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CHILDREN'S MUSICAL THINKING SKILLS AND CREATIVE PROCESSES DURING A COMPOSITION TASK

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By

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BY

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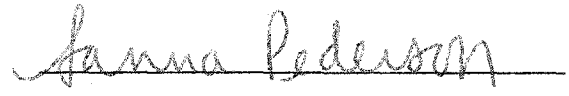

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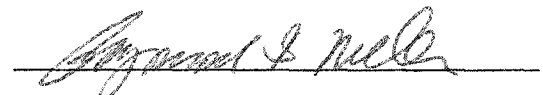

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CHAPTER ONE

Introduction

The Problem

Since the introduction of the National Music Education Standards in 1994, music educators have been aware of the need to integrate compositional activities into their music curriculum. However, hesitancy persists, in part, because the intrinsic benefits of composition are not widely known or understood. There are also issues of appropriateness and applicability. Exactly what kind of composition activities can we, as music teachers, ask our students to do that make sense for their age and level of musical understanding? What becomes the goal of a composition task? Are we asking students to make up melodies or songs just for the fun of it? Or is there something else that we need to know in order to make composition a meaningful *learning* experience for our students? What we know or do not know about how children learn serves as the foundation for what we ask our students to do and how we ask them to do it. These issues and questions are the impetus for this study.

Theoretical Background

There is increasing research interest in how children's creative outcomes are representative of what they understand and how they think creatively. The investigations of children's responses to music, their participation in musical activities, and their creation and manipulation of musical ideas have spawned a variety of theories about the nature of musical thinking skills and musical understanding (Bamberger, 1999; Barrett, 1998; Burnard, 1999; Davidson & Scripp, 1988; Kratus, 1989, 1994; Serafine, 1988; Swanwick & Tillman, 1986; Webster, 1987; Wiggins, 1994).

Research regarding formal and informal types of musical knowledge provides the potential for gaining useful information about the structure of music cognition (Bamberger, 1999; Davidson & Scripp, 1988; Gardner, 1983; Hargreaves, 1986a; Kratus, 1994; Serafine, 1998). Music cognition is defined as "thinking temporally with sound" (Serafine, 1988, p. 72) with events that are "aural-cognitive" (Serafine, 1988, p. 69) in nature. More simply, it pertains to how one perceives and/or creates expressive responses to expressive activities or situations. Sloboda (1985) states: "Somehow the human mind endows these sounds with significance. They become symbols for something other than pure sound, something which enables us to laugh or cry, like or dislike, be moved or be indifferent" (p. 1).

The nature of musical cognition has been investigated through children's use of representative symbols or re-enactments of abstract musical ideas (Bamberger, 1982, 1999; Davidson & Scripp, 1988, 1989; Gardner, 1973/1994; Poorman, 1996; Upitis, 1987, 1992). Studies have shown that when children make music they use imaginative play, draw on musical knowledge, and employ intuition to construct meaningful musical ideas (Bamberger, 1999; Paynter, 2000; Swanwick & Franca, 1999). Davidson and Scripp (1988) refer to children's development of invented musical notation as "windows on music cognition" (p. 196), reflecting the level of understanding and thinking involved with musical activity. They state: "... in music, as in language, the ability to represent relationships among elements in various ways is a more powerful measure of understanding than relying on performance or speech alone" (p. 195). Similarly, DeLorenzo (1989) proposed that the outcomes resulting from children's exploration,

organization, and utilization of musical ideas and materials were, indeed, indicative of their "inner musical thought process" (p. 193).

Music cognition has also been studied in relation to the concept of reflective thinking (Richardson, 1996; Whitaker, 1996). Thinking is individualistic and dependent on a person's "past experience and prior knowledge" (Dewey, 1910, p. 12). The person who is a reflective thinker is able to take an event or situation and consider it in the perspective of predictable outcomes. He/She arranges aspects of the environment according to anticipated consequences. Researchers have likened reflective thinking to the creative strategies that individuals use when they manipulate the elements of a particular domain to create or construct a new idea or product (Richardson, 1996; Serafine, 1988; Whitaker, 1996).

Composition is a musical activity that is dependent on the creation and expression of musical ideas. According to Serafine (1988), composition exemplifies the way in which the "elements of music" are engaged as "the cognitive 'building blocks' from which music is created or heard" (p. 55). Composition involves a person's aural and cognitive decisions about how to organize known sounds and symbols in order to create a sound event or experience.

Paynter (1997) provides a strong argument for the importance of composition in music education: "Composing is not an optional extra; in effect it underpins the whole curriculum, and it is the surest way for pupils to develop musical judgment and to come to understand the notion of 'thinking' in music" (p. 18). The efficacy of compositional activities in the music curriculum is strengthened by their potential as learning and

teaching tools that can be used to develop musical thinking and understanding (Barrett, 1998).

Providing meaningful and effective musical instruction through composition necessitates that music educators have a fundamental understanding of its cognitive and creative elements. Gardner (1976) proposes that "...art education – be it primarily oriented toward production or chiefly directed toward perception – can most effectively proceed if it has been built upon a firm understanding of relevant cognitive and symbolic processes" (p. 205). In order for children to be actively involved with constructing their *own* understanding of music, Webster (1998) encourages music educators to give students opportunities "to make aesthetic decisions...[and]... to apply information in creative ways" (¶ 28).

Successful and meaningful experiences in composition are possible and necessary for every child. These experiences are, however, contingent on teachers being fully aware of why compositional activities are important and how they benefit children's musical development.

Purpose of the Study

Research indicates that problem-solving and decision-making responses to music demonstrate a great deal about one's ability to think musically (Bamberger, 1999; Barrett, 1996; Davidson & Welsh, 1998). The purpose of this study is to examine the creative strategies children use when they compose a simple melody and to explore how these strategies are indicative of their musical thinking skills.

Research Questions

The research questions for the study are:

1. What trends emerge from analysis of the following?
    a. Gender, age, musical experience, and musical background in relation to the compositional outcomes.
    b. The general musical characteristics of the compositional products.
    c. The observed behavior and recorded verbal responses of the participants during the compositional task.
2. How are the participants' behavioral and verbal responses related to the judges' evaluative scores?
3. Is there a relationship between the age, gender, grade level, musical experience, and musical training of the participants and the judges' evaluative scores?
4. Are the musical and creative strategies observed in this study consistent with the music cognition and creativity models found in the literature?

Need for the Study

In most music training institutions, composition is recognized as a creative act governed by conventional processes reserved for individuals specially trained in the rudiments of music performance, music theory, and compositional methods. In this context, composition is grounded in theories and principles that have evolved from centuries of Western European musical traditions and is best represented in the works of those who are recognized as master composers (Regelski, 2002).

The point of view that composition requires special musical training or extra-ordinary musical abilities has often hindered music educators from appreciating its fundamental value to the musical development of their students. Regelski (2002) states:

> Indeed, the habit in music education of having students compose mainly for the purposes of learning the techniques, styles, and practices of the 'great works' and 'great composers' of the past has built in risks and limitations. In the main, it has served only to avoid or obscure the very role of composing and of compositional thinking from the considerations that *should* inform performance and listening. (p. 30)

Serafine (1988) cites composition along with performing and listening as "the clearest and most exemplary functioning of... musical thought" (p. 71). Sloboda (1985) provides a practical definition of composition for use with children's musical instruction. He describes a composer as one who creates, modifies, and rejects ideas until he/she finds a suitable solution.

A general misunderstanding regarding the nature of creative thinking can hinder the incorporation of authentic and appropriate music making activities into the music curriculum. For instance, music educators often view compositional activities as either those which promote the development of conventional music writing skills used by master composers or activities which stress a random, improvisatory compilation of musical sounds and techniques. By and large, little consideration is given for the specific cognitive abilities associated with the creative processes of composing such as divergent and convergent thinking skills. Both types of thinking skills are integral to the music

making activities of children and adults (Gardner, 1985; Hamblen, 1985; Jeanneret, 1997; Kratus, 1994; Webster, 1990).

Understanding the creative process within educational practice is crucial for grasping the skills that provide the foundation for the creative product (Webster, 1990). More likely than not, primary emphasis is given to the tangible outcomes of creative effort rather than recognizing the value and import of the less obvious learning processes. Bickman (1998) notes: "The main error of culture in general and of education in particular is to reify and worship the end products of a mental process instead of constantly engaging in the process itself" (p. 76).

Gaining insight into children's natural ability to create and work out new ideas is an important issue for music educators who want to encourage independent thinking skills in music (Richardson, 1996; Swanwick & Franca, 1999; Webster & Richardson, 1993; Whitaker, 1996). Numerous studies have shown that meaningful experiences in composition provide children with opportunities for decision-making, facilitate musical development, and deepen musical understanding (Barrett, 1998; Gamble, 1984; Paynter; 1997; Swanwick & Franca, 1999; Wiggins, 2001). Rather than *teaching* children to be creative, the focus of instruction is on *nurturing* creativity.

It is important also for music educators to consider the thought processes behind creativity. Teachers must provide musical opportunities that help children develop the cognitive framework needed to apply acquired knowledge and skills in novel, creative ways (Hickey & Webster, 2001). Webster and Richardson (1993) maintain that "music teachers must encourage children to think more deeply and more imaginatively about music and engage students in a wider variety of music experiences if real music learning

is to occur" (p. 7). Bamberger (1999) adds, "...nothing makes a child feel better, more eager to learn, than helping her find and understand what she may at that moment be only barely glimpsing, barely grasping" (p. 48).

Serafine (1988), Sloboda (1985), and others (Burnard & Younker, 2002; Kratus, 1989; Paynter, 2000; Regelski, 2002; Swanwick & Franca, 1999; Swanwick & Tillman, 1986) promote composition as a useful and valuable educational tool that can foster musicianship, listening, and performance skills in the general music classroom. Yet, despite this theoretical support, there is general disparity among music educators and researchers regarding the nature of effective compositional activities as well as disagreement about the age that children are capable of composing (Barrett, 1996; Davies, 1992; Kratus, 1989, 1994).

In order to help students think creatively, teachers themselves must also become creative thinkers and doers (Webster, 1987). Unfortunately, for many music teachers, the careful consideration needed for knowing how, when, and where to incorporate compositional activities into music instruction pales in comparison to daily struggles with limited resources, over-burdened teaching schedules, or the lack of knowledge of effective strategies for adequately implementing compositional activities.

The National Standards for the Arts for K-12 were developed in an effort to recognize the arts as an integral part of the curriculum and to state specifically what students ought to know and be able to do in the arts. The National Standards for Music Education (Appendix A) serve as a guide to ensure that content areas like composition are integrated into the general music learning experience (Lehman, 1993). The means

and rationale by which such activities are actually included, if at all, into the elementary music classroom experience continue to raise legitimate concerns.

Analysis of children's creative strategies for accomplishing musical tasks offers a rich source of information regarding creativity and musical thinking. Music educators need continued support from credible and applicable research that addresses the processes of meaningful learning and provides insight into which teaching strategies are most effective for musical development and independent thinking in music. It is the intent of this study to contribute to gaining further understanding of children's creativity and musical thinking through the examination of their creative strategies when they are asked to compose a simple melody.

Definitions

Cognition. The mental processes involved with memory, thinking, and learning (Radocy & Boyle, 1997).

Composition. A reflective manipulation of musical elements, symbols, or sounds with the intent of creating a novel musical idea that can be represented by a replicable final product (Jeanneret, 1997; Kratus, 1994).

Constructivism. A learning theory that approaches learning and knowing from the perspective of the individual. It is based on two main principles: a) learners construct knowledge for themselves and b) learning is the result of an interaction or disequilibrium between existing knowledge and new experiences or situations (Airasian & Walsh, 1997; Arts in Education Institute of Western New York, n.d.; Olsen, 2000).

Convergent thinking. The facility and competence by which one is able to use acquired knowledge and skills to select an appropriate response to a question or problem

(Kratus, 1994; Wolfe & Linden, 1991). The ability to use "several thoughts or elements toward one solution" (Gardner, 1994, p. 13).

Creative context. The environment or situation, whether natural or experimental, that stimulates or sustains the creative process (Taylor, 1988).

Creative thinking skills. The ability to develop novel strategies or perspectives in order to solve a problem. Characteristics include "...[the ability] to imagine a diverse range of possibilities, [to be] persistent in tackling a problem, and [to have] high standards for work" (Goleman, Kaufman, & Ray, 1992, p. 30).

Creativity. The ability to generate novel and useful ideas and solutions to everyday problems and challenges (Creativity Web, n.d.). Wallas (1926) proposed that there are four stages of the creative process: preparation, incubation, illumination, and verification.

Critical thinking. The mental processes of "actively and skillfully conceptualizing, applying, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action" (Paul, 1993, p. 22).

Divergent thinking. The use of a single thought, concept, or element as the source for many new ones (Gardner, 1994).

Improvisation. The immediate, spontaneous production of music without notation or rehearsal. It has also been characterized as "trying one new musical idea after another" (Kratus, 1989, p. 17), without the intent to produce a replicable final product.

Metacognition. The ability to think about one's own thinking while engaged in activities. It encompasses goal setting, focusing one's attention, monitoring one's actions, and developing successful strategies (Hong & O'Neil, 2001).

MIDI (Musical Instrument Digital Interface). "Standard specifications that enable electronic instruments such as the synthesizer, sampler, sequencer, and drum machine from any manufacturer to communicate with one another and with computers" (National Music Education Standards, 1994, p. 15).

Musical thinking skills. Aural-cognitive skills that are used to *think* in sound but also to perceive, organize, and make sense of the structural relationships between musical events in time (Davies, 1992; Serafine, 1988; Webster & Richardson, 1993; Wiggins, 2001).

Schema (plural: schemas). A context-specific knowledge structure derived from previous experience that serves as a categorical framework for a specific topic or experience. In a musical context, schemas are developed from early exposure to the music of one's culture and represent implicit musical knowledge that influences musical expectancies (Radocy & Boyle, 1997).

Self-Regulation. The ability of individuals to become "metacognitively, motivationally, and behaviorally active participants in their own learning process" (Zimmerman, 1986, p. 308).

Skill Acquisition. The systematic development of abilities and/or procedures that occur in three stages: cognitive, associative, and autonomous (Anderson, 2000).

Verbal protocol. A method of inquiry also known as "think a-louds." It is a process by which an individual is asked to reflect on the thoughts behind his/her actions.

This approach is considered helpful for understanding the thought processes behind problem solving (Whitaker, 1996).

Delimitations

Based in part on the conclusions of Serafine (1988) and Kratus (1989), the subjects chosen for this study were limited to children between ages 8 and 12, in grades 2 through 5. Serafine (1988) maintains that musical thinking is a universal trait and inherent in music-making activities such as composing, performing, and listening. Serafine also suggests that between the ages of 8 and 10 or 11, children experience a period of rapid development in musical understanding that is, more or less, in place by age 11. In his study of children's compositions, Kratus (1989) discovered that children younger than 9 years old had a more difficult time composing songs they could accurately replicate.

In an effort to establish a somewhat homogenous grouping of subjects and to control for variability, all students participating in the study were enrolled in a private MIDI program called *MIDI FOR KIDS®* (*MFK*). Some of the participating students were enrolled in *MFK* classes that met after school hours in area schools once a week for 45 minutes. The remainder of the students in the study attended a weeklong *MFK* summer camp on the campus of the University of Oklahoma. Pre- and posttest interviews given by the student and questionnaires given to the parents or guardians were used to help account for variable factors between subjects such as differences in musical background, musical experience, intellectual and developmental differences, and family influences.

Some of the most revealing studies in creativity have used "naturalistic techniques" (Webster & Richardson, 1993, p. 4), also referred to as a "top-down

schematic-based approach" (Gardner, 1985, p. 126). Cognitive psychologists favor this approach because it focuses on how an individual approaches a problem or situation, uses diverse materials, and arrives at a solution (Gardner, 1985). Gardner (1985) argues that a naturalistic setting (as opposed to a constructed setting) for cognitive studies is favored because "...(researchers) who adopt the contextual, top-down approach can point to the fact that, in everyday experience, such highly interpreted and meaningful stimuli are the norm" (p. 126). Naturalistic settings are often preferred when behavior and responses are reviewed in situations or contexts where they would commonly occur (Bogdan & Biklin, 1998). Conducting this study in the context of the on-going *MFK* classes was considered an important element of naturalizing the observed behaviors and resulting products.

Summary of the Dissertation

Chapter 1 provided a statement of the problem, theoretical basis for the study, the purpose and need for the study, defined relevant terms, and established the study's delimitations. Chapter 2 presents a review of the research literature applicable to the study. Chapter 3 gives a description of the methods and procedures used to collect the data needed to address the research questions presented in Chapter 1. Chapter 4 provides analyses of the data and explanation of the results. Chapter 5 presents the major findings of the study, offers conclusions, and discusses the possible implications for music educators.

CHAPTER TWO

Review of the Literature

Chapter 2 provides an overview of research literature pertinent to the topic of children's musical compositions. Developmental theories in psychology are reviewed followed by a summary of key theories in musical development. Next, models of creativity are surveyed along with elements of creative thinking, the relationship between creativity and reflective thinking, and the relevance of metacognition and self-regulated learning with creativity. Studies dealing with children's compositional processes and products are examined followed by descriptions of Amabile's consensual assessment technique.

Developmental Theories

All areas of complex knowledge and skill acquisition are characterized by sequences of learning and development. Piaget's influential theory of human learning and development centers on two principles: a) intelligence is a generalized mental competency and b) children, based on their experiences and circumstances, develop schemas or strategies to help them make sense of their environment. According to Piaget, children's understanding of their surroundings at any given period of development is considered representative of their level of intellectual capabilities. Piaget determined that his developmental stage theory was universal and would remain constant across different skill areas or domains (Piaget, 1967).

Since Piaget introduced his developmental theory, subsequent studies applying Piagetian principles across different cultures, educational contexts, and skill areas have revealed inconsistencies (Case, 1991). The aspects of Piaget's theory that are most

scrutinized include his assertions about the universality of development, the fixed nature of development, the limited role of symbolic learning, and the claim that optimal learning occurs through unfolding or learning that is child-initiated.

In response to Piaget's assumptions about learning and development, two primary shifts in developmental theory have resulted. First, there is less emphasis on the concept of developmental stages and, therefore, less acceptance of learning as an "unfolding" process. Instead, more emphasis is given to the role of the teacher. In turn, more importance is placed on how learning occurs instead of how a subject is taught. The second theoretical shift involves a greater focus on intellectual diversity and domain-specificity as opposed to generalized mental abilities. The primary developmental theories that represent these two shifts are a) the information-processing theory and b) the theories of Bruner's representational systems along with Vygotsky's "zone of proximal development" (Hargreaves & Zimmerman, 1992).

Information-processing theory evolved from an integration of the abstract analysis of the intake and storage of information in technology with research in human perception, attention, and memory. Studies in artificial intelligence and computer science provided the conceptual basis for many new psychological theories of human learning, intelligence, memory storage, and categorization of information (Anderson, 2000; Gardner, 1985).

Primary elements of the information processing approach include a) the role of long-term memory in accessing related information and b) the integration of new with existing information to facilitate learning (Case, 1991). According to the information-processing theory, learning occurs through a variety of modalities and involves the

encoding, organization, maintenance, retrieval, and reconstruction of information (Swanson, 1987).

When information is processed, categorized, and retrieved, a framework is created called schema. Schemas are context-specific knowledge structures derived from previous experiences that serve as a scaffold for a specific topic or experience. Schemas have also been described as "interactive networks of ideas" (Wiggins, 2001, p. 5) that facilitate understanding by creating connections between mental concepts. They provide the foundation for how future events, situations, or information are perceived and remembered (Ormrod, 1999). Learning takes place and understanding occurs as new information interacts, modifies, challenges, and/or replaces existing schemas.

Bruner's theory of representational development (1966, 1973) and Vygotsky's theory of optimal learning (1978) exemplify the second theoretical shift from Piagetian ideals. Bruner (1966) claims that "instruction is, after all, an effort to assist or to shape growth" (p. 1) and that it is essential for the teacher to understand how growth and development occur. His theory introduces a developmental paradigm consisting of three representational systems: the enactive, the iconic, and the symbolic. Enactive representation is learning by doing, iconic representation is learning through visual representations and images, and symbolic representation involves learning through symbols like those used in language, music, and mathematics. The representational systems are mastered successively and, once implemented, remain ongoing, interacting components of the learning and developmental process. Bruner (1988) characterizes representations as rule-specific and capable of facilitating learning by generalizing

previous knowledge to new situations, often through the medium of another representational system.

In his book, *Toward a Theory of Instruction*, Bruner (1966) outlines features that he considers characteristic of development. He recognizes the importance of the ability to generate responses or actions independent from an existing stimulus and to store and internalize information in order to make predictions or assumptions about the environment. Important elements of intellectual growth include a) the ability to communicate with and interpret through appropriate symbols, including language; and b) the ability to plan and manage one's own work. Finally, the interaction that occurs between a "tutor and tutee" (p. 6) by which the norms or traits of the culture are transmitted, whether systematic and incidental, is important for overall development.

Vygotsky's (1987) theory of optimal learning challenges Piaget's suggestion that learning and development progress via a process of unfolding. Instead of the teacher initiating the learning situation, Vygotsky suggests that the child must initiate learning through exploration with the teacher offering support. Vygotsky's *zone of proximal development* (ZPD) attempts to address the child's future capacity to learn from instruction. The ZPD describes "the discrepancy that exists between the child's performance on a task at any given point in time, and the child's potential level of performance given appropriate instruction" (Hargreaves & Zimmerman, 1992, p. 379).

Psychological developmental theories deal primarily with logical and scientific reasoning and thinking. In the theories mentioned above, few, if any, of these theoretical views directly address the development of creative thinking and artistic skills. Hargreaves (1986a) suggests that, compared to other areas of learning and instruction,

there is an insufficient amount of developmental theory geared toward guiding and verifying instructional practice in the arts and, specifically, music.

Theories of Musical Development

The psychological theories of human development provide an important basis for assumptions concerning musical learning, skill acquisition, and effective music instruction (Davidson, 1994). They corroborate theories of musical development that deal with the nature of musical response and participation (Hargreaves, 1986a). An examination of music learning should therefore, include consideration of *how* the brain processes perceptual information and stimuli.

Cognitive psychology deals with the mental operations and strategies behind the behavioral response to a particular stimuli. The study of music from a cognitive psychological viewpoint involves consideration of the schemas that provide the foundation for musical skills and responses. In a musical context, schemas represent concrete information needed to perform, produce, and understand particular musical norms and styles (Hargreaves & Zimmerman, 1992; Radocy & Boyle, 1997; Wiggins, 2001). Schemas develop from early exposure to music within one's culture. Children form musical schemas from their experiences and involvement with music at home, with their peers, through the media, and through instructional experiences they may receive from school or private lessons.

Theories of musical development generally acknowledge the universality of music based on evidence of the early acquisition of music and language skills. They also address the development of musical skills through training and experience and the cognitive constructs of skill acquisition and refinement (Dowling, 1999; Sloboda, 1985).

Theories pertinent to these ideals include developmental and learning models by Swanwick and Tillman (1986), Serafine (1988), the symbol systems approach (Bamberger, 1982; Davidson & Scripp, 1988; Gardner, 1973), and constructivism (Webster, 1998; Wiggins, 2001).

Based on an extensive analysis of hundreds of children's compositions over a period of several years, Swanwick and Tillman (1986) generated a theory of musical development that follows a discernible succession of age-dependent stages. Their model of musical development draws on several theories and music-related studies, including those of Piaget (1951), Bruner (1966), Ross (1984), and Moog (1976). Swanwick and Tillman propose spiral-like, four-tiered developmental "transformations [that] are both cumulative and cyclical" (Swanwick, 1988, p. 64). The model is based on the four elements of Piaget's play theory: mastery, imitation, imaginative play, and metacognition. Within the four major elements are eight "developmental modes" (p. 332). Each developmental mode represents shifts that occur as the child progresses from an egocentric, idiosyncratic mode of learning to learning that is more structured and involves formal types of musical experiences (Hargreaves, 1990; Swanwick & Tillman, 1986).

The first level of music development in Swanwick and Tillman's model involves the child's mastery of basic responses to sensory information. Initially the child engages in random exploration of timbre, dynamics, and sound sources and eventually exhibits some degree of control for manipulating these elements. The second level reflects the child's ability to imitate things within his/her environment as a means of personal expression. Unstructured imitation and uncoordinated musical gestures are spontaneous

characterizations of the child's own self-expression. With experience and maturity, the child begins to formulate modes of personal expression by incorporating melodic and rhythmic patterns. These musical patterns include elements that are recognizable and predictable within the musical norms of the child's culture (Swanwick & Tillman, 1986).

Imaginative play represents the third level and encompasses the child's ability and willingness to create rather than imitate. Here experimentation and exploration are preferred over imitation and repetition. Stylistic features, idiomatic patterns, and a discernible attempt of control over structure in music making are characteristic of the latter developmental mode at this level.

The final level of the spiral is metacognition. Metacognition pertains to the child's increased awareness of musical experiences and developing musical thinking skills. Due to a heightened sense of self-awareness and the ability to reflect on one's self and others, the child has the capacity of making meaningful connections with his/her musical experiences in ways that are intensely profound and symbolic. The final mode of development involves the ability to reflect consciously and to make informed decisions about one's musical experience through the systematic and complex use of musical materials (Swanwick, 1988; Swanwick & Tillman, 1986).

The differences in compositional abilities and musical understanding between children and adults are governed largely by cognitive rather than physical capabilities (Serafine, 1988). Serafine (1988) advocates a theory of music cognition that characterizes music as "*thinking* in or with sound" (p. 69). As such, it is manifested through and serves as a foundation for the activities of composing, listening, and

performing. She asserts that composing and listening "embody the clearest and most exemplary functioning of... musical thought" (p. 71).

Serafine describes two types of musical thinking: temporal and nontemporal. Temporal processing involves thinking with sounds that are both simultaneous and successive. Non-temporal processing concerns the internal structure and analytical properties of a given piece of music that are not connected to temporal elements. In terms of musical development, Serafine's studies show, for the most part, nontemporal processes develop earlier in children than temporal processes. By age 5, children are able to understand music in a global, nontemporal sense. Temporal processes, which require more careful monitoring and attending of minute changes or patterns in notation, develop by age 8.

In a study investigating the correlation between closure and conservation tasks, Serafine (1988) provided a developmental progression of musical capabilities in children. She recognizes a critical period of music cognition occurring around age 8 when, in terms of musical development, children become familiar with the melodic schemas that are characteristic of their culture. Between ages 7 and 9, children are generally able to categorize musical pieces by differences of meter. By age 9, children are able to discern between tonal and non-tonal melodies. Another important facet of Serafine's theory is her firm belief in the universality of music. She states:

> I have argued that not only "enjoyment," "preference," or "perception" are universals in music, but that specific processes form the core of understanding common to members of a musical community. In my view, such processes are analogous to acquisitions such as language and concepts of space,

> time, number, and so on, rather than to special, individual talents found in devotees of sport or poetry. (Serafine, 1988, p. 234)

As previously mentioned, cognitive processing models address the ways that humans experience, perceive, think about, and understand their environment. Therefore, theories of cognition take into account the mental representations that are created as a result of the learning process (Ormrod, 1999).

The symbol systems approach to musical development is based on the acquisition and use of objects, feelings, or concepts, such as those found in words, pictures, gestures, music, or mathematics. The symbol "can denote itself, as well as other aspects of the world" (Gardner, 1973/1994, p. 128). Symbols may be either referential or systematic. The use of symbols is dependent on *object permanence* and *modal-vectoral sensitivity* (Gardner, 1973, p. 127). Gardner (1973) defines *object permanence* as "recognition that the world is composed of objects that endure" (p. 127) and *modal-vectoral sensitivity* as the ways in which "various aspects of contact, proximity, and intersection are felt phenomenally" (p. 127) and recognized in other objects or persons.

