two males composing using computers, Hickey (1997) found the student's perceived reward and motivation (extrinsic or intrinsic) impacted creative output. Creativity and intrinsic motivation was dependent on the composition task being open or closed. When the task was structured with closed composition parameters and low external reward the creative output was low, but the student exhibited high intrinsic motivation. In contrast, when the task presented was structured with open composition parameters and low external reward, the students exhibited high creative output and high intrinsic motivation. Hickey (1997, 2003, 2013) suggests that teachers should structure tasks that are open, with low external reward for optimal intrinsic motivation and higher levels of creative output.

Wiggins (2002) does suggest that teachers should not set parameters on tasks, but rather create tasks that are open enough to allow students freedom of musical thought. Also, the task should not impose a right or a wrong way to compose, but create an environment that leads students to find their own way to compose (Folkestad, Hargreaves & Lindström, 1998). Development of composition task structure should take into account readiness to compose (Burnard and Younker, 2006; Burnard, 2006). The compositional problems presented to the students should not require students to use skills and concepts they have not yet mastered (Wiggins, 2003). Asking students to solve problems that they are not cognitively ready to solve will affect more then the outcome of their compositions. A well-developed compositional problem is one that combines the knowledge and skills of the musician to create new music (Savage, 2003).

Technology in the Composition Process

Technology has transformed the teaching and learning process in many different ways. The ability to instantly notate, hear, and edit compositions makes technology desirable in the teaching/learning process (Hickey, 2013; Kaschub & Smith, 2009). The ability to preserve information or the development of a composition over time is seen as an advantage of using technology (Folkestad, et al, 1999, 1998; Dammers, 2013; Hickey, 2013; Kaschub & Smith, 2009). Although technology affords the teacher and students many opportunities, there is limited research about the influence of using technology in composition. The majority of the studies do not examine the effect of technology but rather technology's use as a tool in the composition process (Dammers, 2007; Ruthman, 2008; Stauffer, 2001 & 2002; Younker, 2000). Technology may be a way to provide more creativity based music education experiences, including

composition, to students (Reynolds, 2006; Webster & Hickey, 2006). The following section will discuss literature that has used technology as a tool in the composition process.

Studies with elementary aged children. Nilsson and Folkestad (2005) developed a qualitative study to examine students' use of digital tools for the compositional process. The participants in this study (*N*=9) were musical untrained children ranging in age from 6-8. They completed composition tasks over an 18-month period using a synthesizer with keyboard and computer sequencing program. Data collection consisted of MIDI files over time using the Save-As command, participant observations, and interviews conducted throughout the project. The first phase of the project asked students to create music inspired by water and landscape pictures. The second phase presented an open-ended task that asked the students to create a self-portrait and then create music to accompany their portrait. During the concluding interview, the participants were asked to create music without any specialized prompt. Each of the compositions tasks took place during one uninterrupted sitting.

At the conclusion of data analysis, Nilsson and Folkestad (2005) observed five variations of creative music making, (1) computer and synthesizer in the foreground, (2) expressing personal fantasies and emotions, (3) instrument in the foreground, (4) music itself in the foreground, and (5) the task in the foreground. Much like their earlier research (Folkestad, et al, 1999, 1998), the five variations describe strategies used by the composers, not necessarily the structure of the music. Nilsson and Folkestad (2005) use the term foreground to describe the primary means used to compose. By placing the computer and synthesizer in the foreground, the students used the equipment as tools and devices that were controlled and explored; the composition process became a workshop. Students that composed with fantasies and emotions in the foreground invented stories, used dolls, and relied on their emotions to inspire the

composition process. Compositions with instruments in the foreground were constructed

through composition and improvisation processes working together to produce longer

compositions. When the music itself was placed in the foreground students focused on musical

ideas. Their problem solving ability was used to explore and revise musical fragments and ideas.

If the student focused on the task as the sole driving force to create, their composition and

creative potential was stunted.

Nilsson and Folkestad (2005) suggest that some strategies were more successful than

others because the compositional processes were more naturalistic and play oriented. When the

compositional task was viewed as school oriented, one that did not connect with the student's

own world, students did not use their full range of imagination. As suggested by others

(Amabile, 1996; Hickey, 1997; Wiggins, 2003) if the student views the composition task as

something that does not connect with their world they will produce less creative products.

Hickey (1997) examined two 11-year old boys' examples of creative output in

comparison to a theory of risk and reward during a composition activity. Hickey sought to

record instances intrinsic motivation's effect on creative output by using a software program,

Music Mania, installed on a computer with a MIDI sequencer. Music Mania is a program that

guides the user through five areas: melody, rhythm, timbre, dynamics, and texture. The student

does not need to know how to read music notation to play. Each unit has separate compositional

tasks that the student must complete to move to the next stage. Hickey recorded the students

both knowingly and unknowingly as the students' worked on the compositional tasks. She

hoped that by recording the student unobtrusively she would gather better data for comparison.

When examining the recordings of the two boys, Hickey (1997) found that the

unknowingly recorded examples exhibited more evidence of divergent thinking than the

knowingly recorded material. Both boys were selected for this study because of their previous participation in a composition experience with Hickey. She also spoke with their general music teacher to understand their participation in the music classroom. The teacher indicated that they were not talented musically, unable to think creatively, exhibited behavioral problems, and showed below average abilities. The results of their unknowingly recorded material showed that they both had moments of creative musical thought and the potential for imaginative musical creativity.

The individualized experience of using the computer provided an opportunity for the boys to demonstrate creative output. Hickey (1997) suggests that the ideal environment for supporting high intrinsic motivation and high creative output is an environment where the learner perceives surveillance and external rewards are low and the tasks are relatively open. Hickey suggests that the use of computers and creating a relaxed atmosphere may help students to explore their hidden creative potential.

McCord (1999) used Music Mania with MIDI synthesizers to observe four elementary students with learning disabilities during six composition sessions. She hoped the computer would aid the students in two areas, (1) provide a way for students to compose and (2) mediate some of the challenges of their learning disabilities. She unobtrusively recorded all work done on the computer without the student's knowledge. In addition, she used video recordings, observation notes, student interviews, the students' compositions, and on- and off- task behavior to evaluate technology use and musical thinking processes. McCord found that using technology provided the students a multi-sensory learning approach that aided the students to complete composition tasks.

Even though the students were able to compose, they still had difficulties that McCord (1999) relates to their learning disability. The students were literal in their completion of the composition task. McCord notes that is this is common with students with learning disabilities. Distractibility and short-term memory were also issues that inhibited their creativity. Several times McCord mentions having to stop the students to refocus or demonstrate certain musical concepts. She found that this also helped the students in their thinking process and aided their musical memory.

McCord (1999) cautions about generalizing the results to the larger population, but the suggestions she provides may be of help. Other research has found that having students stop and talk about their composition process is beneficial (Barrett 2003; Gromko, 2003; Hickey & Reese, 2001; Wiggins, 1999; Younker and Smith, 1996). Also, the ability for technology to provide multisensory learning experiences in the music classroom cannot be ignored. McCord states that her students were able to compose in large part because of the technology.

In another study by McCord (2002), she used technology to observe special needs students ($N = 6$) composing weekly over an entire semester. Using several software programs (Music Mania, Music Ace, MusicShop, Rock, Rap' n Roll) McCord selected programs for students to use during composition based on their Individualized Education Plan (IEP). If a student had difficulty using a program McCord would examine the available data and consult their IEP to select another program. Data were collected from multiple sources including video recordings of students as they composed, student interviews, the individual compositions, and instances of on and off task behavior. McCord triangulated data with discussions with the children's music teachers, parents, special education teacher, and regular classroom teacher.

The results McCord (2002) provide are consistent with her earlier research (1999) that special needs students are able to compose due in part to the multisensory approach that technology provides. She was able, in consultation with the IEP and stakeholders, to select appropriate technology for the students to successfully compose. Unlike her previous study (1999), McCord utilized children with varying disabilities instead of using only students with learning disabilities. She found that that by selecting a program suited to the needs of the learner, the students were able to compensate for their learning challenges. The students were more successful with programs that did not require them to do and remember multiple steps. McCord (2002) suggests that technology can empower special needs students to compose regardless of their disability. The challenge for music teachers is to select appropriate software that allows the learner to reach their full potential.

Another study that focused on the multiple options technology can provide students in the composition experience was by Gall and Breeze (2005). In their study, Gall and Breeze sought to explore ways that technology can engage students in the composition process. Spanning a two-year period, they discuss the composition work of different groups of students working in pairs. Their research looked at elementary and secondary students, but the most salient points came from the work of elementary students using a looping program called Dance eJay.

Gall and Breeze's (2005) work highlights several issues for using technology in the composition experience. First, the students felt they were being creative and composing relevant music. The students indicated that they were able to make music that was more culturally relevant and more like their out-of-school music. Although, the students did feel that the looping program limited their abilities. They were not able to select anything other than preprogramed loops. However, the students were still pleased with what they were able to do as indicated by

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one student: "…like if you hear instruments playing on those classical tunes, but like, we're into hip-hop and rock and stuff like that … so it's quite … strange for, us to hear the music we're into … it's new … it's good!" (p. 427). The ability to see, hear, and save their work was highly valued by the students. As one student indicated the tools, "Helped us to remember what we did last week, 'cos otherwise we wouldn't have remembered…" (Gall & Breeze, 2005, p. 425).

Gall and Breeze (2005) also observed that there were several trade-offs for using technology in the composition process. The students that had been identified by their teacher as high performing may have found the technology limiting. The looping software only presented the students with certain preset tools to compose, and therefore made the task seem closed. As has been mentioned by others (Hickey, 1997; Wiggins, 2003) students' output is not as creative when they perceive the task as closed or too rigid.

Another trade-off was observed for teacher planning and feedback of student work. The teacher was not able to hear the compositions as the students worked because they were using headphones; the teacher could only see the work on the screen. The students did not seem to mind, because they could try things with out the teacher hearing. If the teacher felt the need to question the students, this caused an interruption to the student's thought process. The visual aspect of the program also influenced the students. The students would select the visually appealing loops sometimes without regard to how they fit musically into the composition. The teachers became much more deliberate in planning instruction which in turn influenced the students' later compositions. As one student notes, "At the beginning, everyone just put random stuff everywhere…they really didn't think about what they were putting, but now they listen to the music more" (Gall & Breeze, 2005, p. 428). Throughout their study, Gall and Breeze

observed that the teacher's role was central to mediating the process of collaborative composition.

The only study found that compares students composing with and without technology was by Kuehne, Lundstrom, and Walls (2013). They investigated if there would be differences between two groups (N = 45) of fourth grade students being taught composition skills; one group used Apple Macintosh computers with Finale Notepad (n = 25) and the other used pencil and paper *(n* = 20) to compose.   The students in both groups worked collaboratively to create music compositions within specified parameters. Both groups meet for eight forty-minute class periods and were assessed before, during, and after learning to compose music. The students were assessed before and after instruction using an instructor created Music Knowledge Assessment. During instruction, the students assessed each other's compositions using a Peer Evaluation Rubric after the fourth or fifth class meeting. At the conclusion of the project, the students completed a Final Self Evaluation Form.

Before comparing the two groups, an *F-test* was computed to determine if variance for each variable were equal or unequal. Descriptive statistics were computed for the Peer Assessment Rubric. Overall, the technology group scored higher than the paper group on all areas. The only significant difference ($t(167)$ = 1.97, p = .03) between the groups was for melody. Results of the Final Self Evaluation Form indicate that the majority of the students in the paper group (85%) felt they worked well together compared to only 53% of the technology group's students felt they worked well together. A Chi Square revealed that this was a significant difference between the two groups, $\chi^2(1, N = 35)$ = 5.84, p = .016. Results of a *t-test* on the mean scores of the Music Knowledge Assessment revealed several significant differences between the two groups. The paper group's pre and posttest means showed a significant

difference ($t(38) = 2.02, p < .001$) gaining over two points whereas the technology group only gained just under one point.   There was also a significant difference ($t(27) = 2.05, p < 0.001$) between the two groups' pretest means; the technology group's score was over two points higher. There was no significant difference in the posttest means of the two groups. When the pretest and posttest means for both groups were combined and then compared there was a significant difference ($t(69) = 1.99, p < .001$) between the scores. The posttest mean was not significantly higher than the pretest.

Interestingly, the students in the technology group rated themselves higher in almost every area. The use of technology allowed the students to try things that were technically impossible for the paper only group. The paper group was limited to composing only what they could perform on the soprano recorder. The technology did not constrain the students in the same ways as the recorder did. Both groups were able to compose no matter which group they were assigned. However, the technology group may have had some advantages.

Studies with secondary students. Airy and Parr (2001) investigated the usefulness of composing music using a MIDI sequencer. The participants in their study were two groups of students ($N=24$) from a polytechnic school specializing in audio production. Group 1 ($n=12$) were students enrolled in year one of a certificate program and Group 2 ($n=12$) were students enrolled in the diploma program. Students from Group 1 participated in a 40-minute semi-structured interview after 10 weeks of MIDI instruction. Fifteen weeks after the initial interview, Group 1 students were asked to respond in writing to several questions gleaned from the initial interview. Group 2 students participated in interviews after 20 weeks of MIDI instruction. Results centered around three central themes: (1) access to music, (2) finding musical voice, and (3) students' preferred music.

The participants responded that none of them had previous access to music technology in school and very of few of them participated in school music. Seventeen of the participants said that they found school music as, "boring, pointless, or a waste of time" (Airy and Parr, 2001, p. 43). They indicated that school music experiences were not linked to their music and focused more on performing skills, theory, and history study of music. At the conclusion of the study, all participants were all able to compose with limited or no musical training. The MIDI controller allowed the participants to have access to a variety of sounds without having to master the technical demands of learning to play an instrument. The use of the MIDI controllers allowed and encouraged the students to think in sound (Webster, 1994). Airy and Parr (2001) also indicated that technology might serve as an entry point for students with little interest in traditional music education models.

Presented in a case study format, Bolton (2008) presents the personal narrative of a student, Josh, while composing. Bolton sought to examine if there would be any observable benefits composing in an online environment. Josh participated in Compose, a learner centered online environment where he worked at his own pace to complete open-ended creative tasks. Compose allows the learner, a music specialist/composer, and the classroom teacher to work together online to complete composition tasks. The program was started to provide students in rural and underserved areas of New Zealand opportunities to participate in composition experiences.

