

EFFECT OF MUSIC-INTEGRATED INSTRUCTION ON
FIRST GRADERS' READING FLUENCY

by

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ABSTRACT

Kerry G. Bryant. EFFECT OF MUSIC-INTEGRATED INSTRUCTION ON FIRST GRADERS' READING FLUENCY (Under the direction of Dr. Mark A. Lamport, Assistant Professor). School of Education, March, 2012.

The study examined music-integrated (MI) instruction, framed by automatic information processing theory and elements of prosody. A quasi-experimental, pre- and posttest design was utilized to ascertain the effect of MI instruction on reading fluency among first grade students. Subjects were students in two public elementary schools in Georgia. To determine the effect of MI instruction on reading fluency scores, independent samples *t*-tests were employed to compare students' Dynamic Indicators of Basic Literacy Skills (DIBELS) test scores. Analysis revealed to what degree MI instruction in reading had effect upon two DIBELS indicators, specifically nonsense word fluency (NWF) and phoneme segmentation fluency (PSF) scores. Researching the application of MI instruction to the teaching of reading establishes its potential impact upon academic rigor and pedagogical creativity.

Keywords: Automatic Information Processing, Fluency, Music Integration, Prosody, DIBELS

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Music is my life. It is my soul. It is a precious gift. It is my sincere hope this effort becomes yet another testament to the awesome power of it to not just entertain, but to teach and ultimately inspire.

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List of Abbreviations

Automatic information processing (AIP)

Criterion Referenced Competency Test (CRCT)

Dynamic Indicators of Basic Early Literacy Skills (DIBELS)

Georgia Department of Education (GDOE)

Georgia Performance Standards (GPS)

Music-integrated (MI)

Music-in-Education National Consortium (MIENC)

No Child Left Behind Act (NCLB)

National Institute for Child Health and Human Development (NICHD)

National Reading Panel (NRP)

Nonsense word fluency (NWF)

Phoneme segmentation fluency (PSF)

United States Department of Education (USDOE)

CHAPTER ONE: INTRODUCTION

American teachers, driven by political and legal demands for accountability, increasingly find themselves embroiled in a struggle to remain independent, innovative, and creative. They struggle against measures imposed by legislation, most prominently No Child Left Behind (NCLB) (U.S. Department of Education [USDOE], 2002), which has unintentionally promulgated highly prescriptive, narrowly-focused models of instruction. These mundane modes of instruction are becoming the norm as administrators and teachers are pressured to produce rapid, positive results on standardized assessments which are thought to be indicators of student achievement.

Among the most important indicators of achievement on standardized tests are those assessing literacy skills. Other standardized assessments such as the Scholastic Aptitude Test (SAT) or American College Test (ACT), administered typically at the secondary levels, emphasize reading and writing skills as well. The reporting of test results to state agencies, coupled with local media coverage of schools' test score performance, has spawned a renewed emphasis on literacy, including a review of which instructional methodologies are the most effective and creative:

Policy makers see assessment as a means of enforcing accountability [...] This view became especially prevalent with the advent of legislation that placed a premium on standardized, quantifiable data regarding children's progress in a number of academic areas, with a significant emphasis on their early literacy achievement. (Casbergue, 2010, p. 13)

Most prominent of the NCLB-mandated assessments in Georgia are the Criterion-Referenced Competency Tests (CRCT). An inordinate focus on consistent, annual increases in CRCT scores may have “great potential for undermining creativity and autonomy for both teacher and student” (Deci, Kasser & Ryan, 2007, p. 64). The disproportionate attention to test results has provided the demand for teaching models such as Success for All (Slavin & Madden, 1999), Direct Instruction (Adams & Engelmann, 2006), and other similar instructional avenues. While such methods may produce rapid test score gains, their inherent design may also suppress higher-order thinking skills, thereby exacerbating cognitive inflexibility and creative rigidity in students and teachers alike.

An inevitable dichotomy has formed between accountability and test score production on one hand, and creative, innovative education on the other. Such a conundrum is precisely what Schelchty (2001) referred to in *Shaking Up the Schoolhouse: How to Support and Sustain Educational Innovation*: “Educators must find ways to respond to the public demand for accountability while preserving the conditions for which real, authentic, integrated learning can take place” (p. 231). Are there viable instructional solutions that do both? If so, can such methods be researched, reported, and replicated? Are there alternative measures of student achievement, aside from the required standardized testing, that may act as indicators of student achievement as well? The research proposed herein will investigate one approach, probing the effect of a music-integrated (MI) instructional program on early literacy acquisition, particularly reading fluency.

Background

Arts integration is not a recent phenomenon. The use of fine arts-integrated instruction has been well-documented and investigated (Campbell, Connell & Beegle, 2007; Rabkin & Redmond, 2006; Oreck, 2006). Though arts-integrated research is not entirely exceptional, the body of research as a whole clearly supports further analysis of arts integration as an effective, creative pedagogical approach. This need for further investigation is evidenced by conclusions in some research that arts and/or music-integrated (MI) instruction possesses multiple traits that reinforce innovative, creative instructional practice while raising student achievement. Despite these reported positive effects, MI instruction lacks cohesion as a body of empirical research, firmly establishing such conclusions “because the studies on music integration we have are so different in nature and their methodology is so different, it’s very difficult to line up three, four or five that all support the same idea that X is the result of Y” (Olson, 2008, p. 20). Such paucity and inconsistency of research reinforces the need to examine MI further.

As school systems’ effectiveness continues to be measured by mandated test scores, arts and MI instruction have emerged as viable means for increasing student achievement. Rabkin and Redmond (2006) asserted that “evidence is now emerging that shows that arts education can have powerful effects on student achievement.

Investigators have found a significant correlation, growing over time, between arts participation and academic performance” (p. 61). What may distinguish arts education and MI instruction as unique in the promotion of achievement is the arts’ apparent capacity for educators to remain effective yet autonomous and creative. Oreck (2006) reinforced this idea by concluding,

The purpose of most arts-based professional programs has not been to transform academic-based classroom teachers into arts specialists. Rather it has been to develop arts skills, promote creative teaching techniques, and increase teachers' knowledge and understanding of arts processes [...] using a constructivist, child-centered pedagogy. (p. 4)

In particular, the investigation of the use of MI strategies to teach early literacy is sporadic, as Standley (2008) asserted in a meta-analysis of MI reading research. Bolduc (2008) concurred in a review of the literature, citing only five correlational and eight quasi-experimental studies documenting some relationship between music and emergent literacy capacity among children. Gaps and inconsistencies clearly exist in the literature concerning arts and MI instruction. Olson (2008) cited MI research methodology, process, and analysis differences. Ellis and Fouts (2001) maintained that a lack of a sufficient quantity of research probing the effectiveness of MI exists: "That is not to say that research is nonexistent. There is some, but because of the quantity and quality issues surrounding the research, there is still much to be done before the claims should be accepted as true" (p. 24). Despite the incongruity of research, robust theoretical relationships are apparent between automatic information processing (AIP), music-prosody connections, and MI used in literacy instruction.

Theoretical Framework

LaBerge and Samuels' (1974) model, automatic information processing in reading (AIP), provides for examination of possible cross-domain cognition shared by music performance and reading skills. AIP has implications for understanding how humans learn, process graphemes (notation) into phonemic information (sound), and then

assimilate sensory data into meaningful information (semantics). The model contends an “attention center” is the integral operator of each memory type and process (i.e. visual, phonological, response, and ultimately, semantic). In two updates to the original theory, Samuels and Flor (1997) and Samuels (2004) argued against the original concept of capacity limit in memory systems, instead supporting work by Stanovich (1990) introducing an “encapsulating” cognitive process. Encapsulation builds high quality memory images as a whole, comprised of word parts, entire words, and word groups or phrases. Stanovich regarded encapsulation, as a feature of automaticity, to be a primary causal agent: “Likewise, processing speed is a result of high-quality lexical representation” (p. 84).

AIP highlights music integration’s application to literacy instruction via “automaticity,” which is the ability to perform cognitive processing at a subconscious level, thus freeing the attention center to consciously process other less familiar information. As quality reading fluency represents the gateway to reading comprehension, likewise particular music skills dependent upon various timed, metronomically-controlled performances may reinforce, through imitation, fluency skills as well. Both processes are characterized by automaticity, a process crucial in reading graphemes, words, and music notation. It may also form a theoretical bridge between music and reading fluency.

Additionally, many researchers support prosody as integral to authentic fluent reading (Dowhower, 1991; Schrauben, 2010; Schwanenflugel, Hamilton, Kuhn, Wisenbaker & Stahl, 2004). Prosodic reading is segmented into what are also essentially musical elements, such as (a) pitch or intonation, (b) stress or loudness, (c) length of

phrases, (d) appropriateness of phrases, and (e) pausal intrusions (Dowhower, 1991; Schrauben, 2010; Schwanenflugel et al., 2004). Some researchers have examined music and reading parallels in varied settings, including children with special needs performing prosodic reading and singing (Staum, 1987) and enhancing reading fluency through a “sing-to-read” middle school program (Biggs, 2008). Biggs (2008) concluded that “prosody appeared to have a direct and significant connection to reading comprehension” (p. 88).

This research addressed the effect of music-integrated instruction on reading fluency as based theoretically on the AIP model and prosody-fluency connections. These frameworks established links to existing literature in both music integration and the acquisition of reading fluency in young children. In the early childhood educational milieu, teachers and students may benefit from understandings derived from such research. This investigation sought to demonstrate how creative, innovative instructional practice could be strengthened through the utilization of MI instruction, simultaneously satisfying strict accountability testing standards.

Problem Statement

A problem persists in current public educational practice because schools use high-stakes assessments to measure student achievement, as mandated by NCLB. The consequences inherent to public reporting of these scores may undermine creative, autonomous teaching and learning. Despite many states’ impressive and consistent gains in test scores since 2002, doubts remain as to the validity of such gains: “While a state’s high-stakes test may show increased scores, there is little support in these data that such

increases are anything but the result of test preparation and/or the exclusion of students from the testing process” (Amrein & Berliner, 2005, p. 2).

If such assertions are true, then two distinct needs emerge: (a) to extend and broaden the search for effective instructional methodology that fulfills accountability requirements while supplying teachers and students with engaging innovative best practices, and (b) to establish the link between MI instruction and the improved effective teaching of critical thinking skills beyond those measured by such assessments. NCLB testing mandates are necessary, present realities for schools. Thus, it is prudent to investigate teaching and learning models that not only satisfy and improve accountability indicators, but which also promote essential skills not overtly measured by standardized tests, such as critical thinking and creative capacity. Inconsistency in methodologies of studies suggesting evidence of transfer of thinking skills in MI instruction is apparent. Nonetheless, much of the evidence is compelling. Catterall (2002) asserted that further investigation of transfer of critical thinking skills learned by participating in the arts is justified, as “sustained and deep learning in the arts may cultivate habits of mind and dispositions impacting future problem-solving behavior” (p. 157).