Modal-vectoral sensitivity can be represented referentially and systematically. Referentially, one is able to make associations across different sensory modalities, such as when a response made in one mode of perception (e.g. visual) is associated with a response to an event or object in another perceptual mode (e.g. aural) (Gardner, 1973/1994; Gardner & Wolf, 1983; Hargreaves, 1986a). Systematically, associations are made within the same mode of perception (e.g. visual to visual or aural to aural). An example of a systematic example might be a stop sign. The sign itself – the shape, color, four white letters - indicates a specific function or action: to stop. In a different context,

however, the same sign could be used to represent a figurative or symbolic stop instead of a literal one. Perhaps the stop sign could be modified and displayed as artwork. In his summarization of the symbol systems approach, Hargreaves (1995) suggests "it probably makes more sense to characterize the symbol system approach as a body of research with a distinct set of theoretical assumptions than as an explicitly stated theory" (p. 31).

The fundamental concepts of the symbol systems theory are identified through the nature of children's use of symbols, particularly how they are organized and related to a type of artistic expression (Hargreaves, 1990). Gardner (1973) recognizes the use of symbols as a developmental milestone for young children and he suggests that artistic development can be explained by what happens within a symbol system. Developmental trends in children's invented notations indicate that they are "symbolic representations" and susceptible to change after the onset of musical instruction (Domer & Gromko, 1996; Hargreaves & Zimmerman, 1992). Domer and Gromko (1996) found that invented notations "seem to be evidence that children are connecting their psychological perception of sound with a symbolic representation of sound" (p. 72). Numerous studies support the idea that children's use of invented musical notation is indicative of their musical cognition (Bamberger, 1999; Davidson & Scripp, 1988, 1989; Upitis, 1987, 1992).

Gardner recognizes two general stages of artistic development: pre-symbolic and symbolic. Between birth and 2 years old, the pre-symbolic child begins to create and interpret symbols. From 2 to 7 years old, the child experiences a type of reorganization and refinement of skills within the symbol systems of his/her culture (Gardner, 1973; Hargreaves & Zimmerman, 1992). The symbolic development achieved at this stage

"implicates processes that will continue to operate in analogous fashion throughout the child's life" (Gardner, 1973, p. 131).

All through development, the child may continue to respond and/or create in ways that are pre-symbolic. The acquired knowledge of the rules and structure of a symbol system superimposed on the pre-symbolic child's need to explore, experience, construct, and reconstruct becomes fundamental to nurturing artistic development (Gardner & Winner, 1982). A unique function of the arts lies in the fact that an individual can continue to engage in activities or objects that incorporate both pre-symbolic and symbolic experiences.

While children lack the scope of experience, years of practice, and level of musical understanding comparable to trained adult musicians, their capacity to engage in musical thinking and creative processes is no less important or profound. Research reveals that "children's musical thinking is not necessarily less sophisticated than that of adults': rather, children's musical thinking is different in ways that are important creatively" (Burnard, 1999, p. 106). Despite limited performance experiences and a restricted command of conventional musical symbols, several studies indicate that, given the opportunity, children are capable of inventing their own representations to complete or cohere their limited understanding of music notation and the expressive elements of music (Davidson & Scripp, 1988, Gardner 1982, Hargreaves et al., 1981; Serafine, 1988; Swanwick & Tillman, 1986; Upitis, 1992).

Davidson and Scripp (1988; 1989) propose a symbol systems model of musical development based on their study of children's invented representations of music. They describe these representations as "windows on music cognition" (Davidson & Scripp,

1988, p. 195). Their research indicates a significant shift in cognitive skills occurs around age 8, involving changes in perception and performance abilities.

> Taking two dimensions together – perception and performance – we can characterize children's musical development as progressing rapidly through parallel stages of increasingly systematic knowledge. This development is measured by the emergence of a stable tonal framework. (Davidson & Scripp, 1988, p. 199)

Children's use of intuitive knowledge is considered an important part of their musical development. In general terms, intuition is defined as: a) spontaneous insight and understanding, b) the passive development of a store of knowledge over time based on previous experience, and c) a cognitive process that occurs without the conscious use of logical or rational thinking (Hogarth, 2001). Bamberger (1999) suggests that, through musical intuition, children are able to make sense of the music making process with little or no formal training. The manifestations of a child's musical intuitions are relative to his/her capacity to interpret and/or create novel musical situations in the context of everyday life. Bamberger recognizes two types of intuitive representations of music: figural (a broad grouping together of musical ideas into units) and metrical (grouping music ideas rhythmically).

Models of Creativity and Creative Thinking

The definitions for creativity and the general application of the term itself are varied and, for the most part, overused (Hargreaves, 1986a). Creativity is characterized often in terms of a type of problem solving that is testable, measurable, and contingent on a supportive learning environment (Jeanneret, 1997). Hargreaves (1986a) offers a

psychological definition of creativity based on two criteria: the attributes of the product and the personal characteristics of the individual. Gardner (1993) describes one involved in the creative process as "a person 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 in a particular cultural setting" (p. 35).

Graham Wallas (1926) outlined a prominent theory of creativity involving four stages, each representing conscious and unconscious elements of the creative process: preparation, incubation, illumination, and verification. Preparation entails the broad, informal collection of material pertinent to solving or investigating a problem. The incubation stage involves the conscious diversion of one's attention *away* from the problem and allowing the unconscious mind to dominate by engaging in unrelated, albeit, personally enjoyable activities. The third stage, illumination, is that unexpected, yet decisive moment when a creative solution appears for the problem. The final stage, verification, is the refinement, making adjustments, and authentication of the solution for practical application. In describing the inherent nature of the creative process for all individuals, Wallas states:

> In the daily stream of thought these four different stages constantly overlap each other as we explore different problems. An economist reading a Blue Book, a physiologist watching an experiment, or a business man going though his morning's letters, may at the same time be 'incubating' on a problem which he proposed to himself a few days ago, be accumulating knowledge in 'preparation' for a second problem, and be 'verifying' his conclusions on a third problem. Even in exploring the same problem,

> the mind may be unconsciously incubating on one aspect of it, while it is consciously employed in preparing for or verifying another aspect. (pp. 81-82)

Various models have also investigated creativity through the perspective of the person, the process, and the product (Balkin, 1990; Davidson, 1994; Kratus, 1990; Richardson, 1996). There are additional studies (Csikszentmihalyi, 1996; Elliott, 1989; Gardner, 1982; Hickey & Webster, 2001; Mooney, 1963; Webster, 1987) that extend the dimensions of creativity to include a fourth, that being the environment. The creative environment is situational as well as contextual. It not only encompasses the place where creative activities occur but also the conditions, whether natural or controlled, under which creativity is sparked and/or sustained (Taylor, 1988).

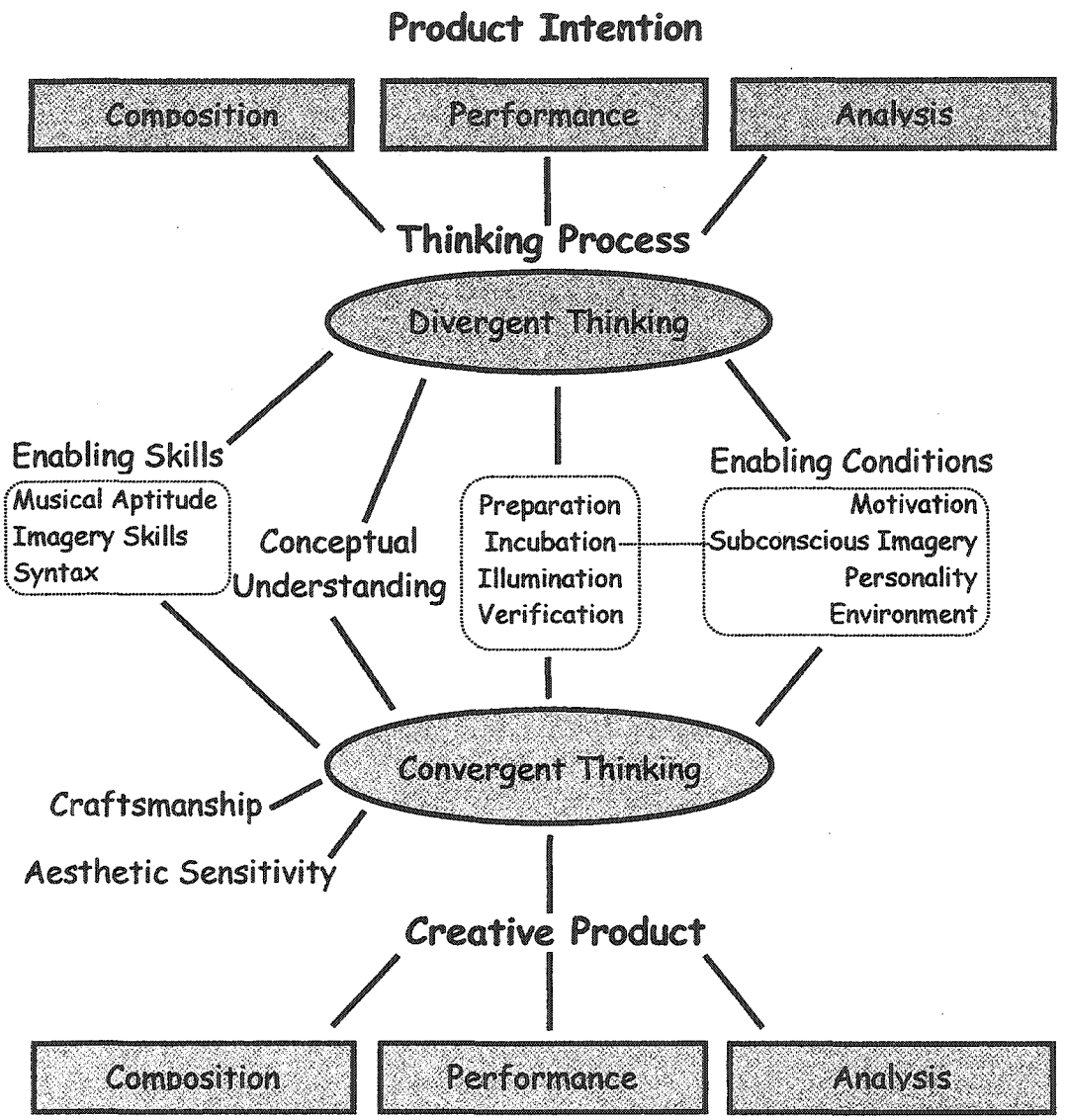
Webster (1987) recommends a model for creative thinking in music based on the individual's "inherent ability to think creatively in music" (Hickey & Webster, 2001, p. 19). His model is built on the intentions and outcomes of creative activity and is delineated by the thinking process, enabling skills, enabling conditions, and the movement between convergent and divergent thinking.

In the model (see Figure 1), creativity is initiated by an individual's intent or goal for the final product, whether composition, performance, or analysis. However, Webster (1987) stresses that "the emphasis (of the model) is less on the musical properties than on the creative expression as a function of the thought process" (p. 161).

A very important element of the model is that the creative thinking process engages both divergent *and* convergent types of thinking. Divergent thinking involves the ability to generate multiple solutions or ideas for a particular problem. Convergent

Figure 1

A Model of Creative Thinking in Music (Webster, 1987)



thinking involves the ability to consider numerous possibilities and distinguish the best possible solution (Webster, 1987).

As the musician begins to engage in divergent thinking, there are four primary affecting elements. First, the person's enabling skills, his/her capabilities, musical development, and previous experiences set in motion the thinking process. Second, conceptual understanding, the factual knowledge a person possess beyond his/her musical understanding, impacts the thinking strategies.

Third, Webster incorporates Wallas' stages of creativity: preparation, incubation, illumination, and verification; exemplifying the conscious and subconscious aspects of creative thinking. As the thinking process moves from divergent toward convergent thinking, ideas flow back and forth through these stages until eventually the individual feels he/she has found a suitable solution.

The fourth major element involves the conditions that support or encourage creative thinking. The enabling conditions include motivation (intensity of interest, goal orientation), personality (individual preferences, the degree to which one is willing to take risks), imagery (the ability to imagine and/or think in sound), and the environment (the circumstances and context of the creative activity).

Webster's model conveys how the creative product is influenced by an individual's ability for (craftsmanship) and sensitivity to (aesthetic sensitivity) making meaningful aesthetic decisions. Craftsmanship is characterized by: a) depth of conceptual knowledge, b) "sensitivity to complex musical relationships" (Webster 1987, p. 163), and c) facility with the symbols of music. Aesthetic sensitivity involves the

capacity to communicate appropriate emotional responses that correspond to the overall product. Webster (1987) identifies it as "the ability to sustain a sense of musical growth and direction over a long period of time" (p. 163).

As the individual narrows down the options and possibilities encountered throughout the creative thinking process, all of these affecting elements and components *converge* toward achieving the overall intent or purpose of the creative activity. Webster (1987) explains the importance of his model in this way:

> One of the major implications of the model for child development in music is that environments that encourage divergent thinking in music are just as important as environments that encourage convergency of thought. It seems quite clear that many children have the benefit of rich opportunities to develop musical skills at home or in formal schooling... However little is done that encourages divergent thinking in music as it interacts with the more convergent aspects of musical thought. (p. 168)

Creativity and Reflective Thinking

Reflective thinking is the inhibition of impulse for the purpose of evaluating a possible solution for an action or belief (Whitaker, 1996). There are two basic aspects of reflective thinking: a) the presentation of a problem or situation that challenges the individual's belief system and causes a state of perplexity or confusion and b) an active investigation that either confirms or negates a solution to the problem or situation. Reflective thinking occurs when one learns to "consider the possibility and nature of the object seen and the object suggested" (Dewey, 1910, p. 7).

Dewey (1910) introduced a multi-phased model of reflective thinking that has influenced theories of music cognition. Dewey's model involved five distinct steps: a) being consciously aware of a problem, b) identifying and defining the problem, c) predicting a possible solution, d) testing out the prediction, and finally e) observing and reviewing the outcome. An individual's environment, coupled with his/her personal experiences, is a governing factor in reflective thinking. The relationship between past and present experience operates on a continuum that reiterates the cognitive aspects of musical understanding (Richardson, 1996). Accordingly, new learning becomes situated in an individual's store of prior knowledge and accumulated experience. It is important, therefore, that students are actively involved in their own learning process. Younker (2002) adds:

> As a person makes sense of an experience, his or her fund of intellectual, emotional and imaginative experience comes into play. The uniqueness of the situation and the individual's perception of the problem are further individualized by the experiences each person brings to that situation. (p. 163)

In cognitive science, reflective thinking techniques have been used to shed light on the cognitive processes that bring about a specific outcome or product. In the field of music psychology, reflection has been examined as "an after-the-fact heightened awareness of some aspect of music thought to be important for its understanding" (Serafine, 1988, p. 36). In these terms, reflection is a determinate and motivator for understanding "how music works, [and] what it is made of" (p. 52). The analysis of

reflection with the music thinking process is central to understanding the unique nature of music. Serafine (1988) states:

> Let me emphasize that the act of reflection/analysis is capable of telling us a great deal about the cognitive organization of music. Indeed, insofar as a musical composition is a record of some person's musical thoughts, we may expect formal analysis to elucidate the structure of such compositional thought. But the mere *artifacts* or *reductions* that result from analysis, such as scales and triadic chords, are not to be confused with the *elements* of music or of thought per se. (p. 55)

Richardson (1996) suggests a model for the thinking and problem-solving strategies of creative behavior based on John Dewey's views of reflective thinking. The model has two primary components, the *person* and the *process.* The *person* component concerns how an individual engages in reflective thinking or how he/she confronts the new experience through the perspective of previous musical experiences. For the person, the cognitive, affective, and aesthetic elements of previous musical experiences become integrated and provide continuity with the new musical experience.

The *process* is the actual musical experience and involves the individual's ability to anticipate, compare, predict, and evaluate. The individual makes associations and comparisons about the ongoing musical experience and then predicts a viable outcome based on the sensory information received and his/her store of knowledge (Richardson, 1996). Possible outcomes are the result of imagining or anticipating the event as it unfolds. Throughout the process, the individual continually evaluates the outcome based on the interactions that occur between anticipation, comparison, and prediction. Through

analytical reasoning and reflective thinking the individual is able to narrow down the most logical description or judgment of the experience (Richardson, 1996).

Whitaker (1996) proposes another theoretical model of musical thinking closely tied to Dewey's concept of thinking. It draws on Dewey's seven phases of reflective thinking: pre-reflection, suggestion, intellectualization, hypothesis, reasoning, test in action/imagination, and post-reflection. In Whitaker's model, reflective thinking is a distinctive process affected by the accumulation of experience and interaction with the environment. She offers three considerations for applying reflective thinking principles to music teaching and learning. First, it is important to acknowledge the impact of accumulated experience, training, and creativity have on individual's musical understanding and ability. Second, the musical learner needs direct, hands-on musical experiences including performing, creating, listening, and re-creating. Third, it is important to practice reflective thinking as a way of approaching problems with multiple interpretations and to encourage good decision-making (Whitaker, 1996).

Constructivism

Constructivism is a learning theory that emphasizes meaning-making, whereby individuals create or construct their own knowledge by building on what they already know (Abdal-Hagg, 1998). It emphasizes thinking and learning that is situated in activity (Webster, 1998). Constructivism focuses on student-centered learning and encourages cooperative learning environments, stresses the process over the product, and asserts that learning is situated in activity (Constructivism, n.d.)

Webster (1998) summarizes the implications of constructivism for music educators. For instance, instead of a teacher-centered approach of fact-telling and

listening to musical examples, an interactive, group-centered environment might include activities such as improvisation, composition, technology-based collaboration over the Internet, and student-led sessions.

Wiggins (2001) suggests that a constructivist classroom might include:

1. Students interacting with and learning from their peers as well as the teacher.
2. Students working independently.
3. Students dealing with subjects within accurate contexts and in ways that enable them to construct their own meanings.
4. Students understanding the context of new learning, knowing why they're learning what they're learning, and assessing their own learning.
5. Instruction that puts learning and problem solving in real life contexts.

In any case, the primary goal for approaching music learning and teaching from a constructivist point of view is to engage children in constructing their own understanding of music by allowing them to make aesthetic decisions of their own and to provide them opportunities to apply the information in creative ways (Webster, 1998).

Metacognition and Self-Regulation

Metacognition and self-regulated learning are closely associated with Dewey's views on reflective thinking. Metacognition is a descriptive term for "how humans think about and control their own thought processes" (Anderson, 2002, p. 1). Ormrod (1999) stipulates that the degree to which an individual engages in metacognition is dependent upon several factors including a complex core of knowledge and skills and one's self-awareness of limitations in learning and memory capabilities. Other important components of metacognition include a) knowing the most effective learning strategies

for one's self, b) having the ability to plan and put into action a successful approach toward accomplishing a task, c) being able to monitor what one knows and how well one knows it, and d) having the ability to effectively retrieve previously learned material (Ormrod, 1999).

Self-regulated learning is a quickly advancing area of cognitive study that offers a practical model for how skills are acquired and learning is fostered. Zimmerman (1986) describes self-regulated learners as "metacognitively, motivationally, and behaviorally active participants in their own learning process" (p. 308). Self-regulation is not a measurable skill like mental ability or academic performance, but a self-generated process initiated by an individual with the intent of attaining a goal (Zimmerman, 2002). Self-regulation is viewed as an individualized and "context-specific set of processes" (McPherson & Zimmerman, 2002, p. 328) that learners use to make their learning more effective.

The utilization of self-regulatory learning practices is relevant to helping students become personally motivated, develop perseverance and inventiveness, and become independent thinkers (McPherson & Zimmerman, 2002; Pogonowski, 1989). Self-regulatory skills allow students to learn to initiate, adjust, and maintain learning strategies that benefit them on a personal level and in real world situations. In order to help students become independent learners in music, it is important for teachers to understand the nature of self-regulatory and metacognitive processes that facilitate musical learning and skill acquisition (McPherson & Zimmerman, 2002).

Metacognitive and reflective processes of learning can be like

> ...silent conversations we have with materials as we are building, fixing,

> or inventing. As we handle these materials, arranging and rearranging them, watching them take shape even as we shape them, we learn. The materials "talk back" to us, remaking our ideas of what is possible. (Bamberger, 2000, p. 2)

This "talk back," by Bamberger's (2000) description, is what prompts an evolving, spiral effect between internal and external activities, representing the metacognitive and self-regulatory processes involved with learning and skill acquisition. Eventually, these evolving events lead the learner to revise or re-evaluate his/ her actions or intentions (Taetle & Cutietta, 2002).

There is a growing body of research that advocates the importance of asking children to reflect on and to talk about their activities, perceptions, or creations as a means of providing clues about their ongoing thinking processes (Freed-Garrod, 1999a, 1999b; Pogonowski, 1989; Welzel & Roth, 1998). The use of verbal protocols (thinking out loud) can serve as a meaningful way to gain better understanding of musical thought processes (Whitaker, 1996). Interviews may be designed with clarifying questions to target a person's thought processes during a compositional task (Manzo, 1998; Whitaker, 1996). Pogonowski (1989) cites some important reasons for asking students to reflect on their musical activities.

> One of the most important components of a creative music strategy…is the degree to which we invite them to reflect upon their musical thought processes… By engaging them in "why," "how," and "what" questions, we encourage students to plan ahead, to monitor their own behavior and openly evaluate outcomes. (p. 12)

Children's Compositions

Numerous studies have shown that children's compositions and representations of abstract musical ideas are descriptive of their level of musical understanding and thinking (Bamberger, 1982, 1999; Burnard, 1999; Davidson & Scripp, 1988; Upitis, 1987, 1992; Wiggins, 1994). Gamble (1984) indicates that the active use of musical materials and ideas is directly related to developing musical understanding. He states

> *Composition* is, I believe, of central importance in music education, for it helps to develop an insight into the very nature of music by involving students in a very intimate way with music and directly confronting them with the problems of making or inventing an expressive and coherent music object (i.e., a composition). In the process of manipulating musical material, in developing, shaping and structuring musical ideas, in forming relationships between ideas, children are using imagination, intelligence and feeling. Composing, after all, is *thinking in sound.* (pp. 15-16)

Composition has been described as a process where ideas are generated, tried, discarded, and/or modified until an acceptable solution is found (Sloboda, 1985). Studies investigating the compositional practices and methods of musically trained adults suggest that creative decision-making is integral to the act of composing (Davidson & Welsh, 1988; Gardner, 1983; Paynter, 2000; Sloboda, 1985). It would stand to reason that children also engage in creative decision-making skills when they compose. Whereas an adult musician's degree of skill acquisition, depth of understanding of the conventional rules and principles of music, level of experience, and years of practice assist the

compositional process and outcome, children seem at an obvious disadvantage due to their lack of acquired skills and experience.

Early investigations into children's music-making endeavors failed to differentiate and often disagreed about the differences between compositional and improvisational behaviors (Burnard, 1999). Subsequent research with clearly defined research protocols for children engaged in composing activities has helped to identify and delineate between compositional and improvisational processes and products (Kratus, 1989; Webster, 1987). Two areas of distinction are a) composition involves the revision of ideas and b) the intent of the compositional product is that it will or can be replicated. Whereas Kratus (1989) operationalized improvisation as "trying one new musical idea after another" (p. 17), Webster (1992) characterized composition as a process of generation, review, and adaptation of musical ideas toward the goal of a final product. This distinction is important since it helps to define the intent of the process and the final product.

Composition and Music Instruction

Over the years, the value and usefulness of composition in music education have been portrayed in a variety of ways: a) an expression of creativity, b) a way to introduce students to the music and methods of contemporary composers, c) a way to increase musical understanding and encourage musical thinking skills, and d) a means of developing compositional skills through musical analysis (Barrett, 1998). Whereas educators aspire to make learning experiences more meaningful and productive for students, music composition is itself a process where the *doing* is as important as the content (Moore, 1989; Wiggins, 1990).

Comparatively, the nature of music composition has much in common with the way other subjects in the curriculum are taught:

> In today's reading and writing programs, children deal with the concepts of main ideas, sequencing, classification, and categorizing. Music composition also helps students gain control over these intellectual tools. It is especially similar to programs that emphasize "process writing"; when composing, students brainstorm (in groups and as individuals), write rough drafts, edit and revise, and create finished products. (Wiggins, 1990, p. 1)

Studies have shown that musical training and experience are not necessarily precursors to highly creative behavior or outcomes. Barrett's (1996) study with 137 elementary-age children found that, even though some of the children had no formal musical training and little musical experience, they were able to produce compositions that demonstrated a certain degree of complexity in terms of their "experimentation with and synthesis of musical ideas" (p. 56). By comparison, compositions by students who had taken several months of private lessons were less experimental, more repetitive, and lacked evidence of the development of musical ideas.

In her study on the relationships between children's musical thinking processes and creative products, Hickey (1995) reported that she found no connection between subjects' musical experience and the ratings they received for creativity and craftsmanship. Hickey examined the musical thinking processes of 21 fourth and fifth grade students with the quality of their musical compositions. The compositions were produced on MIDI synthesizers and recorded with a specially-designed computer

software program. Quantitative and qualitative procedures were used to rate the compositional qualities of the pieces in terms of creativity, craftsmanship, and aesthetic appeal. The students whose compositions were rated most creative exhibited more fluency and flexibility in their generation of musical ideas, were more experimental, and demonstrated a higher level of craftsmanship.

In contrast, Kratus' (1994) quantitative and qualitative investigations of children's compositions led him to conclude that age and musical experience largely determine the *process* and the *product*. Examination of *process* focused on the creative activity that occurs while one is composing while analysis of the *product* involved a description of the musical characteristics of the composition. Kratus (1989, 1996) interpreted the compositional process for children as linear in nature and comprised of exploration, development, repetition, and silence. In his studies, Kratus used a time analysis technique to document a) the repetition and development of melodic and rhythmic motives or patterns, b) evidence of exploration, and c) periods of silence throughout the music making process.

Sudin (1998) developed a research design that addressed the unconscious and conscious music making activities of a group of preschool children. He incorporated non-participant observations to examine unconscious, spontaneous music activities. Sudin observed conscious music making activities in the children by asking them to sing familiar songs or make up new ones. To put his observations in context, Sudin solicited feedback from the parents and teachers regarding each child's musical interests, experiences, and abilities. Sudin and Kratus both used methods that monitored and recorded each specific event in the child's composition or original music making.

The importance of musical composition activities is evident in the general music curriculum. Compositional tasks serve as a means of helping children bridge their musical intuitiveness with the formal aspects of music learning. Swanwick and Franca (1999) characterize this fluctuation between informal and formal learning as "an exercise in imaginative play" (p. 14), which offers opportunity for freedom of expression. They state: "Composition gave the opportunity for assimilation to take over, as it was the student who decided – either consciously or not – what musical elements would be articulated and how" (pp. 14-15).

When given the opportunity to compose within a comfortable range of their musical and technical abilities, children have demonstrated a level of musical understanding that reached toward the "upper limit of (their) development" (Swanwick & Franca, 1999, p. 13). Swanwick and Tillman (1986) found that children "explored the stimuli given whatever way their intellectual and affective impulse led them to, letting intriguing musical richness, variety and interest flourish" (p. 13).

Composition, Technology, and Music Education

The power and influence of technology is continuing to reshape the environment and culture. The implications of the transition from the Industrial Age to the Information Age include: a) an emphasis on brain power versus physical power, b) a multidimensional, interactive mode of working and learning versus a linear, cause-and-effect approach; and c) organization by networks versus hierarchies (Moore, 1989; Naisbitt, 1982). Similarly, technology is changing the nature and organization of music instruction.

Webster (2001) offers a definition for music technology as "inventions that help humans produce, enhance, and better understand the art of sound organized to express feeling" (¶5). As a tool, technology provides individuals "a way of engaging with music in an effort to improve the musical experience while always respecting the integrity of the art" (Webster, 2001, ¶5). Through technology, teachers can create learning environments where children have access to new tools and a means for developing their own creative experiences through discovery and simulation (Moore, 1989).

Composition through technology is particularly suited for experiential, active learning. As students are able to edit, configure, manipulate, and re-create musical sounds and ideas, their compositional capabilities become limitless. Moore (1989) likens this kind of learning environment to a science lab, where learning comes by experimentation and discovery, where individual differences and interests are accommodated, and where small and large group instruction scenarios are still possible.