Bolton (2008) outlines changes in Josh over time using the program. At the beginning of the project, Josh displayed tendencies of helplessness. Josh's teacher described his typical classroom behavior as defeatist, having learning problems, and exhibiting low self-esteem. As Josh progressed through the program Bolton noticed several changes in his compositional skill

and knowledge, the ability to create innovative and interesting pieces, positive self concept about composing, and enjoyment towards the approach of learning. Through email communication with Bolton, Josh continually showed interest in the project and growth as a composer. Bolton cites research by Hickey (1997) and Stauffer (2001) that the computer allowed Josh to learn by doing. Through continued engagement with technology, Josh developed musical problem solving knowledge and skills that led to personal success as a composer.

Ward (2009) spent a little over a year examining if using technology to compose would have any impact on secondary music education in two schools in the United Kingdom. Using an action research model, Ward examined students' interactions before, during, and after composition tasks. He found that the students viewed the technology as a toy and were eager to engage in play to create compositions. Ward suggests that the concept of musicianship needs to be redefined to match the different ways students interact with music. Students interact with technology throughout various phases of their life, so teachers should look for ways to wed the composition process with technology. Ward warns that teachers and researchers should not make the focus of learning about the technology, but more about what the technology can do for the student to enable deep learning.

Studies with ensemble classes and students with instrumental training. Dammers (2010) examined integrating laptop based composition activities during a middle school band rehearsal. The purpose of having the students compose was to see if the composition process would provide a means of expanding the students' musical experiences during ensemble participation. Twenty-four members of an eighth grade band participated in a composition task over a 14-week period during band rehearsal. The students were instructed to compose a melody that was modeled after The Cowboys; a composition they were performing in band class. The

students studied the overall the structure of The Cowboys through a multimedia listening guide that highlighted main compositional devices. The students were then told to create melodies that emulated the melody of The Cowboys. Students used Finale Notepad to create individual melodies. The melodies were evaluated by a three-judge panel for craftsmanship, creativity, and evidence of understanding the concepts present in the model piece. Inter-judge reliability scores were $r = .62$. The results indicate that there were modest levels of craftsmanship and creativity, and even lower levels of conceptual understanding.

Seddon and O'Neill (2003) investigated if there would be differences in strategies used by adolescents with and with out formal instrumental training during a computer based composition experience. The participants ($N = 48$) were ages 13-14 and were grouped as either instrumental training (n = 25) or having no instrumental training (n = 23). All participants, regardless of training, participated in two 30-minute scripted technology-training sessions. Following the initial session, the participants completed three 30-minute individual composing sessions. Participants were directed to "compose a piece that sounds good to you" using a computer and MIDI keyboard with a researcher modified version of the sequencing software Cubase. Participants were presented with 10 sounds in Cubase, but instructed to only use three of those sounds. In order to track the process of composition, the researchers had the students use the Save-As feature to observe distinctive points of the composition process. The computers the participants used were also adapted with a video card that recorded each session for analysis.

At the conclusion of the composition project, the researchers had 48 video recordings and three individual MIDI files for each participant. From the data analysis, the researchers observed two large composition strategies and three meta-approaches. Composition Strategy 1

was identified by a lack of experimentation during the composition process. The participants using Compositional Strategy 1 composed the melody on the first session, harmonized the melody on the second session, and used the third session for various activities. The participants mainly used the keyboard to practice performance skills rather than composition skills. Composition Strategy 2 was identified by how the composition developed over all three sessions. The participants using this strategy composed mainly with experimentation moving between ideas constantly. There was little indication of off-task behavior as the participants were constantly working through the compositional process. The keyboard was used by participants in Composition Strategy 2 as a tool for composition and exploration.

Further analysis by Seddon and O'Neill (2003) revealed several meta-approaches for each of the main composition strategies. The meta-approaches observed were (1) crafting: rehearsal and construction with relatively little exploration, (2) expressing: greater focus on exploratory activities with rehearsal activities used to develop ideas, and (3) immersing: exclusively exploratory with little to no engagement with rehearsal. Seventy-eight percent of participants with formal instrumental music training exhibited low levels of exploratory behavior and mostly used the meta-approach of crafting, whereas participants with no formal instrumental music training used the meta-approaches of expressing and immersing. Seventy-four percent of the participants using these meta-approaches exhibited high exploratory behavior.

Seddon and O'Neil (2003) suggest, as does Webster (1996, 2003), that much of instrumental music education focuses on acquisition of performance skills that mainly requires the use of convergent thinking. Whereas, much of creative behavior focuses on high uses of divergent thinking processes. Seddon and O'Neill suggest two explanations why instrumental training may affect the use of exploratory time in compositions. The first reason may have to do

with self-image. Due to instrumental music training, the participants perceive themselves as being musicians that must operate within certain culturally accepted parameters. This might lead them to produce appropriate compositions to conform to their instrumental musician image. The second reason may be that they are already thinking in sound (Webster, 1996; Folkestad, et al., 1998). As trained musicians, they may have acquired skills that enable them to approach composing differently and forgo early steps in the composition process.

Hewitt (2009) studied the affect of instrumental training, age, and task familiarity on children ($N = 760$) aged 8-12 years old while participating in computer-based composition experience. Using specifically designed software, Hewitt was able to capture the children's composition process in real time as they composed. Each student participated in twenty-minute melody composing sessions where he instructed students to, "write one or more melodies that sound good to you" (Hewitt, 2009, p. 10). In the final data set used for analysis, Hewitt balanced for gender and formal instrumental training.

The results observed by Hewitt seem to confirm findings by other researchers (Seddon & O'Neill, 2001, 2003; Stauffer, 1999, 2001, 2002). The age of the student had an affect on the use of different compositional processes. As students aged there was less use of exploration present in the composition process. The younger students tend to listen to their melodies and then explore as they composed. Hewitt observed as the age of the participant increased there was a decrease in distinct process functions such as exploration. Instrumental music training also seemed to affect the use of exploration as found in other studies (Seddon & O'Neill, 2001, 2003). An interesting finding was that children with instrumental training exhibited high rates of activity when composing compared to their peers. Activity levels for all students increased as the students became more familiar with the software, which is similar to what Stauffer (2002)

observed. The older children seemed to spend more time in decision making rather than evaluating. Hewitt (2009) suggests that further study needs to be conducted to observe the influences of task, age, and instrumental training on individual students composing process.

Mellor (2008) sought to examine secondary students use of strategies as they participate in computer based composition with Dance eJay. Dance eJay is a music looping software that allows the user to create dance tracks. The students ($N = 8$) lived in a lower socio-economic area in north England and were between 13 and 15 years of age. Data collection consisted of unobtrusive video recordings of the students composing, interviews, and verbal commentary from the students about their composition process used as they composed. At the conclusion of the study, Mellor chose to focus on the work of only three student composers.

Mellor (2008) observed that students with the most formal musical instrumental training produced the most convergent compositions. Webster (1996) notes that students with formal instrumental training acquire convergent thinking process as part of their acquisition of performance skills. The ability to think divergently may be hindered by students wanting to produce what they have been taught is acceptable within the performance classroom. Mellor suggests that this may be due to the fact they identify themself as a musician and have fixed views that dance music is not creative.   On the opposite end of the spectrum, the students with little to no formal instrumental training felt using Dance eJay allowed them to act as musicians. This may be because they were operating within an authentic musical role from their musical world (Gromko, 2003; Stauffer, 2013).

Randles (2010) examined if there was a relationship between music self-concept and participation in composition experiences. High school instrumentalists ($N = 77$) were given opportunities to compose over a 12-week period. Using a pretest posttest research design,

Randles administered a researcher-developed questionnaire that asked about previous music experiences and The Self Esteem of Music Ability (SEMA). The SEMA is composed of 43 items related to self-perception of music ability, support from others, and personal musical interest or desire. The sub scores from the SEMA were used in the data analysis. The students used GarageBand with MIDI keyboards to compose on computer workstations in a room adjacent to the school's band room. Each composition session allowed six students to work for about 45 minutes. The students that participated completed one to three composition sessions.

Pearson product-moment correlations were calculated using the pretreatment data of compositional experiences, the three sub scales of the SEMA, and the total score self-concept score. Results indicated that there was a statistically significant relationship ($r = .059, p < .001$) between compositional experiences and self-perception of music ability. There was also a statistically significant relationship ($r = .051, p < .001$) between compositional experience and the total score on the SEMA. After the twelve weeks of composition experiences using the computer, Randles (2010) observed a statistically significant ($p < .01$) correlation between compositional experiences to all factors of the SEMA (SEMA 1, $r = .53$; SEMA 2, $r = .39$; SEMA 3, $r = .53$; SEMA Total, $r = .53$). The results of a Pearson product correlation between the pre and post score indicate that music self-concept remained fairly stable (SEMA 1, $r = .87$; SEMA 2, $r = .73$; SEMA 3, $r = .86$; SEMA Total, $r = .86$) over the twelve weeks of composing. Based on the results Randles (2010) observed, it appears that compositional experience is the strongest predictor of music self-concept.

A salient feature of Randles (2010) research design was that students were provided composition experiences at the same time that band rehearsal was happening. The drive to perform prohibits teachers from providing more creative experiences with their students (Odena,

2001; Strand, 2006). The ability of technology to allow students to work independently from the

teacher to compose is important. It also seems, based on Randles results, that composition

experiences relate to musical self-concept. Randles' design may need to be replicated in more

ensemble settings to observe if his findings remain consistent. If they do, his model of

composition may provide instrumental students more opportunities to compose.

Summary of Research Themes

The present study focuses on comparing the product and process of composition between

two groups of secondary students. One group of students will use technology, acoustic

instruments, and/or voices while the other group will use only acoustic instruments and/or voices

to compose. Composition is in its most concrete sense a creative endeavor (Barrett, 2006).

However, there has been confusion as to what is considered creative (Amabile, 2012; Hickey,

2003, 2013, Webster, 2003). Creativity has been described in this chapter as a process (Wallas,

1926; Webster, 2002) that produces a product that is novel, original, and appropriate for the

solving a problem (Amabile, 1996, 2012; Csikszentmihalyi, 1996; DeLorenzo, 1989; Gardner,

1993; Hickey, 2003; Webster, 2002). Webster (2002) designed a model for creative thinking in

music that will be used as a frame for this study.

Several researchers have tried to explain the process of composition through a series of

frames or models (Burnard & Younker, 2002, 2004; Kaschub & Smith, 2009; Kennedy, 2002;

Stauffer, 2001; Wiggins, 2003). Swanwick and Tillman (1986) examined over 740 examples of

children's compositions to explain children's developmental composition characteristics. Other

researchers have compared expert and novice composers to explain differences while composing

(Barrett, 2006; Younker & Smith, 1996). Both expert and novice composers move through

stages as they compose (Barrett, 2006, Burnard & Younker, 2002, 2004; Kennedy, 2002,

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Stauffer, 2001; Younker & Smith, 1996; Wiggins, 2003). The difference seems to be in the age, skills, and tools composers use (Kratus, 1989, 1994; Reynolds, 2006; Seddon & O'Neill, 2003; Stauffer, 2001).

Within music classrooms, the teacher's role in the composition process is varied, but seems to be important to student success (Barrett, 2006; Bolden, 2009; Gromko, 2003; Reese, 2003; Ruthman, 2008; Younker, 2002). Researchers have found that that task design, which is developed by the teacher, has an important affect on the outcome of the composition process (DeLorenzo, 1989; Hickey, 2013; Sullivan, 2003; Wiggins, 2003). Extrinsic and intrinsic motivation and task parameters also have an effect on student's creative output (Amabile, 1996; Hickey, 1997, 2013). The literature seems to indicate that if the teacher is seen as a co-composer and model, instead of expert, the student will gain confidence (Barrett, 2006; Dogani, 2004; Gromko, 2003; Randles, 2006; Younker, 2000). The feedback that teachers provide to students while they compose also has an affect on creative output (Gromko, 2003; Hickey & Reese, 2001; Reese, 2003; Ruthman, 2008; Webster & Hickey, 1995).

Technology has shown to be a powerful tool that enables students to compose (Folkestad, et al, 1998, 1999; Gall & Breeze, 2005; Hewitt, 2009; Hickey, 1995, 1997; McCord, 1999, 2002; Reynolds, 2005; Stauffer, 2001). Technology has been shown not only to help students preserve their composition products, but also track the process they used to create their compositions (Folkestad, et 1997, 1998; Kaschub & Smith, 2009; Stauffer, 2000, 2003; Younker & Smith, 1996). Students have also been able to find compositional voice and musical identity through technology (Airy & Parr, 2001; Bolton, 2008; Gall & Breeze, 2005; Randles, 2010; Ruthman, 2008; Stauffer, 2001). While studies tout several benefits of using technology during the

composition process, only one study has been found that compares students composing with and

without technology (Kuehne, Lundstrom, & Walls, 2011).

CHAPTER III

METHODS

The purpose of this study was to explore compositional process stages, determine aptitude score changes, and examine differences in two groups (non-technology versus technology) of secondary-level general music students who composed music over eight composition sessions. The non-technology group (control group) used acoustic instruments and/or voices and the technology group (experimental group) used iPads (applications with instrument sounds) and acoustic instruments and/or voices. The following section first describes the data collection instruments, and then provides details about the participants, procedures, and data analysis for this study.

Data Collection Instruments

Data collection for this study included three sources: (1) pre and post music aptitude scores from the Advanced Measures of Music Audiation (Gordon, 1989), (2) self reported scores of compositional progress from the Compositional Process Form, and (3) expert ratings of compositions using Judgment of Musical Compositions Form I (Webster and Hickey, 1995). These three forms are located in the appendices of this document.

The Advanced Measures of Music Audiation (AMMA)

Gordon (1989) developed the AMMA to measure stabilized music aptitude. In his view, music aptitude is the student's potential to learn music. Gordon suggests music aptitude stabilizes in individuals after the age of nine, but instruction in music has the potential to

improve music achievement. However, Gordon suggested music achievement was limited by one's music aptitude.

The AMMA is a listening test consisting of 30 items that present the listener with two musical phrases. The participant listens to the two phrases and decides whether the phrases are the same or different. If participants indicate that the phrase is different, then they must determine if the difference is either tonal or rhythmic. The AMMA was selected as a measure for several reasons. First, as suggested by Mental Measurement Yearbook (1992) the AMMA is an appropriate test for students in grades 9-12 due to the short administration period, and Gordon (1989) indicates that is appropriate for grades seven through adulthood. Second, it has been suggested that the score obtained from the AMMA may be an adequate predictor of music achievement. Finally, the AMMA is considered a reliable measure. Gordon reported reliability of .81 for tonal, .82 for rhythm, and .84 for total scores for secondary-level students using split halves method (Gordon, 1989). This study used split halves method to obtain reliability. The results showed reliability scores of .82 for tonal, .61 for rhythm, and .62 for total scores. Although the tonal score minimally surpassed Gordon's reported reliability, the rhythm and the total scores were below. However, it is important to note that Gordon's (1989) sample size was 872 secondary students, whereas the sample in this study was only 26 students.