Literacy instruction has risen to prominence spurred largely by its measurement in high-stakes tests. As a result, most of the research has focused on early literacy, evidenced by the formation of the National Reading Panel (NRP) in 1997 under federal congressional mandate. The NRP was convened “to assess the status of research-based knowledge, including the effectiveness of various approaches to teaching children to read” (National Reading Panel [NRP], 2001, para. 1). This effort resulted in a series of on-going reports and recommendations. Most germane to this research was the NRP’s

goal to provide “clear, objective, and scientifically based information on the effectiveness of different types of reading instruction and the need to have such research inform policy and practice” (National Institute of Child Health and Human Development, [NICHD], 2000, p. 2). Empirical studies investigating reading instruction may prove valuable to all educational stakeholders. The case for researching such practices is strengthened if such methods indicate improvement of test scores while being innovative. Investigation as to whether any instructional method may hold such duality is warranted.

Music integration as an effective reading instructional practice may possess this duality. The study sample, public school first grade students in the early literacy acquisition stage, provided an appropriate focus for the study. Comparison of performance between control and treatment groups may discern the effect of music integrated instruction on reading fluency skill (University of Oregon Center on Teaching and Learning, 2010). The assessment used in the proposed study is the nationally-normed Dynamic Indicators of Basic Early Literacy Skills (DIBELS). Reading fluency is one of five “major topics for intensive study” (NICHD, 2001, p. v) as selected by the NRP. As such, focus on the effect of MI instruction on first graders’ reading fluency scores is appropriate and aligned with NRP and NCLB goals.

Music performance or learning via the medium of music may foster critical thinking skills as well. Burton, Horowitz and Abeles (1999) indicated that the transfer of critical thinking skills inherent in artistic participation produces similar effects in cross-domain thinking: “Many of these same artistic competencies and dispositions extend to other subject domains where they coalesce in equally distinctive forms- mathematical, scientific, linguistic- as pupils organize different kinds of meaning, insight and

understanding. In other words, they think critically” (p. 45). As such, the oft-argued transfer of thinking skill that artistic and musical endeavor induces appears to be substantive.

Purpose Statement

The purpose of the study was to investigate the effect of MI reading instruction on first grade students’ fluency. The researcher sought to contribute to the growing body of knowledge pertaining to the effectiveness of MI instruction. Understanding the potential of MI, and more broadly arts integration, will inform and guide educators and policymakers in disseminating effective, conceptually-grounded decisions regarding implementation of best practices (Bolduc, 2008; Marshall, 2006; Oreck, 2006; Rabkin & Redmond, 2006; Standley, 2008; USDOE, 2002).

Research Questions

The research questions have been formulated to guide the intended measurement of behavior. Johnston and Pennypacker (1993) framed this connection by stating, “The relation between the question and the design and conduct of the experiment are profoundly important. We expect the experimental procedures to yield data that answer the question” (p. 50). As a result, the study procedures are designed to answer the research questions as follows:

1. To what extent does music integrated (MI) instruction have an effect on DIBELS nonsense word fluency (NWF) among first grade students?
2. To what extent does music integrated (MI) instruction have an effect on DIBELS phoneme segmentation fluency (PSF) scores among first grade students?

Research Hypotheses

Null Hypothesis H₀1: Students who participate in MI reading instruction, as compared to those who do not participate in MI reading instruction, will have no statistically significant differences in terms of DIBELS nonsense word fluency (NWF) scores.

Null Hypothesis H₀2: Students who participate in MI reading instruction, as compared to those who do not participate in MI reading instruction, will have no statistically significant differences in terms of DIBELS phoneme-segmentation fluency (PSF) scores.

Identification of Variables

Operational definitions of the study variables are stated below.

Dependent Variables

The dependent variables are the two DIBELS fluency sub-test scores. They will be measured using corresponding sections of the DIBELS test. Consequently, the dependent variable subsumes a set of DIBELS test scores. (Note: The DIBELS assessment instrument is discussed in Chapter Three.) DIBELS subsection scores, when considered in total as a composite score, indicate first graders' overall reading fluency. DIBELS subsections to be measured include phoneme segmentation fluency (PSF) and nonsense word fluency (NWF). Each fluency subsection has a specifically targeted, individually administered subtest constructed to measure its corresponding fluency area exclusively. The NWF subtest employs a student probe, while the PSF is an auditory measure. Data from each subtest are on an interval scale, as each score represents equal differences, though not in ratios (e.g., a score of 24 on the NWF does not indicate a reader twice as fluent as one scoring 12).

Independent Variable

The use of music-integrated (MI) instruction in reading fluency comprises the independent variable. Classes utilizing MI techniques were taught by teachers trained in arts and MI by ArtsNOW and the Music-in-Education National Consortium (MIENC) (ArtsNOW, 2010; MIENC, 2010a).

ArtsNOW. ArtsNOW is a non-profit arts education professional development organization intending to build educators' capacity to use creativity, authentic arts integration, and sequential arts education to help students fulfill and exceed Georgia Performance Standards (GPS) (ArtsNOW, 2010). First grade teachers of the treatment groups have completed foundational training by ArtsNOW, which requires successful completion of a rigorous three-day arts integration professional learning experience. Treatment group teachers also received training in numerous subsequent site-based professional development and learning communities, consultation, and various other music-integrated instructional support services supplied by ArtsNOW that have been conducted at the site since the initiative began in 2008. All totaled, such ArtsNOW-related training exceeded 80 hours of professional development for the treatment group teachers. Regular use of arts-integration and MI instruction in particular have become daily instructional routine for the treatment groups' classrooms.

Music-in-Education National Consortium (MIENC). The network of laboratory schools and MIENC sites function to “promote the evolution of music teaching and learning practices, advocacy, research, and policy, so that music can provide its essential contribution to promoting a culture of equity and excellence in every school” (MIENC, 2010a, para. 1). In 2009, the treatment school of the proposed study was designated a

laboratory school site for the MIENC. This designation resulted in the delivery of additional on-site music-integrated teacher training delivered by MIENC researchers and consultants in conjunction with ArtsNOW. MIENC assisted in assembly of an online “digital portfolio” to journal music integration activity school-wide. Additionally, MIENC performed on-site interviews and evaluative services. Results of project participation were reported in a qualitative, open-ended interview with representative samples across the stakeholder spectrum, including students, parents, teachers, and school district administrative personnel.

In 2009, an MIENC action research project was initiated at the treatment school in which the Music Learning Leadership team (including first grade teachers and the music teacher) measured the impact of music and language arts integration through two assessments: a MIENC-developed test, the Music Literacy Skills Test (MLST) measuring first grade subjects’ musical ability in rhythmic performance, recognition, or music notation reading; and, a state-developed test, the Basic Literacy Test (BLT), measuring phonemic awareness and reading fluency. Impressive preliminary results informed instructional design regarding further implementation of MI in the teaching of reading at the treatment school, particularly among first grade teachers: “The goal is to increase the capacity of all teachers to work collaboratively to use the arts throughout the curriculum, with particular emphasis on developing music-integrated prowess in first grade teachers” (MIENC, 2010b, p. 4, para. 1).

Summary

The theoretical framework upon which the study was instigated is based upon automatic information processing and elements of fluent, prosodic reading. In the search

for creative pedagogical methods that might still satisfy strict accountability measures, MI instruction has emerged as one such possible solution. Preliminary action research conducted at the treatment school supported further investigation. The apparent effect of MI instruction in the context of reading fluency prompted research questions and attendant hypotheses that examined to what degree MI instruction affected two DIBELS scores. A quasi-experimental, treatment and control study design was implemented using first grade classrooms at two elementary schools. The dependent variables, DIBELS PSF and NWF scores, were examined following a treatment period.

A review of literature regarding the theoretical framework, MI instruction and reading, and transfer of learning is presented in Chapter Two. Then, specific information delineating the design, research elements, and implementation of the study are detailed in Chapter Three. Chapter Four reports results using analysis procedures explained in Chapter Three. Finally, Chapter Five will examine the significance of these results, limitations of the study, and recommendations for future study involving MI instruction and reading.

CHAPTER TWO: REVIEW OF LITERATURE

The present study was prompted by the lack of a cohesive body of literature concerning effect of music integrated (MI) instruction on literacy in young readers. Given the increasing challenge for teachers to maintain instructional autonomy “in an era of school accountability reform and shared decision-making in schools” (Rice, 2009, p. 1), educators face an unprecedented need for creative, effective best practices grounded in research. This chapter will begin by delineating the search process. Then a theoretical framework will be detailed, followed by a review of empirical studies on reading fluency examining three fluency sub-domains: (a) fluency and comprehension, (b) fluency and prosody, and (c) transfer of learning, (i.e. from music to literacy). Finally, research concerning music and reading will be examined.

Search Process

The literature review was prompted by the researcher’s experience in music-integrated instruction. The general topic of music integration became more focused on the research questions as specific avenues of interest were investigated. A preliminary scan of literature concerning the broader areas of effect of music integration, literacy, and transfer of learning research ensued.

As possible source material accrued, the literature review began to be outlined. Models of literature review were consulted, aiming for the search to have as its basis “both theoretical and methodological sophistication, thereby improving the quality and usefulness of subsequent research” (Boote & Beile, 2005, p. 4). Major topical headings

coalesced, including a theoretical framework and a review of empirical literature pertaining to reading fluency and music-integrated reading research.

The iterative, recursive search process was “immersive and complete” (Boote & Beile, 2005, p. 8) so that broader, perhaps unforeseen, connections to topic components might surface. The researcher utilized the Liberty University online research portal and frequently leveraged the information search expertise of an online librarian. Two types of databases were searched throughout: discipline-specific databases, such as PsychInfo Complete, Music Index, and Education Complete; and multi-discipline databases, such ERIC, Dissertation Abstracts International, and Humanities International. Search engines such as EBSCO[®] Host and Google[®] Scholar were used extensively, applying Boolean operators to manipulate search terms. Search terms were guided by the initial review of literature topic headings, then by other terms that became appropriate as relevant literature emerged. Search engine thesauri also provided related terms. Common broad search terms were “music and literacy,” “reading and music,” “music integration,” “interdisciplinary learning,” and “music and language.”

The initial strategy was to locate meta-analyses or statistical combinations of studies concerning music and reading. This research strategy was used to leverage one of the major advantages of research synthesis, that “only study-generated evidence, based on solid experimental research allows the synthesist to make statements concerning causality” (Cooper, 1998, p. 15). Four literature reviews on the subject of music and literacy within the last 10 years were located: Standley (2008), Bolduc (2008), Chang (2000), and O’Herron and Siebenaler (2007). These meta-analyses provided historical context and reviews of numerous studies. Relevant variables, phenomena, and their

relationships became apparent, grounding the present study in a “theoretical framework designed to be a foundation and inspiration” (Boote & Beile, 2005, p. 14). Numerous individual journal articles, books, symposia briefs, and dissertations were collected. References were checked and many more were obtained from the bibliographies of these sources as well.