Amabile's Consensual Assessment Technique

There are several models for and theories about the assessment of creativity. Many attempts to measure and assess creativity have been influenced by the model for creativity and divergent thinking proposed by Guilford in 1950. Creativity tests often involve personality tests, biographical inventories, and behavioral assessments (Amabile, 1983, 1996; Bangs, 1992).

Citing informal evidence from personal accounts of highly creative people, Amabile (1983, 1996) developed a social psychological approach to creativity assessment called consensual assessment technique (CAT). The CAT focuses on the social and environmental conditions that influence creativity. The important, recurring elements in

her research have to do with the roles of intrinsic and extrinsic motivation on creative behavior: "Whatever an individual's talents, domain expertise, and creative thinking skills, that individual's social environment – the conditions under which he or she works – can significantly increase or decrease the level of creativity produced" (Amabile, 1996, p. 17). There are three major components in Amabile's framework of creative activity. They include: domain-relevant skills (skills that are specific to a particular field), creativity-relevant skills (skills related to problem-solving, learning, and thinking), and task motivation (an individual's attitude or perception of the task) (Amabile, 1983).

Amabile's assessment technique is based on the subjective assessment of the creative product. In her consensual definition of creativity, she asserts:

> A product or response is creative to the extent that appropriate observers independently agree it is creative. Appropriate observers are those familiar with the domain in which the product was created or the response articulated. Thus, creativity can be regarded as the quality of products or responses judged to be creative by appropriate observers, and it can also be regarded as the process by which something so judged is produced. (Amabile, 1996, p. 33)

The primary elements of the CAT include a) selecting an appropriate task, b) selecting appropriate judges, and c) establishing interjudge reliability for areas being assessed. In selecting the task, Amabile (1996) offers three criteria:

1. The task must lead to an observable outcome that can be assessed.
2. The task must be open-ended to encourage flexibility and originality.
3. All subjects must be able to adequately perform the task.

Amabile (1996) gives five criteria for the judges:

1. The judges must be familiar with the domain and function as outside observers to the study.
2. The judges must make their assessments independently, without training or interference from the researcher, and without specific criteria for rating creativity.
3. In addition to creativity, the judges must rate other aspects of the product (i.e., aesthetic appeal, technical goodness).
4. The judges should rate the products relative to one another rather than by a preset standard.
5. The products and rating categories should be presented to the judges in random order.

After the judges have assessed the products, their ratings are analyzed for interjudge reliability. It is important that the ratings are reliable since, by definition, "interjudge reliability in this method is equivalent to construct validity" (Amabile, 1996, p. 43).

One of the appealing aspects of the CAT is that it offers a general methodology that can provide subjective yet reliable evaluations of creativity across a broad range of domains and tasks within domains (Amabile, 1996). Amabile has successfully used her technique to evaluate products in verbal creativity (storytelling, prose reading), visual arts (line drawings, paintings, still-life sketches), and problem solving (computer programming, high-tech services, business solutions, unique problem-solving scenarios and inventions). The CAT was used in this study because of its use in other compositional studies (Auh, 1995; Brinkman, 1994/1995; Hickey, 1995; McCoy, 1999;

Priest, 2001) and its degree of reliability for assessing creativity in other domains (Amabile, 1996).

Summary and Conclusion

The examination of children's compositions provides insights into how and what they think about music. The creative strategies children use to re-present musical ideas and concepts are relevant to what they understand musically. Composition can be an effective means of fostering creativity through music. Nonetheless, it is unclear about *how* teachers can and should use composition to encourage children's creative abilities. More often than not, lack of experience with or knowledge of appropriate teaching tools discourages music educators from embracing the limitless potential of compositional activities for their students. Borkowski (1992) suggests that: "Understanding is constructed through interactions with the more competent problem solver" (p. 255). If music educators are able to recognize and understand the creative processes that are involved when children compose, they may be more likely to provide meaningful and appropriate opportunities for their students.

This chapter provided a review of the literature that is pertinent to this study. The following chapter outlines the methods, procedures, and data analyses that were used to examine the creative and musical elements of children's compositions.

CHAPTER THREE

Methods and Procedures

The focus of this study was to explore the creative processes and musical thinking skills of children when they composed a simple melody. Chapter 3 will describe the research methods and procedures that were used to address the purpose of the study. The methods used for gathering the information from the various data sources is presented and discussed in this chapter.

Research Background

There is some controversy about how creativity should be assessed and measured. Quantifying creative abilities through psychometric measures and qualitatively documenting behavior are two methods commonly used to study creativity. However, creativity involves thinking skills that cannot be assessed solely by test scores or through the observation of isolated, non-contextual behavior (Webster & Richardson, 1993). The analysis of abilities such as musical thinking and creative problem solving requires adaptive investigative procedures.

Studies involving the scope and nature of children's compositions often include both quantitative *and* qualitative analyses. Quantitative analysis objectively measures the types and frequencies of decisions that children make when they explore, modify, and test musical ideas for composition. Qualitative analysis provides a subjective representation of the decision making process as it relates to a person's "musical experience and contextual knowledge" (Kratus, 1994, p. 117).

The musical conditions and nature of the compositional task in this study were intended to provide the children a familiar context within the parameters of their musical

understanding and abilities thus enabling them to draw on musical skills that they had experience with or had mastered. This chapter will outline the methods and procedures that were used to examine the compositions of the children participating in this study.

Study Protocol

Children, between the ages of 8 and 12, voluntarily participated in this study. The study group initially involved 45 students from six elementary schools in Oklahoma. Four students participated in the pilot study and one student dropped out after the study began, making the sample size for the main study $N = 40$. The students were enrolled in *MIDI for KIDS®* (*MFK*), a private, after-school music program. The classes met once a week for 30 to 45 minute sessions. Some of the students in the study participated in a week-long *MFK* summer camp at the University of Oklahoma.

A Principal's Letter (Appendix B) was sent to each of the principals of the participating schools for approval prior to soliciting student involvement. The researcher provided a brief introduction of the study to each *MFK* instructor (Appendix C). The MIDI instructor distributed parental consent forms (Appendix D) and family letters and family questionnaires to the students (Appendix E).

The school's general music teacher and the *MFK* teacher assisted the researcher by providing additional information to the students about the study if needed, encouraging voluntary participation, and distributing and collecting consent forms and family questionnaires. The teachers also helped in scheduling times for the researcher to meet with the students.

Although from varied social environments, all children enrolled in the *MFK* after-school program pay a monthly tuition. In the case of participants from the MIDI camp,

each student was given a brief pretest interview by the researcher (Appendix F). A posttest interview was used to solicit the student's overall impression of his/her compositional process and product (Appendix G).

Glover (2000) notes that to make sense of children's creative efforts, the context of the cultural and musical influences in their environment must be considered. The context also involves the conditions that provide the stimulus or motivation for a composer's creative endeavor. Conducting this study in the context of the *MFK* classes was considered an important element of naturalizing the observed processes and resulting products. In order to maintain an experimental situation close to the actual learning environment, the researcher conducted initial observations of *MFK* classes to acquire a feel for the classroom environment and procedures. Participants tested in or near their *MFK* classroom and during regular *MFK* class time.

Administration of the Study

The researcher prompted each student with a prepared script of instructions outlining the procedure and expectations of the study (Appendix H). Each child was instructed to compose a melody using any of the black keys on the MIDI keyboard. Before beginning, the participant was allowed to experiment with the sounds of the black notes on the keyboard. During this time, the student also had the opportunity to ask questions for clarification, if needed.

Each child was asked to make up a melody to go along with a simple, digitally-recorded MIDI accompaniment. A professional composer, who had experience writing similar accompaniments for the *MFK* curriculum, composed the accompaniment. The accompaniment had a 2-measure introduction followed by two 4-measure phrases. The

meter was 4/4 and the tempo was set at 110 beats per minute. The accompaniment used a simple harmonic structure and was played in a bluegrass style using digitally-generated bluegrass instrument sounds. The purpose for using the accompaniment was to provide a harmonic and structural context for the composition task. The use of similar type accompaniments is consistent with improvisational and compositional activities used in the *MFK* curriculum.

Each student used headsets that were connected to the MIDI keyboard in order to decrease outside distractions, to minimize stress, and to provide him/her a relatively quiet environment to work. By using a splitter in the keyboard's headphone jack, the researcher was able to listen to the student's playing on a separate set of headphones.

Students were asked to composed a melody on a digital keyboard, using only the black keys, with the accompaniment. The compositions were recorded onto an Apple G3 laptop computer with Digital Performer 3®. Students were allowed to hear playbacks of their composed melodies and make corrections onto new tracks until they were satisfied with the final result. The children were asked to play the final version of their composed melody twice.

As the composition task began for each student, it was simultaneously recorded as MIDI data onto an Apple PowerBook G3 Pismo via the MIDI sequencing and production program Digital Performer 3 (2001). For accuracy and verification, each student's session was also audiotaped. The audiotaped recordings provided an account of each child's participation in the study and helped contextualize the final musical product with the composition process.

The researcher sat at the computer, monitoring the starting of the accompaniment and recording of the tracks and documenting field notes. The student sat at a MIDI keyboard adjacent to the computer and indicated to the researcher when he/she was ready to begin recording.

After the compositional task, the researcher asked each student to reflect on various aspects of the process and the product. Verbal protocol analysis is often used to monitor an individual's thoughts *while* he/she is engaged in an activity. It has been noted in related studies (Kratus, 1989) that children may not be able to verbalize their reasons for creative decisions. However, it has also been shown that when inquiry is situated appropriately to the nature and context of the task, cognition and action are parts of the same process (Welzel & Roth, 1998). For this study, the posttest interview contained questions that were designed to guide the student to think about and comment on his/her composition - its structure, the musical elements, and the musical ideas used in the composition – as well as his/her impressions of and feelings about the composition experience.

The Pilot Study

Based on the methods and procedures outlined for the main study, a pilot study was conducted to test the construction and procedures of the evaluative tool and data analysis. The pilot study involved a smaller sample of students ($N = 4$), ages 8 to 9. Three music educators familiar with children's musical capabilities were selected by the researcher to evaluate the compositions. The researcher met with the judges individually to give instructions and distribute evaluation materials. Each judge received a set of instructions and evaluation forms (Appendix I), a CD recording of all the compositions in

random order, and a printed copy of the notation of each student's set of tracks (Appendix J). After the evaluations were completed, the researcher conducted an exit interview with each judge to gather materials and solicit feedback about the evaluation procedures and forms.

Reliability analyses were performed on the composition ratings given by all three judges (Appendix K). The level of interjudge reliability for the pilot study met or exceeded acceptable reliability of .70 (Amabile, 1996) in all areas except three. To address the areas of low reliability and based on the feedback from the judges, minor, adjustments were made to the evaluation instructions and forms. The adjustments were needed for clarification and included a slight modification of the instructions to the judges and format changes in the evaluation forms.

Data Analysis

Demographic information about the students in the study was collected from questionnaires and interviews. Questionnaires were given to students' parents and students gave pretest and posttest interviews before and after the composition task. The demographic information included gender, age, grade level, family musical activities, previous musical experience, and length of time enrolled in *MFK* classes. The data were labeled *Student Demographics*, transcribed, and categorized into subcategories (see Appendix L).

Data from the MIDI files were organized and analyzed in a format similar to a model used by Hickey (1995). These variables were labeled *Product* and are described in Appendix M.

The *Process* variables were comprised of the observed behavioral and recorded verbal responses. They included data from field notes recorded by the researcher, audiotaped recordings of the sessions, questionnaire information, and posttest interview responses. The data were transcribed and coded for common themes. An outside judge reviewed the transcripts and coding for accuracy and reliability. The variables that emerged were categorized as indicated in Appendix N.

The evaluation procedures used in main study were the same as those described for the pilot study. Three judges used an evaluative rubric to assess the musical characteristics of each child's final product (see Appendix I). The evaluative tool was influenced by the dimensions of creativity described in Webster's *Conceptual Model of Creative Thinking in Music* (Webster, 1987) and Amabile's *Components of Creative Performance* (Amabile, 1983). The judges were three music education graduate students who had varying degrees of experience working with elementary-aged children in music and had some knowledge of the objectives of the study. The judges met with the researcher individually for instructions and evaluation materials (see Appendix I). Each judge received a set of written instructions and evaluation forms, a CD recording of all the compositions in random order, and notated copies of the compositions with the accompaniment (see Appendix J). The judges independently judged the compositions according to the guidelines suggested by Amabile (1983, 1996).

The procedures used to evaluate the students' compositions were based on the consensual assessment technique (CAT) developed by Amabile (1983, 1996). Adaptations of the CAT have been used successfully in similar studies to evaluate

children's musical outcomes (Auh, 1995; Brinkman, 1994/1995; Hickey, 1995; McCoy, 1999; Priest, 2001). There are five requirements for the assessment procedure.

1. The individuals chosen as judges must have experience in the domain being assessed, although not necessarily the same level of experience.
2. During the assessments, judges must work independently.
3. Other areas in addition to creativity, such as technical aspects and aesthetic appeal, must be included as part of the assessment.
4. "Judges should...rate the products relative to one another on the dimension in question, rather than rating them against some absolute standards they might have for work in their domain" (Amabile, 1996, p. 42).
5. The products being assessed and the evaluation areas should be presented to the judges in different random sequences.

The judges used a 7-point Likert-style scale to rate the degree to which they felt each category was represented in a student's compositional example. The evaluation categories were derived in part from scoring factors used by Webster (1989) and Amabile's (1996) description of the components of creative performance, including "domain-relevant skills," "creativity-relevant skills," and "task-motivation" (p. 84). The categories were divided into two grids. Grid #1 included a combination of the domain-relevant and task motivation skills: *steady tempo*, *phrasing*, *closure*, *craftsmanship*, *harmonic changes*, *replication*, *motivation/effort*, and *originality*. The second grid included creativity-relevant skills: *musical syntax*, *musicality*, and *creativity*. Averages of the evaluations scores given by the judges were calculated for each category except

overall rating. *Overall rating* was the sum of the ratings given for the three evaluative categories in Grid #2.

The data sets used for analyses were *Student Demographics*, *Product*, *Process*, and *Judges' Ratings*. The data were modified so that all variables were quantifiable. Statistical analysis of the data sets involved the compilation of mean scores, standard deviations, frequencies, and percentages. Where applicable, Spearman's rho correlation tests were used to determine significant relationships between the *Process* and *Student Demographics* variables with the *Judges' Ratings* variables. All statistical calculations were performed with the Statistical Package of Social Sciences (SPSS®) 11.0 for Macintosh OS X.

Concluding Remarks

This chapter provided an overview of the research methods, materials, and procedures that were used to implement the study. A total of 45 children, in grades 2 through 5, volunteered for the study: Four of the children participated in the pilot study, 40 children took part in the main study, and one student dropped out after the study began. Most of the students were enrolled in an after school music program called *MIDI for KIDS®* (*MFK*) in six elementary schools in Oklahoma, the remaining students were involved with a week-long *MFK* summer camp. The study was conducted in a naturalistic venue, meaning that the researcher met with the students in the same environment and during the same time as their regular *MFK* classes.

A panel of three independent judges, all experienced music educators, used the consensual assessment technique to rate the students' compositions based on the criteria outlined by Amabile (1983, 1996) and discussed in Chapter 2. For each evaluative

category, the three judges' ratings were averaged together and the resulting mean was used as statistical data.

The data sets used for statistical analysis included: *Student Demographics*, the *Product*, the *Process*, and the *Judges' Ratings Means*. The content of the data sets and their descriptions were discussed in Chapter 3. The analytical procedures and results are reported in Chapter 4.

CHAPTER FOUR

Results

This study examined the creative strategies that children use when asked to compose a simple melody and how these strategies are corroborated by musical thinking skills. This chapter reports the results of the data analyses used to address the research questions. The research questions raised in this study were: a) What are the trends that emerge from the analysis of students' gender, age, musical experience, and musical background; the musical characteristics of the compositional products; and the observed behavior and recorded verbal responses of the students during the compositional task? b) How are the students' behavioral and verbal responses related to the judges' evaluative scores? c) Is there a relationship between judges' evaluative scores and a student's age, gender, grade level, musical experience, and musical training? and d) Are the musical and creative strategies observed in this study consistent with the music cognition and creativity models found in the literature?

The organization of the chapter includes reports of: a) interjudge reliability analysis, b) means and standard deviations for each of the judge's evaluative scores, c) frequencies and percentages of student demographics, d) the minimum and maximum totals and median statistics per category for the product analysis, e) frequencies and percentages of observed behavior and recorded verbal responses, f) correlation analysis of student behavior and responses with judges' evaluative scores, g) correlation analysis of student demographics with the judges' evaluative scores, and h) regression analysis of the independent variables (student demographics, the product, and the process) with the dependent variable (composite score for judges' ratings means).

Judge Reliability

The judges' evaluative procedures were based on Amabile's (1983, 1996) model of consensual assessment technique (CAT) for creativity assessment. The CAT is unique in that it allows for the variability and subjectivity that often occur in *between-groups* outcomes. In this respect, CAT can be applied to a wider population and a broader range of group behaviors. CAT has been adapted and used in studies by Auh (1995), Bangs (1992), Brinkman (1994/1995), Hickey (1996), McCoy (1999), and Priest (2001).

An important element of CAT is reliability between the judges' ratings. Amabile (1996) states:

> By definition, interjudge reliability in this method is equivalent to construct validity. If appropriate judges independently agree that a given product is highly creative, then it can and must be accepted as such. (p. 43)

According to Amabile (1996), creativity reliability ratings greater than .70 are acceptable. The interjudge reliability scores fell within acceptable parameters, between .71 and .89, in all categories with the exception of *degree of originality*. The coefficient alpha for *degree of originality* was lower at .69. Table 1 provides a summary of the interjudge reliability scores.

Table 1

Interjudge Reliability Scores

N of judges = 3

N of cases = 40

Evaluative Categories	*Alpha*
Degree of Steady Tempo	.89
Degree of Phrasing	.87
Evidence of Closure	.88
Craftsmanship	.83
Evidence of Harmonic Changes	.78
Degree of Replication	.85
Evidence of Motivation / Effort	.75
Degree of Originality	.69
Musical Syntax	.88
Musicality	.83
Creativity	.71
Overall Rating	.85

Judges' Ratings

A data set called Judges' Ratings was created from the mean scores of the judges' ratings in each category for each participant. Table 2 lists the means and standard deviations for each judge's ratings per evaluative category.

Table 2

Judges' Ratings: Means and Standard Deviations ($N = 40$)

	Judge #1		Judge #2		Judge #3	
Rating Categories	*M*	*SD*	*M*	*SD*	*M*	*SD*
Degree of steady tempo	4.02	1.44	2.93	1.49	4.40	1.52
Degree of phrasing	3.95	1.28	2.48	1.62	3.58	1.47
Evidence of closure	4.00	1.50	2.38	1.75	3.43	1.63
Craftsmanship	3.85	1.15	2.43	1.71	3.75	1.34
Evidence of harmonic changes	4.00	1.36	2.25	1.60	3.25	1.57
Degree of replication	4.18	1.55	2.45	1.71	3.65	1.55
Evidence of motivation/effort	4.38	1.37	2.73	1.60	3.90	1.41
Degree of originality	4.18	1.24	2.70	1.59	3.58	1.26
Degree of musical syntax	3.62	1.21	2.55	1.66	3.47	1.34
Degree of musicality	3.68	1.16	2.35	1.66	3.52	1.54
Degree of creativity	3.78	1.42	2.73	1.88	3.75	1.34
Overall Rating	11.07	3.25	7.70	5.13	10.75	4.02

The Composition Rating Form

The judges used a 7-point Likert-type scale to rate the degree to which they felt each category was represented in a student's compositional example (see Figure 2, Grid #1). The score given in the final category, *overall rating*, was the sum of the scores given for the three variables in Grid #2: *musical syntax*, *musicality*, and *creativity*. A maximum score of 21 was possible for the *overall rating*. Figure 2 provides an example of the composition rating forms. Refer to Appendix I for a description of the evaluation criteria.

Figure 2
The Composition Rating Form

Grid #1

	Low			Medium			High
Steady tempo	1	2	3	4	5	6	7
Phrasing	1	2	3	4	5	6	7
Closure	1	2	3	4	5	6	7
Craftsmanship	1	2	3	4	5	6	7
Harmonic changes	1	2	3	4	5	6	7
Replication	1	2	3	4	5	6	7
Motivation/Effort	1	2	3	4	5	6	7
Originality	1	2	3	4	5	6	7

Grid #2

	Low			Medium			High
Musical Syntax	1	2	3	4	5	6	7
Musicality	1	2	3	4	5	6	7
Creativity	1	2	3	4	5	6	7

▲Overall rating: _____

▲ This score is the sum of the scores given for the categories in Grid #2: *Musical Syntax*, *Musicality*, and *Creativity*.

Research Question 1a

The first part of *Research Question 1* asked: *What trends emerge from analysis of students' gender, age, musical experience, and musical background?* Demographic data were collected from students through parent questionnaires, pretest and posttest interviews, and field notes recorded by the researcher. The demographic categories (see Appendix L) include *gender, age, grade level, family musical activities, length of time enrolled in the MFK program,* and *previous musical training.* These data were labeled Student Demographics. Table 3 provides the frequencies and percentages for each demographic category.

Of the 40 children participating in the study, 67.5% were girls. Most of the children, 77.5%, were between 9 and 11 years old and 90% were in grades 3 through 5. While all of the students were actively involved with *MFK*, 80% had been enrolled in *MFK* classes for less than a year. When asked if their families engaged in any type of musical activities together, half of the children indicated that they either did not or were not sure. Twenty-five percent of the children recognized that their families did some type of musical activity together. Although all the children in the study had regular music instruction at their schools, only 20% had any type of private music instruction and 30% received some type of assistance from someone at home.

Table 3

Student Demographics: Frequencies and Percentages ($N = 40$)

Variables	*Subcategories*	*n*	*%*
Gender			
	Girls	27	67.5
	Boys	13	32.5
Age			
	8	7	17.5
	9	12	30.0
	10	8	20.0
	11	11	27.5
	12	2	5.0
Grade			
	2nd	4	10.0
	3rd	13	32.5
	4th	10	25.0
	5th	13	32.5
Time in *MFK* class			
	0 – 6 months	15	37.5
	7 – 12 months	17	42.5
	1 – 2 years	6	15.0
	More than 2 years	2	5.0

Table 3 (con't)

Variables	*Subcategories*	*n*	*%*
Family Musical Activities			
	None/unknown	16	40.0
	Non-music activities	4	10.0
	Passive participation	10	25.0
	Active participation	10	25.0
Previous Musical Training			
	School music only	20	50.0
	Someone helps at home	12	30.0
	Private lessons	8	20.0

Research Question 1b

The second part of *Research Question 1* asked: *What trends emerge from analysis of the musical characteristics of the compositional products?* The variables in the data set Product represent the musical characteristics of the notated versions of the compositions. Sum totals were tabulated for a) *number of tracks each student played*, b) *number of different pitches played*, and c) *number of measures of silence played* per student. The *complete range of notes* was calculated by counting the number of steps between the lowest and highest note played. Averages were tabulated for *keystrokes played per track* and the *number of measures played per track* (see Appendix M). Table 4 provides the minimum and maximum totals of the calculations in each of the Product categories.

Table 4

The Product: Minimum and Maximum Totals ($N = 40$)

Variables	*Min.*	*Max.*
Number of Tracks Played	1.00	9.00
Average Number of Keystrokes Played	8.20	66.70
Average Number of Measures Played	1.60	12.50
Total Number of Individual Pitches Played	3.00	17.00
Complete Range of Notes	3.00	26.00
Total Number of Measures of Silence	0.00	33.50

The medians for each of the Product variables by Student Demographic variables were used to highlight similarities and differences between groups of variables. Median values of the Product variables per age group (see Table 5) indicated trends in the *range of notes played* and the *total number of measure of silence*. *Range of notes* corresponded to the distance between the lowest and highest notes played (and in this case, only the black notes) in all of the tracks per child. The data in Table 5 reveal two interesting facts: a) the younger children, ages 8 and 9, experimented with a much wider range of notes (*Mdn* = 14.00) than the older age groups and b) the 11-year old group had a much higher number of measures of silence (*Mdn* = 6.00) than the other age groups.

Table 5

Median values of Product Variables per Age Group (*N* = 40)

Product Variables	*Age Groups*				
	8 yrs. *n* = 7	9 yrs. *n* = 12	10 yrs. *n* = 8	11 yrs. *n* = 11	12 yrs. *n* = 2
	Mdn	*Mdn*	*Mdn*	*Mdn*	*Mdn*
Total # of tracks played	3.00	3.00	3.50	4.00	3.00
Average # of keystrokes	33.50	23.85	32.15	28.00	27.50
Average # of measures played	8.00	8.00	8.85	7.00	8.00
Total # of individual pitches	8.00	7.00	9.00	6.00	7.50
Range of notes played	14.00	10.00	8.50	8.00	9.00
Total # of ms of silence	1.25	2.75	2.13	6.00	2.50

Median values of Product variables by *gender* are presented in Table 6. The trends indicated that the girls' and boys' compositions were fairly equal in all areas except in "total number of measures of silence" where the median number of measures was considerably higher for the boys than for the girls. A review of the notated copies of the tracks revealed that the boys were more likely to do stop-and-start playing during the task while the accompaniment was playing. The girls were more likely to continue playing during the tracks until the accompaniment ended.

Table 6

Median values of Product Variables per Gender ($N = 40$)

Product Variables	*Gender*	
	Girls n =27	Boys n = 13
	Mdn	*Mdn*
Total # of tracks played	4.00	3.00
Average # of keystrokes	28.00	27.00
Average # of measures played	8.00	8.00
Total # of individual pitches	7.00	8.00
Range of notes played	9.00	9.00
Total # of ms of silence	1.35	6.00

Median values for Product variables by *grade level* are given in Table 7. The results indicate that the 2nd grade students had higher medians in "average number of keystrokes," "total number of individual pitches," and "range of notes played." Higher medians in these areas might be indicative of an increased amount of free experimentation and exploration with the sounds and keys of the keyboard among the younger students. However, it must be noted that the 2nd grade group had noticeably fewer students ($n = 4$). Table 7 also shows that the 5th grade students' compositions had more measures of silence than the compositions of students in the lower grades.

Table 7

Median values of Product Variables per Grade level ($N = 40$)

Product Variables	*Grade Levels*			
	2nd gd $n = 4$	3rd gd $n = 13$	4th gd $n = 10$	5th gd $n = 13$
	Mdn	*Mdn*	*Mdn*	*Mdn*
Total # of tracks played	2.50	3.00	3.50	4.00
Average # of keystrokes	33.75	24.00	28.40	28.00
Average # of measures played	8.25	8.00	8.50	7.60
Total # of individual pitches	10.00	8.00	6.00	7.00
Range of notes played	15.50	11.00	7.50	9.00
Total # of ms of silence	3.00	1.00	2.63	6.00

Median values for Product variables by *length of time in MFK classes* are given in Table 8. Overall, the Product medians were consistent across the demographic groups. The demographic areas with the most discrepancy were: a) "7-12 mos" and "average number of keystrokes," b) "2 yrs" and "range of notes played," and c) "> 2 yrs" and "total number of measures of silence."

Table 8

Median values of Product Variables per Length of Time in MFK Classes ($N = 40$)

Product Variables	*Length of Time in MFK Classes*			
	0-6 mos $n = 15$	7-12 mos $n = 17$	1-2 yrs $n = 6$	>2 yrs $n = 2$
	Mdn	*Mdn*	*Mdn*	*Mdn*
Total # of tracks played	4.00	3.00	3.00	4.00
Average # of keystrokes	30.00	24.00	31.05	28.50
Average # of measures played	7.80	8.00	8.25	8.00
Total # of individual pitches	8.00	7.00	6.00	8.50
Range of notes played	9.00	9.00	9.50	7.50
Total # of ms of silence	2.25	3.00	2.13	4.00

Table 9 provides the median values for *product* variables by *family musical activities*. The "none/unknown" group tend to have higher *product* medians in "average number of keystrokes," "total number of individual pitches played," and "range of notes played." Additionally, there is a trend in increasing numbers of measures of silence as children's participation in musical activities increases.