Compositional Process Form

The Compositional Process Form (see Appendix B) is an original researcher-designed form based on the work of several researchers. Burnard and Younker (2002, 2004) Hickey (1995, 1997), Kennedy (2002), Kratus (1989, 1991), Wallas (1926), Webster (1991, 2002), and Wiggins (1992, 2003) identified four stages that emerge during the process of composing: (1) exploration, (2) development, (3) repetition or rehearsal, and (4) production of the actual

composition. At the conclusion of each session, the participants completed the Compositional

Process Form to determine which stage the individual participant and their group is functioning

within. The form uses as 12-point Likert-type scale that is broken down into 3-point segments—

three points for each phase of the compositional process (exploration, development, rehearsal,

production). Each stage is presented as an individual Likert-Type scale, but the analysis will use

a continuum of 1-12 points. The decision was made to present the form to the students as

separate items so they would not rate their process score higher because they wanted to be

perceived as being further along in the process. The results from the students' four stages were

used by the researcher to compare the process of composition between the two groups (control

and experimental) of students.

Judgment of Musical Compositions Form I

Webster and Hickey (1995) designed the Judgment of Musical Composition Form I (see

Appendix C)*,* based on research by Amabile (1996), to measure implicit holistic ratings of

craftsmanship, originality/creativity, and aesthetic value of student compositions. The form is

constructed in two parts. Part one asks the rater to rate specific musical characteristics about

each composition. Part two asks the rater to consider global issues about each composition. All

parts of the form use a Likert-type rating scale from 5 (the highest rating) to 1 (the lowest rating).

The form asks the rater to "use their own definitions of the items given and try to be consistent in

your interpretation of these items from subject to subject" (Webster & Hickey, 1995, p. 39).

Webster and Hickey reported initial inter-rater reliability correlations of r = .82 for global items

and r = .80 for specific items.

Participants

The students in this study represent the typical population researchers like Williams (2007, 2012) label as nontraditional music students who is part of the 80% of the school population who is not part of an ensemble class. Furthermore, they also fit Reimer's (2003) and Strand's (2003) description in that they are enrolled in a secondary general music class, and they have not yet had the chance to participate in music composition experiences because of limited course offerings.

Participants ($N = 27$) for this study were a convenience population and included 11 seventh grade students and 16 eighth grade students enrolled in the primary researcher's general music class at a small rural K-12 school in East Central Alabama. The other section of seventh and eighth students were not included in the study because many were enrolled in special education and often received specialized services during this class time. The school used in this study has a high transient population. For example, the student population during the 2012-2013 school year was 402 students. At the time of this study, the school's total population was approximately 340 students, with approximately 21 total seventh graders and 29 total eighth graders. The participants' ages ranged from 12 to 15 years and there were 11 male and 16 female students. In comparison, the seventh and eighth grade students not included in this study had 10 seventh grade students and 13 eighth grade students and there were 12 male and 11 female students.

Students' music experiences were limited, and before this study, they had little-to-no composition experience. The eighth grade students had general music the previous year, but this was the seventh grade students' first year of formal music instruction. Neither grade level had

elementary music instruction beyond an occasional special class or the school-wide holiday play, which occurred at the end of each fall semester.

Assent/Consent and Training Procedures

This study occurred during April and May of 2014. Approximately two weeks before the study began, the researcher met with potential student participants to explain the purpose and scope of the study. During this meeting, he answered questions and provided the students with the consent/assent form and the audio/video release form (see Appendix A). The researcher informed the students that, though this was part of a research study, they all would participate in the composition sessions because the sessions were part of their regular general music class instruction, regardless of whether or not it was for research. Subsequently, they were told if they wanted to participate in the study, to have their data and information used in the study, they needed to sign the consent/assent and the audio/video release forms and have their parents/guardians sign them. Students were told to return the signed forms to the school's office manager before the end of the 8 sessions and the posttest. There were 27 students in the class and all but one returned the consent/assent and audio/video forms before the study began. One student returned the forms during the study, but then withdrew from school before completing the posttest. That student's data was dropped from some of the analyses for this study.

Before the research study began, all 27 students were trained to use the iPads to complete several music tasks. The iPad training period lasted two weeks during which students used various applications to compose pentatonic melodies, create rhythmic ostinato pieces, create harmonic accompaniment, and explore texture and timbre. In addition, during the training time, the class discussed the creative process and the researcher trained them to use the Compositional Process Form (See Appendix B).

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Group Assignment

All students were administered the Advanced Measures of Music Audiation (AMMA) (Gordon, 1989) before the participating in the group composition experience. This served as a pretest. Based on their total pretest AMMA scores, students were assigned to one of six groups. To ensure all groups were balanced, the six students with the highest total AMMA scores were placed into six different groups (one in each group). The next six students with the next highest scores were randomly assigned, each to one of the six groups. Random selection continued in the same way until all students were assigned to a group. After all students were assigned to one of the six groups, each group was randomly assigned to be either a control group (non-technology, $n = 3$) or an experimental group (technology; $n = 3$). Table 1 shows gender and grade level demographics for the control and experimental groups.

Table 1

Demographic Breakdown for Control and Experimental Groups

	Control			Experimental		
	7th Grade	8th Grade	Total	7th Grade	8th Grade	Total
Female	2	6	8	3	5	8
Male	3	2	5	3	3	6
Total	5	8	13	6	8	14

Note. One student moved before completing the study.

Eight Composition Sessions

Students participated in eight composition sessions. Before Session One, the researcher prepared the pitched classroom instruments (xylophones, metallophones, etc.) and iPads for students to compose using the G pentatonic scale, as they did in the iPad training sessions. However, the researcher did not attempt to limit the students to G pentatonic during composition.

The only instructions the researcher gave the students were: "You must write a piece of music that sounds good to you and your group. Your music must be at least one minute long, with a clear beginning and clear end. Every member of your group must play a part." As a result, during the composition sessions, students reset the settings on the iPads and reset the acoustic instruments (replaced removed keys/bars). In order to track the work of the technology group, the iPads were assigned a number on the lock and home screen. The students in the technology group used the same iPad for each session.

Before each of the eight composition sessions, the researcher reviewed the instructions (stated above). In addition, at the beginning of each composition session, the researcher reviewed the creative process with the students using the Compositional Process Form displayed on a projector screen in front of the room. Finally, at the beginning of each class, starting with the second class (session two), students were asked to discuss in their groups what they accomplished in the previous session. They were given up to 10 minutes for discussion. After the discussion, the researcher asked the students if they had any questions. Once he answered all questions, he instructed them to go to their assigned areas and to begin working or continue working on their compositions for a period of one hour.

In each of the eight sessions, the non-technology group remained in the music classroom and the technology group moved to an adjacent empty classroom. The researcher moved between rooms during the composition sessions. He answered questions when it was appropriate, took notes to determine anecdotally how far students moved during each session, but was a bystander and observer rather than an active part in the students' work. At the conclusion of one hour, the researcher instructed the students to stop working. They returned to

the music room and completed the Compositional Process Form (see Appendix B). Each student

completed one of these forms for each session (resulted in eight forms per student).

During the ninth class time, the one immediately following the final (eighth) composition

session, the researcher audio recorded each group's composition. Only the researcher and the

individual group members were in the room during the recording. No other students or teachers

were present. Before recording, each group received ten minutes to review their composition

and then performed their composition. The researcher audio recorded the compositions using

Audacity software installed on a MacBook Pro with a Blue Yeti USB condenser microphone.

The researcher deleted any extraneous talking that occurred before or after each recording to

attempt to maintain the students' anonymity, but did no other editing to the files. After the

recording session, the class as a whole gathered to listen to all of the compositions. During the

tenth class meeting, the class period immediately following the recording session, all students

were administered the AMMA for a second time to obtain posttest scores.

Expert Ratings

Within two weeks after the researcher recorded the groups' compositions, four expert

music educators met to evaluate the musical compositions using the Judgment of Music

Composition Form I (see Appendix C) (Webster & Hickey, 1995). Judges were selected based

on two criteria: (1) specialty—one in each area: band, choir, general, composer, and (2) at least

five years of public school music teaching experience. At the time of this study, all four judges

had 12 or more years of music teaching experience.

The researcher played the students' original recordings from a MacBook Pro Computer

using a Bose Series II sound dock as the speaker. However, before the judges evaluated the

students' recordings, the researcher randomly assigned a play order for each of the six

compositions. In addition, the researcher trained the judges on how to use the Judgment of

Music Composition Form I. They were instructed to listen to a sample recording and to not take

any notes. They listened a second time, were allowed to make notes, and rated the composition

using the form. The researcher answered any questions they had before the experts evaluated the

students' compositions. The sample form was placed in each judge's envelope. After a few

minutes, once all of the judges were ready, the researcher played each of the six recordings.

Judges were reminded that they could not take notes during the first listening; they were

instructed to just listen.

After the judges listened to all six recordings, the researcher instructed the experts to take

a break of one hour and that they may not discuss the compositions. At the conclusion of one

hour, the researcher reviewed the form with the experts and answered any questions. Then the

experts listened to the recordings again in the same order as the first time. During the second

listening, they could take notes and were instructed to use the Judgment of Music Composition

Form I to rate the recordings. The experts received time between each recording to complete the

form. After the experts rated all six of the compositions, the researcher told the judges to select

two compositions they thought were the best and two they thought were the worst in each of the

following areas: (1) originality, (2) aesthetic appeal, and (3) creativity. The researcher instructed

that each category was different and though a composition was their best (or worst) in one

category, it did not necessarily have to be the best (or worst) in any of the other categories.

Data Analysis

The data obtained using the three forms (previously described) were used to evaluate the research questions. Where appropriate, descriptive statistics were provided. Data for research question 1a, 1b, and 1c were analyzed using a mixed design *MANOVA.* Research question 2 was analyzed using Chi-Square. Research question 3 was analyzed using *one-way between-subjects ANOVA.* Results are reported in Chapter 4.

CHAPTER IV

RESULTS

The purpose of this study was to explore compositional process stages, determine aptitude score changes, and examine differences in two groups (non-technology versus technology) of secondary-level general music students who composed music over eight composition sessions. Description the students was included as part of the method describing the participants for this study. As a reminder, students were administered the AMMA (Gordon, 1989) as a pretest, were assigned to one of six groups based on their AMMA scores (see method for complete group description), and then each of the six groups were randomly assigned to be either a non-technology ($n = 3$) or technology ($n = 3$) group. This chapter includes the results from the data collected from the students and the expert judges and is organized using the three research questions.

Research Question One

As stated in the method, students were administered the AMMA test to determine their aptitude scores before and after treatment. The first research question asked: what will students' AMMA tonal, rhythm, and total scores be before and after participating in eight compositional sessions using either acoustic instruments and/or voices or using iPads (applications with instrument sounds) and acoustic instruments and/or voices, and will there be significant differences in the following three areas?

a. Control group's (non-technology) pre- and posttest tonal, rhythm, and total AMMA scores versus the experimental group's (technology) pre- and posttest tonal, rhythm, and total AMMA scores.

b. Change in control group's (non-technology) pre- to posttest tonal, rhythm, and total AMMA scores.

c. Change in experimental group's (technology) pre- to posttest tonal, rhythm, and total AMMA scores.

AMMA Pretest and Posttest Descriptive Statistics – Question 1a

The results in this section answer the first part of research question one by providing the students' pre- and posttest AMMA scores. Table 2 shows the pre- and posttest tonal, rhythm, and total scores for students in the non-technology (control) group, and Table 3 shows the tonal, rhythm, and total scores for the students in the technology (experimental) group. Table 4 shows the descriptive statistics for the tonal subscale, rhythm subscale, and the total AMMA scores for the pre- and posttest for both groups.

When examining the non-technology group in Table 2, one can see that seven students increased or stayed the same on pre- to post total score. However, five students' scores decreased from pre- to posttest. More specifically, two students decreased by more than 10 points; NT 10 decreased by 12 points and NT six decreased by 14 points. Four of the students' scores decreased in both subscales. Student NT 13 also showed a decrease in the tonal subscale, but increased by three points in rhythm subscale. In addition, three students (NT one, NT five, and NT eight) increased by double digits. Particularly interesting is the difference between student NT eight's total pre- and posttest scores; he/she gained 27 points.

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Examining the students in the technology group in Table 3, one can see that the majority of the students grew from their pre- to posttest scores. Interestingly enough, it appears that the 3 students who decreased from pre- to posttest (total score) all decreased in the rhythm subscale and one student also decreased in the tonal subscale. The decrease in total score was minimal, 5 points or less. Four students' total scores increased by double digits (T 3, T 4, T 5, T 6).

Table 2

AMMA Pre and Post Scores: Non-Technology Group

Student	Pre Tonal	Post Tonal	Pre Rhythm	Post Rhythm	Pre Total	Post Total	Pre & Post Totals Difference
NT 1	22	28	25	31	47	59	12
NT 2	23	27	27	32	50	59	9
NT 3	24	22	28	24	52	46	-6
NT 4	22	21	24	28	46	49	3
NT 5	24	32	25	34	49	66	17
NT 6	25	21	31	21	56	42	-14
NT 7	25	26	29	28	54	54	0
NT 8	21	34	22	36	43	70	27
NT 9	21	17	23	20	44	37	-7
NT 10	23	16	23	18	46	34	-12
NT 11	20	–	19	–	39	–	–
NT 12	19	20	23	22	42	42	0
NT 13	23	19	22	25	45	44	-1

Note. Student NT 11 withdrew from school before completing the posttest.

Table 3

AMMA Pre and Post Scores: Technology Group

Student	Pre Tonal	Post Tonal	Pre Rhythm	Post Rhythm	Pre Total	Post Total	Pre & Post Totals Difference
T 1	18	24	25	27	43	51	8
T 2	22	20	19	24	41	44	3
T 3	20	28	27	29	47	57	10
T 4	16	22	17	22	33	44	11
T 5	21	29	28	30	49	59	10
T 6	18	26	21	26	39	52	13
T 7	24	23	22	25	46	48	2
T 8	27	25	28	26	55	51	-4
T 9	29	29	33	34	62	63	1
T 10	24	24	22	24	46	48	2
T 11	24	24	29	26	53	50	-3
T 12	20	22	25	29	45	51	6
T 13	17	17	26	21	43	38	-5
T 14	21	25	27	27	48	52	4

Table 4

Descriptive Statistics for Pre- and Posttest AMMA

Group	Score Type	*Pre Mean*	*SD*	*Post Mean*	*SD*
Technology	Tonal	21.50	3.78	24.14	3.35
	Rhythm	24.93	4.30	26.43	3.37
	TOTAL	46.43	7.12	50.57	6.38
Non-Technology	Tonal	22.67	1.78	23.58	5.78
	Rhythm	25.17	2.95	26.58	5.84
	TOTAL	47.83	4.43	50.17	11.44

Note. Student NT 11 withdrew from school before completing the posttest. As a result he/she was removed from these analyses.