The search presented a challenge in maintaining proper balance between completeness on one hand and relevance on the other. The researcher employed a judicious approach in deciding which sources to use, keeping in mind that “many miss the centrality of *relevance* as the key issue in conducting and assessing literature reviews” (Maxwell, 2006, p. 29). This relevance was achieved in part by the creation of an annotated bibliography. It was utilized as a tool for delineating relevance of research through careful summative annotations and ease of retrieval based upon content, keyword, topic, author(s), etc. It aided the targeting of information that substantiated ideas being presented. It tracked and managed the digital file and physical locations of information. The annotated bibliography mediated the competing demands for thoroughness, yet consistently maintained relevance “as the most essential characteristic of a good dissertation literature review” (Maxwell, 2006, p. 28).

Theoretical Framework: Automatic Information Processing

The history of the evolution of LaBerge and Samuels’ (1974) seminal theory of automatic information processing (AIP) followed a progression typical of major advances in cognitive psychology. The post-behaviorist theory hinged upon the concept of automaticity and the role of attention centers in determining how information is processed in complex cognitive processes such as reading. Fluency is achieved when

“enough of the components and their coordinations [*sic*] can be processed automatically, then the load on attention will be within tolerable limits and the skill can be successfully performed” (LaBerge & Samuels, 1974, p. 293). AIP acknowledges both the bottom-up and top-down paradigms, emphasizing the routing of information through memory stages from input to an eventual semantic result. This is accomplished through “active/endogenous or passive/exogenous” assigned attention processes (Ruz & Lupaniez, 2002, p. 284). AIP has become embedded in various other related cognitive research, such as neuro-cognitive science (Brown, Martinez, & Parsons, 2006; Kraus, Skoe, Parbery-Clark, & Ashley, 2009; Marin, 2009; Posner & Driver, 1992; Schneider, Pimm-Smith, & Worden, 1994), social psychology (Bargh, 1989; Dijksterhuis & Bargh, 2001), and cognitive psychology in general (Cowan, 1988; Jacoby, 1991). The elemental premise shared by these disparate uses of AIP theory is that information is processed in two ways, either with attention or automatically.

The concept of automaticity and its usage in the lexicon of reading research has become virtually indistinguishable from the term “fluency” itself, as “most scholars treat automaticity as the more general term that embraces a wide variety of behaviors [. . .] Some would prefer to reserve the term ‘fluency’ for reading or other language phenomena. This distinction, however, is not universally recognized” (National Reading Panel [NRP], 2000, p. 3-7). Further overlap in concept between fluency and automaticity is evident as Harris and Hodges’ (1995) *The Literacy Dictionary* defined fluency as “freedom from word-identification problems that might hinder comprehension” (p. 134), while the same text defined automaticity as “fluent processing of information that requires little effort or attention” (p. 85). Such commonality induces a fluid conceptual

interchange between the theoretical premise of automaticity on one hand and reading fluency on the other.

Though automaticity and fluency are used interchangeably, LaBerge and Samuels (1974) stated that automaticity is based on “the assumption that the transformation of written stimuli into meanings involves a sequence of stages of information processing (p. 296). The Posner, Lewis, and Conrad (1972) study, conducted two years prior, examined the complexities of internal cognitive processes involved in visual processing, coding, and semantics or meaning-making. The attendant difficulty in delineating these processes was evident. Isolation of the various components of automaticity became the primary focus of and impetus for constructing the AIP model. In general terms, automaticity could be defined as a subconscious cognitive process that allows one to “perform a complex series of tasks very quickly and efficiently, without having to think about the various components and subcomponents of action involved” (DeKeyser, 1996, as cited in De Ridder, Vangehuchten, & Gomez, 2007, p. 309).

AIP represents a set of hypotheses that purport to describe various cognitive processes involved in the transformation of print, or written stimulus, to meaning through reading, or information processing. There are three memory stages through which visual stimuli are processed prior to eventual arrival in the “semantic system” where symbols acquire their meaning: visual memory, phonological memory, and (when required) episodic memory (LaBerge & Samuels, 1974). Cowan (1988) characterized these memory types into “a brief sensory store, a long-term store, and a short-term or activated-memory store” (p. 171). Three memory modules are attended by an “attention or central processing center” (LaBerge & Samuels, 1974, p. 309) that fulfills an executive function.

All sub-skills involved in the stages are learned but acquired at widely varying speeds according to the learner. Discovery of these processes is made possible by achieving accuracy first (involving attention) and automaticity second (not involving attention). Evidence of the final acquisition of automatic reading is typically not distinct or explicit, described by DeKeyser (1996) as “a continuum of automaticity rather than an automatic-controlled dichotomy” (p. 350).

Further delineations, modifications, and criticisms of various aspects of AIP have ensued. Posner and Snyder (1975) described three essential properties of behavior that make it automatic: “that it be carried out without immediate intention, without conscious awareness, and without interfering with other processes that are occurring at the same time” (p. 212). These basic traits of automatic behavior account for the majority of observable automatic characteristics, confirming in part LaBerge and Samuels’ hypothesis. However, they fail to address the derivation or acquisition patterns of them. This exclusion was the partial impetus for research by Shiffrin and Schneider (1977) that augmented the list, adding two additional properties of automatic behavior: “They require considerable training to develop and are most difficult to modify, once learned” and “once initiated, all automatic processes run to completion automatically (though some indirect control is possible)” (p. 160).

The processing constructs “most often treated by researchers are selectivity and capacity limitation” (LaBerge & Samuels, 1974, p. 294). Theoretically, the role capacity limit played had been controversial, owing to concerns over operationally defining the concept. At a time in cognitive science when post-behaviorist theory focused on limited-capacity examination, Stanovich (1990) pointed out “empirical paradoxes because the

different criteria employed to operationalize the automaticity concept did not display convergent validity” (p. 76). As a central concept in developmental reading theory, Stanovich’s work consequently thrust information encapsulation and modularity to the fore. This resulted in the examination of quality of representation, or lexical quality, and the nature of exchange of information between autonomous cognitive processes, such as attentive or automatic. Recent research has continued to support the encapsulated, high-quality representation hypothesis, whereby “skilled readers rely on high-quality lexical representations that afford autonomous lexical retrieval and reduce the need to rely on top-down context” (Andrews & Bond, 2009, p. 708). Samuels (2004), co-author of AIP theory, concurred in an update, saying, “Logan and Stanovich suggest instead that automaticity may be acquired without invoking concepts of resource limitations. What they offer is a valid view of automaticity as a memory phenomenon” (p. 835).

AIP is particularly suited to frame the present research as automatic behaviors and cognitive processes involved in music performance have historically been intertwined: “research on procedural memory—the memory of skills—indicates that the ultimate goal of musical practice is the automaticity of movements” (Mishra, 2010, p. 11). Thus in practicing and performing musical skills executed verbally, with either written text or in combination with music notation, automatic skill transfer seems particularly plausible. Automaticity in word recognition appears to be a vital skill in building text fluency and consequently, comprehension. Music performance holds potential for reinforcing “reading skills and overall reading achievement” (Biggs, Homan, Dedrick, Minick & Rasinski, 2008, p. 210).

Empirical Research: Fluency and Comprehension, Prosody and Transfer

In 1997 the National Reading Panel (NRP) formed by the U.S. Congress charged its members “to assess the status of research-based knowledge, including the effectiveness of various approaches to teaching children to read” (National Institute of Child Health and Human Development [NICHD], 2000, p. 1-1). This generative project fostered profound educational policy reform in the area of literacy by deciding and defining, through an extensive research review process, what literacy topics would be studied in depth. The NRP

considered, discussed, and debated several dozen possible topic areas and then settled on the following topics for intensive study:

- Alphabets, including phonemic awareness instruction and phonics instruction
- Fluency
- Comprehension, including vocabulary instruction, text comprehension instruction, teacher preparation and comprehension strategies instruction
- Teacher education and reading instruction
- Computer technology and reading instruction. (NICHD, 2000, p. 1-2)

As many literacy topics are essentially processes or sub-skills involved in the development of literacy skill, comprehension may be viewed as paramount in the teaching of reading. The NRP’s establishment of this ultimate objective of literacy instruction was pointed out by Lewis and Tregenza (2007) who concluded that “children who have the ability to fluently decode a text but do not understand what they have read

cannot be considered readers. Communication of meaning is at the heart of the reader/writer relationship” (p. 12).

Consequently, fluency in reading must also be obtained to allow readers “sufficient attentional control” (LaBerge & Samuels, 1974, p. 300) to make meaningful connections between printed text and its semantic or contextual meaning.

Comprehension has a very strong research and theoretical base, “indicat[ing] that while fluency in and of itself is not sufficient to ensure high levels of reading achievement, fluency is absolutely necessary for that achievement because it depends upon and typically reflects comprehension” (Pikulski & Chard, 2005, p. 513). This assertion is evidenced by recent trends in educational priorities developing effective fluency instruction strategies: “The recognition of the importance of fluency that has emerged as part of our developing understanding of the construct has led to a corresponding emphasis on fluency assessment and instruction within the literacy curriculum” (Kuhn, Schwanenflugel, Meisinger, Levy, & Rasinski, 2010, p. 230).

As automaticity, fluency, and prosody are regarded to be “the gateway to comprehension” (Rasinski, 2006, p. 704), the present research is informed by work in the parallel domains of reading fluency and music integration. Following is an examination of the essential aspects of fluency including (a) the linkage between fluency and comprehension, (b) the emerging realization of the role of prosody in fluent reading, and (c) the research regarding transfer of learning. This is broadly examined in a general sense, building a relevant context for the eventual specific exploration of transference of musical skill to reading fluency skill.

Fluency and Comprehension

Fluency and automaticity share a profound cognitive overlap. As a result, the two terms are used interchangeably in much reading research (Harris & Hodges, 1995; NICHD, 2000). Additionally, in assessing literacy skill it has become difficult to mention fluency or automaticity without also including comprehension (NICHD, 2000). The two domains e.g. fluency/automaticity and comprehension function in a distinct parallel manner: “Automatic word recognition is central to the construct of fluency and fluency’s pivotal role in the comprehension of text” (Kuhn et al., 2010, p. 231). Thus automaticity, fluency and comprehension are inextricably linked. A review and update of AIP theory in 2004 acknowledged the shift of comprehension from an antecedent skill induced by automaticity, to one that is instead an integral component of it: “When our model was first published, we thought of automaticity in a very limited way, but we came to realize it would be extended to include virtually every aspect of reading comprehension as well” (Samuels, 2004, p. 829).