Table 9

Median values of Product Variables per Musical Family Activities ($N = 40$)

Product Variables	*Family Musical Activities*			
	None/ unknown $n = 16$	Non-musical $n = 4$	Passive $n = 10$	Active $n = 10$
	Mdn	*Mdn*	*Mdn*	*Mdn*
Total # of tracks played	3.50	3.00	4.00	3.00
Average # of keystrokes	29.90	25.50	27.50	26.50
Average # of measures played	8.00	7.90	7.70	8.00
Total # of individual pitches	8.00	7.50	6.00	6.00
Range of notes played	12.50	7.50	8.00	9.00
Total # of ms of silence	1.18	1.18	3.50	5.50

Table 10 provides the median values for Product variables by *previous musical experience*. One should note that the "someone helps at home" group had elevated Product medians in "total number of tracks played," "average number of keystrokes," and "total measures of silence." The "private music lessons" group had a higher median than the other groups in "range of notes played".

Table 10

Median values of Product Variables per Previous Musical Experience ($N = 40$)

	Previous Musical Experience		
	School music classes only $n = 20$	Someone helps at home $n = 12$	Private music lessons $n = 8$
Product Variables	*Mdn*	*Mdn*	*Mdn*
Total # of tracks played	3.00	4.50	3.00
Average # of keystrokes	26.50	30.50	24.75
Average # of measures played	7.90	8.00	8.00
Total # of individual pitches	8.00	6.00	8.00
Range of notes played	9.00	9.00	12.00
Total # of ms of silence	1.30	4.88	3.25

Research Question 1c

The third part of *Research Question 1* asked: *What trends emerge from analysis of the musical characteristics of the compositional product?* Through field notes and audiotaped verbal responses, the researcher documented each student's observed behavior during the composition task.

An event coding method was adapted for this part of the study (Bogdan & Biklin, 1998; Pitman, Eisikovits, & Dobbert, 1989). The researcher transcribed all of the audiotaped recordings and field notes. A notated version of each child's recorded composition tracks was paired with the transcript and studied simultaneously to contextualize and verify the observed and recorded data. The main, recurring events and topics that emerged were documented and grouped into categories. Labels for the categories were influenced by an event coding list method used by Hamilton (1999). Then, each category was divided into four subcategories and the subcategories were ranked from lowest (1) to highest (4). With the notated tracks as a source of authentification, the researcher went back through the transcripts and coded each main event or idea by category and subcategory. For reliability and to check for accuracy of the coding, an outside judge reviewed a random sampling of half of the transcripts with the matching notated versions of the composition tracks. The researcher and the outside judge consulted and agreed that the coding was accurate. This data set was labeled Process. The frequencies and percentages for these Process variables and their subcategories are provided in Table 11 (also see Appendix N).

Interaction ratings were based on the communication between the student and the researcher during the composition task (ex: questions/comments related to the task,

questions/comments focused on completing the task). Twenty percent of the students had little or no verbal interaction with the researcher during the task. Seven and a half percent carried on conversations that were not related to the task while 72.5% of the students engaged in positive, task-oriented interaction with the researcher during the task.

The ratings for *attitude toward the task* were based on the self-efficacy and willingness of the student to take part in the composition task. These ratings indicated that 12.5% of the students had difficulty getting started, 22.5% worked at the task but demonstrated low self-confidence, 25% were willing and demonstrated some degree of confidence, and 40 % of the cases demonstrated confidence and were explorative in their composing.

Learning characteristics rated not only how motivated students were to grasp the concept of the task, but also considered how they would meet the requirements. In this category, 17.5% seemed confused or unmotivated in their attempts, 12.5% seemed timid but motivated, 42.5% demonstrated motivation for completing the task, and 27.5% showed a recognizable degree of motivation and were able to generate a sense of working toward a goal.

Participation rated the degree to which students were actively involved in the task and looked for evidence of their ability to focus on the activity. Five percent of the students demonstrated extremely low effort, 40% seemed reluctant in their attempts and had rather low focus, 32% were actively involved, but only somewhat focused, and 22.5% of the students were rated as active participants and highly focused on the task.

The *Composing and listening strategies* considered the approaches students used to work out their musical ideas and to recall their melodies. There was an equal split

between students who did not utilize any noticeable strategy and were unable to recall their melodies (32.5%) with those who incorporated some sort of strategy and were able to recall at least parts of their melodies with some accuracy (32.5%). Eight percent showed some focus on the task but were not able to recall their melodies and 15% demonstrated a high degree of focus and were able to recall their melodies with some accuracy.

Aural awareness and musical understanding referred to a) the student's aural awareness of the musical elements heard in the accompaniment and the melody and b) his/her ability to verbalize musical intentions and knowledge in either metaphorical or conceptual terms. Seventeen and a half percent of the students demonstrated very low aural awareness and were able to say very little metaphorically or conceptually about their composition. Seventy percent of the students' ratings clustered around the two middle categories: those who demonstrated an intuitive awareness and understanding of what they heard (42.5%) and those who were somewhat more aware of the aural elements of the music but were able to verbalize them in only general terms (27.5%). On the other hand, 12.5% of the students identified specific musical elements in the accompaniment, planned elements in the melody to compliment or match the accompaniment, and were able to describe their musical intentions in metaphoric or conceptual terms.

Individual assessment dealt primarily with the responses students gave during the posttest interview when asked to reflect on their own compositions and the extent to which those reflective comments were related to the actual goal of the task. They were asked to give an overall evaluation of their product and reasons for their answers. Also,

included in this category were the positive and/or negative comments students made about their compositions. The comments were recorded on audiotape or in field notes.

The majority of students (72.5%) were rated in the two lowest ranking categories: "none" and "general, not goal-directed" indicating that they did not offer any substantive reasons or opinion regarding their musical choices. When asked, 20% were able to give a general response and opinion of their composition. Five percent of the students in this category demonstrated some degree of reflection in their musical choices, expressed intentions for the outcome, were able to give brief explanations about what they liked or did not like about their composition, and, if they were not satisfied with the outcome, described how they might make a change.

A review of the frequencies and percentages in Table 11 reveals that the categories *interaction*, *attitude toward the task*, and *learning characteristics* were positively weighted. The majority of the outcomes in these categories fell in the upper range, between subcategories 3 and 4, suggesting that most students exhibited an elevated level of interest and focus in the composition task. In contrast, *individual assessment* was negatively weighted indicating that most students in the study provided few, if any, goal-oriented reasons for or opinions about their musical choices. The frequencies and percentages for subcategories *participation* and *aural awareness & musical understanding* followed a normal curve, suggesting that the majority of students' observed level of participation and awareness of musical elements were fairly evenly distributed between subcategories 2 and 3. There was an uneven distribution between the subcategories for *composing & listening strategies*.

Table 11

Process Variables: Frequencies and Percentages ($N = 40$)

Process Variables	*Subcategories*	*n*	*%*
Interaction			
	1. Little or none	8	20.0
	2. Social chat	3	7.5
	3. General interest	19	47.5
	4. Focused on task	10	25.0
Attitude Toward the Task			
	1. Unable to play	5	12.5
	2. Timid, lack confidence	9	22.5
	3. Willing, some confidence	10	25.0
	4. Confident, explorative	16	40.0
Learning Characteristics			
	1. Confused, not motivated	7	17.5
	2. Timid, somewhat motivated	5	12.5
	3. Motivated, somewhat goal- oriented	17	42.5
	4. Highly motivated, goal-driven	11	27.5
Participation			
	1. Non-participant	2	5.0
	2. Reluctant, little focus	16	40.0
	3. Active participant, somewhat focused	13	32.5
	4. Active participant, highly focused	9	22.5
Composing & Listening Strategies			
	1. Random playing, no recall	13	32.5
	2. Some focus on composition, no recall	8	20.0
	3. Focus on composition, partial recall	13	32.5
	4. Focus on composition, fairly accurate recall	6	15.0

Table 11 (con't)

Process Variables	*Subcategories*	*n*	*%*
Aural Awareness & Musical Understanding			
	1. None demonstrated	7	17.5
	2. Very intuitive, unable to verbalize	17	42.5
	3. Some awareness, limited understanding	11	27.5
	4. Awareness & general understanding	5	12.5
Individual Assessment‡			
	1. None	13	32.5
	2. General, not goal-directed	16	40.0
	3. Assessment appropriate for the goal	8	20.0
	4. Reflective, focused, monitors progress	2	5.0

‡ (N = 39) Due to missing data. Rating scale: 1 – *Low*, 4 - *High*

Research Question 2

The second research question - *To what extent are the components of creativity related to the compositional process?* - investigated the relationship between the *process* variables (students' observed behavioral and verbal responses during the creative process) and *judges' ratings* variables. As discussed in *Research Question 1c*, the *process* variables (students' behavioral and verbal responses) were transcribed from audiotaped recordings and field notes taken by the researcher. Based on the transcriptions, common themes were documented, categorized, and divided into four levels, ranging from low to high. *Research Question 1c* offers a detailed description of the data documentation. The means and standard deviations are provided in Table 12. It is interesting to note that *individual assessment* had the lowest mean score as well as the lowest degree of variance between scores.

Table 12

Process Variables: Means and Standard Deviations (N = 40)

Variables	*M*	*SD*
Interaction	2.78	1.05
Attitude Toward Musical Task	2.93	1.07
Learner's Characteristics	2.80	1.04
Participation	2.73	0.88
Composing & Listening Strategies	2.30	1.09
Aural Skills & Musical Understanding	2.35	0.92
Individual Assessment	1.97	0.87

/(*N* = 39) Due to missing data. Rating scale: 1 – *Low*, 4 - *High*

Studies with relatively small samples do not allow for assumptions about the shape of the distribution of their data, making it necessary to use nonparametric statistical methods (Rainbow & Froehlich, 1987). Due to the nature of the data collected for this study, the nonparametric measure, Spearman's rho, was used to determine whether any relationships existed between the Process and Judges' Ratings variables (see Tables 13-19).

Interaction categorized the nature of communication between the student and the researcher during the composition process. Rating descriptors in order of rank, from lowest to highest, included: "little or none," "social chat," "general interest," and "focused on task." Correlation analysis found significant relationships between *interaction* with *closure*, *replication*, *originality*, and *musical syntax*. The correlation coefficients and significance levels are presented in Table 13. Judges' Ratings variables that did not correlate with *interaction* were *steady tempo*, *phrasing*, *craftsmanship*, *harmonic changes*, *motivation/effort*, *musicality*, *creativity*, and *overall rating*.

Table 13

Spearman's rho: Interaction x Judges' Ratings ($N = 40$)

Judges' Ratings	*Correlation Coefficient*	*Sig. (2-tailed)* ***
Steady Tempo	.210	.194
Phrasing	.268	.094
Closure	.341	.031*
Craftsmanship	.303	.057
Harmonic Changes	.209	.196
Replication	.541	.000**
Motivation/Effort	.299	.061
Originality	.349	.027*
Musical Syntax	.331	.037*
Musicality	.271	.091
Creativity	.305	.055
Overall Rating	.307	.054

* $p < .05$ ** $p < .01$ Rating scale: 1– *Low*; 4 – *Medium*; 7 – *High*

The rating descriptors for *attitude toward the task* in order of rank, from lowest to highest, were: "unable to play," "timid, lacks confidence," "willing, some confidence," and "confident, explorative." The correlation coefficients and significance levels are presented in Table 14. The results showed a strong, positive correlation between student attitude and each of the Judges' Ratings categories.

Table 14

Spearman's rho: Attitude Toward the Task x Judges' Ratings ($N = 40$)

Judges' Ratings	*Correlation Coefficient*	*Sig. (2-tailed)* ***
Steady Tempo	.474	.002**
Phrasing	.502	.001**
Closure	.428	.006**
Craftsmanship	.545	.000**
Harmonic Changes	.433	.005**
Replication	.493	.001**
Motivation/Effort	.524	.001**
Originality	.547	.000**
Musical Syntax	.562	.000**
Musicality	.511	.001**
Creativity	.560	.000**
Overall Rating	.583	.000**

* $p < .05$ ** $p < .01$ Rating scale: 1– *Low*, 4 – *Medium*, 7 – *High*

The rating descriptors for *learning characteristics* in order of rank, from lowest to highest, included: "confused, not motivated," "timid, somewhat motivated," "motivated, somewhat goal-oriented," and "highly motivated, goal-driven." The correlation coefficients and levels of significance are presented in Table 15. There was a significant correlation between *learning characteristics* and each of the Judges' Ratings categories. The weakest areas of correlation were in *steady tempo*, *phrasing*, and *musicality*.

Table 15

Spearman's rho: Learning Characteristics x Judges' Ratings ($N = 40$)

Judges' Ratings	*Correlation Coefficient*	*Sig. (2-tailed)* ***
Steady Tempo	.397	.011*
Phrasing	.399	.011*
Closure	.409	.009**
Craftsmanship	.426	.006**
Harmonic Changes	.407	.009**
Replication	.435	.005**
Motivation/Effort	.414	.008**
Originality	.446	.004**
Musical Syntax	.424	.006**
Musicality	.384	.014*
Creativity	.442	.004**
Overall Rating	.438	.005**

* $p < .05$ ** $p < .01$ Rating scale: 1– *Low*, 4 – *Medium*, 7 – *High*

The rating descriptors for *participation* in order of rank, from lowest to highest, included: "nonparticipant," "reluctant participant, little focus," "active participant, somewhat focused," and "active participant, highly focused." The correlation coefficients and levels of significance are listed in Table 16. The results indicated a strong positive correlation between *participation* and each of the Judges' Ratings categories. The weakest areas of correlation were with *steady tempo* and *replication.*

Table 16

Spearman's rho: Participation x Judges' Ratings ($N = 40$)

Judges' Ratings	*Correlation Coefficient*	*Sig. (2-tailed)* ***
Steady Tempo	.437	.005**
Phrasing	.545	.000**
Closure	.531	.000**
Craftsmanship	.565	.000**
Harmonic Changes	.500	.001**
Replication	.454	.003**
Motivation/Effort	.529	.000**
Originality	.588	.000**
Musical Syntax	.522	.001**
Musicality	.499	.001**
Creativity	.577	.000**
Overall Rating	.567	.000**

* $p < .05$ ** $p < .01$ Rating scale: 1– *Low*, 4 – *Medium*, 7 – *High*

The rating descriptors for *composing and listening strategies* in order of rank, from lowest to highest, were: "random playing, no recall," "some focus on composition task, no recall," "focus on composition task, partial recall," and "focus on composition task, fairly accurate recall." Table 17 provides the correlation coefficients and levels of significance. There was a strong, positive correlation between *composing and listening strategies* and each of the Judges' Ratings categories. However, it is important to note that the strongest area of correlation was in *replication,* perhaps because the students *did* incorporate some sort of strategy in order to play their melodies twice.

Table 17

Spearman's rho: Composing and Listening Strategies x Judges' Ratings ($N = 40$)

Judges' Ratings	*Correlation Coefficient*	*Sig. (2-tailed)* ***
Steady Tempo	.523	.001**
Phrasing	.557	.000**
Closure	.578	.000**
Craftsmanship	.575	.000**
Harmonic Changes	.535	.000**
Replication	.718	.000**
Motivation/Effort	.532	.000**
Originality	.568	.000**
Musical Syntax	.595	.000**
Musicality	.587	.000**
Creativity	.527	.000**
Overall Rating	.576	.000**

* $p < .05$ ** $p < .01$ *Rating scale: 1*– Low, *4* – Medium, *7* – High

The rating descriptors for *aural awareness and musical understanding* in order of rank, from lowest to highest, included: "none demonstrated," "mostly intuitive, unable to verbalize concept," "some skill, limited understanding," and "basic aural awareness with general understanding." Correlation coefficients and levels of significance for *aural awareness and musical understanding* and Judges' Ratings are presented in Table 18. The judges' scores that had the strongest correlation were *craftsmanship* and *originality*. There were five Judges' Ratings that did not correlate with *aural awareness and musical understanding*. They included *steady tempo, phrasing, closure, harmonic changes*, and *replication*.

Table 18

Spearman's rho: Aural Awareness and Musical Understanding x Judges' Ratings ($N = 40$)

Judges' Ratings	*Correlation Coefficient*	*Sig. (2-tailed)* ***
Steady Tempo	.204	.207
Phrasing	.293	.067
Closure	.309	.052
Craftsmanship	.430	.006**
Harmonic Changes	.310	.052
Replication	.297	.063
Motivation/Effort	.403	.010*
Originality	.459	.003**
Musical Syntax	.357	.024*
Musicality	.342	.031*
Creativity	.389	.013*
Overall Rating	.391	.013*

* $p < .05$ ** $p < .01$ *Rating scale: 1*– Low, *4* – Medium, *7* – High

Individual assessment rated students' own opinions of their work and product. The rating descriptors, ranked from lowest to highest were: "none," "general assessment, not goal-directed," "assessment appropriate for the goal," and "reflective, monitors progress with focus on the goal." Correlation coefficients and levels of significance for *individual assessment* and Judges' Ratings are presented in Table 19. There was one Ratings area, *steady tempo*, that did not correlate with this Process category.

Table 19

Spearman's rho: Individual Assessment x Judges' Ratings ($N = 39$) ǂ

Judges' Ratings	*Correlation Coefficient*	*Sig. (2-tailed)* ***
Steady Tempo	.303	.061
Phrasing	.382	.016*
Closure	.408	.010*
Craftsmanship	.463	.003**
Harmonic Changes	.370	.020*
Replication	.477	.002**
Motivation/Effort	.522	.001**
Originality	.525	.001**
Musical Syntax	.437	.005**
Musicality	.405	.011*
Creativity	.455	.004**
Overall Rating	.451	.004**

* $p < .05$ ** $p < .01$ Rating scale: 1– *Low*, 4 – *Medium*, 7 – *High*

ǂ one case excluded for missing data.

Research Question 3

The third research question asked: *Is there a relationship between the judges' evaluative ratings and a student's age, gender, grade level, musical experience, and previous musical training?* In order to address *Research Question 3*, a Spearman's rho analysis was used to determine the relationships that are evident between the Student Demographics data and the Judges' Ratings. The sources and treatment of the demographic data were discussed in Chapter 3 and Chapter 4 (*Research Question 1a*). Table 20 presents the correlation results of the demographic variables: *gender*, *age*, *grade level*, *family musical activities*, *length of time in MFK classes*, and *previous musical training* – with the Judges' Ratings variables.

Age was significantly correlated with 9 of the 12 categories in Judges' Ratings, more than any other Student Demographic variable. *Grade level* and *age* shared areas of significant correlation in *steady tempo*, *phrasing*, *closure*, *harmonic changes*, and *originality*. *Gender* was negatively correlated with the Judges' Ratings due to the large number of girls in the study. *Family musical activities* had weak correlations with *steady tempo*, *phrasing*, *replication*, *originality*, and *musicality*. *Time in MFK classes* yielded weak correlations with *replication* and *steady tempo*. *Previous musical experience* had a low, non-significant correlation with *replication*.

Table 20

Spearman's Rho: Student Demographic Variables x Judges' Ratings Variables ($N = 40$)

Judges' Ratings	*Gender* $n = 40$	*Age* $n = 40$	*Grade* $n = 40$	*Family Musical Activities* $n = 40$	*Time in MFK Classes* $n = 40$	*Previous Musical Experience* $n = 40$
Steady Tempo						
Correlation Coefficient	-.230	.380	.348	.342	.023	.249
Sig. (2-tailed)*	.154	.016*	.028*	.031*	.889	.122
Phrasing						
Correlation Coefficient	-.306	.368	.349	.347	.155	.065
Sig. (2-tailed)*	.055	.020*	.027*	.028*	.338	.692
Closure						
Correlation Coefficient	-.221	.418	.407	.288	.096	.097
Sig. (2-tailed)*	.171	.007**	.009**	.072	.554	.550
Craftsmanship						
Correlation Coefficient	-.284	.255	.226	.281	.130	.099
Sig. (2-tailed)*	.076	.113	.162	.079	.426	.545

* $p < .05$ ** $p < .01$

Table 20 (con't)

Judges' Ratings	*Gender* $n = 40$	*Age* $n = 40$	*Grade Level* $n = 40$	*Family Musical Activities* $n = 40$	*Time in MFK Classes* $n = 40$	*Previous Musical Experience* $n = 40$
Musicality						
Correlation Coefficient	-.290	.319	.296	.340	.164	.223
Sig. (2-tailed)*	.069	.045*	.064	.032	.311	.166
Creativity						
Correlation Coefficient	-.247	.295	.254	.195	.166	.090
Sig. (2-tailed)*	.124	.064	.113	.227	.307	.580
Overall Score‡						
Correlation Coefficient	-.310	.320	.283	.278	.150	.168
Sig. (2-tailed)*	.052	.044*	.077	.082	.354	.299

* $p < .05$ **$p < .01$ ‡ *(N = 39 - one case excluded for missing data)*

Table 20 (con't)

Judges' Ratings	*Gender* $n = 40$	*Age* $n = 40$	*Grade Level* $n = 40$	*Family Musical Activities* $n = 40$	*Time in MFK Classes* $n = 40$	*Previous Musical Experience* $n = 40$
Musicality						
Correlation Coefficient	-.290	.319	.296	.340	.164	.223
Sig. (2-tailed)*	.069	.045*	.064	.032	.311	.166
Creativity						
Correlation Coefficient	-.247	.295	.254	.195	.166	.090
Sig. (2-tailed)*	.124	.064	.113	.227	.307	.580
Overall Score‡						
Correlation Coefficient	-.310	.320	.283	.278	.150	.168
Sig. (2-tailed)*	.052	.044*	.077	.082	.354	.299

* $p < .05$ **$p < .01$ ‡ *(N = 39 - one case excluded for missing data)*

The means and standard deviations of the Judges' Ratings by categories for each of the Student Demographic variables are given in Tables 21 through 26. These data provide another interpretation of the trends that occurred between the two data sets. The scores categorized by *gender* in Table 21 indicated that girls scored consistently higher than boys in all evaluative categories.

Table 21

Means and Standard Deviations: Gender x Judges' Ratings ($N = 40$)

	Girls $n = 27$		*Boys* $n = 13$	
Judges' Ratings	*M*	*SD*	*M*	*SD*
Steady Tempo	4.00	1.45	3.33	0.99
Phrasing	3.63	1.45	2.72	0.59
Closure	3.52	1.58	2.74	1.08
Craftsmanship	3.61	1.30	2.80	0.87
Harmonic Changes	3.44	1.36	2.59	0.80
Replication	3.79	1.49	2.67	0.86
Effort	3.77	1.30	3.38	1.01
Originality	3.63	1.15	3.18	0.86
Musical Syntax	3.52	1.36	2.59	0.79
Musicality	3.47	1.38	2.59	0.76
Creativity	3.61	1.34	2.97	0.90
Overall Rating	10.65	3.97	8.15	2.36

Rating scale: 1– *Low*, 4 – *Medium*, 7 – *High*

Table 22 presents the means and standard deviations for Judges' Ratings categorized by *age*. The scores for the 8-year olds were consistently lower than all of the older age groups. The 9-year olds scores were higher than the 8-year olds but remained lower than the scores for the 10-, 11-, and 12-year olds. There was a consistent linear relationship between ages 8 and 11 in all Ratings categories except *craftsmanship* and *motivation/effort*. *Originality* and *creativity* were the only categories that maintained a linear trend across all age groups. There was no consistent linear relationship between ages and scores for the 11- to 12-year old children.

Table 22

Age x Judges' Ratings: Means and Standard Deviations ($N = 40$)

	8 yrs $n = 7$		9 yrs $n = 12$		10 yrs $n = 8$		11 yrs $n = 11$		12 yrs $n = 2$	
Judges' Ratings	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Steady Tempo	2.76	0.87	3.56	1.35	4.25	1.09	4.30	1.38	4.00	2.36
Phrasing	2.29	0.75	3.31	1.18	3.54	0.99	3.85	1.67	3.50	1.17
Closure	2.29	0.87	3.08	1.46	3.13	1.32	4.12	1.65	3.67	0.94
Craftsmanship	2.71	0.85	3.22	1.30	3.63	0.90	3.61	1.53	3.67	1.41
Harmonic Changes	2.19	0.79	3.17	1.18	3.42	0.97	3.55	1.51	3.50	2.12
Replication	2.86	1.10	3.19	1.57	3.54	1.23	3.94	1.55	3.50	1.65
Motivation/Effort	2.90	0.66	3.36	1.11	4.12	0.79	3.88	1.60	4.67	1.41
Originality	2.81	0.50	3.22	0.87	3.79	0.73	3.82	1.53	4.34	0.94
Musical. Syntax	2.29	0.78	3.20	1.30	3.33	0.96	3.70	1.46	3.50	2.12
Musicality	2.43	0.96	3.08	1.27	3.33	0.93	3.61	1.60	3.50	1.17
Creativity	2.71	0.65	3.17	1.03	3.70	1.00	3.82	1.68	4.00	1.88
Overall Rating	7.43	2.13	9.44	3.53	10.46	2.78	11.15	4.69	11.00	5.19

Rating scale: 1– *Low*, 4 – *Medium*, 7 – *High*

The means and standard deviations for Judges' Ratings categorized by *grade level* are shown in Table 23. Whereas similarities between trends of the scores by *age* and the scores by *grade level* would be expected, it is interesting to note that, in contrast to the information given in Table 22, there is a consistent increase in mean ratings as grade level increased.

Table 23

Grade Level x Judges' Ratings: Means and Standard Deviations ($N = 40$)

	2nd grade $n = 4$		3rd grade $n = 13$		4th grade $n = 10$		5th grade $n = 13$	
Judges' Ratings	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Steady Tempo	2.75	0.57	3.44	1.44	4.03	1.07	4.26	1.44
Phrasing	2.17	0.79	3.10	1.15	3.50	1.02	3.79	1.57
Closure	2.08	0.88	2.98	1.29	3.10	1.43	4.05	1.54
Craftsmanship	2.50	0.80	3.26	1.23	3.43	1.01	3.62	1.45
Harmonic Changes	1.83	0.43	3.10	1.21	3.30	0.90	3.54	1.51
Replication	2.25	0.57	3.31	1.53	3.47	1.21	3.87	1.50
Motivation/Effort	2.75	0.57	3.33	1.08	3.93	0.87	4.00	1.54
Originality	2.67	0.61	3.15	.80	3.70	0.74	3.90	1.44
Musical. Syntax	2.25	0.57	3.05	1.34	3.23	0.96	3.67	1.47
Musicality	2.33	0.86	2.97	1.28	3.27	0.95	3.59	1.50
Creativity	2.83	0.88	3.05	1.00	3.57	0.97	3.85	1.62
Overall Rating	7.41	2.20	9.08	3.50	10.13	2.80	11.13	4.53

Rating scale: 1– *Low*, 4 – *Medium*, 7 – *High*

The data for the category *family musical activities* was gathered from the pretest interview responses. Students were asked whether their families participated in any type of musical activities together. Based on the responses, four subcategories were created. The subcategories are described below from the viewpoint of the student. They include:

1. "none" – The student indicated that his/her family did not participate in any activities together, musical or nonmusical, or that he/she was not sure.
2. "nonmusical" – The student indicated that his/her family did activities together but they were not music-related.
3. "passive" – The student indicated that he/she did some types of activities with the family such as: listen to the radio, sing along with the radio, listen to someone else sing or play an instrument, or sing songs on rare occasions (ex. holidays, birthdays).
4. "active" – The student indicated that his/her family did specific musical activities together on a regular basis, such as: play instruments with one or more members in the family, sing songs together (cultural or religious), attend musical events together (ex. concerts, recitals)

The means and standard deviations for *family musical activities* and Judges' Ratings are given in Table 24. There are four interesting observations: a) the subcategory "nonmusical" ($n = 4$) received the highest mean scores in 9 of the 12 Ratings categories, b) the "passive" group ($n = 10$) received the highest mean scores in *steady tempo* and *repetition*, c) *phrasing* was the only ratings category in which the "active" group ($n = 10$) received the highest mean scores, and d) the subcategory "none" ($n = 16$) maintained the lowest scores across all ratings areas.