AMMA Pre- and Posttest Comparisons – Question 1a, 1b, and 1c

A mixed design multivariate analysis of variance (MANOVA) was run to compare the mean scores for the pre- and posttest tonal and rhythm subscales and also the total score of the non-technology students versus the technology students. Table 5 shows that there were no significant differences between the groups for any of the three scores. The answer to research question 1a is there were no significant differences between the two groups AMMA pre- and posttest scores.

As previously mentioned, many students' scores changed from pre- to posttest. However, there were no significant differences observed. The answer to research question 1b and 1c is that there were no significant differences in the tonal, rhythm, and total AMMA pre- and posttest scores for either the non-technology or technology groups.

Table 5

Multivariate Analysis of Variance for AMMA

	Wilks' λ	*F*	*df*	Sig.	Partial Eta^2	Power
Group (Tech vs. Non Tech)	0.98	0.37	2	0.96	0.003	0.055
Time (Pre- vs. Posttest)	0.98	1.66	2	0.21	0.126	0.313
Time * Group	0.94	0.75	2	0.48	0.061	0.162

Research Question Two

The second research question asked: during eight composition sessions, what will students' self-report regarding their own and their groups' compositional process scores, and will there be any significant differences between the control (non-technology) group's scores versus the experimental (technology) group's scores? As stated in the method, at the conclusion of each session the students completed the Compositional Process Form to obtain a self-reported process score for individual and group progress in the composition process. Each student reported where

they thought they individually were in the process and where they thought their group was in the process. Students did not discuss as a group what their group's process score should be for each session.

Compositional Process Form Descriptive Statistics

The data presented here provides the answer to the first part of research question two. Table 6 details the self-reported scores on the individual portion of the Compositional Process Form. Table 7 details the self-reported scores on the group portion of the Compositional Process Form. Furthermore, Cronbach's Alpha indicated the reliability for this form was .82.

Interestingly, the individual students and groups using technology spent more time in the exploration phase of the compositional process. Some individual students in the technology group stayed in exploration phase until session five while the non-technology students reported both individually and as a group that they completed exploration after the third session.

Another interesting finding is that, even though technology students (individually and in groups) marked that they were finished with exploration by the end of the third session, three technology students indicated they were in exploration again in the fifth session. The non-technology students indicated that they individually and their groups spent the majority of the eight sessions in rehearsal and production, whereas the technology students marked that they individually and their groups spent the majority of their time in exploration and development.

Table 6

Crosstabs for All Sessions: Individual Scores

Session #	Composition Process Levels	Technology versus Non-Technology		Total	Chi-Square (p)
		Technology	Non-Technology		
1	Exploration	7	8	15	1.99 (.37)
	Development	5	2	7	
	Rehearsal	1	0	1	
	Production	0	0	0	
	Total	13	10	23	
2	Exploration	5	6	11	3.42 (.18)
	Development	5	7	12	
	Rehearsal	3	0	3	
	Production	0	0	0	
	Total	13	13	26	
3	Exploration	4	1	5	4.1 (.13)
	Development	7	5	12	
	Rehearsal	2	6	8	
	Production	0	0	0	
	Total	13	12	25	
4	Exploration	1	0	1	8.91 (.03*)
	Development	8	2	10	
	Rehearsal	5	7	12	
	Production	0	4	4	
	Total	14	13	27	
5	Exploration	4	0	4	12.2 (.007**)
	Development	4	0	4	
	Rehearsal	6	8	14	
	Production	0	4	4	
	Total	14	12	26	
6	Exploration	0	0	0	9.27 (.01**)
	Development	3	0	3	
	Rehearsal	7	2	9	
	Production	2	8	10	
	Total	12	10	22	
7	Exploration	0	0	0	2.03 (.36)
	Development	2	0	2	
	Rehearsal	6	5	11	
	Production	6	7	13	
	Total	14	12	26	
8	Exploration	0	0	0	0 (1)
	Development	0	0	0	
	Rehearsal	2	2	4	
	Production	11	11	22	
	Total	13	13	26	

Note. Total $N = 27$. Some students were missing during some sessions.

* Chi-Square is significant at the 0.05 level (2-tailed).
** Chi-Square is significant at the 0.01 level (2-tailed).

Table 7

Crosstabs for All Sessions: Group Scores

Session #	Composition Process Levels	Technology versus Non-Technology		Total	Chi-Square (p)
		Technology	Non-Technology		
1	Exploration	6	6	12	4.59 (.2)
	Development	6	1	7	
	Rehearsal	1	2	3	
	Production	0	1	1	
	Total	13	10	23	
2	Exploration	6	7	13	1.08 (.58)
	Development	6	6	12	
	Rehearsal	1	0	1	
	Production	0	0	0	
	Total	13	13	26	
3	Exploration	4	2	6	7.02 (.03*)
	Development	7	2	9	
	Rehearsal	2	8	10	
	Production	0	0	0	
	Total	13	12	25	
4	Exploration	0	0	0	7.89 (.02*)
	Development	8	1	9	
	Rehearsal	6	11	17	
	Production	0	1	1	
	Total	14	13	27	
5	Exploration	3	0	3	10.82 (.01**)
	Development	6	1	7	
	Rehearsal	5	7	12	
	Production	0	4	4	
	Total	14	12	26	
6	Exploration	0	0	0	11.94 (.003**)
	Development	4	0	4	
	Rehearsal	6	1	7	
	Production	2	9	11	
	Total	12	10	22	
7	Exploration	0	0	0	3.26 (.19)
	Development	3	0	3	
	Rehearsal	5	4	9	
	Production	6	8	14	
	Total	14	12	26	
8	Exploration	0	0	0	0.38 (.54)
	Development	0	0	0	
	Rehearsal	2	1	3	
	Production	11	12	23	
	Total	13	13	26	

Note. Total $N = 27$. Some students were missing during some sessions.
* Chi-Square is significant at the 0.05 level (2-tailed).
** Chi-Square is significant at the 0.01 level (2-tailed).

Compositional Process Form Comparisons

A Chi-Square was performed to observe if there were differences between the technology and non-technology groups' individual and group scores on the Compositional Process Form. It must be noted that there were less than five cases per cell. Result from this analysis should be viewed with caution. Table 6 shows there were no statistically significant differences between the groups (technology versus non-technology) for individual scores for sessions one, two, three, seven, and eight. Additionally, there were no statistically significant differences found between the groups (technology versus non-technology) for group scores for session one, two, seven, and eight (see Table 7).

Though there were some areas that were not significantly different, there were some significant differences discovered using the Chi-Square. Table 6 indicates that there were statistically significant differences between the technology and non-technology groups for individual scores for sessions four, five, and six. In addition, a statistically significant difference was observed between the technology and non-technology groups for group scores for sessions three, four, five, and six (see Table 7).

Ultimately, it appears that there were no differences between the technology and the non-technology groups in the beginning and ending of the compositional process (sessions one, two, seven, and eight). However, there were differences between the technology and non-technology groups in the middle sessions (three, four, five, six). Based on these results, the answer to the second part of research question two was that there were some significant differences between the two groups self-reported compositional process scores.

The third research question asked: regarding specific music characteristics, global considerations, and overall reactions, what will expert music educators' rate compositions from the control group (non-technology) and the experimental group (technology), and will there be any significant differences in expert music educators' ratings of compositions from the control group (non-technology) versus compositions from the experimental group (technology)? Four expert judges rated the compositions using the Judgment of Musical Compositions Form I (Webster and Hickey, 1995). Table 8 shows demographic data for the judges.

Table 8

Demographic Information: Judges

	Specialty	Gender	K-12 Experience	Higher Education Experience
Judge 1	Composition	F	20	13
Judge 2	Instrumental	F	8	14
Judge 3	Vocal	F	21	0
Judge 4	General Music	M	13	0

Judgment of Musical Compositions Form I Descriptive Statistics

The first part of research question three asked about expert music educators' (judges) ratings for compositions from both groups (non-technology and technology). The data presented in this section answers this part of the question.

The Judgment of Musical Compositions Form I has two subscales (global and specific music content) that combine for an overall total score. Table 9 shows judges' ratings for the subscales and total score for each composition. Overall reliability was determined using Cronbach's alpha. For the judges' scores for each item on the rating sheet, reliability was .92. When their scores for just specific music content were analyzed for reliability, the result was .85;

global was .90. These results indicate strong to very strong inter-rater reliability for the four judges using the Judgment of Musical Composition Form I to rate the individual compositions.

The judges' scores in Table 9 indicate that judge one (composer) rated all the technology groups higher than the non-technology groups. Judges three's (choral) and four's (general music) highest total scores were two of the technology groups. Furthermore, both judges rated at least one non-technology group higher than a technology group. Interestingly, Judge two (instrumental) had a technology group as the highest scoring group, but was the only judge that rated two non-technology groups over the other technology groups.

Table 9

Judgment of Musical Composition Form I: Subscales and Total Score

	Group	Sub Group	Specific Music Content	Global Music Content	Total Score
Judge 1	Technology	1	34	54	88
		2	46	57	103
		3	32	48	80
	Non-Technology	1	26	32	58
		2	33	45	78
		3	15	26	41
Judge 2	Technology	1	32	37	69
		2	48	52	100
		3	28	35	63
	Non-Technology	1	34	41	75
		2	34	35	69
		3	34	42	76
Judge 3	Technology	1	40	52	92
		2	49	60	109
		3	41	50	91
	Non-Technology	1	20	26	46
		2	33	42	75
		3	39	58	97
Judge 4	Technology	1	36	51	87
		2	42	51	93
		3	28	43	71
	Non-Technology	1	25	19	44
		2	35	47	82
		3	22	25	47

Table 10 shows the mean scores for the technology and non-technology groups. The technology group's mean scores on global and specific music content were at least 11 points higher than the non-technology group. Moreover, the technology group's total mean score was approximately 21 points higher than the non-technology group. The non-technology group and technology group had similar standard deviations for specific music content, however global and total scores for the non-technology group showed larger standard deviations than the technology group.

Table 10

Expert Ratings of Technology versus Non-Technology Compositions

Group	Score	*M*	*SD*	*N*	95% CI for Mean Difference	Min.	Max.
Technology	Specific	38	7.42	12	33.28, 42.72	28	49
	Global	49.17	7.47	12	44.42, 53.91	35	60
	Total	87.17	14.12	12	78.19, 96.14	63	109
Non- Technology	Specific	29.17	7.35	12	24.49, 33.83	15	39
	Global	36.5	11.31	12	29. 31, 43.69	19	58
	Total	65.67	18	12	68.28, 84.55	41	97

Each judge was asked to identify the two best and two worst compositions for craftsmanship (technical skill), originality/creativity (imaginativeness), and overall aesthetic value (feelingful musical experience). Table 11 shows each judge's overall reaction to the best and worst compositions. Their choices were not analyzed using statistics. However, the results overall showed that all judges selected technology based compositions as the best in each category more than the non-technology compositions. Furthermore, the results also showed that all judges selected non-technology compositions as the worst in each category more than the technology compositions.

Table 11

Overall Reaction to Compositions

Judge	Craftsmanship		Originality		Aesthetic Appeal	
	Best 2	Worst 2	Best 2	Worst 2	Best 2	Worst 2
1	T1, T2	N1, N3	T1, T2	N1, N3	T1, T2	N1, N3
2	T2, T3	T1, N2	T2, T3	T1, N2	T2, T3	T1, N2
3	T2, N3	N1, N2	T2, N3	N1, N2	T2, N3	N1, N2
4	T1, N2	N1, N3	T1, T2	N1, N3	T2, N2	N1, N3

Note. T represents technology groups and N represents non-technology groups.

Table 12 shows the judges' overall reaction to the compositions along with individual scores for each composition. The compositions selected as the best two were not always the highest rated compositions. Judge two selected composition T3 as one of the best in all three categories. However, Judge two's rating of composition T3 was the lowest in specific music content, global music content, and in the total score. Judge four selected composition N2 as one of the best for craftsmanship and aesthetical appeal. However, Judge four's ratings for specific music content, global music content, and the total score fell between the best two and worst two rated compositions. Interestingly, the compositions chosen by each judge as the worst two were also the judge's two lowest rated compositions by total score.

Table 12

Overall Reaction to Compositions With Judges Scores

Craftsmanship	Judge	Best 2 Identified	Music Content Scores			Worst 2 Identified	Music Content Scores		
			Specific	Global	Total		Specific	Global	Total
	1	T2	46	57	103	N1	26	32	58
		T1	34	54	88	N3	15	26	41
	2	T2	48	52	100	T1	32	37*	69
		T3	28*	35*	63*	N2	34*	35	69
	3	T2	49	60	109	N1	20	26	46
		N3	39*	58	97	N2	33	42	75
	4	T1	36	51	87	N1	25	19	44
		N2	35*	47*	82*	N3	22	25	47
Originality	Judge	Best 2 Identified	Music Content Scores			Worst 2 Identified	Music Content Scores		
			Specific	Global	Total		Specific	Global	Total
	1	T2	46	57	103	N1	26	32	58
		T1	34	54	88	N3	15	26	41
	2	T2	48	52	100	T1	32	37*	69
		T3	28*	35*	63*	N2	34*	35	69
	3	T2	49	60	109	N1	20	26	46
		N3	39*	58	97	N2	33	42	75
	4	T1	36	51	87	N1	25	19	44
		T2	42	51	93	N3	22	25	47
Aesthetic Appeal	Judge	Best 2 Identified	Music Content Scores			Worst 2 Identified	Music Content Scores		
			Specific	Global	Total		Specific	Global	Total
	1	T2	46	57	103	N1	26	32	58
		T1	34	54	88	N3	15	26	41
	2	T2	48	52	100	T1	32	37*	69
		T3	28*	35*	63*	N2	34*	35	69
	3	T2	49	60	109	N1	20	26	46
		N3	39*	58	97	N2	33	42	75
	4	T2	42	51	93	N1	25	19	44
		N2	35*	47*	82*	N3	22	25	47

Note: Scores with an * indicate that the composition was not in the highest two or lowest two as rated by the judge.