Fluency alone, however, is not sufficient to guarantee comprehension. Studies have shown that fluency may be at or near normal levels in young readers, yet comprehension may still lag (Nation, Cocksey, Taylor, & Bishop, 2010; Shaywitz, et al., 1995). This phenomenon may be due in part to the tendency for most fluency assessment to be comprised primarily of words-per-minute or simple word accuracy measures (Kim, Petscher, Schatschneider, & Foorman, 2010). Another possible explanation for comprehension deficiencies among fluent readers is the tendency to disregard an emerging essential aspect of fluent oral reading embodied by prosody (Kuhn et al., 2010; Miller & Schwanenflugel, 2006; Rasinski, 2006; Rasinski & Hamman, 2010).

A variety of research methodologies exist in the literature exploring the fluency-comprehension connection, each utilizing a variety of analytic techniques and choice of subjects appropriate to each study design and objective. Despite the array of research methods and population characteristics in these studies, a vast majority arrive at a singular, closely-aligned relationship between fluency and comprehension, as “the skill of reading fluency is an obvious factor in reading comprehension proficiency, so teachers must search for the best ways to improve reading fluency” (Zugel, 2009, p. 3).

Such a diversity of research methodologies and subject profiles has failed to confound the emergence of certain effective instructional techniques aimed at building these skills. Once such prominent group of related techniques, commonly referred to as repeated and/or guided reading, leverages supervised, ability-grouped reading with various combinations of instructional activities such as read-alouds, choral reading, student repeat reads, partner reads or reader’s theater (Armbruster, Lehr, & Osborn, 2001; O’Herron & Siebenaler, 2010; Zugel, 2009). Application of this class of techniques has been equally varied too, particularly across anomalous groups of learners as well as “mainstream” readers.

Thierren’s (2004) meta-analysis on 28 strict, fully-experimental (i.e. randomized selection) studies examining the use of repeated reading reinforced its apparent instructional validity, as significant effect sizes “indicate[d] that repeated reading improves the reading fluency and comprehension of both nondisabled (ND) students and students with LD” (p. 257). Armbruster, Lehr, and Osborn (2001) cited the use of repeated and guided reading techniques found to be particularly effective, even necessary, in promoting fluent, prosodic reading by concluding that “repeated and

monitored oral reading improves reading fluency and overall reading achievement” (p. 24).

Researching populations outside mainstream learners acquiring reading fluency and comprehension skill is characteristic of many more studies applying these instructional practices, such as Gorsuch and Taguchi (2010); Taguchi, Takayasu-Maass, and Gorsuch (2004); and Tam, Heward and Heng (2006), all of whom investigated fluency/comprehension interventional techniques including repeated reading with English-Language-Learners (ELL). A proliferation of other studies exist using repeated and guided reading techniques on atypical populations such as gifted or highly-fluent, capable readers (Reis, Eckert, McCoach, Jacobs, & Coyne, 2008), at-risk or behaviorally disordered students (Alber-Morgan, Ramp, Anderson, & Martin, 2007), and students with reading deficits resulting from learning disabilities in either fluency or comprehension, or both (Cates, Thomason, Havey, & McCormick, 2006; Spencer & Manis 2010; Therrien, Gormley, & Kubin, 2006; Vandenberg, Boon, Fore, & Bender, 2008; Walczyk & Griffith-Ross, 2007). This research substantiates the widely variant and novel ways that best practices in reading fluency instruction, executed amongst diverse populations, may be directed. Consequently, the potential for effective MI instruction in reading fluency is indicated.

The relationship between fluency and comprehension is not mutually exclusive. Previous dogma had been premised upon the notion that fluency attainment results in greater comprehension, but such a framework appears too linear and simplistic. An evolving modern conception assimilates fluency into comprehension, making fluent reading “a multidimensional construct” (Strecker, Roser, & Martinez, 1998, p. 297).

Reading with comprehension, the ultimate goal of learning to read, presumes fluent reading as “a complex developmental process that is based on the integration of diverse components into a smooth and automatic foundation on which fluent reading and consequently comprehension are grounded” (Bashir & Hook, 2009, p. 196). This understanding of fluency and comprehension across a wide spectrum of research methodologies, settings, and applications may serve to inform other more creative applications, such as the use of MI reading instruction, too.

Fluency and Prosody

The character, scope, and definition of fluency has evolved since the formation of the NRP in 1997. A National Assessment of Educational Progress report cited within the initial NRP text reported that “reading fluency of a nationally representative sample found 44% of students to be disfluent even with grade-level stories that the students had read under supportive testing conditions. Furthermore, that study found a close relationship between fluency and reading comprehension.” (Pinnell et al., 1995, as cited in NICHD, 2000). Such an emphasis on and prominence of the importance of fluency in obtaining comprehension changed the way fluency is regarded and defined. Narrowly-focused conceptions of fluent reading that concentrated on speed, word counts, and accuracy alone began to give way to a view of “fluency defined as not only accuracy and automaticity of individual word reading, but also prosodic rendering of the text needed for children to adequately comprehend” (Schwanenflugel et al., 2006, p. 119).

Such a transformation in the fluency paradigm has had a concomitant effect on reading instruction, practice, and assessment. The interconnectedness of fluency with comprehension and prosody within both written and oral expression suggests a need to

reexamine how fluency is taught and assessed as “common practice narrows fluency to rate and accuracy, our understanding of fluency should be broadened rather than narrowed” (Deeney, 2010, p. 442). In this regard, metaphorical description provides an effective means for understanding the extant definitional dichotomy. “Surface” fluency assessment “leads to practices such as simply urging students to read faster,” while a “deep” fluency concept “views fluency far more broadly as part of a developmental process of building decoding skills that will form a bridge to reading comprehension and that will have a reciprocal, causal relationship with reading comprehension” (Pikulski & Chard, 2005, p. 512). Through on-going research establishing its central role within this broader schema, prosody came to fill a need for augmenting and deepening a contemporary view of fluency. Further, the congenerous character of both musical and prosodic elements bodes well for the use of MI instruction in developing reading fluency: “When teachers use songs, chants, and rhymes to teach phonemic awareness, they also model prosody. When children are taught to notice the apparent lengthening of vowels or durations of silence, they are receiving direct instruction in rhythmic perception” (O’Herron & Siebenaler, 2007, p. 21).

The incorporation of prosody into instructional methodology and assessment presents many challenges. As the nature of prosodic elements is essentially aural or verbal, it lacks inherent material or physical artifact. Prosodic reading has most typically been analyzed by the transformation of “speech sound waves of oral reading into a visual representation called a spectrogram where the waves can be analyzed more or less directly” (Schwanenflugel et al., 2006, p. 119). Having only representations of prosodic elements as source material, assessment of prosody itself is especially vulnerable to the

vagaries of interpretation. Another challenge is that many primary prosodic elements are supra-segmental, i.e. they “operate over units larger than a single segment. Prosodic contours may span a word, phrase, or larger units” (Price, Ostendorf, Shattuck-Hufnagel, & Veilleux, 1988, p. 99). The developmental stage of elementary school children may itself be another obstacle to leveraging prosody as an instructional strategy as “studies have shown that some aspects of interaction between prosodic accent and focus may not be mastered by the age of 10 years” (Stojanovik, Setter & Ewijk, 2007, p. 1612).

A metamorphosis continues regarding prosody’s role and relationship with other areas of literacy, notably comprehension. Conclusions reached by various researchers investigating any possible reciprocity between fluent, prosodic reading and comprehension run the gamut from confirmation to doubt. The literature is equally variant in terms of methodology, design and research objective.

Meyer and Felton (1999) posited a strong theoretical link between reading with proper expression (prosody) and meaning-making, stressing that oral reading mirroring non-textual verbal speech is critical as “young children often rely on prosodic and rhythmic characteristics of oral language to derive meaning before they achieve true linguistic competence” (p. 286). Likewise specific empirical evidence of a prosody-comprehension bridge emerged in Miller and Schwanenflugel’s 2006 and 2008 studies, leading to a conclusion based upon the evidence such as “children who showed larger basic declarative sentence declinations and larger pitch rises following yes-no questions tended to demonstrate greater reading comprehension skills” (2006, p. 850). Various other studies corroborated similar conclusions confirmatory of the close ties between prosodic fluency and comprehension (Deeney, 2010; Dowhower, 1987; Dowhower,

1991; Herman, 1985). Ravid and Mashraki (2007) succinctly stated prosody's integral place in achieving proper reading comprehension via decreased attentional energy devoted to decoding of text, saying, "Fluent readers read texts prosodically, or smoothly and coherently. They construct a clear representation of the story which consequently vastly promotes reading comprehension" (p. 151).

Other researchers concluded the relationship between fluency, prosody, and comprehension is weak or not as significant. In a longitudinal, cross-sectional study involving a randomized large sample ($N = 945$) of kindergarten through second grade students, Schatschneider, Fletcher, Francis, Carlton and Foorman (2004) concluded that "an assumption that measures of general oral language facility (vocabulary and expressive-receptive fluency) would be the best predictors of comprehension, and would be comparable with phonological awareness in their predictive utility. These results do not support that hypothesis" (p. 272). Though such an analysis is necessarily predictive in nature, prosodic ability nonetheless exhibited a weak correlation to comprehension success ($r = .20$).

Another study reported that "reading data clearly indicate that the intervention was successful in improving reading fluency" (Spencer & Manis, 2010, p. 82), yet "no positive correlations were found between gains in comprehension and gains on any of the fluency-related reading measures" (p. 83). This typifies the lack of completely consistent, conclusive supporting data in examining the prosody/fluency-comprehension connection. It substantiates either the notion that spurious factors have gone undetected in studies that do show significant comprehension gains amongst prosodic readers, or that researchers' attention might better be directed toward a focus on decoding or automaticity

in developing fluency, resulting in increased comprehension. As Samuels (2007) asserted, “It is the simultaneity of decoding and comprehension that is the essential characteristic of reading fluency. Secondary characteristics of fluency such as expression are indicators, but are not the essential characteristics” (p. 564).

The essentiality of prosody in describing a fluent reader continues to be examined. Through the lens of past and current theoretical discourse, how early literacy skill is acquired begins with Jean Piaget and Arnold Geselle, both of whom adopted positions that all learning, especially literacy, must be developed in stages that are basically “biologically fixed and that the timetable could not be influenced by instruction” (Slegers, 1996, p. 4). Early literacy instruction grounded in this view gave rise to teaching more limited, constrained skills such as simple letter naming or letter-sound correspondences. These print-based, reading readiness skills became “prerequisite to literacy learning and the foundation for eventual fluent reading of connected text” (Casbergue, 2010, p. 15). This school of thought, however, failed to acknowledge the role of prosody as elemental to fluency.