Table 24

Family Musical Activities x Judges' Ratings: Means and Standard Deviations ($N = 40$)

	None $n = 16$		Nonmusical $n = 4$		Passive $n = 10$		Active $n = 10$	
Judges' Ratings	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Steady Tempo	3.17	1.20	3.92	1.37	4.43	1.56	4.07	1.06
Phrasing	2.79	1.07	3.67	1.36	3.67	1.56	3.73	1.20
Closure	2.73	1.41	4.17	1.55	3.50	1.60	3.54	1.29
Craftsmanship	2.83	1.05	4.00	1.33	3.73	1.31	3.50	1.22
Harmonic Changes	2.65	1.13	3.83	1.29	3.47	1.41	3.43	1.15
Replication	2.81	1.28	3.42	1.10	4.07	1.51	3.77	1.40
Motivation/Effort	3.15	1.13	4.42	1.29	3.73	1.20	4.03	1.16
Originality	3.02	0.90	3.91	1.14	3.53	1.09	4.00	1.14
Musical. Syntax	2.67	1.05	3.75	1.26	3.67	1.45	3.43	1.29
Musicality	2.67	1.17	3.59	0.68	3.47	1.50	3.57	1.22
Creativity	3.02	1.09	4.00	1.25	3.57	1.33	3.67	1.37
Overall Rating	8.40	3.27	11.34	3.19	10.73	4.17	10.67	3.76

Rating scale: 1– *Low*, 4 – *Medium*, 7 – *High*

Table 25 lists the means and standard deviations for Judges' Ratings categorized by the length of time each child had been enrolled in *MFK* classes. At the time of the study, the MIDI classes had not been offered at any of the students' schools for more than three years. Worthy of note is the consistency of the ratings between the four subcategories. The means of ratings for students who had been in the *MFK* classes less than a year, "0 to 6 months" ($n = 15$) and "7 to 12 months" ($n = 17$), were generally comparable with differences in means ranging between .60 and .04 standard deviations. There was a slight increase in means for the next subcategory, "1 to 2 years" ($n = 6$). The greatest increase in means occurred in the students with 2 years or more of *MFK* experience ($n = 2$). It is interesting to note that the subcategory with the lowest ratings' means across all evaluative areas, the "7 to 12 months" group, also had the largest n of the four subcategories. In contrast, the subcategory with the highest ratings means across all evaluative areas, the "> 2 years" group, had the smallest n.

Additional observations (see Table 26) within the subcategories revealed that 80% of the students participating in the study had been enrolled in the MIDI classes for less than a year with two-thirds of the students in this category between ages 8 and 10. Twenty percent of the students had been enrolled in *MFK* classes for more than a year and three-fourths of these students were between 10 and 11 years old.

Table 25

Length of Time Enrolled in MFK Classes x Judges' Ratings: Means and Standard Deviations ($N = 40$)

	0 – 6 mos $n = 15$		7 - 12 mos $n = 17$		1 – 2 yrs $n = 6$		+ 2 yrs $n = 2$	
Judges' Ratings	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Steady Tempo	3.96	1.34	3.37	1.17	3.94	1.63	5.50	0.71
Phrasing	3.24	1.27	3.04	1.16	4.05	1.51	4.33	1.89
Closure	3.20	1.40	3.08	1.34	3.61	1.79	4.33	2.82
Craftsmanship	3.36	1.21	3.02	1.16	3.84	1.23	4.50	1.65
Harmonic Changes	3.16	1.28	2.92	1.13	3.56	1.41	4.17	2.12
Replication	3.53	1.23	3.02	1.42	3.83	1.36	4.84	2.60
Motivation/Effort	3.56	1.39	3.35	1.00	4.17	1.00	5.17	1.18
Originality	3.47	1.32	3.27	0.85	3.89	1.02	4.17	1.18
Musical. Syntax	3.22	1.24	2.94	1.20	3.61	1.54	4.33	1.41
Musicality	3.04	1.23	3.00	1.12	3.61	1.54	4.50	2.12
Creativity	3.40	1.44	3.08	0.96	4.00	1.19	4.67	1.41
Overall Rating	9.67	3.75	9.06	3.25	11.28	4.29	13.50	4.95

Rating scale: 1– *Low*, 4 – *Medium*, 7 – *High*

Table 26

Age Distribution for Length of Time Enrolled in MFK ($N = 40$)

Age	0 – 6 mos $n = 15$	7 - 12 mos $n = 17$	1 – 2 yrs $n = 6$	+ 2 yrs $n = 2$
8 years	4	2	1	0
9 years	1	10	1	0
10 years	4	1	2	1
11 years	5	3	2	1
12 years	1	1	0	0

The means and standard deviations for *previous musical experience* and Judges' Ratings are presented in Table 27. The subcategories include:

1. "school music classes only" – The student received no other type of musical instruction other than what he/she received in regular music classes at school.
2. "someone else helps at home" – The student received some degree of help or assistance with *MFK* assignments or other musical activities from a family member.
3. "private music lessons" – The student either was receiving or had received some type of private music instruction.

Except for *Steady Tempo*, the students in the "someone else helps at home" group had higher ratings in all categories than either of the other two groups. The "private music lessons" group had higher scores in *Steady Tempo*.

Table 27

Previous Musical Experience x Judges' Ratings: Means and Standard Deviations

($N = 40$)

	School Music Classes Only $n = 20$		Someone Helps at Home $n = 12$		Private Music Lessons $n = 8$	
Judges' Ratings	*M*	*SD*	*M*	*SD*	*M*	*SD*
Steady Tempo	3.53	1.50	3.94	1.23	4.17	1.11
Phrasing	3.23	1.45	3.67	0.96	3.08	1.40
Closure	3.12	1.57	3.61	1.31	3.13	1.53
Craftsmanship	3.18	1.35	3.72	0.85	3.17	1.38
Harmonic Changes	3.03	1.43	3.45	1.03	3.08	1.18
Replication	3.28	1.50	3.86	1.27	3.13	1.41
Motivation/Effort	3.43	1.36	4.14	0.73	3.42	1.33
Originality	3.32	1.18	3.83	0.59	3.37	1.35
Musical. Syntax	3.12	1.44	3.44	0.95	3.13	1.38
Musicality	2.92	1.42	3.67	0.95	3.13	1.22
Creativity	3.27	1.37	3.72	0.90	3.33	1.42
Overall Rating	9.32	4.16	10.89	2.72	9.58	3.85

Rating scale: 1– *Low*, 4 – *Medium*, 7 – *High*

A multiple regression was used to determine which independent variables from the data sets (*Student Demographics*, the *Product*, and the *Process*) were the best predictors for the dependent variable (a composite score of the *Judges' Ratings*). Summing the rating scores for each student generated a composite score. The ratings composite score was used then as the dependent variable. The best model for compositions with higher composite scores is given in Table 28. These variables accounted for 64 % (r^2 = .642) of the variance in the judges' ratings. The strongest predictors in this model were: *Average number of keystrokes played per track*, *Total number of individual pitches played*, and *Complete range of notes used in all tracks*. The variables that were removed included: *aural awareness and musical understanding*, *number of tracks played*, *previous musical training*, *participation*, and *individual assessment*. A collinearity diagnostic (see Table 29) was performed to address concerns for possible intercorrelation among the independent variables. *Length of time in MFK classes* had high tolerance (.734), indicating that it was a stable estimate of the model.

Table 28

Multiple Regression Analysis for Best Model of Judges' Ratings Composite Score

Predictor	*Beta*	*t*	*Sig.*
Age	-.554	-1.550	.134
Gender	-.260	-1.421	.168
Grade level	.616	1.614	.119
Length of time in *MFK* classes	-.206	-1.584	.126
Family music activities	.133	.889	.382
Average # of keystrokes per track	.653	4.123	.000
Average # of measures per track	-.305	-1.467	.155
Total # of individual pitches played	.964	3.082	.005
Complete range of notes	-1.009	-3.190	.004
Total # of measures of silence	-.172	-.870	.392
Interaction	.213	1.067	.296
Attitude	-.463	-2.025	.054
Learning characteristics	.180	.730	.472
Composing & listening strategies	-.357	-1.456	.158

Table 29

Collinearity Diagnostic for Intercorrelation Among the Independent Variables with Judges' Ratings Composite Score

Predictor	*Beta*	*t*	*Sig.*	*Tolerance*	*VIF*
Age	-.522	-1.185	.250	.096	10.382
Gender	-.306	-1.251	.226	.313	3.191
Grade level	.571	1.201	.245	.083	12.115
Length of time in *MFK* classes	-.222	-1.394	.179	.734	1.363
Family music activities	.147	.772	.449	.512	1.952
Previous musical training	-.041	-.245	.809	.672	1.488
Number of tracks played	.050	.185	.855	.253	3.953
Average # of keystrokes per track	.644	3.440	.003	.534	1.874
Average # of measures per track	-.277	-1.113	.280	.301	3.321
Total # of individual pitches played	.942	2.584	.018	.141	7.105
Complete range of notes	-.997	-2.598	.018	.127	7.871
Total # of measures of silence	-.178	-.636	.532	.238	4.195
Interaction	.207	.871	.395	.332	3.011
Attitude	-.473	-1.541	.140	.199	5.032
Learning characteristics	.140	.456	.653	.198	5.055
Participation	.069	.253	.803	.254	3.934
Composing & listening strategies	-.460	-1.257	.224	.140	7.166
Aural awareness & musical understanding	.001	.005	.996	.195	5.135
Individual assessment	.073	.212	.834	.159	6.284

Research Question 4

Research Question 4 asked whether the general trends observed in this study were consistent with similar studies involving music cognition and creativity models. The lack of significant correlation between demographic elements such as age, grade level, or previous training and creative process categories is supported by the literature (Bangs, 1992; Hickey, 1995). Hickey (1995) found that "musical performance experience and training are not necessary for highly creative production" (p.142). Auh (1995) indicated that informal musical experience was a strong predictor of musical creativity. Further discussion of the trends observed and relevant literature will be provided in Chapter 5.

Summary

Chapter 4 presents results of the analysis of the data collected for this study. Areas discussed include judge reliability analysis and the descriptive summaries of student demographic data, the product characteristics, behavioral and verbal data of the creative process, and the compositional evaluative scores.

There were several areas of significant relationships observed in the data between the Process variables and the Judges' Ratings. A Spearman rho analysis (see Tables 13-19) indicates positive correlations between each of the Process variables and the Judges' Ratings categories. The Process areas that have the strongest significant correlations were: *composing and listening strategies*, *participation*, *attitude toward the task*, *learning characteristics*, and *individual assessment*, respectively.

A Spearman rho analysis was used to examine the relationships between the Student Demographics and Judges' Ratings. Demographic and Ratings categories with positive significant correlation included: *grade level* and *age* with *steady tempo*,

phrasing, *closure*, *harmonic changes*, and *originality*. Due in part to the large uneven distribution of girls and boys in the study, *gender* was negatively correlated with all of the Ratings' areas. *Family musical activities*, *length of time in MFK classes*, and *previous musical experience* had one or more areas of weak significance with Judges' Ratings.

In the data collected for this study, the means and standard deviations of the Judges' Ratings by Demographic categories indicated the following trends:

1. Consistently, the girls in the study received higher scores than the boys.
2. There was a linear relationship in scores from ages 8 to 11 for all but two of the ratings categories (*craftsmanship* and *motivation/effort*) and the scores in *originality* and *creativity* showed a linear relationship across all age groups.
3. The increase of scores by grade level was consistent in all ratings' areas.
4. The ratings for students who claimed they did nonmusical type activities with their families were higher in all but two of the evaluation categories.
5. Across all evaluative areas, students who had been enrolled in MIDI classes for more than 2 years scored higher than those who had been in MIDI classes less than 2 years.
6. In this study, students who indicated that someone at home helped them with musical activities had higher ratings than students who had only school music instruction or students who were taking or had taken private music lessons.

Chapter 5 will present a summary and discussion of the major findings presented in Chapter 4, implications of the study, and suggestions for future research.

CHAPTER FIVE

Summary, Implications, and Recommendations

Chapter 5 will summarize the study's major findings, discuss their relevance in relation to previous research, and conclude with implications for teaching and further study.

Summary of the Study

Research indicates that music composing, performing, and listening are mental activities that involve *thinking* in sound (Gamble, 1984; Serafine, 1988; Webster, 1989). Therefore, researchers stress the importance of encouraging children to *think* more imaginatively and intuitively about music through varied music making activities. Music composition is an activity where the intuitive nature of children's musical understanding is exemplified through their ability to reconstruct abstract musical ideas into symbolic representations. Through imaginative play and experimentation with musical ideas, both important elements of composing, children link their musical intuitiveness with the formal aspects of musical understanding (Bamberger, 1999; Davidson & Scripp, 1988; Swanwick & Franca, 1999). The purpose of this study is to examine the creative strategies children use when they compose a simple melody and to explore how these strategies are indicative of their musical thinking skills. Areas of particular interest are: a) the general characteristics of the students' demographics, their compositional products, and their responses/behaviors during the compositional process, b) the effect, if any, that a child's gender, age, grade, musical experience, and previous musical training might have on his or her composition; and c) the nature of the relationship between a child's observed behavioral and verbal responses with his or her composition ratings.

This was an exploratory study involving 45 volunteer students, between the ages of 8 and 12, who were enrolled in an after-school music program called *MIDI for KIDS®* (*MFK*). The researcher chose four children for the pilot study and the remaining 41 children participated in the main study. One child dropped out during the study leaving a sample size of $N = 40$ for the main study.

The children were asked to compose a short melody on a MIDI keyboard via Digital Performer 3® to go along with a digitally recorded accompaniment. There were several important components of the composition task design: a) the use of an accompaniment and use of only the black keys to provide a harmonic and rhythmic context for the composed melodies, b) presentation of the task in a format and in an environment that was familiar to the children, d) flexibility in completion of the task so the children would be able to experiment with and adjust their musical ideas, e) the capability of students to hear their compositions immediately, and f) use of software that would facilitate recording the compositions as accurately as possible.

Data were collected and analyzed using a combination of quantitative and qualitative techniques. Raw data were collected from field notes, family questionnaires, student interviews, audiotaped recordings, and MIDI files. The qualitative data were transcribed, coded, and categorized into two data sets: Process and Judges' Ratings. The quantitative data resulted from the Student Demographic and the Product variables.

The Student Demographics variables included *age*, *gender*, *grade level*, *family musical activities*, *length of time in MFK classes*, and *previous musical training*. Analyses of the Student Demographics data involved frequencies, percentages, means and standard deviations. The Product variables involved the musical attributes of each

student's composition including: *number of tracks, average number of keystrokes, average number of measures, total number of individual pitches, complete range of notes,* and *total number of measures of silence.*

The Process variables were categorized by the major themes that emerged from combined transcriptions of field notes, family questionnaires, and audiotaped recordings. These categories included *interaction, attitude toward the task, composing and listening strategies, learning characteristics, participation, aural awareness and musical understanding,* and *individual assessment.* Descriptive subcategories were created for each of the variables and ranked from lowest (1) to highest (4). The data from the transcripts were coded by category and ranked by subcategory.

The Judges' Ratings data resulted from the outcomes of an evaluative tool based on an adaptation of Amabile's (1983, 1996) consensual assessment technique (CAT). The CAT is designed to give a broad, subjective assessment of creativity. Adaptations of CAT have been used successfully in similar studies to evaluate children's musical outcomes (Auh, 1995; Brinkman, 1994/1995; Hickey, 1995; McCoy, 1999; Priest, 2001). Three experienced music educators independently judged each composition according to the guidelines suggested by Amabile (1983, 1996). They used a 7-point Likert-style scale to rate each student's compositions in several areas. The rating areas included: *steady tempo, phrasing, closure, craftsmanship, harmonic changes, replication, motivation/effort, originality, musical syntax, musicality, creativity,* and *overall rating.* Averages of the evaluation scores given by the judges were calculated for each category except for *overall rating. Overall rating* was the sum of the last three evaluative categories: *musical syntax, musicality,* and *creativity.*

Discussion

Creativity models generally include four primary components: the person, the process, the product, and the environment (Balkin, 1990; Csikszentmihalyi, 1996; Davidson, 1994; Elliott 1989; Gardner, 1982; Kratus, 1990; Richardson, 1996; Webster, 1987). Consideration of these creativity components occupies an important role in addressing the research questions for this study. It must be noted that, due to the small sample size and the exploratory/participatory nature of this study, the discussion of the evidence provided here is merely suggestive and applicable only to what was observed by the researcher.

Cultural and Personal Effects on Student Composition

Research Question 1 addresses the trends observed in the data collected through interviews, field notes, audiotaped recordings, and MIDI files. The information gathered from the students in this study provided a social, educational and environmental context for their compositional activities and outcomes. Folkestad (1998) explains that the context of music making involves "not only the people, features, and characteristics present for the time being. It also involves a historical dimension – cultural and personal – including the experience of previous situations" (p. 129).

Effects of Age, Gender, Musical Experience, and Background

The first part of *Research Question 1* asked: *What trends emerge from analysis of gender, age, musical experience, and musical background in relation to the compositional outcomes?*

The consideration of age, gender, grade level, family activities, musical experiences, and forms of previous training were important elements that helped frame each child's musical response. The Student Demographics data set included six categories: *gender*, *age*, *grade level*, *musical family activities*, *length of time in MFK classes*, and *previous musical training*. Analyses of the data involved frequencies, percentages, means and standard deviations.

The major findings included: a) all of the Process variables were positively weighted and many were significantly correlated with the Judges' Ratings; b) of the Student Demographic variables, only *grade level*, *age*, and *family musical activities* had significant correlations with the Judges' Rating; and c) compositions that received the highest judges' ratings had a limited, singable range, fewer individual notes, a higher number of keystrokes, and exhibited elements of continuity making it easier for the student to replicate. For this study, these findings suggest that: a) the "process" was closely related to the judges' scores of the final product, b) age and developmental factors had an impact on the students' compositions, c) involvement with their family seemed to play a role in how students performed on their compositions, and d) the judges were in general agreement about the structural and musical characteristics of a "good" melody.

The degree to which biological and environmental elements influence musical development has been long debated. There is growing support for the theory that it is not a question of which one has the greater effect on musical ability, but how they interact to provide the context for development (O'Neill & Sloboda, 2001). Examining individual differences can provide insight into the biological and environmental interactions that shape musical behavior or outcomes. Age, gender, and training are areas commonly

investigated to determine individual differences in musical development (Hargreaves, Comber, & Colley, 1995; Hargreaves, Kemp, & North, 2001).

In the present study ($N = 40$), over two-thirds of the students were girls ($n = 27$). Due to this skewed ratio of girls to boys and the small number of participants, it is reasonable that this imbalance will influence the trends in gender that emerge. Therefore, the trends that do emerge in the data analysis are not considered as indicative of a population where gender is normally distributed. Although subjects' ages ranged from 8 to 12, the majority of the students were between 9- and 11-years old ($n = 31$) and in grades 3, 4, and 5 ($n = 36$).

There are many developmental implications regarding the range of musical skills and level of musical understanding between children in early and upper elementary grades. Between ages 6 and 9, children are exploratory and experimental in their music making. Their music begins to take on rhythmic, melodic, and structural characteristics similar to the music of their culture. As children mature they become aware of the structure and rules of music and they tend to imitate the musical style they listen to most often (Hargreaves, 1996; Swanwick & Tillman, 1986; Webster, 1987). This information is pertinent to the study in that it helps to address trend observed in the data regarding age and grade level: Age and grade level had more areas of significance with the judges' ratings areas than the other demographic categories.

The nature and scope of an individual's musical experiences influences his/her fluency of musical ideas and encourages exploratory behavior (Folkestad, 1998). In this study, students were asked about formal and informal musical experiences at home, at school, and private music lessons. Half of the students indicated that they and their

families either did nonmusical activities together, did not do organized activities together, or they (the students) did not know. The other half of the students referred to musical activities that were labeled "passive" or "active." Passive musical activities involve situations where there is little or no initiation on the part of the child to create or make music or actively take part in a musical activity. Passive activities include listening or singing with the radio as background music, singing 'Happy Birthday" or holiday songs once a year, and watching TV. Active musical involvement included singing religious or cultural songs on a regular basis, attending concerts and recitals, or playing instruments together. Jonathan, an 11-year old, described his and his family's active involvement with music:

J: Sometimes my mom sings in the morning and when I come home from school.

AB: Do you sing with her?

J: Sometimes. She makes up her own songs or she takes a tape and plays it. She used to play the violin…I'm in a choir in Norman, the Norman Children's choir.

The commonality of the musical experiences of the students participating in the study were generalized into two areas: a) all of the students attended general music classes in public schools in Oklahoma and b) all of the students were either enrolled in the *MIDI for KIDS®* (*MFK*) after-school music program or were attending a week-long *MFK* summer camp. It was not surprising that 80% of the students who participated in the study had been enrolled in *MFK* classes for less than a year since the program was fairly new and had not been offered in any of the school locations for more than 3 years.

The last demographic category, *previous musical training*, investigated the type of musical training or instruction each student had taken or was receiving in addition to the *MFK* classes. Most of the children in the study did not have any additional musical instruction outside of their public school music classes and the *MFK* classes. Although very few students indicated that they had taken private music lessons, 30% mentioned that someone at home (a parent, sibling, aunt, uncle, or grandparent) worked with them or gave them additional help with playing an instrument or singing. These last three demographic areas, *family musical experience*, *length of time in MFK classes*, and *previous musical training* provide an instructional backdrop for the students' compositions in this study.

Research indicates that informal musical experiences provide the foundation for compositional creativity (Auh, 1995). Folkestad (1998) notes:

> The great majority of all musical learning takes place outside schools, in situations where there is no teacher, and in which the intention of the activity is not to learn about music, but to play music, listen to music, dance to music, or be together with music. Each of these examples typify situations in which we experience music in one way or another. (p. 99)

Therefore, it is important to have a broad understanding of the nature of the musical activities in which the children have been involved, whether at home, at school, or in the larger community.

Trends in the Musical Characteristics of Children's Compositional Products

Research Question 1b asked: *What trends emerge from analysis of the musical characteristics of the compositional products?*

The Product variables were common musical elements compiled from the notated versions of the children's compositions. Musical attributes of each student's set of tracks were recorded by *the number of tracks played, the average number of keystrokes played, the average number of measures played, the total number of individual pitches played, the complete range of notes used,* and *the total number measures of silence*. The minimum and maximum totals per Product category are presented in Table 4.

Median values of the Product variables were used to observe trends with the Demographic categories (see Tables 5-10). The Product variables fell into three areas of compositional characteristics:

1. Refinement – *total number of tracks*.
2. Exploratory and experimentation – *average number of keystrokes*, *total number of individual pitches*, and *range of notes played.*
3. Reflection/Listening – *total number of measures of silence*.

The students who played more tracks were generally those who seemed motivated to refine their compositions or kept trying until they "got it right." The most obvious trend was by *grade level* (see Table 7); the *number of tracks* increased as the grade levels increased. These results suggest that the older students were more willing to keep working with their melodies until they were satisfied with the final product. Developmental research in music supports this conclusion: As children mature, they a) become more interested the structural aspects of music and b) tend to mimic the musical

idioms of the music they to which they are most exposed (Hargreaves, 1986, Webster, 1987). DeLorenzo (1989b) also found that as children became more experienced in music making, they were more likely to work "with a limited set of ideas at much greater depth and breadth" (p. 4).

In the category *previous musical training,* students who indicated that someone at home helped them with practicing or other music activities played more tracks than students who took private lessons or who had no other experience with music outside of public school music classes and *MFK* classes. Whereas formal training encourages rules about creating and exploring new musical ideas, informal music making which is independent of musical training "seems to be a self-evident activity which is justified by the most frequent answer, 'I just do it'" (Folkestad, 1998, p. 127). This was evident in one student's response:

AB: When I asked you to make up a melody, what was the first thing you started to think about?

S: I kind of thought…I kind of have a knack for making stuff up so I thought, "That's something I can do."

During their interviews, many students in this category talked about trying to incorporate material they had previously made up while practicing at home. When asked where he got his ideas for his melody, another student replied, "Practice at home. I did think of that first part first before at home." Research supporting this observation indicates that composition is related more to practical experience and practice than to formal musical training (Folkestad, 1998). Informal musical experiences have been identified as important precursors of compositional activity (Auh, 1995).

Trends in exploration and experimentation were more pronounced in the compositions of 2nd graders and children who were 8 and 9 years old (see Tables 5 & 7). Both groups had higher medians for *average number of keystrokes* and *range of notes played.* These trends have developmental implications. Gardner (1973/1994) describes the creative behavior of children between ages 5 and 7 or 8 as effervescent, inventive, and spontaneous. In contrast, 7- to 11-year old children mature and enter a period of "latency" (Gardner, 1973/1994, p. 256), a time when creative activity and expression begin to diminish. Findings in the *musical family activities* category indicated that students who claimed they had neither musical nor nonmusical experiences with their families outside of everyday life were more exploratory in their range of notes. This trend is similar to the exploratory behavior characteristic of younger children (Gardner, 1973/1994) and may be related to the children's limited musical opportunities (DeLorenzo, 1989b). Swanwick and Tillman (1986) suggest that explorative behavior in older children could also be developmental. They describe a developmental shift in children from possessing a "vernacular" knowledge of music to a "speculative" form of knowing. The speculative phase is the child's ability to manipulate familiar forms or conventions into something new or unique. This shift often results in a regression in the child's mastery and fluency of skills.

> First attempts at musical speculation sometimes appear to be a kind of regression to earlier stages of manipulative insecurity. Some of the earlier fluency seems to be lost in a new phase of experimentation which is often focused on melodic development. (Swanwick & Tillman, 1986, p. 324)

A reduced amount of exploration and experimentation was evident in the subcategory involving children who had been enrolled in *MFK* classes for 7 and 12 months. The children in this group had on average the fewest keystrokes in their compositions. The average age of the children in this group was 9.5 years. This is consistent with Webster's (1987) suggestion that children around ages 9 and 10 tend to create music that is a) more predictable and consistent with the music of their culture and b) become more concerned with the organization and accuracy of their music. A child's years of enculturation and level of musical instruction would certainly affect his/her concept of what a "good" or acceptable melody looks and sounds like.

The evidence of reflection/listening characteristics seems more apparent in the compositions with a higher number of measures of silence. The demographic profile of a student in this study whose composition had the highest frequency of measures of silence suggests a boy, 11-years old, in the 5th grade, with more than two years experience in *MFK* classes, who actively participates in musical activities with his family, and receives some type of support from someone at home when he practices or plays music. In studies on music improvisation, research shows that novices tend to get caught up in the physical and technical aspects of playing an instrument and they lack the fluency or preconceived structure of musical ideas that experts develop over years of hard work and performance (Hargreaves, Cork, & Setton, 1991). Due to their developmental and experiential limitations, it is expected that the students in this study would exhibit many novice-like characteristics. As novices, the students' lack of fluency and experience could help explain hesitancy or stopping during the task as they reflect and re-orient themselves to what they heard in the music.

These characteristics are also relevant to DeLorenzo's (1989b) description of progressive phases of creative behavior. She identifies a shift from the wide-range exploration of inexperienced children to a more tailored, in-depth approach of "determining how musical ideas related to one another and how these ideas became ordered in the resulting musical piece" (p. 4). As children become more familiar and experienced with creative expression in a particular medium, the better able they are to reflect on the music, the structure, and stylistic features. Instead of filling up space with notes, they will make a decision about how to play something so that it fits or matches what they want to hear. Nonetheless, due to the small sample size and exploratory nature of this study, it must be noted that the evidence provided here is merely suggestive and applicable only to what was observed by the researcher.