Judgment of Musical Compositions Form I Comparisons

The second part of research question three asked if there were significant differences between expert music educators' (judges) ratings for the two groups (non-technology and technology). Judges' scores for specific music content, global music content, and overall scores were analyzed using a one-way between-subjects ANOVA. Table 13 shows there were statistically significant differences found between the judges' scores for the technology versus

the non-technology group compositions for the specific music content $F(1, 22) = 8.56, p = .01$,

global music content, $F(1, 22) = 10.48, p = .004$, and total score $F(1, 22) = 10.6, p = .004$.

According to these results, the answer to the second part of research question three was that there were significant differences in judges' ratings for non-technology compositions versus technology compositions. As previously reported in Table 9 and Table 10, the scores for the technology compositions were generally higher than the non-technology composition scores.

Table 13

One-way Between-subjects ANOVA: Expert Ratings of Technology versus Non-Technology

Compositions

	Score	Sum of Squares	df	Mean Square	F	Sig.
Specific	Between Groups	468.17	1	468.17	8.59	0.008**
	Within Groups	1199.67	22	54.53		
	Total	1667.83	23			
Global	Between Groups	962.67	1	962.67	10.48	0.004**
	Within Groups	1010.67	22	91.85		
	Total	2983.33	23			
Total	Between Groups	2773.5	1	2773.5	10.6	.004**
	Within Groups	5756.33	22	261.65		
	Total	8529.83	23			

Note. **$p <.01$

CHAPTER V

DISCUSSION

Music education authors, curricula designers, and researchers have long been advocates

for developing students to fulfill a variety of musical roles (Andrews, 1970; Elliot, 1995; Hickey,

2013; MENC, 1994; Reimer, 2003; Webster, 2002; Wiggins, 2003). The literature seems to

indicate that students often do not receive many creative experiences, including composition

(Byo, 1999; Orman, 2002; Strand, 2006).   However, the literature also indicates that students

that participate in composition experiences receive benefits that go beyond creating a tangible

product (Gromko, 2003; Hickey, 2003, 2013; McCord, 1999/2000; Stauffer, 2003, 2013;

Webster, 2002, Wiggins, 2003).

Students enter music classrooms with a technology skill set that often surpasses that of

the teacher (Gardner & Davis, 2013; Hickey, 2004). A growing body of literature suggests that

technology should be utilized in music classrooms to connect with students and their musical

world (Hickey, 1997, 2004; Reynolds, 2005; Webster, 1994, 2009; Webster & Hickey, 2006;

Uptis, 1989).   Furthermore, literature indicates that technology can be a way to allow students to

participate in composition experiences with or without some musical abilities (Hickey, 2013;

Kaschub & Smith, 2009; Webster & Hickey, 2006; Williams, 2007, 2012).

This study is unique from previous research because it examines differences between

students using technology versus students who do not use technology during the composition

process. Although other studies examined technology as a tool for composition, they did not

compare groups with and without technology (Hickey, 1997; Mellor, 2007; McCord, 1999/2000, 2002; Nilsson & Folkestad, 2005; Riley, 2006; Ruthman, 2008; Seddon & O'Neil, 2003; Stauffer, 2001; Ward, 2009).

Only one other study examined differences between students who used and did not use technology to compose (Kuehne, Lundstrom, & Walls, 2013). Although there are similarities between this study and the Kuehne, Lundstrom, and Walls' study, there were more differences than similarities. The students in Kuehne, Lundstrom, and Walls' study were in the fourth grade. The composition task in Kuehne, Lundstrom, and Walls' study required the students to compose a piece with, "at least five different instruments, be eight or more measures long, be in 3/4 or 4/4 meter, include a melody, include an identifiable rhythm, use dynamics, and be in ABA form" (Kuehne, Lundstrom, & Walls 2013, p. 39). This study differs because the population was seventh and eighth grade students and their composition task was open-ended. Furthermore, the only instructions the students in this study received were to write a piece of music that sounds good to you and your group that is at least one-minute long, with a clear beginning and end, and every member of your group must perform for the final recording.

Another difference between the two studies was how technology is utilized. In Kuehne, Lundstrom, and Walls' study, the students used desktop computers with notion software to compose. Students in this study used iPads and could choose from several different applications to complete their composition. Notation was a required component in Kuehne, Lundstrom and Walls's study, whereas in this study notation was not required. As suggested by Gromko (2003), the students in this study were not inhibited by notation, but allowed to create their own compositional narrative based on selected compositional tools and group dynamics.

Ultimately, the purpose of the Kuehne, Lundstrom, and Walls study was to determine the effect of technology integration in composition on 4th grade students' opinions through peer review of the process and product of composition, and on their musical knowledge on an achievement test after composing with or without technology. In this study, the purpose was to determine if there were differences in seventh and eighth grade students' posttest scores using the AMMA (Gordon, 1989), their self-reported time in the compositional process using a researcher-created form, and professional musicians' ratings on the compositional products using the Judgment of Musical Composition Form I (Webster and Hickey, 1995). One large difference to note was that all of the forms used in this study, as previously reported, were statistically reliable (all .80 or higher). Alternately, in the Kuehne, Lundstrom, and Walls (2013) study, no reliability was reported for the forms, which were all created by the researchers. The remainder of this chapter will discuss findings by topic as presented in Chapter 4.

Change in Pre- to Posttest Scores on AMMA

Examination of students' pre- and posttest music aptitude scores revealed several interesting findings. First, when looking at the gain and loss from pre- to posttest for all three areas (tonal, rhythm, and tonal) the technology group gained more total points than the non-technology group. However, there should be caution when interpreting this result because the technology group had two more students than the non-technology group. More over, when examining where students lost or gained points in the subscales (tonal and rhythm), the results from this study suggest having technology options for composition may affect student's musical aptitude. The technology groups had three students who lost points from their pre- to posttest total score. In addition, the technology group's score loss ranged from three to four points. One student lost points in tonal and rhythm and the other two lost points only in rhythm. In contrast,

five non-technology students lost points from their pre- to posttest total score and that loss ranged from 1 to 14 points. All five of these lost points were in both tonal and rhythm.

Several authors suggest that the tools students' use affects not only the overall composition, but student learning as well (Hickey, 1997; Kratus, 2001; McCord, 2002; Reynolds, 2005; Stauffer, 2002; Wiggins, 2003).   The technology group had a full range of tonal options available to them because of the applications they used. The applications provided a large range of instrumental or vocal timbres. In addition, they were able to create new sounds. The technology group could use the iPad touch screen to manipulate different sounds (tonal and rhythm). As a result, students could compose without demonstrating vocal or instrumental proficiency (i.e. playing an instrument or singing on pitch).

In contrast, the non-technology groups were limited to using their voices or the acoustic instruments available to them in the music classroom. Students could choose between various instruments including winds, guitars, piano, percussion, Orff and chromatic mallet instruments, found instrument sounds (such as chairs, body percussion, etc.), or use their voices. However, the students had to possess the technical ability to manipulate the instruments or their voices to produce the sounds they wanted to include in their compositions.

Bolton (2008) and Burnard (2006) indicated that students focus on what they already understand and throughout the composition process build upon that knowledge. In the first two sessions, both groups (technology and non-technology) focused on using the classroom instruments on which they had previous music learning. Also during this time, the technology students were exploring the different applications, but were not using them in the composition process. However, by session three for some and four for all groups, when the technology group discovered that iPads offered more options, they abandoned the classroom instruments.

Furthermore, the non-technology groups' compositions resembled their school music experiences (World Music Drumming, Drum Line Cadences, etc.), whereas the technology groups' compositions more closely resembled their out of school music options. As Airy & Parr (2001), Mellor (2007a), and Ward (2009) suggest in their research, the technology students in this study discovered that technology was a more useful tool for their compositions and interacted with it more than the acoustic instruments; they were all using the iPads by session 4. In addition, they discovered they had many more options to create music that was different from their school music experiences.

The students' resulting compositions reflected differences that could be associated with using technology. Only two of the three non-technology groups included a tonal instrument in their final compositions. One of the groups used piano to begin their composition and also used it as a bridge between two sections in their music. Another group used an alto metallophone to improvise with other unpitched percussion instruments. For both of these groups, it appeared that these were purposeful choices, but neither group used their tonal instruments to create thematic material. Rather, the tonal instruments served as glue to piece together two rhythmic sections. All of the technology groups included melodic material and one used a melodic theme as unifying element for their composition. Two used melodic material to provide harmony and or ambient sounds.

The technological tools the students used to compose may have a larger impact than originally suggested by other researchers (Hickey, 1997, McCord, 2002; Stauffer, 2001; Wiggins, 2003). Overall, the technology group's mean pre-test scores ($M = 46.42$) were slightly lower than the non-technology group ($M = 47.83$). Interestingly, on the posttest the technology group's mean scores ($M = 50.57$) slightly surpassed the non-technology group ($M = 50.16$).

However, the change from pre- to posttest score was not found to be statistically significant for either group (tonal, rhythm, and total score).

Finally, Gordon (1997) stated after age 9 even high quality music programs have no affect on music aptitude. The results of this study indicate that music educators and researchers may want to examine the role of technology on music aptitude and audiation. Previous research has shown that technology allows students to participate in music experiences that once were inhibited by lack of skills and knowledge (Airy & Parr, 2001; Hickey, 1997; Webster, 1994; Webster & Hickey, 2006). Students are interacting more with technology both in and out of the music classroom, therefore it may be prudent in the future to examine technology's affects on music aptitude and audiation. Reynolds (2005) suggests technology aids students in performing composition tasks on the Swanwick and Tillman (1986) developmental spiral at earlier stages. Technology may aid students in developing music aptitude and audiation skills differently than previous thought.

The Compositional Process

Throughout all eight sessions, the students reported individually and as groups that they worked within all levels of the composition process. The difference between the groups (technology and non-technology) was found primarily between the middle sessions (three, four, five, and six). There were also differences individually between the students that did and did not use technology for sessions four, five, and six. Several inferences can be made about these differences from previous research.

Kaschub & Smith (2009) stated that students who use technology in the composition process need time to learn how to manipulate hardware and software before they can compose. Even though all of the students spent two weeks before the project learning to use the iPads and

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various applications, the technology students needed help using the iPads throughout sessions one, two, three, and four. By session five, they seemed to have worked out their technology issues.

As reported in the results, there were no differences between the technology and non-technology groups for sessions one and two, and sessions seven and eight. Initially, both groups of students wanted to incorporate acoustic instruments in their compositions. Each technology group's focus was almost exclusively on the acoustic instruments, almost neglecting the iPads completely. Some of this may be due to previously mentioned technology issues. Additionally, this might also account for more time spent in exploration and development (Kaschub & Smith, 2009).

Hickey (1995) observed that spending more time in exploration produced more creative compositions. This finding is consistent with what was observed in this study. The technology groups spent the majority of their time in exploration and development, whereas the non-technology groups spent more time in rehearsal and production. The judges rated the technology groups higher than the non-technology groups. This finding will be discussed further in the next section.

Before this study, the students participated in the World Music Drumming (Schmid, 1998) curriculum for several months. Their primary performance experience was in the school's World Music Drumming Ensemble. Although there are tonal experiences built within this curriculum the primary participatory experiences are rhythmic using unpitched percussion instruments. Several authors suggest that composition experiences and tasks should be authentic, related to what is being learned in the music classroom, and should have students solving musical problems (Burnard, 2006; DeLorenzo, 1989; Hickey, 2013; Wiggins, 2003). Students in

both groups started composing with what was comfortable. For them, it was unpitched percussion instruments. In this case, the compositional process was also a problem solving activity as the groups independently had to figure out how to develop a composition with minimal guidelines.

Hickey (2013) suggested that students will produce creative products that are also socially and historically contextual. Webster (1996) stated that students who are part of an ensemble (i.e. band) compose with that ensemble type in mind; they compose using the styles and instruments they have experienced. In addition, several authors' indicated that student's compositions directly reflect their formal music learning (Folkestad, et al, 1997, 1998; Hewitt, 2009; Seddon & O'Neil 2001, 2003; Stauffer, 2003). In this study, the non-technology groups' compositions were a direct reflection of the musicianship attained through the World Music Drumming Ensemble experiences and their initial decisions were based upon their contextual understanding of ensemble music. It seems their musical identity was tied to their classroom musical experiences (Stauffer, 2003, 2013). They used the same instruments they played in the World Music Drumming curriculum. Furthermore, Webster's (2002) Model of Creative Thinking in Music suggests that enabling skills and conditions will affect students' creative work. Consequently, this may have inhibited their compositional ideas to the point where they composed within what they thought was the socially acceptable frame of the classroom.

Airy and Parr (2001) indicated that technology allows for more freedom in the composition process. The technology groups may have felt freer to try new ideas because of the technology and because the technology was not part of the socially accepted classroom framework. Traditionally, The World Music Drumming curriculum does not include extensive electronic instruments. Their compositions included techniques and styles that reflected their

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own personal music tastes (Airy & Parr, 2001; Mellor, 2007a). This was not always the case. At the beginning of the compositional process, they were working more like the non-technology groups. However, as the students became more comfortable with using the technology their compositions became incrementally different from the non-technology groups' compositions. Overall, it appears that using technology freed students to combine their classroom musical knowledge and their personal musical preferences to create compositions that reflected new learning.

The students in this study built upon their previous knowledge to create new compositions. The non-technology groups' compositions, for the most part, were modeled after their previous learning experiences. Alternately, the technology groups' compositions evolved throughout the 8 sessions and were not like the models they previously had in their formal music classes.

<div align="center">**Expert Ratings of Compositional Products**</div>

Several studies supported using Amabile's (1996) Consensual Assessment technique to assess students' creative products (Hickey, 2001; Priest, 2001; Webster & Hickey, 1995). Experts in this study used the Consensual Assessment technique to assess and compare the student's creative products. Specifically, they used Webster and Hickey's (1995) Judgment of Musical Compositions Form I. The results in this study showed higher reliability on this form than the original study by Webster and Hickey. Hickey (2001) suggested using judges that are not only experts in their music education specialty area, but also understand the context of the public school music classroom. The higher reliability on this form in this study may be because each of the judges had at least eight years of experience as a public school music educator.

Overall, the technology groups were rated higher by the judges than the non-technology groups. The Judgment of Musical Compositions Form I used in this study may have influenced this result. The form asks judges to rate compositions on specific and global musical considerations. The judges indicated after rating all the compositions that it was difficult to rate some of the compositions because they were lacking some elements of music. For instance, only one of the non-technology compositions had a melody. The judges felt they had no choice but to rate those compositions without tonal elements lower. The form did not provide a not applicable option.