The other dominant perspective, labeled a constructivist view modeled after theory advanced most notably by Lev Vygotsky, held that both written and oral language is itself a primary instrument for learning. Developmental cognitive processes encompass language in a synergistic fashion rather than by sequentially marking developmental stages (Vygotsky, 1962, 1978). The kind of literacy knowledge regarded as valuable in constructivist thought may be characterized as more qualitative in nature. As such, constructivist-based reading fluency instruction and assessment is less amenable to calculable fluency indicators, such as words-per-minute measures, and is instead more

attentive to “ease of reading, smoothness, and prosody—the rhythm and melody in reading printed texts orally” (Moskal, 2006, p. 4). This model of literacy more readily accepts that “instruction on accuracy, automaticity, and prosodic reading can and should occur in unison—in a constructivist, integrated and synergistic manner” (Rasinski, 2006, p. 705).

Like the research into fluency’s role in comprehension, many different instructional approaches have substantiated positive outcomes in promoting prosodic fluency skill. Nearly all of them have guided or repeated reading practices at their core (Kuhn & Stahl, 2003; Morris & Nelson, 1992; Stahl, Heubach, & Cramond, 2005). The particular repeated reading practices found to be especially effective are “approaches that incorporate repeated reading provid[ing] support for young readers through feedback and modeling of fluent, expressive reading. Often this repeated reading support comes from echo reading, choral reading, or listening to pre-recorded book tapes or CDs” (Schwanenflugel et al., 2006, p. 121).

As two major components of fluency, automaticity and prosody clearly stand apart from others mentioned in the literature (i.e. decoding accuracy, word recognition). The automaticity literature is robust and well-established since its genesis was brought about by AIP theory in 1974 by LaBerge and Samuels (Stanovich, 1990). In contrast to automaticity, the role of prosody is less entrenched in the body of reading research. Though a consensus exists as to the overall definition of fluency (NICHD, 2000), prosody has, comparatively, only recently emerged as a possible bridge between the principal components of automaticity, fluency and comprehension (Dowhower, 1991). AIP theory accounts for the effortless decoding of text that fluent readers exhibit, but

fails to take up the part prosody plays in the expressive rendering of text. It is the very expressiveness demonstrated by truly fluent readers that subsumes an underlying understanding of textual meaning: “Implicit in the phrase *reading with expression* is the use of those prosodic features that account for the tonal and rhythmic aspects of language” (Kuhn & Stahl, 2003, p. 5).

Simply put, prosody likely stands as a bridge between fluent rendering of text and comprehension of it. If prosodic readers parse textual clues, rapidly assimilate their context and syntax, and render them in expressive, oral readings, they signal a deep understanding of them. By contrast, Rasiniski (2004) offered this description of a non-prosodic but fluent reader that succinctly delineated how prosody must attend fluency for true, deep comprehension:

If readers read quickly and accurately but with no expression in their voices, if they place equal emphasis on every word but have no sense of phrasing, and if they ignore most punctuation, blowing through periods and other markers that indicate pauses, then it is unlikely that they will fully understand the text. (p. 46)

Prosody plays a role at the juncture of fluency and comprehension, ensuring the reader grasps both overt and sub-textual meanings.

Prosodic and musical elements possess a remarkable surface commonality as well. The labels for the elements of prosody themselves borrow from common musical vernacular: “Features or indicators of prosodic reading include (a) pitch or intonation, (b) stress or loudness, (c) length of phrases, (d) appropriateness of phrases, (e) pausal intrusions, and (f) final phrase lengthening” (Schrauben, 2010, p. 85). Reading comprehension reinforced by prosodic fluency must be arrived at through a complex

chain of other elements of literacy (i.e. phonemic skills, vocabulary, alphabets, etc.). Comprehension may be regarded as a higher-order thinking skill dependent upon a host of other cognitive skill sets, most pertinently, fluency and prosody. Consequently, spoken prosody mirrors music performance, particularly singing, in several ways as Gerard and Auxiette (1992) posited: “The temporal evolution of the spoken string that constitutes prosody is usually studied by considering three variables: the rising and falling of the voice pitch and intensity, and the rhythm” (p. 94).

Educators can infer that a highly interrelated process of literacy learning is at work, where learners progress from simple phonics and phonemic awareness, through vocabulary acquisition, followed by fluency with prosody, and finally, comprehension. The progression, though, is far from linear or sequential. It is reliant instead upon complex exchanges and recursive cognitive tasking. Likewise, research into the relationship between music and language is revealing a similarly complex cognitive hierarchy at work. The research “is beginning to demonstrate the important role that music can play in informing broad theories of higher order cognitive processes” (Levitin & Tirovolas, 2009, p. 221). Exactly how this transfer occurs is not known, but it may be better understood in the context of learning transfer research.

Transfer of Learning

The examination of transfer of learning, or adapting learned concepts and skills to new applications, has its roots in early discourse such as that conducted by Thorndike (1919) who defined it as “a determination of the response of analytic thinking; it is a main factor in man’s success with novel situations. The progress of knowledge is a matter of insight into the constitution and relations of long familiar ones” (p. 148).

Humans possess the unique ability to transfer prior experience and learning, modifying it to suit dissimilar situations. The degree of “transfer or associative learning” (Thorndike, 1919; Posner & Snyder, 1975) is unique to the human species to the extent that it is consistently dependent upon the environment or usage into which it is adapted. Many cognitive psychologists have contended that “human memory is an associational machine that operates entirely without control of the subjects’ strategies” (Anderson & Bower, 1973, as cited in Posner & Snyder, 1975, p. 205). If such contentions are valid, the potential is tremendous for finding genuine relevance between related domains such as music performance and reading fluency. The literature concerning transfer of learning examined herein comes from two highly compatible fields: cognitive and neuro-cognitive psychology.

Cognitive psychology and transfer of learning. One of the most prominent groups of cognitive scientists to have investigated learning transfer are Bloom, Englehart, Furst, Hill and Krathwohl (1956), who issued their landmark *Taxonomy of Educational Objectives: The Classification of Educational Goals. Handbook I: Cognitive Domain*, revised and modified in 2001 by Anderson and Krathwohl, (Eds.), in *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom’s Taxonomy of Educational Objectives*. Both original and revised taxonomies are hierarchies of educational objectives expressed through levels of cognition. They reference application, synthesis, evaluation, and ultimately creation as the uppermost, higher-cognitive domain skills. All these cognitive skills subsume transfer skills (Anderson & Krathwohl, 2001; Bloom, et al., 1956). The skills are widely accepted with “increasing significance as researchers continue to demonstrate the importance of students being made aware of their

metacognitive activity, and then using this knowledge to appropriately adapt the ways in which they think and operate” (Krathwohl, 2002, p. 214). The transfer of knowledge between settings and situations and amongst domains is thus a crucial skill in learning. The cardinal skills described by these taxonomies are some of the most dominant in all of education: “Bloom’s taxonomy has become influential to the point of dogma in American colleges of education” (Booker, 2007, p. 348).

Learning to adapt or transfer knowledge and skills has sometimes been referred to as “critical thinking, which consists of seeing both sides of an issue, deducing and inferring new conclusions from available facts, solving problems in new contexts, and so forth” (Willingham, 2007, p. 10). The ability to think critically is based upon the ability to transfer learning from other domains. This cognitive skill holds great potential in applying learning from and between distinct but inter-related disciplines, such as music performance and reading fluency. Musical performance itself embodies transfer of learning in the form of some or all of the taxonomical levels of application, synthesis, evaluation, and creation: “Procedural skills are the central knowledge domain in use during music performance, requiring careful and precise higher-order cognitive processing to ensure correct development” (Hanna, 2007, p. 14). When musical performance is conjoined with fluency-building activities, the transfer of learning and critical thinking required to accomplish these parallel tasks ensure these higher-order objectives have been met (Besson, Schön, Moreno, Santos, & Magne, 2007; Ehrenberg, 2010; Hanna, 2007).

Some dissent exists as to the relative import assigned to such taxonomies, however. Critics of the teaching of thinking skill assail its practicality and decry the

substitution of such an obtuse mental exercise for essential substantive knowledge.

Booker (2007) went so far as to assert that “the inability of American children to compete internationally to a great extent is a result of our reliance on Bloom in expecting critical and advanced thinking from kids who have been trained to regard facts as unimportant” (p. 347). Likewise, critical thinking exercised as a skill built upon accumulation of knowledge-level facts as a rudimentary task assigns the attainment of new knowledge to the lowest cognitive level on Bloom’s taxonomy pyramid. Wineburg and Schneider (2010) singled out this peculiarity “as knowledge is a prerequisite to critical thinking. But most important, knowledge represents its highest aim. There can be no new knowledge without new questions. The pyramid narrows to a point. Turning it on its head opens up new worlds” (p. 61).

Despite some resistance to the emphasis placed upon explicitly teaching higher-order thinking skills, the rationale for using music within generalist classrooms often continues to be based upon the ease and suitability it provides in fostering these skills (Bower, Lobdell & Owens, 2005; Martorella, Beal & Bolick, 2005; Slavin, Daniels & Madden, 2005; Sunal & Haas, 2006). Moore (2007) cited the unique capacity music holds for inducing transfer of, in this case, social studies content to analytical thinking: “Furthermore, music of any period provides insights about different cultures and historical eras and allows students to analyze the historical or contemporary social forces that have shaped human history” (p. 23).

The idea of closely aligned cognitive transfer involving nearly-identical tasks has been investigated in young, emergently literate children as well. Gromko and Poorman (1998) substantiated a gain in spatial-temporal reasoning, a cognitive task critical for

authentic comprehension of text, as measured by the Wechsler Preschool and Primary Scale of Intelligence-Revised (WPPSI-R, 1989). The reasoning for such gains targeted the automatic transfer of sound-to-symbol techniques endemic to typical early childhood and adolescent music training and performance. The same held true for cognitive tasking performed “in reverse,” that is, by near-transfer from literacy to musical domains as “high levels of music reading in high school wind players could be predicted by a combination of reading comprehension, auditory discrimination of rhythmic patterns, visual-field articulation, and spatial orientation ($F = 21.26$, $p < .001$)” (Gromko, 2004, p. 8). These studies seem to indicate that children’s organization of musical sound temporally and spatially provides a validation of the concept of near-transfer of the same or similar cognitive tasks in reading as well.

The substantive and growing body of literature that documents an apparent fluent conduction of both content and thinking skills involved in musical and non-musical domains warrants examination as to how and why this phenomenon occurs. Other perspectives outside strict behavioral or cognitive approaches are providing an important and enlightening dialectic, especially the research conducted by neuro-cognitive scientists exploring the music-language connection.

Neuro-cognitive psychology and transfer of learning. Advances in medical imaging have made the field of neuro-cognitive science a valuable resource for educational psychologists and researchers. Framed by educational inquiry and many times in collaboration with educational researchers, neuro-cognitive scientists use tools such as positron emission tomography (PET) scans, functional magnetic resonance imaging (f-MRI) and other technologies. These collaborations are creating a rapidly

growing body of research exploring the brain's physiological operation while performing complex cognitive processes such as reading or performing music. Much of this work has substantiated ways in which the human brain utilizes an incredibly intricate vast neural network to apply learning in novel, dissimilar, or parallel situations.