Trends in Children's Behaviors and Verbal Responses During a Compositional Task

The last part of *Research Question 1* asked: *What trends emerge from analysis of the students' observed behaviors and recorded verbal responses during the compositional task?*

Students' behaviors and verbal responses during the composition tasks were recorded, transcribed, and categorized by common themes to comprise the Process variables. The Process variables were categorized by the major themes that emerged from combined transcriptions of field notes, family questionnaires, and audiotaped recordings. The categories included: *interaction* (the student's questions and/or comments related to completing the task), *attitude toward the task* (the student's general attitude and level of confidence), *learning characteristics* (a student's observed and recorded responses that pertained to his/her goal of completing the composition task),

participation (the degree to which a student seemed actively involved with the composition task), *composing and listening strategies* (the student's ability to accurately recall the melody), *aural awareness & musical understanding* (the student's ability to hear musical elements and to verbalize his/her musical understanding in either metaphorical or conceptual terms), and *individual assessment* (the student's responses when asked to evaluate, describe, and reflect on his her composition). Descriptive subcategories were created for each of the variables and ranked from lowest (1) to highest (4). The data from the transcripts were coded by category and ranked by subcategory.

A review of the frequencies and percentages in Table 11 revealed several interesting trends in the distribution of observed responses. The categories *interaction, attitude toward the task,* and *learning characteristics* were positively weighted suggesting that most students exhibited an elevated level of interest, were focused in the composition task, and motivated to complete the task. Also, these results might indicate that; overall, the students were comfortable with the testing environment, the task requirements, and their ability to meet the requirements. *Individual assessment* was negatively weighted indicating that most students in the study provided few, if any, goal-oriented reasons for or opinions about their musical choices. This negative trend may be due to the children's lack of vocabulary or experience with verbally expressing their opinions or feelings about their performance and final product. The data for *participation* and *aural awareness and musical understanding* were distributed normally across the study population. The normal distribution of ratings in these areas may be indicative of the appropriateness of the task for the developmental and ability levels of the students in the study.

The subcategory of *composing and listening strategies* was not normally distributed. The frequency of ratings in this category indicated that almost a third of the students (32.5%) received the lowest level of ratings, "random playing, no recall." Combining the two lowest rating levels, more than half of the students (52.5%) were unable to replicate their melodies and demonstrated either no or very little strategy for trying to remember their melodies. Forty-seven and a half percent of the students (in the upper two rating levels) seemed to utilize some type of strategy or organization to help them remember their compositions. The polarization of scores in this category is an interesting outcome and may suggest a scenario similar to what DeLorenzo (1989a) observed in her study of children's music problem-solving processes. DeLorenzo identified differences in the degrees of personal investment and motivation her students demonstrated for their work. She describes "observable indicators of investment" (p. 196) that included not only what the student said or did but also his/her "attentiveness to the development of the piece as well" (p. 196). In her report, she states:

> Whereas highly involved problem solvers demonstrated increasing levels of excitement and intensified drive as they neared a solution, uninvolved problem solvers were easily distracted and rarely showed facial emotion, verbal interest, or concern for the resulting product.

And, although this study demonstrates trends that are similar to DeLorenzo's (1989a), the small size of the present sample prohibits anything more than speculation.

The Relationship of the Components of Creativity to Children's Compositional Processes

Research Question 2 asked: *To what extent are the components of creativity related to the compositional process*?

Correlation analysis of the Process variables (students' observed behavioral and verbal responses during the creative process) and Judges' Ratings of students' compositions revealed numerous areas of significant correlation. The strongest correlations occurred between the Judges' Ratings and the categories *composing and listening strategies, participation, attitude toward the task, learning characteristics,* and *individual assessment.* These results indicate that there was a very strong relationship between the compositional process (what the students did and how they did it) and the creative components of the product that were evaluated by the judges. Best (1992) validates the importance of the relationship between the creative process and the creative product. He indicates that the two are inseparable, such that "the process can be identified only by the product; the process can be described only by reference to the product" (in Barrett, 1998b, p.14). The findings from this study are supported by research that says, as much attention needs to be given to the process as the product.

There are important instructional implications in this relationship between the process and the product. Traditionally, educational objectives have placed a tremendous amount of value on tangible, measurable outcomes and products. However, instruction that takes into account the process as an indispensable part of the product encompasses broader objectives: a) to help children become aware of and value musical thinking and doing, b) to offer children meaningful, varied opportunities to be creative and imaginative, and c) to support children in finding and owning their creative "voice" and in discovering ways to share it with others.

The category *interaction* referenced the nature of the interaction between the student and the researcher during the composition process. *Interaction* had four areas of

significant correlation ($p < .05$) with the Judges' Ratings: *replication* ($r = .718, p = .000$), *originality* ($r = .349, p = .027$), *closure* ($r = .341, p = .031$), and *musical syntax* ($r = .331, p = .037$). In general, students who tended to be more interactive during the composition task were more likely to incorporate novel musical ideas into their compositions. It is also interesting to note that these students' melodies were given higher ratings for musical structure and organization and indicated awareness of phrase and harmonic structure. With that said, it is not surprising that these students were also able to replicate their melodies more accurately. Closure and musical syntax are elements that suggest some type of structure and organization within the composition. Also, the use of original ideas could provide implicit musical structure.

The ratings areas that were found to have a significant correlation ($p < .01$) with *attitude toward the task* were *overall rating* ($r = .583, p = .000$), *musical syntax* ($r = .562, p = .000$), *creativity* ($r = .560, p = .000$), *originality* ($r = .547, p = .000$), and *craftsmanship* ($r = .545, p = .000$) (see Table 14). The nature of this correlation indicates that a student's perceived attitude toward him- or herself, the task, the researcher, and the environment had a positive effect on the composition. Overall, the judges recognized that these students' melodies tended to incorporate novel and creative musical ideas and maintained a sense of musical continuity throughout. Based on the scores, these melodies tended to be more expressive, aesthetically appealing, and had a sense of technical structure and musical organization. These findings have implications concerning the age-appropriateness and creative context of a task. If a task is age-appropriate, then students will feel comfortable with the expectations and possible solutions for its completion. The familiarity of the environment in which this task took

place (during regular *MFK* class time and in an area in close proximity to the *MFK* classroom), familiarity with the instrument used (a MIDI keyboard), and familiarity with the mode of presentation and technology (a digitally recorded accompaniment that goes along with a musical activity or melody) were elements that possibly supported students' ability to be more expressive and organized in their compositions (DeLorenzo, 1989a, Folkestad, 1998).

The *learning characteristics* category was strongly correlated ($p < .05$) with *originality* ($r = .446, p = .004$), *creativity* ($r = .442, p = .004$), *overall rating* ($r = .438, p = .005$), *replication* ($r = .435, p = .005$), *craftsmanship* ($r = .426, p = .006$), and *Musical Syntax* ($r = .424, p = .006$) (see Table 15). This category rated the students' own responses that pertained to whether or not they were working toward a goal and, in particular, toward the completion of the task. Compositions from the students who demonstrated goal-directed behaviors were considered creative, incorporated novel musical ideas, and established a flow from one section or phrase to the next. The melodies played by this group had obvious elements of musical structure and organization, therefore making them easier for the students to replicate. It is interesting to note that the weakest areas of correlation in this category were in *steady tempo*, *phrasing*, and *musicality*; especially since the former two are often considered to be important elements of musicality.

The *Participation* category rated the student's level of involvement during the composition process and had significant correlations ($p < .01$) with all of the judges' scores. The strongest correlations were *originality* ($r = .588, p = .000$), *creativity* ($r = .577, p = .000$), *overall rating* ($r = .567, p = .000$), and *craftsmanship* ($r = .565, p = .000$),

respectively (see Table 16). This finding suggests that students who demonstrated higher levels of involvement also produced compositions that the judges considered to be more original, creative, and had musical qualities that were technically and aesthetically appealing. Also, the judge's ratings indicated they felt these students were more successful in incorporating and linking together rhythmic or melodic idea(s) in order to give their melody a sense of continuity.

The results further revealed that the ratings students received for *composing and listening strategies* had a strong correlation ($p < .01$) with the scores they received from the judges in all evaluative areas (see Table 17). *Replication* ($r = .718, p = .000$), *musical syntax* ($r = .595, p = .000$), and *musicality* ($r = .587, p = .000$) were areas that had the strongest correlations. The *composing and listening strategies* category dealt with the student's ability to recall any or all of the melody and the degree of focus on the task. Students who demonstrated more of these strategies during the compositional process were judged as more successful at replicating the melody, able to organize their musical ideas in a way that was aesthetically pleasing to the adult listeners.

The category *aural awareness and musical understanding* had the strongest correlation ($p < .01$) with ratings in *craftsmanship* ($r = .430, p = .006$) and *originality* ($r = .459, p = .003$) (see Table 18). This Process category involved the awareness that children seemed to have about the music they heard, including its stylistic, harmonic, and/or structural characteristics. It also involved the level of understanding the students exhibited relative to what they heard. The findings showed that children who were rated highly in aural awareness and understanding also received high scores for their use of original musical ideas and the continuity of the musical ideas between sections of their

melody. An interesting element of this particular part of the findings relates to the Judges' Ratings that did not correlate with *aural awareness and musical understanding.* The scores for *steady tempo, phrasing, closure, harmonic changes,* and *replication* were positively weighted but failed to agree with the Process rating. A possible explanation for this finding is the subjective nature of the Process ratings that were based on subjective account of observations and responses of the students. In contrast, the judges made rather objective judgments based on the actual recorded and notated products. These five areas of least agreement are all easily determined by an objective assessment of the students' recorded and notated outcomes.

Individual assessment rated each child's own verbal reflections of his/her effort, the process to accomplish the task, and the final product. *Originality* ($r = .525, p = .001$), *motivation/effort* ($r = .522, p = .001$), *replication* ($r = .477, p = .002$), *craftsmanship* ($r = .463, p = .003$), *creativity* ($r = .455, p = .004$), and *musical syntax* ($r = .437, p = .005$) were strongly correlated ($p < .01$) with *individual assessment* (see Table 19). These results indicate that students who were more reflective and self-aware about the process and their products were likely self-motivated, able to think of original and creative musical ideas, able to incorporate their ideas appropriately to create a technically sound and aesthetically pleasing melody, and able to remember enough of the structure and qualities of the melody to adequately play it again.

However, it must be pointed out that the majority of the students (72.5%) received low ratings for individual assessment, indicating that, when asked, they either provided no feedback or their responses were very general in nature and not directly related to the task. These findings are supported by Barrett's (1998a) statement that:

> [When they are composing] Children are engaged in the processes of 'describing, analysing [*sic*], interpreting, and evaluating' sound combinations through the compositional act although these processes are not evidenced in verbal form. Rather, they are evidenced in the musical artefact [*sic*], the composition itself, and in particular in the form and structure of the composition. (p. 61)

In relating all these findings to the original research question one should note that all of the Process categories were positively correlated with the Judges' Ratings. The number of significant correlations between the Process elements and the Judges' Ratings suggests a strong relationship between the behaviors and verbal responses of the children in the study and their final products. Kratus (1989) suggests that the creative process and the creative product may be difficult to distinguish since they coexist as *the act* and *the result*, respectively. In this study, children who produced compositions with higher ratings were also more involved with the process. Throughout the process, they had a) a sense of *what* they wanted to accomplish (goal-oriented), b) a sense of *how* they were going to accomplish it (strategies), c) were motivated to put forward the effort to complete the task, and d) were able to talk about and reflect on how well they performed or completed the task. However, as suggested in the findings of the aural awareness and musical understanding category, some form of objective evaluation must balance the assessment of children's creative endeavors.

Relationship Between Children's Compositions and Demographics, Musical Experience, and Musical Training

Research Question 3 asked: *Is there a relationship between judges' assessments made of a student's compositional outcome and his/her age, gender, grade level, musical experience, and musical training*?

The results indicate several areas of significant correlation between the Student Demographic variables and the Judges' Means. The Demographics categories include *gender*, *age*, *grade level*, *family musical activities*, *length of time in MFK classes*, and *previous musical training*. A report of the means and standard deviations of the judges' scores for girls' and boys' compositions showed that, consistently and across all categories, the girls received higher scores than the boys (see Table 20). These findings must be viewed with caution, however. *Gender* may not to be a meaningful descriptor of this study's sample since two-thirds of the students were girls. Due to this discrepancy and the small sample size, the statistics relating gender with the other variables are highly skewed.

The general trends observed for *age* and *grade level* in this study indicate that, for children ages 8 through 10, as age and grade level increased, so did the judges' ratings. This upward trend in musical abilities and increased level of understanding for older children with more musical experience is to be expected. However, it was interesting that although the trend remains true for rating means per *grade level*, it is not true for children ages 10, 11, and 12. In this case, the scores remained close in range and the higher ratings fluctuated between age groups (see Tables 22 & 23). This trend is corroborated by Gordon's (1989) theory of music aptitude. Gordon posits that, until the age of 9,

children's musical aptitude is in a flux of development, being affected by the environment and their own musical innate abilities. However, around age 9, children's aptitude levels off and becomes "stabilized" (p. 7). He explains:

> His musical environment will no longer have any effect on his level of music aptitude. That is not to say that a child cannot achieve in music after he is nine years old. What it means is that child who is older than nine will not be able to achieve in music any higher than his level of stabilized music aptitude will allow. (p. 7).

Also, this trend might be expected at the primary level since grade level instead of age becomes a strong delineator of children's instructional experiences and opportunities. For children between ages 10 and 12, researchers describe a period where creativity and artistic behaviors begin to taper off (Gardner, 1973/1994). In either case, research supports the general trends observed in this study with regard to age and grade level.

General trends documented for the category, *family musical activities*, show an interesting relationship between the kinds of activities that students and their families did together and the ratings the students received on their compositions. The researcher asked each student if his/her family did any type of musical activities together and, if so, what those activities might be. Responses were divided into one of four areas:

1. None – The student indicated that either the family did not participate in organized activities together or he/she was not sure.
2. Nonmusical – The student indicated that the family did some type of organized activity together but it was not related to music.

3. Passive – These activities included situations where there is little or no initiation on the part of the student to create or make music or actively take part in a musical activity.
4. Active – These activities included singing religious or cultural songs on a regular basis, attending concerts and recitals, or playing instruments together

Fifty percent of the students in the study described some type of music-related activity in which their families participated, while the other's responses were categorized into the "none" or "nonmusical" groups. There were four ratings areas strongly correlated with *family musical activities*: *steady tempo*, *phrasing*, *replication*, and *originality* (see Table 20). Students in the subcategory, "nonmusical," received the highest ratings in 8 of the 12 evaluative categories (see Table 24). This trend is supported by Sloboda and Davidson (1996) who indicate that much of the musical training that an individual receives is informally transmitted through the culture and through products of the culture. This process is called enculturation. They explain that "music performance ability builds on a very common human heritage, rather than a rare set of special characteristics" (p. 178). Even though many of the students in this study admitted that they and their families were not involved in any "musical activities," the exposure they have had with music through the environment and through their culture – especially in this day of media saturation – may have provided them with an intuitive musical knowledge. The students' store of intuitive musical understanding, coupled with their instructional experiences in school music classes and MIDI classes, proved to be beneficial to their ability to accomplish a simple compositional task.

The category, *length of time enrolled in MFK classes*, includes the subcategories of: "0 to 6 months," "7 to 12 months," "1 to 2 years," and "2 or more years" (see Table 25). Of particular interest is the consistency in ratings between the four subcategories. The ratings for students who had been in the *MFK* classes "0 to 6 months" and "1 to 2 years" were comparable across all evaluative categories. It is interesting to note, again, that enculturation likely plays a role in these findings. Sloboda and Davidson (1996) state: "There is evidence that much learning about music and its structures is something that takes place normally as a result of exposure to the musical products of the culture" (p. 178). The findings for this category suggest that students in the "0 to 6 months" and "1 to 2 years" groups were working on a comparable level of general musical understanding. However, this still does not explain the drop in scores for the "7 to 12 months" group which had the lowest ratings of the other subcategories. Additional observations (see Table 26) within the subcategories revealed that 80% of the students participating in the study had been enrolled in the MIDI classes for less than a year with two-thirds of the students in this category between ages 8 and 10. Twenty percent of the students had been enrolled in *MFK* classes for more than a year and three-fourths of these students were between 10 and 11 years old. Age and developmental factors likely play a central role in the differences in scores since the majority of the students are between 9 and 11. Another interesting element might be the effects of the additional training that the MIDI classes provide. As mentioned earlier, the research indicates that novices tend to get caught up in the physical and technical aspects of playing an instrument (Hargreaves, Cork, & Setton, 1991). Possibly the new learning challenges the child's intuitive musical understanding – as one learns more, one has more to think about.

Hence, this might cause a lack of fluency and self-confidence in the child as he/she pursues new musical ideas. Hickey's (1995) research found that students whose compositions were rated more creative also demonstrated more fluency and flexibility in their musical ideas. This research may additionally share some foundation with schema theory. Schemas are knowledge structures that are formed and changed as learning occurs and new information is processed and organized (Hargreaves, 1996). Another interesting trend in this category involves the group with 2 years or more of *MFK* experience. This group had noticeable higher ratings, however, it also had the smallest number in the group, $n = 2$. The increase of rating accompanied by more years experience in MIDI classes would be consistent with effects of schema development in these students.

The subcategories for the last demographic category, *previous musical experience*, are: "school music only," "someone helps at home," and "private music lessons." The data shows that there is a slight improvement for *steady tempo* across the three subcategories (see Table 27). However, in the 11 remaining ratings categories there is a trend toward higher scores in the "someone helps at home" group over the scores in the other two groups, "school music only" and "private music lessons." In fact, the scores for "school music only" and "private music lessons" tended to be close in most ratings categories. The implications of these findings support the trends observed and discussed in the previous demographic categories, *length of time in MFK classes* and *family musical activities*. The overall increase of ratings for "someone helps at home" group suggests the effects of enculturation and experience. It would stand to reason that children who experiment with and practice their musical ideas at home would be more

fluent and comfortable in expressing those ideas in other situations. Barrett (1996) came to a similar conclusion in her study of children's compositions. She found that children with little musical experience and no formal training were able to compose with a certain degree of complexity that surpassed the compositions of children who had taken several months of private lessons. The compositions of students who had taken private lessons were generally less experimental, more repetitive, and lacked much development of musical ideas. She concluded that previous musical training was not linked to children's abilities to make aesthetic decisions.

Overall, the Student Demographics categories show noticeably weaker relationships with the Judges' Ratings than did the Process elements. The exceptions are *age* and *grade level*. One or both of these areas are significant with *steady tempo*, *phrasing*, *closure*, *harmonic changes*, *motivation/effort*, *originality*, *musical syntax*, and *overall rating* (see Table 20). As discussed earlier, the trends in *age* and *grade level* have implications related to the developmental abilities of children and the developmentally-appropriate use of composition in the general music classroom. For this study, the trends indicate that as the age and grade level of the child increased, his/her compositional ratings in these areas also increased. Maturation, experience, and level of instruction would seem to be factors that helped older children receive higher ratings than the younger children. Hence, the task used in the study seems more developmentally-appropriate for students in the upper rather than the lower elementary grades. This finding stresses the importance of providing students with instructional and experiential opportunities that fit their capabilities.

A multiple regression analysis (see Table 27) was used to determine which variables from the three data sets (Student Demographics, Product, and Process) were possible predictors for the higher ratings given by the judges. Of the 19 independent variables, 14 accounted for 64 % (r^2 = .642) of the variance in the judges' ratings. The large number of variables with relatively weak correlations and the high level of collinearity indicate that the model is weak. However, the most reliable positive predictors in the model were: *average number of keystrokes played per track* and *total number of individual pitches played. Complete range of notes used in all tracks* was a significant negative predictor, meaning that a narrow range of pitches chosen was predictive of a higher judge's rating. Although this model is weak, it seems to suggest that as the averages and/or totals in these predictor categories increased, the judges' ratings also increased. Hence, the judges were more likely give higher scores to students who had a high number of keystrokes and played within a narrower, more singable range. It is interesting to consider the possible explanations for this trend in the judges' ratings and what it says about the assessment of creative outcomes, such as composition. Trained musicians face particular challenges when they assess children's compositions, including their a) preconceived criterion for how an "acceptable melody" should sound, b) expectations about musical structure and technical strength, and c) perception of a composition's level of creativity and aesthetic appeal based on its degree of conformity to cultural norms and expectations. Children's developmental capabilities, level of experience, or lack of training do not render their compositional efforts less creative, only different from adults' compositions (Burnard, 1999). In order to encourage students to think and act more creatively and imaginatively about music, educators themselves must

be creative and imaginative thinkers and doers (Webster & Richardson, 1993). On the part of the educator, this poses a very important yet challenging task of maintaining a developmentally- and instructionally-appropriate perspective toward assessing their students' creative outcomes.

The Relationship Between Children's Musical and Creative Strategies and Previous Models of Music Cognition and Creativity

The fourth research question asked: *Are the musical and creative strategies observed in this study consistent with the music cognition and creativity models found in the literature?*

The musical cognition models discussed in this study (see Chapter 2) included models by Swanwick and Tillman (1986), Serafine (1988), and the constructivist theory (Webster, 1998; Wiggins, 2001). Many of the study's findings were supported by the main principles of these models.

Swanwick and Tillman (1986) posit a theory of musical development that involves a series of age-dependent stages, which are "cumulative and cyclical" (p. 64). The stages are divided into four areas: mastery, imitation, imaginative play, and metacognition. Swanwick and Tillman describe the first level, mastery, as what happens when children, birth to age 4, learn by responding to and eventually manipulating the sensory stimuli in their environment. Imitation refers to the ways children, ages 4 to 9, learn by imitating what they see and hear from their environment and culture as a means of personal expression and identity. Imaginative play represents children's (ages 10 to 15) willingness to go beyond imitation to personal expression that involves the creation of new or novel ideas through exploration and experimentation. Finally, metacognition is

exemplified by children's (ages 15 and above) awareness of musical experiences and their ability to make meaningful connections between what they know and what they can create.

The evidence gathered in this study supports children's use of imitation and imaginative play in their compositions. Swanwick and Tillman (1986) explain that children attempt to incorporate melodic ideas, rhythmic patterns, or stylistic features from the "community of musical commonplaces" (p. 322). Some students attempted to imitate the expressive and stylistic elements they heard in the accompaniment. Sonya, an 11-year old 5th grader, describes how she decided on the stylistic characteristics of her composition.

S: I just heard the beat and then how the beat was long. And the beat was fast and steady paced so I just figured staccato would go best with it.

AB: Yeah, it was kind of bouncy. So, you were listening to the style of music?

S: Yeah.

AB: How would you describe your piece to someone?

S: I'd probably say it was bubbly.

Through imaginative play, the child begins to manipulate familiar musical forms and ideas into something new or unique (Swanwick & Tillman, 1986). Imaginative play is evident in the exploratory and experiential elements of the students' compositions. Taylor, a 9-year old in the third grade, indicated that her favorite part of her composition was the beginning where she skipped some notes and then came back to the ones she skipped. In her posttest interview, she described the musical ideas she used: playing to the right side of the keyboard instead of the left, skipping notes and then coming back to

them, and putting in rests by skipping notes and then coming back to them. Taylor's description of her musical ideas is naïve, but indicative of an intuitive and imaginative sense of how she wanted the music to sound.

Other children in this study mentioned how they tried to immolate the musical ideas they heard, sang, or played at home, school, or MIDI classes into their compositions. Warren, a 12-year old in the fifth grade, explained how he tried to incorporate melodic ideas he learned from MIDI class into his composition.

AB: Are there any activities from MIDI class that helped you make up a melody?

W: Kind of "Yankee Doodle." Almost to the last part sounded kind of like "Yankee Doodle," but not really. I played the same three notes but I didn't play them at the exact tune.

The findings of this study seem to support portions of Swanwick and Tillman's (1986) music developmental model with regard to the students' use of imitation and imaginative play in their compositions.

Serafine (1988) offers a developmental progression of musical capabilities in children, including a critical period of development occurring between ages 7 and 9. During this time children become more aware and experimental with the musical idioms of their culture and environment. In this study, there were numerous references made by the students about the close relationship that existed between their musical ideas and choices and the music of their immediate environment. Another emphasis of Serafine's theory is the idea that compositional activities encourage individuals to think in sound as they put together musical ideas. Based on her comments during the composition task,

one 11-year old fifth grade student demonstrated that she was thinking in sound. The following is an excerpt from the transcriptions of the researcher's field notes and the audiotaped recording of this student's session:

After playing and recording the 2nd track:

S: Wait a minute. (*The student is humming and touching the keyboard's keys, aurally practicing what she wants to do. She does all this without the accompaniment.*) I think I've got it now.

(*Playing and recording of the 3rd track. After the song ends, the student thinks for a moment and mumbles to herself,*

S: "I'd like to try that again. That was a good one."

After she listened to the last track she played, the student added:

S: I like it. I think I could have gone doo-doo-doo (*student sings do – mi – sol*). Or, I don't know, just a different note at the very end. That's all right. It still sounds good.

As indicated by this student's transcript, she clearly had an aural idea of what she wanted to play and was able to make aural judgments about what she actually did play. The findings of this study seem to support Serafine's (1988) music developmental model with regard to the compositional activities encouraging students to "think in sound."

The symbol systems approach to musical development is based on the acquisition and use of objects, feelings, or concepts, such as those found in words, pictures, gestures, music, or mathematics. Children's drawings and invented notations of musical ideas or sounds have been shown to relate to their musical cognition (Bamberger, 1999; Davidson & Scripp, 1988, 1989; Upitis, 1987, 1992). Gardner recognizes two general stages of

artistic development that are based on the symbol systems approach: pre-symbolic and symbolic. Between birth and 2 years old, the pre-symbolic child begins to create and interpret symbols. From 2 to 7 years old, the child experiences a reorganization and refinement of skills within the symbol systems of his/her culture, which continues throughout life (Gardner, 1973; Hargreaves & Zimmerman, 1992). In this study, children's symbolic approach to composition was evident in their use of aural representations, involving timbre, expressive elements, melodic patterns, and rhythmic patterns. One observed example of a student's musical symbolization in this study involved a fourth grade, 10-year old student named Cora. During her composition task, she was consistent in her efforts to play a high pitch on the keyboard to coincide with a high-pitched motive that was played in the accompaniment at the end of measures 4, 6, 8, and 10 (for a notated copy of the accompaniment, see Appendix J). Other students also mentioned that they made an effort to match that particular motive heard in the accompaniment.

Symbol use is also demonstrated when students are able to make connections from one musical experience to another one through experimentation and exploration. In this respect the symbol systems approach has some overlapping principles with constructivism. Constructivism is a learning theory that emphasizes meaning-making, whereby individuals create or construct their own knowledge by building on what they already know (Abdal-Hagg, 1998). It emphasizes thinking and learning that is situated in activity (Webster, 1998). Constructivism focuses on student-centered learning and encourages cooperative learning environments, stresses the process over the product, and asserts that learning is situated in activity (Constructivism, n.d.)

Several examples have already been cited where students indicated that their choice of musical ideas represented another concept or idea. Once again, Cora's participation in the study will serve as an example for this topic. She provides an interesting look at how musical learning in one context was reconstructed and applied to a new musical situation. For her composition task, Cora played four tracks, all of them in different registers on the keyboard and with very little repetition of her melodic ideas. Throughout all four tracks, Cora's playing was explorative and experimental, however, she explained how she connected her experiences of playing other instruments with her composition task.

AB: Are there any activities that you've been doing at MIDI camp that kind of helped you come up with ideas for [your composition]?

C: The drums.

AB: How's that?

C: Because, when you hit the drumhead at a certain spot, it makes a different noise than when you hit it at a different spot.

AB: How does that relate to what you were doing on the piano?

C: Uh, not all the keys sound alike. Some are high and some are low.

There were two creativity models discussed in this study: Wallas' (1926) theory of creativity and Webster's (1987) model for creative thinking in music. Wallas (1926) outlined a prominent theory of creativity involving four stages, each representing conscious and subconscious elements of the creative process: preparation, incubation, illumination, and verification. Webster (1987) recommends a model for creative thinking based on the individual's "inherent ability to think creatively in music" (Hickey &

Webster, 2001, p. 19). His model focuses on the intentions and outcomes of creative activity and is delineated by "thinking process," "enabling skills," and "enabling conditions." Webster's thinking process incorporates Wallas' four stages of creativity as the means by which musical ideas are refined as they move back and forth between convergent and divergent thinking. The enabling skills and enabling conditions include the musical and non-musical factors that interact with the creative thinking process.