All of the technology groups had some tonal elements in their compositions. In addition, one of the technology compositions included rap. There was nothing on the form to evaluate the rap portion. After the researcher spoke with the judges it was decided that the Judgment of Musical Compositions Form I was adequate for what they were asked to do, but perhaps using a different form or having a more closed composition task would result in a different outcome. Previous research suggested the parameters of the composition task affect the product (Barrett, 2003; Burnard, 2006; Delorenzo, 1989; Hickey, 1997, 2013; Sullivan, 2003; Wiggins, 2003). This study sought to allow students the freedom to express musical thought, and the researcher sought to create an environment that leads students to find their own way to compose (Folkestad, Hargreaves & Lindström, 1998; Wiggins, 2002). Therefore, any attempt to limit or close the composition task might have led to less creative compositional products.

Some of this might be alleviated in the future if (1) the students can consult the rubric during the creation process, and (2) if the students are involved in the creation of the rubric to evaluate their compositions. The students were not told their final compositions were going to be evaluated by experts because, as Hickey (1997, 2013) suggests external motivation may

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negatively affect creative output. There are no examples in the Consensual Assessment literature consulted for this study that allowed students see or create a rubric before or during the creative process (Hickey, 2001; Priest, 2001; Webster & Hickey, 1995). The researcher also served as the student's music teacher. Throughout the compositional process other researchers suggestions (Barrett 2003; Hickey, 2013; Hickey & Reese, 2001; Reese, 2003; Ruthman, 2008) framed the dialogue for feedback. Specifically, when providing feedback to the students the researcher focused on the intent of the students, was positive, and provided specific suggestions for improvement.

Another interesting finding was related to the compositions each judge selected as his or her best two and worst two in three categories: craftsmanship, originality/creativity, and aesthetic appeal. Judges were asked to select these with no other instructions. As the results indicated the best two were not necessarily the highest rated compositions. Judge two (instrumental music education expert) chose composition T3 as one of the best compositions in every category, however he/she rated T3 as the lowest. When asked why composition T3 was selected, the judge indicated that there was tonal dissonance in the composition that was appealing.
Judge four (general music education expert) selected a composition as one of the best, but his/her ratings did not support this. Composition N2 was selected as the best in craftsmanship and aesthetic appeal. However, this composition was rated third in specific and global music content and total score. Considering the judge's early musical background as a percussionist, the non-technology students heavy use unpitched percussion instruments may have influenced his or her selection, though one cannot be sure.

It is interesting that the likes and dislikes of a composition do not necessarily align with experts' ratings. Teachers often have to separate personal likes and dislikes from the evaluation

of student work. Separating personal likes from objective evaluation may be an advantage of using expert judges instead of students to rate compositions. Hickey (2001) found that when students were used as experts they are reliable, but they often made judgments based on their personal likes. Students may be used to rate creative/compositional products. However, students will need training to become objective evaluators. As suggested by Hickey the students and teachers in the classroom may often be the best evaluators of creative works produced in the classroom.

Researcher Observed Group Behaviors

Throughout the eight composition sessions, the researcher took anecdotal notes as he observed the students. Although these notes were intended to keep the researcher consistent throughout the eight sessions several interesting phenomena emerged. These focused on group dynamics and group interaction styles. Furthermore, these two phenomena were also mentioned by other researchers, and can inform some of the results from this study (Bolden, 2009; Hickey, 1997; Kaschub, 1997; Kaschub & Smith, 2009; Mellor, 2007, 2008; Stauffer, 2001; Ward, 2009; Wiggins, 1999/2000, 2003).

Group Dynamics

Music education researchers and practitioners may also gain valuable information by further examining peer dynamics within group composition experiences. Peer relationships during composition experiences can be motivational and lead to a shared vision of the product (Kaschub, 1997; Wiggins, 1999/2000). According to Wiggins (2003), the roles students assume within the group are an essential first step for successful composition. The majority of the students in this study were working together to form a collective compositional product.

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In this study, two students (NT8 and T13) became leaders of their individual groups in different ways. Student NT8 initially did not seek group leadership, but after a disagreement took a more active role in shaping the direction of the composition process. This student brought the group together and helped form a shared vision of their final product. Student NT8 grew 27 points from pre- to posttest total score, the largest gain of any student. In the last 3 sessions, Student NT8's group began helping other non-technology groups by offering constructive criticism.

In contrast, student T13's total score modestly dropped from pre- to posttest by 5 points. The most significant result related to student T13 was that his or her control affected the working conditions of their entire group. Student T13 was insistent on using an acoustic instrument throughout the group's composition even though the rest of the group wanted to use only the iPads. The rest of the group members began focusing only on their iPads and did not work together. Kaschub and Smith (2009) warn isolation can be a result of using technology in the composition process. There was no shared vision for the composition process or product. On the last day of the project, the students had no clear idea for their composition product and asked for guidance. The majority of the group's composition was improvisation.

Do leadership roles students assume affect their learning? This finding seems to be in line with Wiggins' (2000) suggestion that when groups achieve shared understanding and a common purpose they will be more successful in the composition process. In addition, Webster's (2002) Model of Creative Thinking in Music suggests that enabling conditions (personal and/or social/cultural) will affect students' progress in the creative process. Although the composition produced by student NT8 was not highly rated by the expert judges, the group was successful in producing a completed composition. Furthermore, the group also aided other non-technology groups in the completion of their compositions. Conversely, student T13's leadership isolated

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members of his or her group. There was no shared group vision, which ultimately affected the composition process and product. Student NT8's growth and student T13's loss and their leadership roles were interesting and warrants further investigation.

Interaction styles during group composition. As mentioned in Chapter 2, Kaschub and Smith (2009) identified common within group interaction styles, which included concurrent, collaborative, and executive. The researcher noted that the ways students worked with one another differed between the technology and non-technology groups. Each of the non-technology groups worked in a collaborative style throughout the composition process. They tended to model and discuss their ideas as they worked. The students had periods where they worked individually on ideas, but they always sought confirmation from the group as they worked.

Alternately, the technology groups began composing in a concurrent style. The students composed side-by-side, working out individual problems and then would try to unify their individual parts. This was due in part because the students could not hear their individual iPad without headphones. The technology isolated the students. The limitations in volume also limited the combinations of acoustic instruments and iPads. Though other music composition studies with students using technology had students composing in isolation (Airy & Parr, 2001; Hewitt, 2009; Hickey, 1997; Mellor, 2007a, 2007b; Stauffer, 2001), the students in this study had to learn how to compose with technology while interacting as a group.

In the technology groups, the composition process moved from concurrent style to collaborative composition once the students learned to create jam sessions with GarageBand. Jam sessions allowed the students to work simultaneously by connecting up to four iPads via Bluetooth or Wi-Fi. Once they discovered and learned this, they abandoned the acoustic

instruments in favor of the iPads. Furthermore, as the students were able to learn how to make the technology interact this impacted the style of composition.

Though there seemed to be some advantages to composing with technology, there was a limitation, primarily the size of the groups. As suggested by Kaschub and Smith (2009) the groups' size impacts the interactions and learning. The jam session feature can only accommodate four iPads at a time. In five member groups, students had to solve the problem of incorporating the fifth student into their composition. One group worked around this limitation by adding a rap part to their music. This solution helped them accommodate using only four iPads. A different group solved the iPad limitation by having a group member play their iPad independently with the other iPads connected through jam session.

Unfortunately, as mentioned earlier, the control of one group member led one technology group to work in what Kaschub and Smith (2009) described as executive style of composition. Executive group composition has the emergence of a domineering leader. The student that took control of this group would not listen to suggestions from their other group members or the primary researcher. Kaschub and Smith (2009) discuss extreme frustration with non-leader students in this style of composition. This was evident to the primary researcher. The students suggested the day the leader was absent, that as a group, they worked better without the student. As discussed earlier this interaction was detrimental to the composition product. However, even though there were working issues within the group the students seemed pleased with the composition product. Kaschub and Smith (2009) have suggested that even if students are not satisfied with their group working conditions they will generally be pleased with the final composition product.

Another area that emerged was related to evaluation. Wiggins (1999/2000) suggested that when students compose in groups, evaluation happens throughout the process. In addition, Kaschub and Smith (2009) propose shared understanding, compositional vision, and evaluation techniques benefit the individual student's ability to evaluate. The students' assessment of their ideas came from their group members and they very rarely asked for outside help from the researcher. There were several instances where the non-technology groups would assess not only their personal group, but also the other non-technology groups.

Limitations

This study has several limitations that must be taken into account when reviewing and interpreting data and results.

1. The population used for this study was students enrolled in seventh and eighth grade ($N = 27$) general music at a rural K-12 school in Alabama. Results may not be generalizable to other populations that are dissimilar.

2. Data gained to compare the two groups of students during the compositional process was obtained from self-reported scores of progress. Although the reliability was high and there was no apparent indication of false reporting, it is possible that students rated themselves either better or worse based on other environmental factors.

3. The researcher was also the music instructor for the students. Results may not be generalizable to general music sections not taught by the researcher.

Conclusions

Wiggins (2003) stated that an essential first step in the process of composition involves deciding roles and tools for the composition process. It seems that the tools and the roles of the group members had an affect on the process of composition. The tools selected affect not only

the product, but also the type of learning that takes place. The roles students choose impacts the vision and direction of the compositional process.

Webster (2002), Hickey (2003), Kratus (1989) and Kennedy (2002) have all proposed compositional processes models with at least four steps. This study sought to observe if there were differences between students using technology versus students not using technology in the compositional process. Regardless of the use technology, this study's results indicate that students do move through stages and can be adequate raters of their own individual and group's compositional progress. Generally, students began and ended the composition process the same, but the middle sessions differed depending on the tools used.

Results from this study indicate that students can compose music regardless of whether they use technology or not. However, technology can offer students several advantages. It allows students to compose music that more closely resembles their musical culture and not necessarily the musical culture found in the classroom (Air & Parr, 2001; Barrett, 2003; Bolton, 2008; Burnard, 2006; Folkestad, et al, 1999, 1998; Gall & Breeze, 2005; Mellor 2007a; Ward, 2009; Webster, 1994). Non-technology groups composed music similar to what they learned within their music classroom. The use of iPads freed the students in the technology groups from their own technical ability, which in turn gave them a more diverse tonal palette (Airy & Parr, 2001; Gall & Breeze, 2005). The non-technology groups were limited to the sounds they were comfortable with producing. However, the technology groups might have been limited too. The technology students had difficulty combining the iPads and acoustic instruments because they were limited in the amount of volume the iPad could produce. If the technology students had been more successful combining the acoustic instruments and the iPads they too may have relied on what they were familiar and comfortable creating.

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Technology may have an affect on learning due to the presence of tonal and rhythmic abilities. Results indicate that students using technology showed a greater change in pre- to posttest scores of music aptitude for tonal, rhythm, and total scores. Both groups of students' scores grew, but the technology students' scores grew more. This finding is supported by the ratings of expert judges. Overall, the expert judges rated the technology groups higher than the non-technology groups in all areas (global, specific, and total music content).

Implications for Music Education

Researchers and music educators should focus on providing students with creative experiences that include music composition (Barrett, 2006; Burnard & Younker, 2002; Hickey, 1997, 2013; Kaschub & Smith, 2009; Kennedy, 2002; Kratus, 1989, 1994; Stauffer 2001, 2002, 2003; Webster, 2002; Wiggins, 1994, 1999/2000, 2003). The present study attempted to add to the music composition knowledge base by comparing music composition using two different approaches. Results from this study generated several findings for music educators to consider when structuring music composition experiences for their students:

1. Students are able to compose regardless of the tools used for composing (technology versus non-technology).

2. Using technology to compose over time may affect how students answer questions on a standard music aptitude test such as Gordon's AMMA (1989). Using technology more than not using technology may positively affect the acquisition of music aptitude and/or music audiation skills.

3. Composition experiences should be imbedded throughout the curriculum to ensure students have multiple composition frameworks.

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4. Students can reliably report their progress toward the completion of a composition task.

5. Music experts that understand the context of the PK-12 school music classrooms are reliable assessors of student's compositional products.

6. When assessing students' compositional or other creative tasks, the assessment instrument should adequately reflect what students should be able to create. To do this, students may need more structural guidelines for their work and/or they need to see how they will be assessed.

Recommendations for Future Research

The results of this study indicate the need for further research in the following areas:

1. Replicate this study with a wide variety of different types and sizes of student populations including different grade levels, socioeconomic statuses, and students in band, choir, orchestra, and general music classes.

2. Examine the affects of technology on music aptitude and audiation.

3. Examine Consensual Assessment techniques of compositions created with and without technology by a wide variety of different types and sizes of student populations including different grade levels, different socioeconomic statuses, and students in band, choir, orchestra, and general music classes.

4. Compare the difference of the process and product of composition between students using desktop computers and midi keyboards versus students using iPads.

5. Further examine techniques for students to self-report their progress in completing a creative task.

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6. Explore the role individual students assume in composition groups. Determine if their group roles affect music learning and growth.

7. Examine the affects of various music training on compositional voice and identity.

8. Further research is needed designing and testing assessments for rating student compositional products. Specifically developing assessments that reflect the multiple media, genres, and styles with which students interact.

REFERENCES

Airy, S., & Parr, J. (2001). MIDI, music and me: Students' perspectives on composing with MIDI. *Music Education Research, 3*(1), 41-49. doi: 10.1080/14613800020029941

Amabile, T. M. (1996). *Creativity in context: Update to the social psychology of creativity.* Boulder, CO: Westview Press.

Amabile, T. M. (2012). *Big C, little c, Howard and Me: Approaches to understanding creativity.* Retrieved from http://www.hbs.edu/faculty/Pages/item.aspx?num=42404.

Barrett, M. (2003). Freedoms and constraints: constructing musical worlds through the dialogue of composition. In M. Hickey (Ed.), *Why and how to teach music composition* (pp. 3-27). Reston, VA: MENC.

Barrett, B. (2005). A systems view of creativity. In D. Elliott (Ed.), *Praxial Music Education* (pp. 177-195). New York: Oxford University Press.

Barrett, M. (2006) Creative collaboration: An "eminence" study of teaching and learning in music composition. *Psychology of Music*, *34*(2), 195-218. doi: 10.1177/0305735606061852.

Beveridge, T. (20100). No Child Left Behind and fine arts classes. *Arts Education Policy Review, 111,* 4-7. doi: 10.1080/10632910903228090.