Of particular interest are neurological studies examining music and language cognition: "the largest paradigm shift has been the increased use of neuroimaging to inform theories about the brain basis for musical behaviors. A second theme has been an increased interest in the origins of music and its connection with language" (Levitin & Tirovolas, 2009, p. 211). Much neurological evidence has surfaced indicating striking similarities between music and language cognitive processes, bolstering the case for near-transfer or associative learning between the two domains.

Schlaug, Jäncke, Huang, Staiger, and Steinmetz (1995) conducted one of the first neurological studies to confirm plasticity of brain structures in musicians, namely an enlargement of the "midsagittal area of the corpus callosum in those who had experience in musical training versus those without" (p. 1050). This held implications for how musical training holds potential for improvement of hand, eye, and ear (listening) coordination, essential physical skills in language expression and reading too. Besson, Schön, Moreno, Santos, and Magne (2007) confirmed the likelihood that "a set of common processes may be responsible for pitch processing in music and in speech and these processes are shaped by musical practice" (p. 403). If such hypotheses regarding brain plasticity are true, caused by the re-tracing of neural pathways that music performance necessitates subjects to engage in (e.g. music rehearsal, drill and practice),

the implications for music's effect on the same neuro-cognitive processes involved in language are substantial. These contentions have only begun to be explored.

AIP theory subsumes a shared processing of phonological, visual, episodic (as needed), and semantic memory systems (LaBerge & Samuels, 1974). Current interpretations of neuro-imaging studies appear in large part to uphold most of this original theoretical assumption. High resolution imaging studies coupled with interventional assessments substantiate “that music and language show parallel combinatoric generativity for complex sound structures (phonology) but distinctly different informational content (semantics)” (Brown, Martinez, & Parsons, 2006, p. 2798). Thus music and language tasks share interconnected and highly related neuro-physiological phenomena when imaged, but logically possess separate means for arriving at meanings as each language system (i.e. musical sound/notation versus speech /text) has unique lexical and syntactic components.

The linguistic and musical syntactic systems have been explored with enthusiastic assertions of their commonality but also skepticism of it. Most neuro-cognitive studies have concentrated historically on musical-linguistic structural relations that are of four basic types: two of them rhythmic in nature (i.e. grouping and metrical structures) and two that are somewhat more abstract i.e. tonal or “time-span reduction,” and tension-relaxation over time or “prolongation reduction” (Lerdahl & Jackendoff, 1983).

Musicologists and linguists have made comparisons between musical and reading/linguistic syntax and structure, advancing theory that favors the likelihood of true compatibility (Horton, 2001; Tojo, Oka, & Nishida, 2006; Pesetsky, 2007; Rohrmeier, 2007). However, as many theorists endorse a strong neuro-cognitive correlation between

music and language, others are considerably more cautious or dubious (Feld, 1974; Powers, 1980). In the past half-decade, though, the medical and the biological sciences in general have stepped forth, buoyed by advances in available technology. Teams of cognitive, learning, and neurological researchers offer numerous empirical studies as evidence.

How and why contemporary brain science finds a strong attraction to the topic of music and language is readily understood. Language and music themselves are two distinct abilities of the human species, emblematic of domain-specific cognitive mechanisms, i.e. mechanisms unique to language and music-making. Music and language cognition is more easily examinable than, for an example, artistic value, meaning, or kinesthetic proclivity (Fodor, 1983). This ideal pre-condition for the study of a linkage between physical and behavioral research presents a level of interest researchers find intriguing and revealing as to how humans learn, process, and communicate information:

The presence of a second, musical syntactic system in the human mind naturally leads to the question of the relation between them. Are they mentally isolated, modular systems, or might there be cognitive and neural overlap? A preponderance of evidence of late points to the latter (Patel, 2008, p. 241)

Conjoining the parallel syntactic systems i.e. language and musical presents a potentially powerful tool in teaching language through cognitive processes both deeply embedded in the brain. The development of instructional practice informed by this research is seemingly worthwhile, but further research and theoretical refinement resulting from such efforts is eminently prudent and necessary.

Music and Reading

Four large ($n > 10$) research syntheses have been performed in the last 12 years reviewing the use of music in teaching literacy skills. The individual studies included in these meta-analyses met a widely variant range of qualifying criteria. Each review of literature classified its component studies in unique ways: by research design (Bolduc, 2008); chronologically and by literacy area (Standley, 2008); via a matrix linking music experience/music non-experience to degree or existence of relationship (Chang, 2000); or those relating specifically to a pre-determined set of music and language research topics (O'Herron & Siebenaler, 2007).

The individual studies cited within these meta-analyses possessed a vast array of methodologies, topics within general literacy (i.e. phonics, phonemic awareness, vocabulary, fluency, comprehension, etc.) and research designs. Consistency and quantity of quasi-experimental, experimental, or correlational studies remains elusive. As Standley (2008) reported, "Comprehensive, integrative analyses of the experimental literature in this area are few" (p. 18).

Given the methodological and design variety, as well as a lack of a coherent and substantive quantity of research into music and reading, following is a review of music and literacy studies arranged by literacy area as identified in the National Reading Panel *Report of Sub-Groups* (NICHD, 2000). The presentation of it herein is intended to lend consistency as it is identically formatted as found in the empirical studies of reading preceding this section. A review of studies concerning music and alphabets, (i.e.

phonemic awareness and phonics instruction) is first, followed by music and comprehension or fluency.

Music and Alphabets (Phonemic Awareness and Phonics)

Successful music performance requires an enhanced ability to aurally discriminate many elements of music, most importantly musical pitch (i.e. a tone's physical frequency as written in musical notation). Interplay in young readers' ability to accurately distinguish changes of pitch exist as similar processes are indicated in phonemic awareness and phonics skill. Lamb and Gregory (1993) concurred with the existence of such a possibility, as the ability to perceive "slight differences in phonemes thus appears to depend on the ability to extract information about the frequencies of the speech sounds. It is reasonable to assume that such an ability is related to discrimination of pitch differences in music" (p. 25). A strikingly similar conclusion was reached by Gromko (2005), as a particular sub-skill within phonemic awareness, phoneme segmentation fluency, was positively affected by music instruction: "Results revealed that kindergarten children ($n = 43$) who received four months of music instruction showed significantly greater gains in development of their phoneme-segmentation fluency when compared with children ($n = 60$) who did not receive music instruction" (p. 206). Musical training appears to enhance aural acuity, thus mapping explicitly to an emergent reader's phonemic awareness and general phonetic skill. Many other studies substantiate this relationship (Anvari, Trainor, Woodside, & Levy, 2002; Colwell, 1994; Osbourne, 1980; Wagley, 1978).

More recently, McMullen and Saffran (2004) posit that childrens' ability to create and organize learned sound categories may in fact significantly involve shared

mechanisms between linguistic and musical domains. Patel (2008) echoed that conclusion, summarizing a significant body of literature that supported it: “Recent empirical research on children and adults supports this prediction, because it finds that pitch-related musical abilities predict phonological skills in language” (p. 78).

Still other research conducted on a comparative basis fails to support the music-phonology connection. Poeppel (2001), and a replication of the same study conducted by Peretz and Coltheart (2003), found that damage to focal cortical regions of the brain failed to impact musical perception whereas language interpretation was greatly compromised, leading to the conclusion that either is processed in a fundamentally different way. Additionally, a number of studies show the two cerebral hemispheres exhibit significantly different biases in sound processing. Specifically, linguistic phonemic tasks show a greater reliance on the left hemisphere, whereas many musical sound perception tasks involving pitch in particular activate structures within the right hemisphere (Stewart, von Kreigstein, Warren & Griffiths, 2006; Zatorre, Belin, & Penhne, 2002; Zatorre, Meyer, Gjedde, & Evans, 1996).

The increased usage of multi-sensory approaches to teaching phonemic awareness and enhancement of phonics skill has led to a reciprocal rise in the search for creative instructional methods that are effective. Phonics skill has long been recognized as “a necessary precursor to skilled reading” (Scheffel, Shaw & Shaw, 2008, p. 150). A lack of ability to properly manipulate phonemes is an obstacle to word decoding and thus a constraint to achieving fluency. Conversely, the ability to read music notation may also be predicted by parallel increases in literacy skill as “a combination of reading comprehension, auditory discrimination [...] visual-field articulation, and spatial

orientation” (Gromko, 2005, p. 200) showed significantly higher success rates in music sight-reading skill (i.e. performing music not previously seen by the subject). Such a reciprocal relationship in cognitive skill carries strong implications that music perception skill is closely linked to phonological processing, and further suggesting “that skill in music perception is related to auditory or cognitive mechanisms beyond those tapped by phonological awareness” (Anvari, Trainor, Woodside & Levy, 2002, p. 126).

Highly similar effective instructional techniques co-exist in teaching phonics and music performance skill. The complexity of word decoding and phoneme manipulation to form words and sentences mirrors music notation reading, association with sound, and manipulation of notes to form coherent melodies. Each need to be taught in a segmented fashion, ideally using instruction “that focuses on one or two skills that produce greater transfer than a multiskilled approach” (NICHD, 2000, p. 2-41) to exert maximum effect. Similarly, musical passages are learned traditionally in “systematic sequence-repetition methods, and it is this process that may mirror sequential skills in other areas such as literacy” (Piro, 2009, p. 34). Using these skills in tandem, switching between the domains in parallel fashion, might consequently support and enhance learning that occurs in either.

Music, Comprehension, and Fluency

The acquisition of automatic reading skill enables fluent reading, which provides a stepping stone to the ultimate goal of any reader: comprehension. A chain of literacy skills emerge that “suggest a causal path going from 1) phonics knowledge to better word recognition, and 2) word recognition to better fluency” (Eldredge, 2005, p. 178). As

phonics knowledge is indicated by increases in accuracy of word recognition, music performance to enhance phonics skill “significantly enhances print concepts and prewriting phonics skills of children” (Standley & Hughes, 1997, p. 82), posing formidable potential for building a “stronger bridge” from phonics to word recognition and in turn to fluency. The interconnectedness of various literacy skills enhanced and supported by cross-domain instructional practice in music performance skills bodes well for the potential in achieving effective fluency reading instruction that focuses “on accuracy, automaticity, and prosodic reading [that] can and should occur [...] in an integrated and synergistic manner” (Rasinski, 2006, p. 705).

Students experiencing difficulties in reading fluency or comprehension have been shown to achieve success in musically-formatted instruction, thus increasing their self-efficacy in reading. This is due to the self-correction and formative assessment inherent to musical performance and instruction while singing or when playing simple instruments (Biggs et al., 2008). Continuous correction in musical performance is necessarily specific and focused, an indigenous aspect favorable to its use in promoting reading fluency and comprehension. Schunk and Rice (1993) paralleled the efficacy of this kind of assessment to reading fluency and comprehension instruction, saying “Progress feedback informs students that the strategy is effective, they are making progress in learning, and they are capable of improving their skills. These beliefs are validated as students experience success” (p. 11).