In addition to Webster, there are several models that include the person, the process, the product, and the environment as elements that situate creative activity (Balkin, 1990; Csikszentmihalyi, 1996; Davidson, 1994; Elliott 1989; Gardner, 1982; Kratus, 1990; Richardson, 1996). The data that were collected and used in this study were similarly divided into Student Demographic, the Product, and the Process. The following discussion will address some of the major findings of the study along with relevant information from the literature.

The environmental and instructional contexts of music learning have an unmistakable impact on an individual's ability to engage in and appreciate music. The context of learning concerns more than just physical surroundings. Folkestad (1998) describes context as the "total situation" (p. 106): the activity itself and everything that encompasses its production and communication including the individuals who are involved and their cultural and historical backgrounds (Folkestad, 1998; Small, 1995).

The Student Demographic variables provide information about the environmental and personal context of the compositions created during this study. The results show that the girls participating in this study received higher ratings on their compositions across all evaluative categories than did the boys. A study by Wilson and Wales (1995) found

similar trends between boys and girls. Sloboda (1985) indicates that the tendency for girls to score higher than boys is common throughout musical development literature. However, due to the skewed ratio of girls to boys and the small number of participants in the present study, it is reasonable that this imbalance will influence the trends in gender that emerge. Therefore, the trends that emerge in the data analysis are not considered as indicative of a population where gender is normally distributed.

There have been few studies reported about the effect of gender bias toward girls in music activities that involve composition and technology, especially since these two areas are perceived traditionally as male-dominated fields (Armstrong, 2001; Colley & Comber, 2003; Comber, Colley, Hargreaves, & Dorn, 1997; Green, 1997). Girls' low self-confidence and negative attitudes toward technology have been attributed to their lack of interest in and experimentation with music technology.

The role of gender in composition and technology raises interesting issues for music educators. From her extensive research of gendered musical practices, Green (1997) concluded that social and cultural "gender codes" are perpetuated in the school environment and that music education has particular areas of concern, namely in technology and composition (Armstrong, 2001; Green, 1997). Traditionally, composition and technology are fields that have been portrayed as masculine activities. When these two fields meet in the music classroom, there is the potential of a less than supportive learning environment for girls (Armstrong, 2001).

In a follow-up study in Britain, Colley and Comber (2003) found that the gender gap seems to have narrowed since the early 1990's but has not, by any means, disappeared. Their previous study (Comber, Colley, Hargreaves, & Dorn, 1997) involved

two groups of secondary school children in the United Kingdom grouped by age, 11 to 12 years old and 15 to 16 years old. In their attitudes toward computers, boys were more positive and more confident than girls. Boys tended to use computers at home and for a wider variety of uses, including word processing, programming, graphics, and games. Boys also displayed a stronger gender-biased view of technology than girls.

In a more recent study, Colley and Comber (2003) used a different set of students, but divided them into the same age groups, 11 to 12 years old and 15 to 16 years old. Colley and Comber found that even though more students had access to computers at home than in the earlier study, boys continued to be more positive and have more confidence in using computers. There was significant domination by boys in the frequency of use of music technology and computer games. In contrast to the 1997 study, girls in the 2003 study showed a higher gender bias toward technology than the boys.

For the present study, it is interesting that the number of girls who were enrolled in the MIDI classes and volunteered for this study far exceeded the number of boys. Their participation and successful completion of the composition tasks suggest that the girls were neither intimidated by nor less motivated than the boys who also took part in the study.

Some possibilities for the outcomes involving gender in this study include the nature of the how technology was used in the ongoing MIDI classes and the context of instruction. The focus of the activities in these MIDI classes is to develop musical understanding and creativity through learning to play the keyboard. In terms of technology, the lack of competition between individuals and the cooperative nature of the

learning environment may have put the girls in these classes on a more level playing field with the boys in terms of feeling successful and opportunities for expression. The small group setting likely gives students a familiar social and educational environment since no more than 6 students were enrolled in a class at a time and the students often met in the music classrooms at their own schools. In this case, the use of MIDI technology seemed to facilitate rather than distract from the musical learning environment by a) providing a variety of sound sources and musical textures that the students could manipulate and experiment with to create interesting ensembles and accompaniments and b) providing a psychologically safe and musically fun context for music instruction in a small group setting. These observations are corroborated by studies involving Swedish students who used computer technology to compose music (Folkestad, 1998). The researchers found that, for the students, the technology and type of equipment they used became subservient to the experience of making music.

The Product variables were separated into three areas of compositional activity: refinement (total number of tracks), exploratory and experimentation (*average number of keystrokes*, *total number of individual pitches*, and *range of notes played*), and reflection/listening (*total number of measures of silence*). Refinement referred to those students in this study who played more tracks because they were motivated keep trying until satisfied with the final product. The students who indicated that someone at home helped them in some way, played more tracks than those who took private lessons or who had no other experience with music outside of public school music classes and MIDI classes. Increases in *age* and *grade level* also correspond with increases in the number of tracks played.

These findings have developmental and instructional implications. Trends in exploration and experimentation were more pronounced in the compositions of 2nd graders and children who were 8 and 9 years old (see Tables 7 & 9). Both groups had higher medians for *average number of keystrokes* and *range of notes played.* This trend is supported by the literature regarding the general capabilities of children from ages 5 to 13. The literature indicates that, between ages 6 and 9, children's compositions are still exploratory, but begin to take on the inflections of the music they hear around them, with predictable rhythmic and melodic patterns and a stronger sense of tonality (Webster, 1987). It is not until after age 10, however, that children become more aware of musical structure and are more concerned with trying to organize their musical ideas by the implied rules of the music with which they are familiar (Webster, 1987). Mattie, a 4th grade student, described it this way:

AB: When I (asked) you to make up a melody and when you were practicing on the black keys, was there anything that you started thinking about that gave you ideas for your melody?

M: Some ideas. 'Cause I hear a lot of music and some of them have different melodies. So I just make up my own and see how it sounds like.

AB: So, is this right?...the music you like to make up is the kind of music you listen to?

M: Yeah.

Mattie makes it clear that she draws her musical ideas from the music of her environment. In her pretest interview, Mattie indicated music plays an important role in

her family's life and their activities. She described singing songs with her family in the evenings, usually after a meal. She also mentioned that many of the songs they sing are in their native language and unique to the culture from which they originate. When given the opportunity to make up their own music, children, like Mattie, draw on the music with which they are most familiar.

Median values of Product variables for *gender* (see Table 8) indicated that the girls' and boys' compositions were equal in all areas except in "total number of measures of silence" where the median number of measures was considerably higher for the boys (*Mdn* = 6.00) than for the girls (*Mdn* = 1.35). A review of the notated copies of the boys' tracks revealed that they were more likely to stop-and-start playing during the task while the accompaniment was playing. The girls were more likely to continue playing through the track until the accompaniment ended. Folkestad, Lindström, and Hargreaves (1997) found that one major difference in how girls and boys approach composition is related to the role of rhythm. Boys are more inclined to listen for the drum line and then the bass line whereas the girls were more likely to listen for the melody and chords first. Folkestad et al. (1997) describe this bottom-up versus top-down perspective as musical awareness that is *background* versus *foreground.*

Philip, one of the 5th grade students participating in the study, demonstrated background musical awareness while composing his song. The accompaniment that the students heard was in bluegrass-style with a 2-measure introduction and a very simple harmonic structure. It featured three instrument sounds: harmonica, fiddle, and banjo. The banjo provided the bass part on a continuous eighth note pattern. The fiddle played the middle part, in open 6ths on the offbeat. The harmonica played the upper part in a

continuous 16th note pattern. A notated example of the accompaniment is provided in Figure 5.

After he listened to the accompaniment play through once, Philip began to put together an eighth note pattern that rhythmically and harmonically matched the accompaniment. One interesting feature that Philip added was a 16th note ending to each of his phrases that matched a similar motive played by the fiddle. When the researcher asked Philip what musical things he thought about when he composed his piece, Philip provided this explanation: "(I) noticed the (repeated sounds) in the other parts and tried to copy it." A portion of the notated version of Philip's final track with the accompaniment is presented in Figure 5.

The relationships that emerged between the Process variables and the Judges' Ratings scores show that, in the case of the present study, the factors that had the greatest effect on the composition scores were the problem solving and music making skills that the children used during the task and how they used them. It was also evident that, individually, many of the Student Demographic variables had little or no impact on the Ratings' scores. In most cases, a student's previous musical training and family activities were not major influencing factors. However, whether or not the student played/practiced an instrument at home and were helped or encouraged by someone at home *did* seem to have a strong, positive relationship with his or her composition ratings.

Whether listening to or creating music, children rely on informal as well as formal forms of understanding, which are represented through divergent and convergent thinking, respectively. For their musical development, Webster (1987) stresses the importance of learning environments that engage children in both types of thinking.

Webster's model of creative thinking in music emphasizes the significance of the process which embodies the thinking, knowing, experiencing, and being parts of creativity. The process involves everything, musical and non-musical, that an individual needs and uses to solve a musical problem or create a new musical idea. The children's creative processes observed in this study indicated that active experience, exploration, and discovery opportunities in music provided the best foundation for their ability to compose.

Figure 5.

Philip's composition.

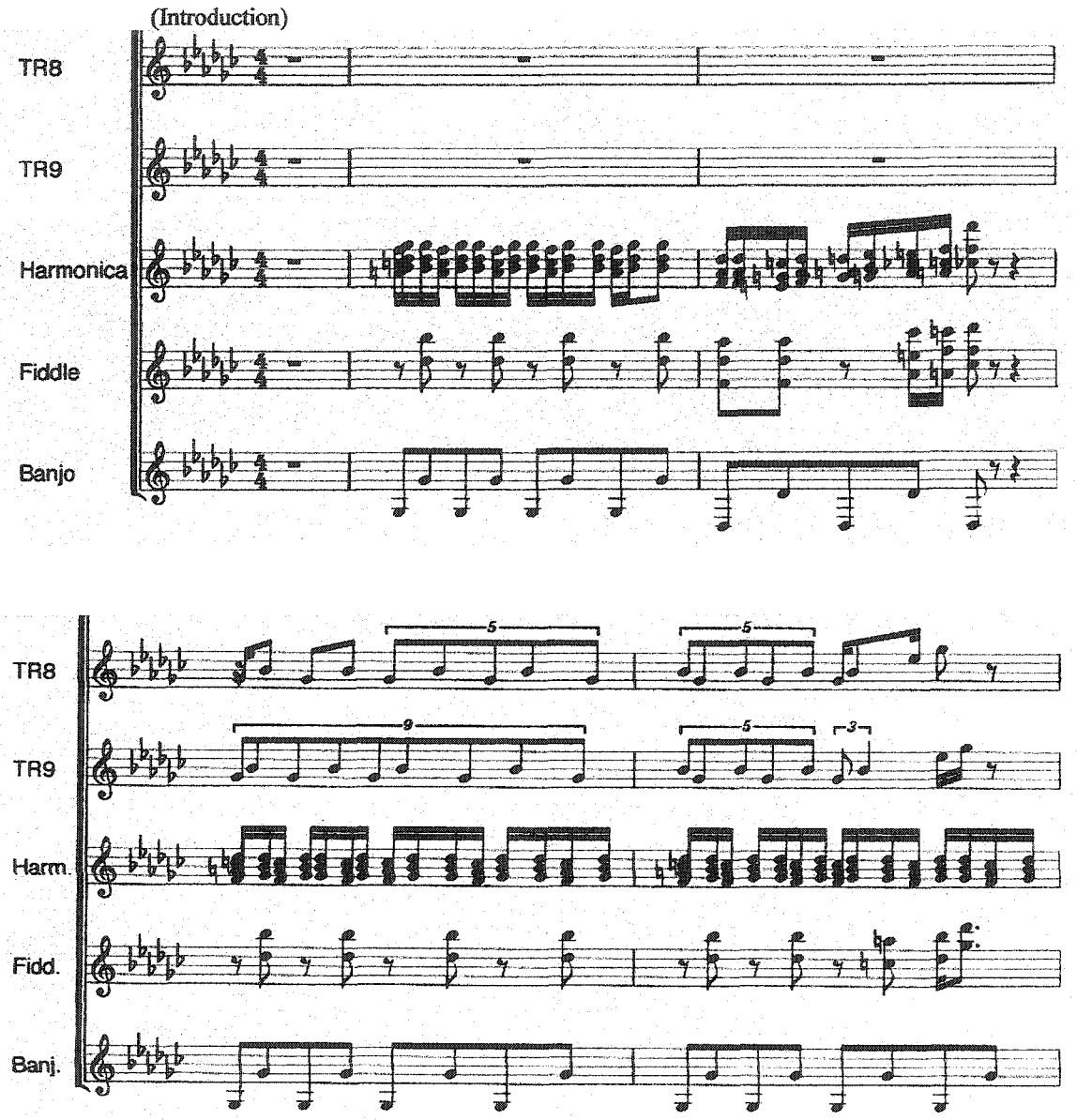
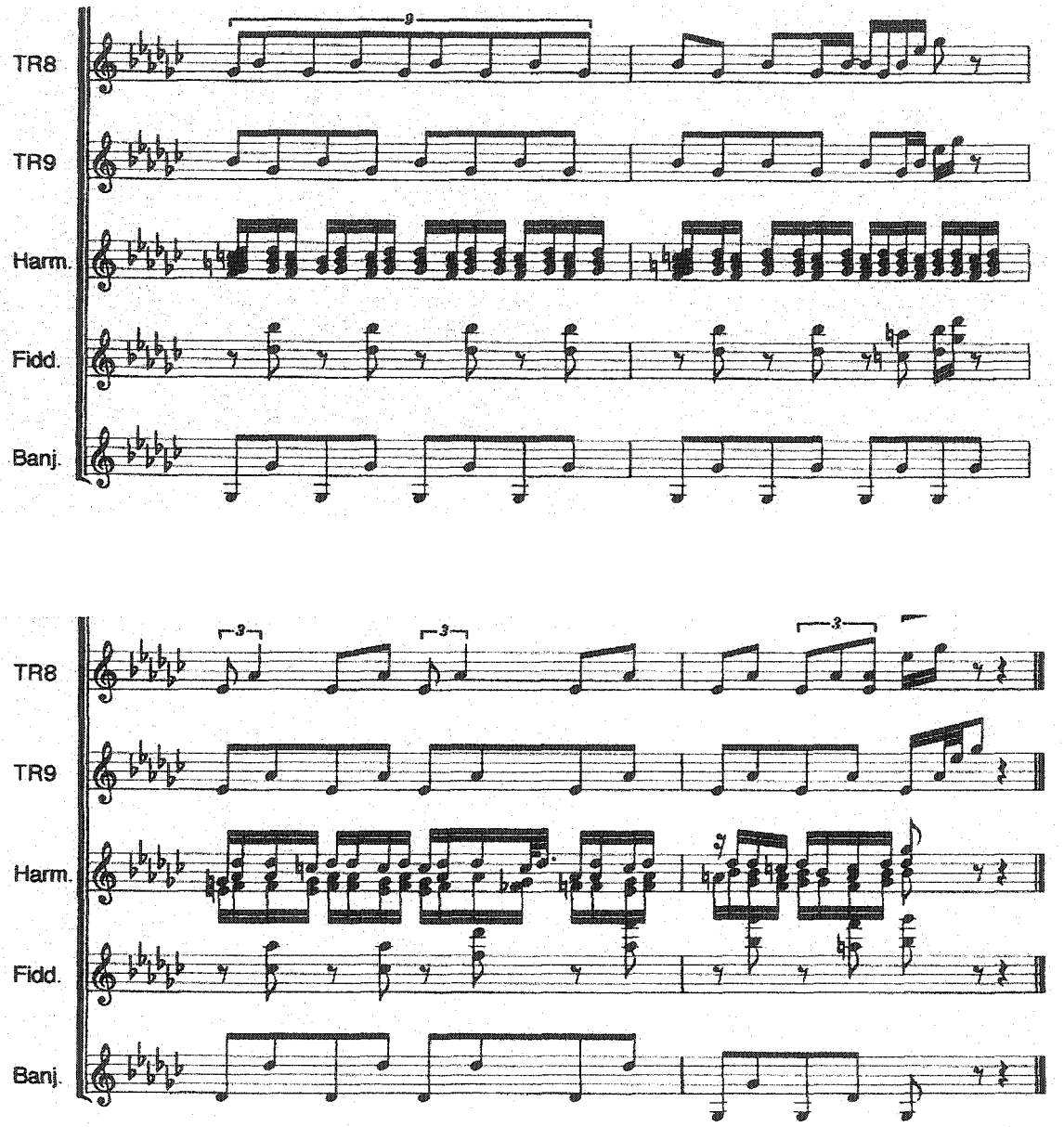


Figure 5. (con't)

Philip's composition.



Implications and Recommendations for Future Research

Due to the study design and small sample size, it is not possible to make generalizations from these data to a larger population. The trends observed in this study are modest and not conclusive. Therefore, the implications for this study will be approached as recommendations for future research. Research, by its nature, raises more questions than answers. From the trends that emerged in the study, a series of questions are presented and accompanied by recommendations for future research. A number of questions can be asked based on the observations of this study, including:

Are there developmental trends in children's creativity, and if so, what are they?

The trends in the Student Demographic data indicated that age and grade level were significantly correlated with several of the Judges' Ratings categories. These findings are supported by research studies that suggest a general progression of skill acquisition (Gardner, 1973/1994; Hargreaves, 1986a; Hickey, 2002; Swanwick & Tillman, 1986; Webster, 1987). Additional research is needed with studies that are longitudinal and that investigate similarities and differences in development across several artistic domains (ex: visual arts, dance, music, etc.). This research might provide valuable clues about the broad nature of creativity as well as offer insight into the creative components that are unique to individual domains.

Children's creativity: Can it be assessed? If so, what should be assessed – the process or the product?

Creativity assessment is controversial and varied, but the issues of assessing *children's* creativity are even more ambiguous. The appropriateness of an assessment tool for creativity is guided by how it is defined, conceptually and theoretically. The

interactions of factors that effect creativity make it difficult for researchers to agree on one definition or description. If a tangible product or an observable outcome is what defines creativity, then objective assessment may suffice. However, creativity models that are process driven reveal a complex combination of factors that cannot be measured solely by objective means. Factors such as the environment, experience, level of instruction, thinking processes, acquired and inherent skills, attitude and self-efficacy, family relationships, cultural factors, and social-economic factors intertwine to become the underlying force that inspires an individual to create something that might be considered unique, novel, useful, or appreciated by others in the domain. Some researchers of creativity, including Amabile (1983, 1996) and Csikszentmihalyi (1999), support a subjective approach to creativity assessment. Subjective creative assessment of an object or outcome is based on the degree to which those who work in that domain recognize its value and usefulness. Unfortunately, as Mayer (1999) reports, there are very few "scientifically valid examples" (p. 451) found in the creativity literature.

Several studies, including the present study, have adopted an approach to creativity assessment that incorporates both objective and subjective evaluations (Auh, 1995; Hickey, 1995; McCoy, 1999). The premise for both types of assessment stems from the importance that these researchers place on the relationship between the process and the product. In particular, Webster's (1987) model of creative thinking in music (see Figure 1) illustrates an intricate relationship between the thinking process, the person, and the environment with the product intent and eventual outcome. In composition, the product is generally a tangible, measurable, identifiable, aural representation of the composer's creative intent. On the other hand, identifying the composer's thinking

process and all the elements that influenced that process beyond any observed and/or recorded behavioral and verbal responses requires speculation. From such a perspective, relying on the speculative insights of experts (i.e., individuals with a body of experience within a particular domain or field) carries with it a certain amount of recognition and validation that the observed and/or recorded responses are, indeed, related to and influential upon the final product.

The assessment of children's creative activities by adults raises concerns about the type of criteria that are most appropriate, whether objective or subjective, and the focus of assessment, whether the process or the product. As noted in the literature review, children's creative endeavors are not less creative than adults' are; they are fundamentally different. In the present study, the judges used very broad, rather subjective evaluation criteria to assess an impartial representation (a digital recording and notated version) of each child's compositional product. Based on the research that has addressed the use of CAT to assess creativity (Amabile, 1996), the levels of reliability among the evaluative categories were within acceptable ranges ($\geq .70$), with the exception of one area: *originality*. Although the judges' assessments were based largely on the product, they were asked also to speculate about certain aspects of the process, including motivation/effort, expressiveness, aesthetic appeal, and the use of novel or creative musical ideas. Hence, the process and the product were not evaluated as separate components, but as parts of the whole.

Whether using CAT to evaluate children's artworks or informally assessing students' creative efforts in the classroom, there is a need for music educators to recognize the specific factors that provide the environmental, educational, developmental,

and personal contexts for creativity and how these are evident in the process and the product. Out of the already complex issue of creativity assessment rises a dire need for additional research to provide philosophical and practical guidelines to educators regarding assessing children's compositions.

What role does gender play in children's compositional abilities?

A review of the literature concerning gender issues in music education revealed an area of study that is woefully under-researched in the United States. Numerous studies from the United Kingdom and Europe provide the bulk of what educators know about gender issues in the general classroom, and in regard to composition. In spite of the differences and similarities related to gender observed in this study, the uneven distribution of girls to boys ($n = 27$ and $n = 13$, respectively) and the exploratory nature of the study make it difficult to draw conclusions about the effect of gender on the outcomes. There is a definite need for further research concerning the role of gender in activities that involve musical composition and the use of technology in the music classroom across a broad spectrum of contexts, including cultural, social, and educational, and developmental.

How should technology be utilized in children's music compositional activities?

The newness and limited amount of research in the areas of technology and musical composition make this a viable area of concern for music educators and for additional research. While Webster (2001) provides a persuasive argument for the effectiveness of technology in music teaching, an overriding problem remains regarding the availability or lack of availability of technology in schools in the United States. As a teaching tool, technology can provide children with new avenues for learning, creating,

and problem solving. However, the draw back for many music educators may not be the availability of technology but how to use it appropriately and efficiently in the classroom. Since technology in the classroom is relatively new, the philosophical and methodological constructs for establishing its benefits and usefulness in instruction are key.

The children who participated in this study were actively involved in music classes that used MIDI technology as a tool and vehicle for learning about music and building skills in music. As previously noted, the composition task for this study was designed to be congruent with these children's *MFK* experiences. This study's results indicated that the children's attitudes and general orientation toward the use of technology with musical activities were generally positive and, in some cases, were carried over into individual practice and exploration of music outside of class. It must be noted that many of the students in the MIDI classes had access to either a rented or purchased MIDI keyboard at home. In turn, students who explored their own musical ideas or practiced outside of class were more likely to incorporate those into new music-making situations, such as the composition task for the study. For these children, the context of musical instruction and practice was embedded in the use of technology and vice versa. The use and presentation of technology in the MIDI class was subservient to the overriding goal of learning about and making music.

In the field of music education research itself, there is a need for researchers to continue to explore ways that technology can serve as an efficient and worthwhile tool for discovery and understanding. Webster (2001) states: "...the development and study

of technology as a means of teaching music makes our theories, research, curricula, teaching strategies, and our entire professional development much stronger" (¶120).

Conclusion

The National Standards for Music Education (1994) provide music educators with guidelines for structuring competent musical instruction in the conventional elements of music. Much of school music instruction is formal and often involves learning through listening and/or performing the compositions of well-known composers (DeLorenzo, 1989b), along with the development of basic skills. While the nature of this instruction is foundational to learning about music, children have a fundamental need to experience music intimately through imagination, discovery, and musical thinking.

Beyond the need to know about the basic structure and terminology of music, children need experiences that inspire creativity, promote aesthetic decision-making, and which ultimately facilitate deeper understanding in music. Creative experiences are an important element of music instruction but DeLorenzo (1989b) warns that often "creativeness" (p. 3) can overshadow the thinking process that is the core of creativity. Webster (1987) posits a model for creative thinking in music that establishes the "thinking process" as the nucleus for creative activity. Musical composition is an activity that can provide students with opportunities to think aesthetically and musically, to create new ideas, to make musical choices, and to reflect on the outcomes of their creative decisions.

The nature of compositional activities suggests an integration of formal and informal types of knowing. The findings from this study showed a strong relationship between the Process variables (responses from the students while they performed the

task) and the Judges' Ratings. This seems to indicate that methods of teaching that support formal with creative, intuitive ways of knowing and learning are needed in music education curricula. These might take the form of experiential and exploratory activities or activities that pose a "problem," are open-ended for student-led inquiry and conclusions, and provide students opportunities to apply learned skills in new ways. Composition gives students rare opportunities to apply new skills, construct their own learning, and make aesthetic decisions. Therefore, compositional activities form an important link between musical thinking and skill acquisition.

A good deal of informal musical learning is intuitive and takes place outside of the school classroom. Informal learning experiences can provide students with unique opportunities to make music, to be expressive, and to create new musical ideas. They can have as much, if not more, influence on a child's attitude toward and involvement in music as teacher-led instruction. Intuitive knowledge cannot be taught nor is it acquired in the same way for everyone, but it is fundamental to the development of creativity. It is perpetuated by interactions and experiences with families and culture, life experiences, and individual interests.

When compositional activities are structured properly, children make aesthetic choices based on their imagination and experience. The design of these activities should acknowledge that instruction is meaningful and useful to students and must be compatible with their experiences, abilities, and their core of musical knowledge. Musical learning experiences can help students make sense of what they know (formally or informally), understand how it can be applied or found in new situations, and discover ways to construct new musical forms or ideas.

A major challenge for music educators is formulating a philosophy and mode of musical instruction that incorporates appropriate measures of skill learning with creative, musical thinking. Pogonowski and others (Webster, 1990, 1998) suggest a curriculum that is process-oriented, experiential, hands-on, active, interactive, and open to discovery.

> It involves a learning program in which students interact with musical content as they assume the roles of composer, performer, conductor, critical listener, and music researcher. The ongoing music experiences planned for the students by the music teacher are primarily based on those processes indigenous to musical behavior and creative problem solving (Pogonowski 1985 in Pogonowski, 1989, p 15).

The investigation of activities that bolster musical understanding, such as how musical ideas are created, explored, and developed into a final product, have profound practical and philosophical implications for music education. For many practitioners, the primary focus of general music instruction is straightforward: follow the national and district-wide endorsed curricular objectives. However, often a struggle ensues between curricular expectations and the individual music teacher's interpretation and implementation:

> Okay, today I have to teach quarter notes and quarter rests to my first graders. Let's see...after we sing this week's featured song from our books, I'll show the children what a quarter note and quarter rest look like (using large visual aids) and we'll look for them in songs from the book. To finish out the class, we'll practice drawing them – all the notes in red and the rests in blue. Oh, and I need to make sure I collect the papers so

I can enter this activity as a grade for this grading period.

While this scenario is hypothetical, it is based on the researcher's actual experiences and observations as an elementary music practitioner and serves as an example for the present discussion. Clearly, this activity is intended to meet an instructional objective however, based on what is known about how learning occurs, it falls short of providing the students with opportunities for hands-on experience, exploration, discovery, and the creation or manipulation of musical ideas upon which future learning can be based. To follow Webster's (2001) suggestion of "embedding" creativity into instructional experiences, an alternative scenario might include the following strategies. After learning the song and identifying the recurring rhythmic pattern of  through aural, visual, and movement activities, the students have the opportunities to:

- While singing or listening to the song, move on the steady beat for the quarter and eighth notes but "freeze" movement on the rests.
- While singing the song, add a percussion instrument sound or MIDI instrument sound to the three quarter notes while leaving the rest on the last beat silent.
- Sing the song and find three corresponding, descending sounds on the keyboard. Play the pattern and sing the words for the class.
- As a class, agree on where to play the three-note melodic pattern on the keyboard and play it with a stylized (ex: jazz, rock, reggae, blues, country, classical, etc.) digitally recorded accompaniment.