Bolden, B. (2009). Teaching composition in secondary school: a case study analysis. *British Journal of Music Education, 26*(2) 137-152. doi: 10.1017/S0265051709008407.

Bolton, J. (2008). Technologically mediated composition learning: Josh's story. *British Journal of Music Education, 25*(1) 41-55.

Burnard, P. (2000). How children ascribe meaning to improvisation and composition: rethinking pedagogy in music education. *Music Education Research, 2* (1), 7-23.

Burnard, P. (2006). Understanding children's meaning-making in composition. In I. Deliege, & G. A. Wiggins (Eds.), *Musical creativity: Multidisciplinary research in theory and practice* (pp. 110-133). New York: Psychology Press.

Burnard, P., & Younker, B. (2002). Mapping Pathways: Fostering creativity in composition. *Music Education Research, 4*(2), 245-261.

Burnard, P., & Younker, B. (2004). Problem-solving and creativity: Insights from students' individual composing pathways. *International Journal of Music Education. 22*(1), 59-76. doi: 0.1177/0255761404042375.

Byo, S. J. (1999). Classroom teachers' and music specialists' perceived ability to implement the National Standards for Music Education. *Journal of Research in Music Education, 47*(2), 111–123. doi: 10.2307/3345717.

Choate, R. (1967). Tanglewood Symposium: Music in American society. *Music Educators Journal, 54*(3), 49-58.

Choate, R. (1968). *Documentary report of the Tanglewood Symposium.* Washington, DC: MENC.

Consortium of National Arts Education Associations. (1994). *National standards for arts education: what every young American should know and be able to do in the arts.* Reston, VA: MENC.

Crow, B. (2006). Music creativity and the new technology. *Music Education Research,*
    8(1), 121-130.

Crow, B. (2008). Changing conceptions of educational creativity: A study of student teachers'
    experience of music creativity. *Music Education Research, 10*(3), 373-388.

Csikszentmihalyi, M. (1996). *Creativity: Flow and psychology of discovery and invention.*
    New York: Harper Collins.

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

Dogani, K. (2004). Teachers' understanding of composing in the primary classroom. *Music*
    Education Research, 6(3), 263-279. doi: 10.1080/1461380042000281721.

Elliott, D. (1995). *Music maters: A new philosophy of music education*. New York: Oxford
    University Press.

Fautley, M. (2004) Teacher intervention strategies in the composing processes of lower
    secondary school students. *International Journal of Music Education. 22*(3), 201-217.

Folkestad, G., Lindström, B., Hargreaves, D. J., &. (1997). Young people's music in the digital
    age: A study of computer based creative composition. *Research Studies in Music*
    Education, 9(1), 1-12.

Folkestad, G., Hargreaves, D. J., & Lindström, B. (1998). Compositional strategies in
    computer-based music-making. *British Journal of Music Education, 15*(1), 83-97.

Folkestad, G., & Nilsson, B. (2005). Children's practice of computer-based composition.
    Music Education Research, 7(1), 21-37.

Gall, M., & Breeze, N. (2005). Music Composition Lessons: The Multimodal Affordances of
    Technology. *Educational Review, 57*(4), 415-433.

Gardner, H. (1993). *Creating minds: An anatomy of creativity.* New York: Basic Books.

Gardner, H., & Davis, K. (2013). *The App Generation: How today's youth navigate identity, intimacy, and imagination in a digital world.* Grand Rapids: Yale University Press.

Gordon, E. E. (1989). *Advanced Measures of Music Audiation.* Chicago: GIA Publications, Inc.

Gordon, E. E. (1997). *A Music Learning Theory for Newborn and Young Children.* Chicago: GIA Publications, Inc.

Gromko, J. E. (2003). Children composing: Inviting the artful narrative. In Hickey, M. (Ed.), *What and how to teach music composition: a new horizon for music education* (pp. 69-90). Reston, VA: Rowman & Littlefield Education.

Guilford, J. P. (1950). Creativity. *American Psychologist, 5*(9), 444-454.

Hew, K., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Education Technology Research and Development, 55*, 223-252. doi: 10.1007/s11423-006-9022-5

Hewitt, A. (2009). Some features of children's composing in a computer-based environment: The influence of age, task familiarity and formal instrumental music instruction. *Journal of Music, Technology and Education, 2*(1), 5-24.

Hickey, M. (1995). Qualitative and quantitative relationships between children's creative musical thinking process and products (Doctoral dissertation, Northwestern University, 1996). *Dissertation Abstracts International, 57*(01), 145. (UMI No. 9614754).

Hickey, M. (1997). The computer as a tool in creative music making. *Research Studies in Music Education,* 8, 56-70.

Hickey, M. (2001). An application of Amabile's consensual assessment technique for rating the creativity of children's music compositions. *Journal of Research in Music Education, 49*(3), 234-244.

Hickey, M. (2002) Creativity research in music, visual art, theater, and dance. In R. Colwell and C. Richardson (Eds.) *The new handbook of research on music teaching and learning* (pp. 398-415). New York: Oxford University Press.

Hickey, M. (2003). Creative thinking in the context of music composition. In M. Hickey (Ed.), *What and how to teach music composition: a new horizon for music education* (pp. 31-53). Reston, VA: Rowman & Littlefield Education.

Hickey, M. (2012). *Music outside the lines: Ideas for composing in K-12 music classrooms.* London: Oxford University Press.

Hickey, M. (2013) What pre-service teachers can learn from research. In Kaschub, M & Smith, J. (ed.), *Composing our future: Preparing music educators to teach composition.* (pp. 33-56). New York: Oxford University Press.

Hickey, M., & Lipscomb, S. (2006). How different is good? The assessment of children's creative musical thinking. In I. Deliege and G. Wiggins, (Eds.), *Musical creativity: Multidisciplinary research in theory and practice* (pp. 97-110). New York: Psychology Press.

Hickey, M., & Reese, S. (2001). The development of a rating scale for judging constructive feedback for student compositions. *Journal of Technology in Music Learning, 1*(1), 10-19.

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.

Jinright, J. W. (2003). Factors associated with teacher computer use in Kindergarten through grade 12 school music classrooms in Alabama, Georgia and Florida (Doctoral dissertation, Auburn University, 2003). *Dissertation Abstracts International, 64*(06), 2052. (UMI No. 3095791).

Kaschub, M. (1997). A comparison of two composer-guided large group composition projects. *Research Studies on Music Education, 8,* 15-28. doi: 10.1177/1321103X9700800103.

Kaschub, M., & Smith J. (2009). *Minds on music: Composition for creative and critical thinking.* Lanham, MD: Rowan & Littlefield Publishers.

Kennedy, M. A. (2002). Listening to the music: Compositional processes of high school composers. *Journal of Research on Music Education,* 50(2), 94-110.

Kratus, J. K. (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. doi:10.2307/3344949.

Kratus, J. K. (1994). Relationships among children's music audiation and their compositional process and product. *Journal of Research in Music Education, 42*, 115-130.

Kratus, J. K. (2001). Effect of available tonality and pitch options on children's compositional processes and products. *Journal of Research in Music Education, 49*(4), 294-306.

Kuehne, J. M., Lundstrom, D., & Walls, K. C. (2011). A comparison of compositional teaching methods: Paper and pencil versus computer hardware and software. *Journal of Technology in Music Learning, 5*(1).

Lehman, P. (2000). How can the skills and knowledge called for in the National Standards best be taught? In C. K. Madsen (Ed.), *Vision 2020: The Houswright Symposium on the future of Music Education* (pp. 89-101). Reston: MENC.

Mark, M. L. (1996). *Contemporary music education*. (Third ed.). New York, NY: Schirmer Books.

Mellor, L. (2007). Computer-based composition in the primary school: An investigation of children's "creative" responses using the CD Rom Dance eJay. *MusicaeScientiae, 11*(1), 61-88.

Mellor, L. (2008). Creativity, originality, identity: Investigating computer-based composition in the secondary school. *Music Education Research, 10*, 451-472.

McCord, K. A. (1999/2000). Music composition children using music technology by elementary with learning disabilities: An exploratory case study. (Doctoral dissertation, University of Northern Colorado. 1999). *Dissertation Abstracts International, 60/07*, 2421.

McCord, K. A. (2002). Children with special needs compose using music technology. *Journal of Technology in Music Learning, 1*(2), 3-14.

NAfME (2014a). *Core Music Standards (Composition-Theory Strand).* Reston, VA: National Association for Music Education (NAfME). Retrieved from http://musiced.nafme.org/musicstandards/

NAfME (2014b). *Core Music Standards (Technology Strand).* Reston, VA: National Association for Music Education (NAfME). Retrieved from http://musiced.nafme.org/musicstandards/

Nilsson, B., & Folkestad, G. (2005). Children's practice of computer-based composition. *Music Education Research,* 7(1), 21-37. doi: 10.1080/14613800500042042.

Odena, O. (2001) *How do secondary school music teachers view creativity? A report on educators' views of teaching composing skills.* In: British Educational Research Association (BERA) Annual Conference, 13-15 Sep 2001, University of Leeds, UK.

Odena, O. (2012). Creativity in the music classroom. In G. McPherson & G. Welch (Eds.), *The Oxford Handbook of Music Education* (Vol. I, pp. 512-528). New York: Oxford University Press.

Orman, E. K. (2002). Comparison of the National Standards for Music Education and elementary music specialists' use of class time. *Journal of Research in Music Education, 50*(2), 155-164. doi: 10.2307/3345819.

Randles, C. (2010). The relationship of compositional experiences of high school instrumentalist to music self-concept. *Bulletin of the Council for Research in Music Education, 184,* 9-20.

Reese, S. (2003). Responding to student compositions. In M. Hickey (Ed.), *Why and how to teach music composition: a new horizon for music education* (pp. 211-232). Reston: VA: Rowman & Littlefield Education

Reid, S. (2002). Creativity: a fundamental need of adolescent learners. In T. Sullivan & L. Willingham (Eds.), *Creativity and music education* (pp. 100-109). Edmonton, AB: Canadian Music Educator's Association.

Reimer, B. (1989). *A philosophy of music education: Advancing the vision* (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall.

Reimer, B. (2003). *A philosophy of music education: Advancing the vision* (3rd ed.).

     Englewood Cliffs, NJ: Prentice-Hall.

Reynolds, N. (2005). The computer as scaffold, tool and data collector: Children composing

     with computers. *Education and Informational Technologies, 10*(3), 239-248. doi:

     10.1007/s10639-005-3004-9.

Richardson, C. P. (1983). Creativity research in music education: A review. *Bulletin of the*

     Council for Research in Music Education, 74, 1-21.

Riley, P. E. (2006). Including composition in middle school band: effects on achievement,

     performance, and attitude. *Update: Applications of Research in Music*

     Education, 25(1), 28-38.

Ruthmann, S. A. (2008). Whose agency matters: Negotiating pedagogical and creative

     intent during composing experiences. *Research Studies in Music Education*. 30,

     43-58. doi: 10.1177/1321103X08089889.

Running, D. J. (2008). Creativity research in music education: A review (1980-2005). *Update:*

     Application of Research in Music Education, 27(1), 41-48.

SEADAE (2014). *National Core Arts Standards: Dance, Media Arts, Music, Theatre and Visual*

     Arts. Palmyra, PA: State Education Agency Directors of Arts Education (SEADAE).

     Retrieved from http://www.nationalartsstandards.org/

Seddon, F. A. (2006). Collaborative computer-mediated music composition in

     cyberspace. *British Journal of Music Education. 23*(3), 273-283.

     doi:10.1017/S0265051706007054.

Seddon, F. A., & O'Neil, S. A. (2003). Creative thinking processes in adolescent computer-based composition: An analysis of strategies adopted and the influence of instrumental music training. *Music Education Research, 5*(2), 125-137.

Stauffer, S. L. (2001). Composing with computers: Meg makes music. *Bulletin of the Council for Research in Music Education, 150,* 1-20.

Stauffer, S. L. (2002). Connections between the musical and life experiences of young composers and their compositions. *Journal of Research in Music Education, 50*(4), 301-322. doi: 10.2307/3345357.

Stauffer, S. (2003). Identity and voice in young composers. In M. Hickey (Ed.), *Why and how to teach music composition: a new horizon for music education* (pp. 91-111). Reston, VA: Rowman & Littlefield Education.

Stauffer, S. (2013) Preparing to engage children in musical composing. In M. Kaschub & J. Smith (Eds.), *Composing our future: Preparing music educators to teach composition.* (pp. 75-108). New York: Oxford University Press.

Strand, K. (2006). Survey of Indiana music teachers on using composition in the classroom. *Journal of Research in Music Education, 54*(2), 154-167.

Sullivan, T. (2002). Creativity in action. In T. Sullivan & L. Willingham (Eds.), *Creativity and music education* (pp. 179-194). Edmonton: Canadian Music Educator's Association.

Swanwick, K. (2011). Musical development: Revisiting a generic theory. In R. Cowell & P. Webster (Eds.), *MENC Handbook of Research on Music Learning: Volume I Strategies* (pp.140-172). New York: Oxford University Press.

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.

Taylor, J. (2003). The status of technology in K-12 music education. *Journal of Technology in Music Learning, 2*(2), 67-73.

Upitis, R. (1989). The craft of composition: helping children create music with computer tools. *Psychomusicology, 8*(2), 151-162.

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

Ward, C. J. (2009) Musical exploration using ICT in the middle and secondary school classroom. *International Journal of Music Education, 27(*2) 154-168. Doi: 10.1177/2055761409102323.

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

Webster, P. R. (1994). Time, technology, and creative process. *Arts Education Policy Review.*

Webster, P. R. (2000). Reforming secondary music teaching. *Journal of Secondary Gifted Education,* 12(1), 17-24.

Webster, P. R. (2002). Creative thinking in music: advancing a model. In T. Sullivan & L. Willingham (Eds.), *Creativity and music education* (pp. 16-33). Edmonton: Canadian Music Educator's Association.

Webster, P. R. (2003a). Asking students to reflect on their creative work: encouraging the

      revision process. *Music Education Research,* 5(3), 243-248.

Webster, P. R. (2003b). 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 (pp. 55-66). Reston

      VA: Rowman & Littlefield Education.

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), 28-44.

Webster, P., & Hickey, M. (2006). Computers and technology. In G. McPherson (Ed.), *The*

      child as musician: a handbook of musical development (pp. 375-396). New York:

      Oxford University.

Wiggins, J. H. (1994). Children's strategies for solving compositional problems with peers.

      Journal of Research in Music Education, 42, 232-252.