The use of MI instruction surfaces consistently when review of learners’ self-efficacy, confidence, and engagement in literacy learning is examined. The proclivity of young readers especially to eagerly participate in music-based activities is elemental to

the potential effectiveness of MI in promoting an array of cognitive skills: reading fluency, prosody, and comprehension chief among them (Curtis & Bharucha, 2010; Gardner, 1985; Junkins, 2003; Nicholson-Nelson, 1998; Klopper & Dachs, 2008; Parlakian & Lerner, 2010). The iterative process of reading curriculum refinement is constantly searching for ways to incorporate engaging practices in the interest of bolstering fluency and comprehension. MI has proven effective in fulfilling that role: “therefore, it is crucial that methods of reading instruction be constantly assessed, tailored and developed in order to make the process of learning to read an enjoyable, beneficial and positive adventure. Incorporating singing into a reading curriculum clearly invigorates children” (Junkins, 2003, p. 112). Towell (1999/2000) concurred in a review of literacy practices incorporating music, saying, “When students experience emotional responses [...] triggered by the music, they become engaged with the text. Engagement is a key factor for motivating children to read and one that leads to lifelong reading” (p. 284).

Various theories have been advanced as to how and why observed increases in comprehension, fluency and musical literacy are analogous. In one of the earliest empirical studies to examine this relationship, Lloyd (1978) concluded the two primary reasons are due to (a) the strengthening of compare/contrast skills, as “both depend upon being able to perceive likenesses and differences in sounds and in the shapes of symbols,” and (b) congruous fine motor operational skills, as “music is read from left to right and top to bottom, the same as reading words” (p. 323). Hansen, Bernstorff and Stuber (2004) in their book *The Music and Literacy Connection* re-stated Lloyd’s views and built upon these findings by adding a specific association to reading fluency itself,

defining it as the “ability to express ideas clearly, verbally or in writing as compared to the ability to perform music smoothly, easily, and readily” (p. 9). The increase in fluency and comprehension appears to be a reciprocal relationship for both reading and music as “the integration of music into literacy learning settings may aid in language development while promoting musical development at the same time” (Wiggins, 2007, p. 55).

Still, pinpointing how ability in the musical domain transfers to literacy development, particularly in fluency and comprehension, remains elusive. Piro (2009) contended as much when reviewing an earlier study (Piro & Ortiz, 2009) by offering that the “issue of cognitive transfer has been one quite difficult to prove conclusively. How is it that systematic and sustained involvement in one proficiency area could actually strengthen another?” (p. 32). Various other studies spanning many decades are similarly inconclusive or fail to find specific evidence of direct transfer (Babbitt, 1977; Friedman, 1960; Kvet, 1985; Lauder, 1976; Wolff, 1980). Such studies, however, exhibit limitations related to now-outdated testing protocols (Friedman, 1960), validity concerns related to small or single-gender populations (Wolff, 1980; Lauder, 1976) or lack of evidence beyond correlation such that causality could not be inferred (Babbitt, 1977; Kvet, 1985; Chang, 2000).

Summary

The body of literature examined gives considerable context to the research contained herein. A theoretical framework based upon automatic information processing (i.e. automaticity) lays a foundation for the examination of the degree of effect music integration may have on literacy. Empirical studies regarding fluency and comprehension, prosody, and transfer of learning between domains further paint the

background onto which the present research may take the foreground. Some extant gaps in research on music and reading connections include a clear description of the meaning of the apparent relationship between prosody and comprehension “as correlational studies do not conclusively provide whether prosody causes better comprehension or good comprehension makes students read with prosody” (Deeney, 2010, p. 446).

Chapter Three outlines the research procedures and design used to investigate to what degree MI reading instruction affected reading fluency in first grade students. Knowledge gained from this study might contribute to a growing body of literature, and thus inform best practices in instruction. The aim was to enhance and promulgate creative teaching through music integration, offering a viable, effective alternative to prescriptive teaching that accountability measures so often induce.

CHAPTER THREE: METHODOLOGY

Introduction

The purpose of the study was to investigate the effect of MI reading instruction on first grade students' fluency. The researcher sought to contribute to the growing body of knowledge pertaining to the effectiveness of MI instruction. Understanding the potential of MI, and more broadly arts integrated instruction, will inform policymakers in disseminating effective, conceptually-grounded decisions regarding implementation of best practices. The research questions steered the choice of design, participants, setting, instrumentation, and procedures described in this chapter. After describing these elements, the chapter will conclude with an overview of the data analysis employed.

The research questions are:

1. To what extent does music integrated (MI) instruction have an effect on DIBELS nonsense word fluency (NWF) among first grade students?
2. To what extent does music integrated (MI) instruction have an effect on DIBELS phoneme-segmentation word fluency (PSF) scores among first grade students?

The corresponding null hypotheses that were tested included:

Null Hypothesis H₀₁: Students who participate in MI reading instruction, as compared to those who do not participate in MI reading instruction, will have no statistically significant differences in terms of DIBELS nonsense word fluency (NWF) scores.

Null Hypothesis H₀₂: Students who participate in MI reading instruction, as compared to those who do not participate in MI reading instruction, will have no

statistically significant differences in terms of DIBELS phoneme-segmentation word fluency (PSF) scores.

Design

A quasi-experimental, pre- and posttest design was used. A convenience sample comprised of students in a public K-5 elementary school in Georgia (referred to as “Jones” Elementary School to preserve confidentiality) served as subjects in the treatment group. Students at another public K-5 elementary school in Georgia (referred to as “Smith” Elementary to preserve confidentiality) served as subjects in the control group. Jones and Smith Elementary Schools have markedly similar demographics as Table 1 shows.

Participants’ reading fluency was indicated by scores on pre- and posttests, collected at the start and conclusion of an eight-week treatment period. The scores were two sub-sections of the DIBELS test: the nonsense word fluency (NWF) measure and the phoneme segmentation fluency (PSF) measure. The DIBELS NWF and PSF measures are the test designers’ designated grade-level benchmarks for students at the end of kindergarten and beginning of first grade, as these specific measures demonstrate a “pattern of performance with the odds in favor of achieving subsequent goals and thus receive a recommendation of *Benchmark - At grade level*” (Good, Simmons, Kame'enui, Kaminski & Wallin, 2002, p. 2). Additionally, the participating school district had mandated the use of DIBELS tests in all member elementary schools.

Fidelity to coverage of same or similar content was controlled by the use of weekly tracking records created by the researcher. This threat was controlled by examining the data the tracking records produced. They are summarized in Table 3 and

Table 4. These show a high degree of fidelity to reading instructional time and similarity of reading standards coverage between treatment and control sites for the duration of the study.

A selection threat due to the necessary use of intact classes existed in this study. The researcher was unable to control assignment of particular students to classes at either treatment or control site, though the classes assigned to participate at either site were randomly selected by each school's principal. Comparison of pre-test DIBELS NWF and PSF scores failed to produce statistically significant differences, indicating the null hypothesis of no difference between treatment and control group means is accepted. Table 1 establishes the similarity of both demographics and compensatory service populations between the treatment and control groups. Table 2 demonstrates similarity of performance by students in both treatment and control groups on two related reading measures, Georgia CRCT language and reading scores. Pre-test scores, however, were not used as a covariate due to assumption violations described in Chapter Four. The researcher concluded it is reasonable to assume that selection poses a threat to validity of findings.

Participants

The study involved 55 first grade students at Jones Elementary (treatment group) and 60 first grade students at Smith Elementary (control group). Only first grade students with a minimum attendance rate of 80% through the duration of the study were included. The projected 2011-2012 enrollment for Jones Elementary is 550 students (pre-K through 5th grades); projected 2011-2012 enrollment for Smith Elementary is 800 students (pre-K through 5th grades). Both sites have witnessed an increase in minority students,

particularly Hispanic students, over the last nine years, mirroring the student ethnic population trend of the school system itself. Both Jones and Smith Elementary are Title I designated schools. Table 1 provides relevant demographic information for both schools.

Table 1

Demographic Information for Jones and Smith Elementary, 2009-2010^a

Demographic	Jones (treatment)	Smith (control)
Race		
Asian	7%	6%
Black	6%	13%
Hispanic	11%	12%
Multi-racial	4%	6%
White	72%	63%
Compensatory services		
Free/reduced lunch	55%	57%
Gifted	3%	3%
Limited English proficient	12%	9%
Special education	10%	8%

^aSource: Georgia School Council Institute, 2009

Table 2 summarizes 2009 student achievement data most germane to the study.

Table 2

CRCT Language and Reading Scores, First Grade, Jones and Smith Elementary, 2009^a

Test Area	Jones (treatment)	Smith (control)
English Language Arts		
Exceeds standard	24%	27%
Meets standard	61%	63%
Does not meet standard	15%	10%
Reading		
Exceeds standard	44%	45%
Meets standard	48%	52%
Does not meet standard	8%	3%

Note. ^aSource: Georgia School Council Institute, 2009

Setting

The first grade class settings at both Jones and Smith Elementary delivered reading instruction for a comparable amount of time per week. Fluency was usually embedded within instruction in other literacy areas and skills as deemed necessary and logical. For example, in teaching phoneme segmentation fluency (PSF) skills, the reader may have been given a skill set to identify and separate initial attack sounds (consonants) from subsequent vowel sounds, called “onset-rime.” In conjunction with delivery of onset-rime phoneme segmentation skill, fluency was added as the next level of mastery by using various techniques to promote speed of that skill, allowing the reader to decode quickly and accurately.

Music Integrated (MI) versus Conventional Instruction

The instructional processes and techniques used to promote fluency is what differentiated the control and treatment settings. In the control class, instruction was reliant primarily on traditional teacher-student modeling, imitation, reinforcement, etc. In

the treatment (MI) class, teacher-student modeling, imitation, and reinforcement were also utilized, but such techniques were predicated upon musical strategies and executed using musical performance. The musical medium, for example, may have been as simple as singing, clapping, or use of “body percussion,” or it may have involved borrowed, student-designed, or “found-sound” instruments.

Another example utilizing MI reading instruction in onset-rime reading was taught by assigning a note value, such as the first of two paired eighth notes to the consonant, and the second of two paired eighth notes to the vowel comprising the onset-rime in question. The onset-rime letters, placed directly under each eighth note as might be found in song lyrics, were displayed to the class. A metronome was then employed to regulate and attenuate the speed of fluent decoding of the two parts of the onset-rime until the fluency rate achieved comprehension, performing the reading in what is known in music as an *accelerando*, or a gradual speeding up.