- Play the rhythmic pattern as an ostinato while singing the song or while listening to the accompaniment.
- Create a new four beat rhythm pattern by putting the rest on a different beat and use it as an ostinato with the song and/or accompaniment.
- Assign new sounds to the new ostinato and play along with the accompaniment as the class sings.
- Get with a friend in class, combine two ostinati together, and create a new 8-beat ostinato. While the class sings, let partners take turns playing their new ostinato.
- Individually or with a partner, make up a new melody to go along with the "Hot Cross Buns" accompaniment and play it for the class.

With these activities, children are experiencing music and learning about musical concepts within the context of "Hot Cross Buns." However, the variety of application of skill and integration of exploration and experimentation over the course of several class periods provide the children with many opportunities for thinking about and participating in making music.

For the educator, questions may surface about how one might assess and evaluate the outcomes described in this activity and, with all that has been said about "process," how does that fit in with assessment. The assimilation or embedding of skill learning with creative activity provides the children with a framework for learning how to generate new ideas, how to work through ideas, how to make aesthetic and technical decisions toward a final product, and how to incorporate such experiences into an ongoing interest of creating and composing new musical ideas. It is key that a framework

for creative action is established through which children feels comfortable and successful. Developing a learning environment for creativity requires creative thinking and action on the part of the teacher. Hopefully, as the teacher provides opportunities for music making and aesthetic expression, the children will be join in. Assessment then is a natural extension of the teacher's monitoring and observation of students' progress throughout the process and culminating in the final product. With the record and replay capabilities of MIDI technology, students may be asked to assess their own performance or comment on how they thought of their musical ideas. As the audience, the class (or a panel of students) may give an informal assessment and provide helpful feedback for a student's performance of his/her composition. The teacher might provide an assessment rubric to children for their compositions. The rubric could not only serve as an assessment guide but also provide students ideas and suggestions about putting together their compositions.

The importance of composition in music education is supported by the prevailing need for humans to create and participate in music making activities. The environmental, instructional, and psychological contexts of music making also have an unmistakable impact on an individual's ability to engage in and appreciate music. Composition is unique in the ways that it encourages individuals to engage in complex thinking and decision-making skills. Continued analyses of the opportunities afforded to children – including hands-on musical experiences, the manipulation of familiar musical instruments with familiar concepts, opportunities for reflection upon the music making process, and appropriate educational contexts - will add to the growing body of evidence that composition is a useful indicator of and catalyst for in-depth musical understanding.

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APPENDIXES

Appendix A

National Music Education Standards

1. Singing, alone and with others, a varied repertoire of music.
2. Performing on instruments, alone and with others, a varied repertoire of music.
3. Improvising melodies, variations, and accompaniments.
4. Composing and arranging music within specified guidelines.
5. Reading and notating music.
6. Listening to, analyzing, and describing music.
7. Evaluating music and music performances.
8. Understanding relationships between music, the other arts, and disciplines outside the arts.
9. Understanding music in relation to history and culture.

Appendix B

Letter to the School Principal

for research conducted under the auspices of the

University of Oklahoma-Norman Campus

To the Principal at _____ School:

I am a doctoral student under the direction of Dr. Nancy H. Barry in the School of Music at The University of Oklahoma-Norman Campus. I am requesting permission to include some of the students at your school in a research study being conducted under the auspices of the University of Oklahoma-Norman Campus, entitled *Musical Creativity in Children* (IRB FY2003-310). The purpose of the study is to examine how children demonstrate creativity when asked to make up a short melody on the keyboard. The children participating in the study will include 3rd, 4th, and 5th grade students who are enrolled in the after-school music program, *MIDI for KIDS.* As part of the study, each child in the study will be asked to compose a song on a MIDI keyboard. All activities that involve the student will occur in or near the MIDI classroom and during MIDI class time. The entire process should take about 15 minutes per student. The findings from this project will provide information to music educators about musical activities that nurture creativity in children between the ages of 8 and 11.

The information gathered for this study will be used in a dissertation. Portions of the information may also be used in published articles and presentations at professional conferences but reports about the inquiry will not identify individuals, place names, or events. In fact, the published results will be presented in summary form only. All

information provided will be kept strictly confidential and released only with explicit written permission.

Participation in this study is strictly voluntary. Your participation or non-participation will not affect the services normally provided to the school. No foreseeable risks, beyond those present in routine daily life, are anticipated in this study. For inquiries about rights as a research participant, contact the University of Oklahoma-Norman Campus Institutional Review Board (OU-NC IRB) at (405) 325-4757 or irb@ou.edu.

If you have any questions about this research project, please feel free to call me at (405) 824-8313 or e-mail at angbarker@ou.edu. *THANK YOU* in advance for your participation and help.

Angela Barker

School of Music

University of Oklahoma

I have read and understand the terms and conditions of this study and I hereby agree to participate in the above-described study. I understand that my participation is voluntary and that I may withdraw at any time without penalty.

X_____ _____

PRINCIPAL'S SIGNATURE DATE

X_____ _____

PLEASE PRINT YOUR NAME HERE RESEARCHER'S SIGNATURE

If you agree to let your school participate in the research study described above, please sign both copies of the consent form and keep one copy for your records.

THANK YOU!

Appendix C

Introduction of the Study

The following introduction will be read verbatim to each student when to inform him/her about the study:

I am doing a research project with children your age and asking them to make up a melody on the keyboard. I will be working with other students like you who are already in the MIDI for KIDS class at your school. If you decide to participate in this project, I will meet with you for a few minutes during the MIDI class. I will ask you to compose a song on the keyboard and then I will ask you to play it for me. While you are working out ideas for your song, I will be recording everything onto my computer. I will also be using a tape recorder to record our conversation and your composition. After you have played your composition, I will have some questions to ask you about your composition.

If you would like to participate in this research project, your must ask your parents to sign this Consent Form and then you will return it to your MIDI teacher. If you decide later that you don't want to participate in the project, you may drop out at any time.

Appendix D

Parent/Legal Guardian Consent Form

for research conducted under the auspices of the

University of Oklahoma-Norman Campus

Dear Parents or Guardians:

I am a doctoral student in Music Education at the University of Oklahoma. My dissertation topic and study is *Musical Creativity in Children* and I am requesting your permission for your child to participate in the study. I am also asking permission to use information received from interviews given your child before and after his/her participation. All information collected will be kept confidential, and reports about the inquiry will not identify individuals, place names, or events. The study and analyses will be used in a dissertation and portions of the information may be used in published articles and presentations at professional conferences.

The study will involve children between the ages of 8 and 11 who are enrolled in the *MIDI for KIDS* Summer Camp at the University of Oklahoma, June 9-13, 2003. This study will be conducted at Catlett Music Center. Each child in the study will compose a simple melody on a MIDI keyboard and then answer some brief questions about it. The entire process should take about 15 minutes per student. To assist with accurate recording of participant responses, each child will be audiotaped while he/she is participating in the study. For research purposes, each child's composition will be recorded via MIDI technology, transcribed, and analyzed for relevant information

regarding musical creativity in children. After meeting with the researcher, each student will have the opportunity to choose a "thank you" prize.

Participation in this study is strictly voluntary. Your child's participation or non-participation will not affect the services normally provided to him or her by the MIDI Camp. No foreseeable risks, beyond those present in routine daily life, are anticipated in this study. For inquiries about rights as a research participant, contact the University of Oklahoma-Norman Campus Institutional Review Board (OU-NC IRB) at (405) 325-8110 or irb@ou.edu.

If you have any further questions or concerns, refer to the contact information below. Please keep one copy of this letter for future reference. Thank you in advance for your cooperation and support.

Thank you,

Angela Barker
School of Music
University of Oklahoma
Phone: (405) 824-8313
Email: angbarker@ou.edu

Dr. Nancy H. Barry, Professor of Music Education
School of Music
University of Oklahoma
Office: 325-4146

If you agree to let your child participate in the research study described above, you must write your child's name in the space provided and sign your name on this consent form. Please sign both copies of the consent form. You will keep one copy for your records. Return the other copy on the first day of the MIDI for KIDS *Summer Camp.*

I have read and understand the terms and conditions of this study and I hereby agree to give permission for my child *(please print name)*_____

to participate in the above-described study. I understand that my child's participation is voluntary and that he/she may withdraw at any time without penalty.

_____Please initial here if you agree to have your child audiotaped. (*Participants have the right to refuse to allow such taping without penalty.)*

X_____ _____

PARENT/GUARDIAN SIGNATURE DATE

X_____ _____

PLEASE PRINT YOUR NAME HERE RESEARCHER'S SIGNATURE

Please return <u>one</u> of the <u>signed</u> consent forms to the MIDI for KIDS Summer Camp.

Appendix E

Family Questionnaire – Cover Letter

for research conducted under the auspices of the

University of Oklahoma-Norman Campus

Dear Parents or Guardians,

I am a doctoral student in Music Education at the University of Oklahoma. My dissertation topic is *Musical Creativity in Children.* The study will take place in the after-school program, *MIDI for KIDS,* in which your child is enrolled. As part of the study, each child in the study will be asked to compose a song on a MIDI keyboard. Some of the information that I am collecting will include general information about students' musical experiences at home and at school. Since you've agreed to let your child participate in this study, I am requesting that you take about five minutes to fill out the attached FAMILY QUESTIONNAIRE.

By completing this questionnaire, you are providing informed consent to participate in this study. All information provided on the questionnaire will be kept confidential, and reports about the inquiry will not identify individuals, place names, or events. The information gathered for this study will be used in a dissertation and portions of the information may also be used in published articles and presentations at professional conferences.

Participation in this study is strictly voluntary and you may withdraw at any time without penalty. For inquiries about rights as a research participant, contact the

University of Oklahoma-Norman Campus Institutional Review Board (OU-NC IRB) at (405) 325-4757 or irb@ou.edu.

If you have any questions about this research project, please feel free to call me at (405) 824-8313 or e-mail at angbarker@ou.edu. *THANK YOU* in advance for your participation and help.

Angela Barker

School of Music

University of Oklahoma

Family Questionnaire

Dear Parents or Guardians,

This questionnaire is part of an experimental study called *Musical Creativity in Children*. To provide some background information regarding the children involved in this study, please complete this brief questionnaire. Please return this questionnaire to your child's MIDI teacher.

Thank you,

Angela Barker

School of Music

University of Oklahoma

1. Does your family participate in musical activities together?

   If so, please describe.

2. Does anyone in your family play an instrument?

   If so, who and which instrument?

3. Has anyone in your family taken music lessons?

   If so, who and for which instrument?

Please return this Questionnaire to your child's *MIDI for KIDS* teacher.

THANK YOU!!

Appendix F

Student Pretest Interview

Student Name:_____ Age:_____ Grade:_____

School:_____

1. Does your family ever play instruments together or sing songs together?
2. Do you play an instrument besides the keyboard?
    a. If so, which one?
    b. Do you take private music lessons?
    c. How long have you taken music lessons?
3. How long have you been taking *MIDI for KIDS* classes at your school?
4. What do you like most about the MIDI classes?
5. What do you like least about the MIDI classes?
6. What do you enjoy most about your regular music classes at school?
7. What is the biggest difference between your regular music class and the MIDI class?

Appendix G

Student Posttest Interview

Protocol analysis – clarifying questions that target the thought processes that occur during an activity (Manzo, 1998).

1. After hearing your song, what did you about like it?
2. What was your favorite part of your song? Why?
3. What part was your least favorite part? Why?
4. What would you change?

   How would you change it?
5. When I told you to make up a melody, what was the first thing you started to think about?
6. What were the most important parts of your composition?
7. What are the main ideas? (Kind of like a sentence has a main idea)
8. Are there any activities that you do in your MIDI class that helped you come up with ideas for the composition? If so, what?

Appendix H

Instructions to the Student

The following script will be read verbatim to each student immediately before he/she participates in the study:

Thank you agreeing to participate in this study. This is what we will do. First, I'm going to play a song. I want you to listen to it and then I will ask you some questions about it.

(Play musical example)

Sometimes there are two parts to a song, the melody and the accompaniment. This is the accompaniment (play part of musical example) but there isn't a melody or song that goes along with it..

Have you ever tried to make up a melody by yourself? Have you ever tried to make up a melody to along with an accompaniment in the MIDI class?

I want you to do something like that for me. You will listen to the accompaniment and then you add your own melody to go along with it. I will try it first so you can see what I mean. (musical example begins and Researcher plays a melody on the black keys)

Did the melody match the accompaniment?

How was the melody different from the accompaniment?

Now, I want you to make up a melody for the accompaniment. I would like for you to use only the black keys.

You will make up a song to go along with the accompaniment. When you think you have your melody worked out, I want you to practice it on the keyboard. When you've finished practicing your melody, I will ask you to play your song for me two times.

After you play your melody, I will play it back to you on the computer and then I'll ask you some questions about the melody.

I will be using a tape recorder to record our conversation and your keyboard playing. I will also be using my computer to record all the notes you play on the keyboard.

If you have any questions about the instructions or need for me to go over them again, let me know now. Do you have any questions? Do you know what to do? Are you ready to begin?

Okay, let's begin.

Appendix I

Evaluation Instructions, Criteria, and Forms

MAIN STUDY – JUDGE # _____

INSTRUCTIONS

1. You must work independently. If you have any questions, please call 824-8313 or email angbarker@yahoo.com.
2. Complete one evaluation form for each Subject. Put your Judge's number and the Subject's number at the top of each rating form.
3. Listen to each Subject's set of tracks three times.
   - 1st time: listen to all tracks to become familiar with what the Subject played.
   - 2nd time: listen to the tracks again and give ratings on Grid #1.
   - 3rd time: listen to the tracks again and give ratings on Grid #2.
4. Use **Grid # 1** to give an *overall* rating of the tracks. The ratings will range between *1* (low) and *7* (high) according to the categories described for Grid #1.
5. Use **Grid #2** to give an *overall* rating of the tracks according to the categories described for Grid #2.
6. Your evaluation and rating of each Subject must be based solely on your own interpretation of the categories and your opinion of how as they relate to what you hear played.

Composition Rating Grid #1

	Low			Medium			High
Steady tempo	1	2	3	4	5	6	7
Phrasing	1	2	3	4	5	6	7
Closure	1	2	3	4	5	6	7
Craftsmanship	1	2	3	4	5	6	7
Harmonic changes	1	2	3	4	5	6	7
Replication	1	2	3	4	5	6	7
Motivation/Effort	1	2	3	4	5	6	7
Originality	1	2	3	4	5	6	7

Description of Categories for Grid #1

Steady tempo – The degree to which the Subject maintains a steady tempo throughout which may or may not be the tempo established by the accompaniment.

Phrasing – The degree to which the Subject shapes musical ideas into phrase units (i.e., the grouping of ideas, attempts to begin and end phrases).

Closure– The degree to which the Subject brings the composition to a logical conclusion.

Craftsmanship – The degree to which the Subject uses similar or compatible rhythmic and melodic ideas to establish continuity between phrases/sections.

Harmonic changes - The degree to which the Subject's composition follows the harmonic changes implied by the accompaniment.

Replication – The degree to which the Subject accurately replays the composition (next to last track).

Motivation/Effort – The degree of interest and effort the Subject demonstrates in accomplishing the composition task.

Originality– The degree to which the Subject incorporates unique and novel musical ideas in the composition.

Composition Rating Grid #2

Categories	Low			Medium			High
Musical Syntax	1	2	3	4	5	6	7
Musicality	1	2	3	4	5	6	7
Creativity	1	2	3	4	5	6	7

EXAMPLE

*** Overall Score: _____**

Description of Categories for Grid #2

Musical syntax – The degree to which you feel the composition, as a whole, is technically good and structurally organized.

Musicality – The degree to which you feel the composition, as a whole, is musically expressive and aesthetically appealing.

Creativity – Based on your own subjective definition of creativity, the degree to which you feel the composition is creative.

*** Overall score** – Add up the ratings given for *Musical Syntax*, *Musicality*, and *Creativity* and enter that number here.

COMPOSITION RATING FORM

Judge #: _____ Subject #: _____

Grid #1

	Low			Medium			High
Steady tempo	1	2	3	4	5	6	7
Phrasing	1	2	3	4	5	6	7
Closure	1	2	3	4	5	6	7
Craftsmanship	1	2	3	4	5	6	7
Harmonic changes	1	2	3	4	5	6	7
Replication	1	2	3	4	5	6	7
Motivation/Effort	1	2	3	4	5	6	7
Originality	1	2	3	4	5	6	7

Grid #2

	Low			Medium			High
Musical Syntax	1	2	3	4	5	6	7
Musicality	1	2	3	4	5	6	7
Creativity	1	2	3	4	5	6	7

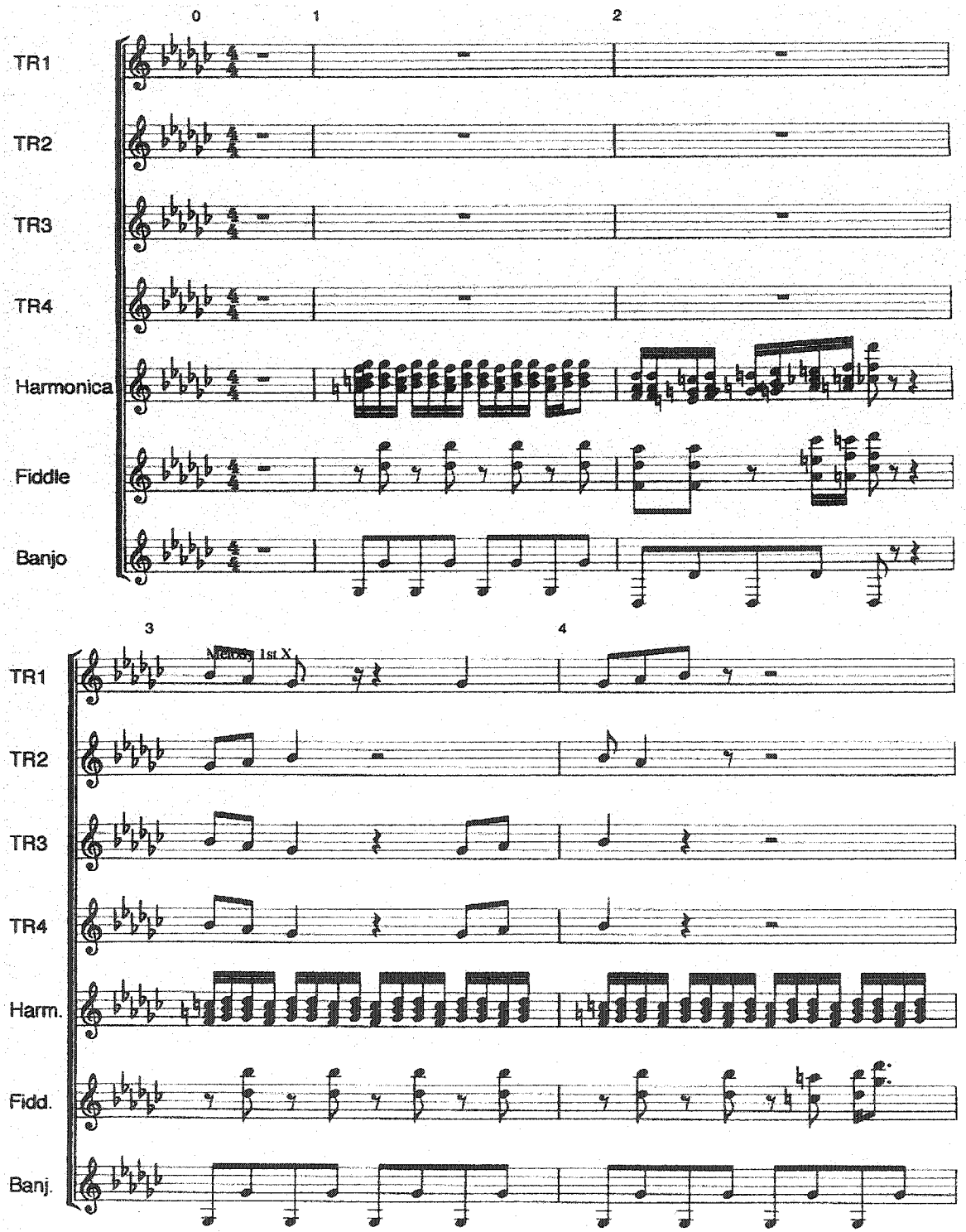
Overall Score: _____

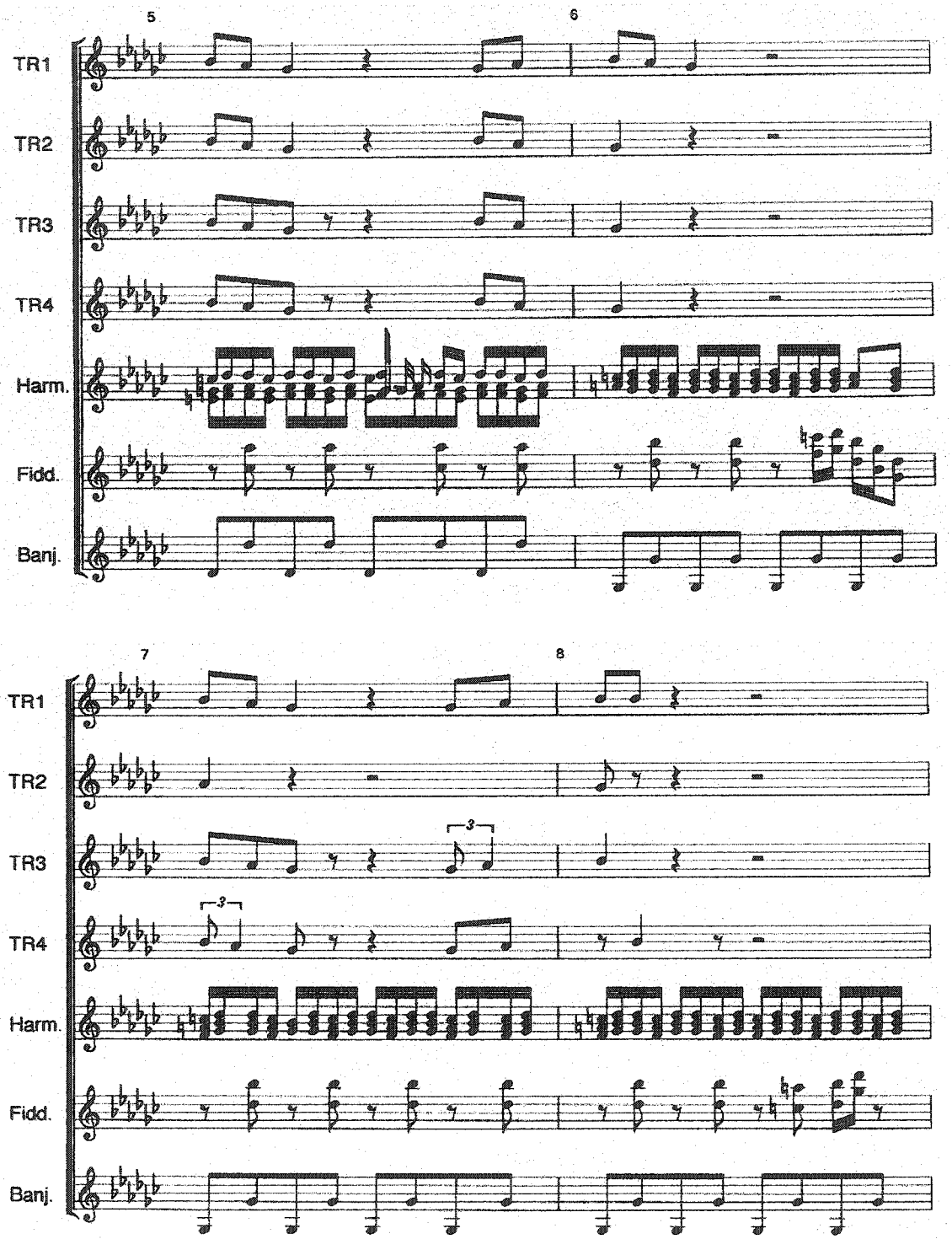
NOTES:

Appendix J

Notated Copy of a Student's Compositional Tracks

Composed by
James Faulconer




5
6
TR1
TR2
TR3
TR4
Harm.
Fidd.
Banj.
7
8
TR1
TR2
TR3
TR4
Harm.
Fidd.
Banj.

Appendix K

Interjudge Reliability Analysis for the Pilot Study

N of Judges = 3

N of Cases = 4

Evaluation Categories	*Reliability*
Degree of steady tempo	.98
Degree of phrasing	.88
Evidence of closure	.96
Craftsmanship	.92
Evidence of harmonic changes	.78
Degree of replication	-.41
Evidence of motivation / effort	.77
Degree of originality	.36
Musical Syntax	.69
Musicality	.91
Creativity	.51
Overall process score	.84
Across all categories	*.98*

a = .05

Appendix L

The Student Demographics Variables: Categories and Coding for Subcategories

Category	*Subcategories*
Gender	a. Girls b. Boys
Age	a. 8 years b. 9 years c. 10 years d. 11 years e. 12 years
Grade Level	a. 2nd grade b. 3rd grade c. 4th grade d. 5th grade
Family Musical Activities	a. None/unknown b. Nonmusical activities c. Passive participation d. Active participation
Length of Time in MFK Classes	a. 0 to 6 months b. 7 to 12 months c. 1 to 2 years d. > 2 years
Previous Music Training	a. School music classes only b. Someone helps at home c. Private music lessons

Appendix M

The Process Variables: Categories and Descriptions

1. The number of MIDI tracks played.

   The number of tracks played per child.

2. The average number of measures played.

   The sum of measures played, divided by the number of tracks played.

3. The average number of keystrokes played.

   The sum of keystrokes played, divided by the number of tracks.

4. The average number of different pitches played.

   The sum of different pitches played, divided by the total number of tracks.

5. The average number of measures of silence.

   The number of full beats of silence grouped into 4 beat measures and divided by the number of tracks played.

6. The range of notes played.

   The distance between the highest and lowest notes played in all tracks.

Appendix N

Process Variables: Categories of Students' Observed and Recorded Responses with Coding for Subcategories

Category	*Subcategory*
A. Interaction	
	1. Non-interactive / does not initiate interaction / all "yes/no" answers.
	2. Socializing / general talking, not necessarily related to the task.
	3. Asks general questions related to the task / responds to researcher's questions.
	4. Asks specific questions / gives task-specific comments.
B. Attitude Toward the Task	
	1. Totally intimidated / unable to play /afraid to press down keys.
	2. Timid / willing to try but lacks confidence.
	3. Willing to try and somewhat confidant.
	4. Confident and demonstrates experience/Not so worried about which "keys" to press down – instead concerned with what it "sounds" like.

Category	*Subcategory*
C. Learner's Characteristics	
	1. Confused, afraid / distracted, not motivated.
	2. Timid / somewhat motivated.
	3. Motivated / playing instrument on their own, without instruction / not oriented to the composition task.
	4. Task-oriented / focused, serious / motivated toward a goal.
D. Participation	
	1. Watching, listening only / no active participation.
	2. Apprehensive / careful participation, reluctant
	3. Active participation / somewhat focused / somewhat goal-oriented.
	4. Active participation / focused / goal-oriented.
E. Composing and Listening Strategies	
	1. Random playing without trying to remember previous attempt(s).
	2. Some focus on playing but unable to remember or recall.
	3. Some focus on playing and able to remember parts of the melody.
	4. Focused and able to remember most of what was played.

Category	*Subcategory*
F. Aural Awareness and Musical Understanding	
	1. None demonstrated / student is unaware of what he/she played.
	2. Somewhat aware / intuitive understanding but not able to verbalize (lacks appropriate terminology).
	3. More aware / has some idea of what he/she wants to hear.
G. Individual Assessment	
	1. Not specific / unable to make assessment / assessment is not goal-directed.
	2. Able to make general assessment / idea-directed but final product is not determined by a specific intention or goal.
	3. Able to make assessment based on his/her goal for final product and aware of process to achieve the goal.
	4. Reflective / talking or reasoning with one's self about the task / monitors progress to the goal.