Wiggins, J. H. (1999/2000). The nature of shared musical understanding and its role in

      empowering independent musical thinking. *Bulletin of the Council for Research in*

      Music Education, 143, 65-90.

Wiggins, J. (2002). Creative process as meaningful music thinking. In T. Sullivan & L.

      Willingham (Eds.), *Creativity and music education* (pp. 78-88). Edmonton: Canadian

      Music Educator's Association.

Wiggins, J. (2003). A Frame for understanding children's compositional processes. In

      M. Hickey (Ed.), *Why and how to teach music composition: a new horizon for music*

      education (pp. 141-165). Reston, VA: Rowman & Littlefield Education.

Williams, D. B. (2007). *Reaching the "Other 80%": Using technology to engage "non-traditional music students" in creative activities*. Prepared for the Proceedings of the Tanglewood II "Technology and Music Education" Symposium, University of Minnesota, April 2007. Retrieved from https://musiccreativity.org/documents/tanglewood2tech_dbwilliams0.pdf

Williams, D. B. (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).

Younker, B. A. (2000). Thought processes and strategies of students engaged in music composition. *Research Studies in Music Education*, *24*(1) 24-39. doi: 10.1177/1321103X0001400103.

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

APPENDIX A

INTERNAL REVIEW BOARD DOCUMENTATION

Approval, Protocol # 14-113 EP 1403

IRB Administration <irbadmin@auburn.edu>

Mon 3/31/2014 1:06 PM

To:Robert Lyda <lydarob@tigermail.auburn.edu>;

Cc:Jane Kuehne <kuehnjm@auburn.edu>; Kimberly Walls <wallski@auburn.edu>;

📎 1 attachment

Investigators Responsibilities rev 1-2011.docx;

Please note: Use IRBadmin@auburn.edu for questions and information; use IRBsubmit@auburn.edu for protocol/forms submissions.

Dear Mr. Lyda,

Your protocol entitled "A Comparison of Music Compositional Process and Products of Two Groups of Secondary Students: Using Only Acoustic Instruments Versus Using Acoustic Instruments and iPads " has received approval as "Expedited" under federal regulation 45 CFR 46.110(5,6,7).

Official notice:
This e-mail serves as official notice that your protocol has been approved. A formal approval letter will not be sent unless you notify us that you need one.   By accepting this approval, you also accept your responsibilities associated with this approval. Details of your responsibilities are attached. Please print and retain.

Consent document:
Your approved, stamped consent document/s will soon be sent. Please make copies as needed.
Please note that you must use copies of that/those document/s when you consent participants, and provide a copy (signed or unsigned) for them to keep.

Expiration:
Your protocol **will expire on March 13, 2015**. Put that date on your calendar now. About three weeks before that time you will need to submit a final report or renewal request.

If you have any questions, please let us know.

Best wishes for success with your research!
Susan

IRB / Office of Research Compliance
115 Ramsay Hall (basement)
Auburn University, AL 36849
(334) 844-5966
irbadmin@auburn.edu *(for general queries)*

COLLEGE OF EDUCATION

CURRICULUM & TEACHING

**(NOTE: DO NOT AGREE TO PARTICIPATE UNLESS AN APPROVAL STAMP
WITH CURRENT DATES HAS BEEN APPLIED TO THE DOCUMENT.)**

PARENTAL PERMISSION/CHILD ASSENT
for a Research Study entitled
*"A Comparison of Compositional Process and Products of Two Groups of Secondary
Students: Using Only Acoustic Instruments Versus Using Acoustic Instruments and
iPads"*

Your child is invited to participate in a research study to examine if there will
be any differences in the music aptitude scores and the compositional process and
product of two groups of secondary general music students after participating in a
composition experience lasting eight sessions. The study is being conducted by
Mr. Robert L. Lyda, under the direction of Dr. Jane M. Kuehne in the Auburn
University Department of Curriculum and Teaching. Your child was selected as
a possible participant because he or she is currently enrolled in seventh and
eighth grade general music. Since your child is age 18 or younger we must
have your permission to include him/her in the study.

What will be involved if your child participates? If you decide to allow your
child to participate in this research study, we will be analyzing your child's
completed course assignments. Your child will be asked to take a music
aptitude test then participate in small group (4 or 5 students per group) to
create a musical composition using classroom instruments, their voice, or iPads.
The students will be randomly assigned to work in either a technology group
or a non-technology for eight class sessions. At the end of each session, the
students will rate their group members and themselves on their level of
creativity. On the last day of the project the students will perform their
compositions. The compositions will be recorded and then evaluated by music
professionals. During the last session, your child will take a music aptitude test
again to observe any changes after participating in the project. Your child's total
time commitment will be approximately ten class sessions. If you and your
child agree to participate in this study, you are agreeing for your child's
completed course assignments/data to be analyzed. Before analysis of course
assignments all identifiable information will be removed.

Are there any risks or discomforts? There is the possibility of coercion due to the
students being the primary researcher's students. There is the possibility of breach of
confidentiality of information.

Are there any benefits to your child or others? If your child participates in
this study, your child can expect to gain self-satisfaction from participation in the

Parent/Guardian initials _____ and Participant initials _____

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creative process leading to an original composition. We/I cannot promise you that your child will receive any or all of the benefits described.

Are there any costs? There are no costs to you or your child to participate in this project.

If you (or your child) change your mind about your child's participation, your child can be withdrawn from the study at any time. Your child's participation is completely voluntary. Your child's participation in this study will not affect their course grade. If you choose to withdraw your child, your child's data can be withdrawn as long as it is identifiable. Your decision about whether or not to allow your child to participate or to stop participating will not jeopardize your or your child's future relations with Auburn University, the Department of Curriculum and Teaching or Notasulga High School.

Your child's privacy will be protected. Any information obtained in connection with this study will remain confidential. The data collected will be stored under lock and key in the principal investigator's office. Before your child's course assignments/data is analyzed, all identifiable information will be removed. All data analyzed will be anonymous. Information obtained through your child's participation may be used to fulfill dissertation completion, presented at a professional conference, or published in an academic journal.

If you (or your child) have questions about this study, *please ask them now or* contact Robert L. Lyda at 334-724-1420 or Dr. Jane M. Kuehne at 334-844-6852. A copy of this document will be given to you to keep.

If you have questions about your child's rights as a research participant, you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334)-844-5966 or e-mail at hsubjec@auburn.edu or IRBChair@auburn.edu.

Parent/Guardian initials _____ and Participant initials_____

www.auburn.edu

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HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE WHETHER OR NOT YOU WISH FOR YOUR CHILD TO PARTICIPATE IN THIS RESEARCH STUDY. YOUR SIGNATURE INDICATES YOUR WILLINGNESS TO ALLOW YOUR CHILD TO PARTICIPATE. YOUR CHILD'S SIGNATURE INDICATES HIS/HER WILLINGNESS TO PARTICIPATE.

_____   Robert C. Lyda   2/17/14
Participant's signature Date   Investigator obtaining consent   Date

_____   Robert L. Lyda
Printed Name   Printed Name

_____
Parent/Guardian Signature   Date

_____
Printed Name

Parent/Guardian initials _____ and Participant initials_____

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CURRICULUM & TEACHING

AUDIO & VIDEO RELEASE - MINOR

During your child's participation in this research study, "A comparison of music compositional process and products of two groups of secondary students: Using only acoustic instruments versus using acoustic instruments and iPads", your child will be audio and video recorded. Your signature on the Informed Consent gives us permission to do so.

Your signature on this document gives us permission to use the audio and video recording(s) for the additional purposes of publication and presentation beyond the immediate needs of this study. These audiotapes will not be destroyed at the end of this research but will be retained indefinitely.

Your permission:

I give my permission for video recording(s) produced in the study, "**A comparison of music compositional process and products of two groups of secondary students: Using only acoustic instruments versus using acoustic instruments and iPads**", which contain audio and video recordings of my child, to be used for the purposes listed above, and to also be retained indefinitely.

_____   *Robert C. Gyle* 2/17/14
Parent/Guardian's Signature Date   Investigator's Signature   Date

_____   *Robert L. Lyda* _____
Parent/Guardian's Printed Name   Investigator's Printed Name

_____
Minor's Signature   Date

_____
Minor's Printed Name

The Auburn University Institutional
Review Board has approved this
document for use from
3/14/14 to 3/13/15
Protocol # 14 -113 EP1403

NOTASULGA HIGH SCHOOL
"Home of the Mighty Blue Devils"

500 East Main Street
Notasulga, AL 36866
334-724-1240

Brelinda Sullen,
Principal

Freddie Williams,
Assistant Principal

December 15, 2013

Institutional Review Board
c/o Office of Human Subjects Research
307 Samford Hall
Auburn University, AL 36849

Dear IRB Members,

After reviewing the proposed study, "A comparison of two composition experiences: Composing with tradition instruments versus composing with iPads", presented by Mr. Robert L. Lyda a graduate student at Auburn University, I have granted permission for the study to be conducted at Notasulga High School.

The purpose of the study is to determine if there is a difference in music aptitude scores and the process and product of musical compositions between students using technology and students using traditional instruments after eight sessions. The primary activity will be music composition (with and without technology). Only students in the 7th and 8th grade are eligible to participate.

I understand that music composition exercises will occur for four weeks during students' regularly scheduled music instruction. This will take place at least twice a week for four weeks lasting 1 hour to 1 and 15 minutes per session. I expect that this project will end not later than May 15, 2014. Mr. Lyda will contact and recruit our students and will collect data at Notasulga High School.

I understand that Mr. Lyda will receive parental/guardian consent for all participants. Mr. Lyda has agreed to provide to my office a copy of all Auburn University IRB-approved, stamped consent documents before he recruits participants on campus. Any data collected by Mr. Lyda will be kept confidential and will be stored in a locked filing cabinet in his office in the music classroom. Mr. Lyda has also agreed to provide to us a copy of the aggregate results from his study.

If the IRB has any concerns about the permission being granted by this letter, please contact me at the phone number listed.

Sincerely,

Mrs. Brelinda C. Sullen,
Notasulga High School

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APPENDIX B

STUDENT DATA COLLECTION FORM

Student Name: _____   Date: _____

I. INDIVIDUAL

Directions: Think about what *you* accomplished during today's class. Decide at which level you mostly worked, then circle the number below that best reflects *your* progress during class today. Within each level, 1 = Beginning, 2 = Almost There, 3 = Almost Finished.

Exploration				Development				Rehearsal				Production		
1	2	3	⇕	1	2	3	⇕	1	2	3	⇕	1	2	3

Please write a sentence explaining why you think you are working at the level you selected.

II. Check the areas below that *you* worked the most on today.

☐ **Melody**
☐ **Harmony**
☐ **Rhythm**
☐ **Form**
☐ **Expressive Elements**

☐ **Other**
   If you checked other, please explain:

_____

III. ENTIRE GROUP

Directions: Think about what *your group* accomplished during today's class. Decide at which level **the entire group** mostly worked, then circle the number below that best reflects *the entire group's progress* during class today. Within each level, 1 = Beginning, 2 = Almost There, 3 = Almost Finished.

Exploration				Development				Rehearsal				Production		
1	2	3	⇕	1	2	3	⇕	1	2	3	⇕	1	2	3

Please write a sentence explaining why you think your group is working at the level you selected.

Lyda –Compositional Process Form 1b

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APPENDIX C

JUDGES FORMS

Judgment of Musical Compositions Form I

Judge's Name _____   Date: _____

Subject ID Letter _____

General Directions: By now, you have listened to the 10 subjects' compositions at least once. We ask that you listen to each composition again using the following rating form. The form is designed in two parts. Each part uses a Likert-type rating scale with numbers from 5 to 1. Please interpret "5" as the highest rating and "1" as the lowest. Circle (or check where appropriate) the rating number that you feel is appropriate for each item. Use your own definitions of the items given and try to be consistent in your interpretation of these items from subject to subject.

Part 1 asks you to rate specific musical characteristics. Note that we ask you to consider the presence of certain musical characteristics and also the imaginative use of some of these characteristics. Part 2 asks that you consider certain global issues about the compositions as a whole.

Part 1 Specific Musical Characteristics

Musical Characteristics (presence)

Rhythm
   • The degree to which the composition shows a pleasing use of rhythm.

        5   4   3   2   1

Texture
   • The degree to which the composition shows a pleasing use of texture (use of more than one instrument or pitch at a time.)

        5   4   3   2   1

Timbre
   • The degree to which there is a pleasing use of sound in the design.

        5   4   3   2   1

Harmony
   • The degree to which there is a pleasing use of harmony in the composition.

        5   4   3   2   1

Expression
   • The degree to which the work conveys dynamics, tempo, or high/low contrasts.

        5   4   3   2   1

Musical Characteristics (Imagination)

   • Imaginative treatment of the following musical elements: (Please place a check mark under the number of your rating for each element).

	5	4	3	2	1
Rhythm	___	___	___	___	___
Melody	___	___	___	___	___
Range (sound space)	___	___	___	___	___
Harmony	___	___	___	___	___
Expression	___	___	___	___	___
Form	___	___	___	___	___

Part 2 Global Considerations (Form I continued)

- First impression.

  5   4   3   2   1

- Imaginative varying and ornamenting.

  5   4   3   2   1

- In general, the degree to which the composition has aesthetic value.

  5   4   3   2   1

- The amount of detail in the composition.

  5   4   3   2   1

- The degree to which the composition conveys a sense of originality.

  5   4   3   2   1

- The degree to which the composition displays craftsmanship.

  5   4   3   2   1

- The degree to which the composition exhibits some unifying feature (i.e. motif, rhythm, melody, etc.).

  5   4   3   2   1

- The degree to which the composition itself shows novel musical ideas.

  5   4   3   2   1

- The degree to which the composition shows novel use of the instruments.

  5   4   3   2   1

- The degree to which the composition shows variety.

  5   4   3   2   1

- The level of complexity of the composition.

  5   4   3   2   1

- Using your own subjective definition of creativity, the degree to which the composition is creative.

  5   4   3   2   1

- Using your own subjective reaction to the composition, the degree you liked it.

  5   4   3   2   1

Overall Reactions

Judge: _____

Simply list the subject ID letters that you believe to be the 2 "best" and 2 "worst" in each of the following categories. A subject may be listed in more than one category.

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1. Craftsmanship (technical skill).

Best 2 | **Worst 2**

_____ _____   _____ _____

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2. Originality/Creativity (imaginativeness).

Best 2 | **Worst 2**

_____ _____   _____ _____

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3. Overall aesthetic value (feelingful musical experience).

Best 2 | **Worst 2**

_____ _____   _____ _____