Both treatment and control classes employed “traditional” reading instruction techniques such as choral, paired, small group, and silent independent reading. Instruction in the MI model, though, leveraged the inherent intonation, phrasing, rhythmic, temporal, and expressive qualities of music performance for the promotion of fluent prosodic reading. This is noteworthy, as “when children are reading prosodically, one can infer that they are well on their way to having automatic and fluent word decoding skills” (Schwanenflugel et al., 2006, p. 122). This was intended to enhance chances for more rapid comprehension.

In another technique to promote the GPS ELA1R4 fluency indicator, “c. reads grade-level text with appropriate expression” (GDOE, 2008, p. 3), MI-trained teachers

paralleled the rise and fall (ascent-descent) of an eighth-note major scale with similar speech intonation patterns associated with interrogative or declarative statements. Students sang the familiar pattern of major scales on a given syllable coupled with corresponding hand movements or drawings of steps on the board corresponding to the melodic contour. Words in a sentence, which reflected similar intonation patterns, were then substituted for the syllables. Finally, the scale rise and fall involved in note singing was replaced with speech- words from the sentence in question, mirroring the scale's rise and fall.

In effect, the tonal pattern of a musical scale had served as a bridge allowing students to move from non-prosodic reading to fluent, “sing-song” expressive reading and speech. Similar musical elements, such as rhythm, tempo, and phrasing, likewise mirrored the corresponding prosodic elements by substituting speech and reading elements for learned musical ones. In a non-MI setting, rote teacher imitation or simple direct instruction was most often employed to achieve that kind of fluency.

These are but a few examples of MI instruction in the area of reading fluency. The gamut of MI instructional techniques is considerably dynamic, as teachers participating nationally in the ArtsNOW/MIENC laboratory schools, along with consultants and other associated educators, continue to contribute to the development of MI instructional ideas and lessons, adding to the repertoire designed to teach reading via music. This dynamism is so apparent that any singular description of MI instruction would belie its immensity and variety. MI instruction is largely dependent upon the resourcefulness, professional training, MI experience, and creativity of MI practicing teachers.

Fidelity and Uniformity of Music Integrated (MI) Instruction

Three MI treatment classes at Jones Elementary utilized the same or similar MI techniques and lessons during the eight-week study period, aiming to achieve as similar MI delivery as possible. Individual fluctuations in teachers' style, enthusiasm, rapport with students, etc. varied from teacher to teacher. These factors may have exerted some degree of influence, as would be the case with any delivery of instruction. The same content was covered as dictated by coverage of the GPSs for reading fluency. The researcher provided weekly "tracking records" to teachers so that similarity of pacing and content coverage could be monitored by grade-level chairs at each school as the study was in progress. Table 3 summarizes the tracking records regarding the GPS reading fluency standards covered week by week at each school. Following that is a list of the GPS for reading fluency.

Table 3

Reading Fluency GPS No. ELA1R4, Elements Covered per Week by School

Week Number	Jones Elementary	Smith Elementary
1	All ^a	All
2	a., c., e.	All
3	All	a., c., e.
4 ^b	All	a., b., e.
5	All	a., b., e.
6	a., b., e.	All
7	a., b., e.	All
8	All	All

^a - "All" indicates all five GPS fluency elements, i.e. ELA1R4 a., b., c., d. and e., were covered.

For first grade, the GPS for fluency are:

ELA1R4 The student demonstrates the ability to read orally with speed, accuracy, and expression. The student:

- a. applies letter-sound knowledge to decode quickly and accurately.
- b. automatically recognizes additional high frequency and familiar words within texts.
- c. reads grade-level text with appropriate expression.
- d. reads first-grade text at a target rate of 60 words correct per minute.
- e. uses self-correction when subsequent reading indicates an earlier misreading within grade-level text. (GDOE, 2008, p. 3)

Partial coverage of fluency standard GPS ELA1R4 occurred an equal amount of times per school during the eight-week study (i.e. three weeks out of eight). Partial coverage, when it did occur in a given week, consisted of the same GPS elements (i.e. elements a., b., c., and e.). The researcher concluded that reading fluency content coverage was predominantly the same at each site.

Similarly, the amount of instructional time between schools was tracked via the tracking records. Table 4 summarizes this aspect of the study.

Table 4

Reading Fluency Instructional Time^a in Minutes per Week by School

Week Number	Jones Elementary	Smith Elementary
1	427	434
2	381	407
3	457	423
4 ^b	368	332
5	466	448
6	404	461
7	444	454
8	459	464

^a - Fluency instruction embedded within other reading competencies also being taught

^b - Week 4 contained Labor Day holiday, so weekly target was 360 minutes

The first grade class settings at both Jones and Smith Elementary self-reported a goal of delivering reading fluency instruction, embedded within other reading content areas, every day for an average minimum of 30 minutes per class. Given there were three

participating classes per school, this comprises the total goal of 450 reading instructional minutes per week per school (i.e. 30 minutes/day x 3 classes x 5 school days = 450 minutes/week/school).

Jones Elementary had a total reading fluency instructional time during the study of 3,406 minutes, with a weekly mean of 425.75, ($\bar{X}_{\text{Jones}} = 425.75$). Smith Elementary had a total reading instructional time during the study of 3,423 minutes, with a weekly mean of 427.87, ($\bar{X}_{\text{Smith}} = 427.87$). Comparison of weekly reading fluency instructional time means, $\bar{X}_{\text{Jones}} = 425.75$ to $\bar{X}_{\text{Smith}} = 427.87$, revealed a negligible difference in reported reading instruction time. Additionally, care was taken at each site to offer reading instruction in the same general time frame each day, typically in the mornings before midday lunch.

Instrumentation

The dependent variables in the proposed research were measured by the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) test. The instrument is comprised of four basic measures: initial sound fluency (ISF), phoneme segmentation fluency (PSF), nonsense word fluency (NWF) and DIBELS oral reading fluency (DORF). The student participants at the start of the study had just completed kindergarten and were beginning the first grade. In accordance with the test developers' recommendations, the two selected dependent variables in the study, phoneme segmentation fluency (PSF) and nonsense word fluency (NWF), are the most appropriate areas of instructional focus, and thus were chosen to be the dependent variables, as Good, Simmons, Kame'enui, Kaminski and Wallin (2002) surmised, "As with the end of kindergarten patterns, established skills on PSF and NWF at the start of first grade appear to be important

instructional targets for students to be on track for reading outcomes” (p. 12). Table 5 summarizes reliability data related to the DIBELS sub-tests utilized in this study.

Table 5

Description of DIBELS Sub-tests and Reliability Data^a

Test Area	Description	Reliability Data
PSF- Phoneme segment fluency	segment 3-4 phoneme into individual phonemes	$r = 0.88, p < .01^a$ $r = 0.79, p < .01^b$
NWF-Nonsense word fluency	alphabetic; letter-sound correspondences	$r = 0.81, p < .01^a$ $r = 0.83, p < .01^b$

^aFor the two-week, alternate-form.

^bFor the one-month, alternate-form.

Phoneme Segment Fluency (PSF)

The PSF measure is designed to assess a reader’s ability to segment three or four phoneme words fluently. The assessor presents the word in its entirety as normally pronounced or read. The subject immediately responds with the individual phonemes that comprise the entire word. For an example, the examiner says “hat” and the student says “/h/, /a/, /t/” in response, thus effectively decoding and segmenting the individual phonemes that comprise the word. The PSF measure has been found to be “a good predictor of later reading fluency achievement” (Kaminski & Good, 1996).

Nonsense Word Fluency (NWF)

The NWF measure is a standardized, individually-administered assessment of the alphabetic principle in reading, an essential skill upon which fluency is predicated. Two elemental parts of that principle are tested: (a) letter-sound (grapheme-phoneme)

correspondence, in which letters represent their most common sound, and (b) the ability of the student to blend letters into words in which the letters make their most common sounds (Kaminski & Good, 1996). The student is presented with an 8.5 x 11-inch sheet of paper on which words are randomly ordered, either vowel-consonant or consonant-vowel-consonant (e.g. “fiv,” “rog,” or “ev”). The stimulus word may be reproduced by the student either in segmented fashion or in total (i.e. “fiv” may be correctly scored for three points, one per sound, if read either “/f/, /i/, /v/” or “fiv”). Words produced in totality (“fiv” as opposed to “/f/, /i/, /v/”) logically take less time to produce and consequently more non-sense words per minute may be read. Thus a higher number of words served as a fluency indicator since non-segmented words, due to speed or fluency, increased the total number of words per minute.

Procedures

IRB approval was obtained from Liberty University and the school district of which Jones and Smith Elementary schools are a part. Following that approval, from August 15, 2011, and ending October 10, 2011, a period of eight school weeks, participants in both treatment and control groups were involved in the study. The pre-test DIBELS was administered immediately at the start of the study period, the week of August 15, 2011.

Teachers conducted the pre-test DIBELS administration during daily literacy instructional time prior to departure for recess, “specials” (i.e. physical education, music, art, computer lab, etc.), and first grade lunch that began at 11:30 a.m. School instruction began at 8:00 a.m., making the available testing window 8:00-11:30 a.m. each day. Pre-testing simultaneously coordinated with local site administration and the participating

teachers at each site. The number of dates assigned to pre-testing depended upon the exact number of students in each class and the relative speed of DIBELS testing each teacher could properly execute. Fully certified teachers, three per site, one per class, conducted the DIBELS administration. Para-professionals and other regular support personnel supervised the remainder of the class while the teacher performed DIBELS pre-test assessments.

Following pre-testing, students in the treatment group received daily MI reading instruction for a target time period of 30 minutes per day for eight weeks. Teachers of the three MI treatment classes at Jones Elementary utilized the same or similar MI techniques and lessons every day during the eight week study period. In consultation with each other, identical or similar MI lesson plans were executed each week, so that the most similar MI delivery possible was attained. Control group subjects did not receive any MI instruction in any subject, but instead participated in “traditional” reading instruction, absent any use of MI at all. This eight-week period comprised the study period. Both treatment and control sites covered identical fluency content as dictated by GPS ELA1R4 (GDOE, 2008).

Following treatment, another form of the DIBELS (i.e. PSF and NWF fluency sub-tests), was administered to subjects in both sites as a posttest. First grade teachers involved in the study administered all posttest measures too. The same testing schedule and protocols were observed for administration of the posttest as had been for the pre-test regarding test administrator, time of day, amount of students per day, etc. The treatment/study period concluded October 10, 2011. Posttests were administered the week beginning October 3, 2011.

Data, once collected at each site by the grade level lead teacher, were transmitted to the researcher via school district inter-office mail or personal delivery. Data were reported in the form of DIBELS test score summaries for each student for both the pre- and posttests. Student attendance, attrition, history, and other external threats were evaluated upon receipt of the data after the treatment/study period. Data clearing these criteria for use in analysis were retained and underwent statistical treatment as described in the analysis section. Other artifacts relevant to the treatment and control sites were also collected and transmitted in similar fashion to the researcher. These included weekly “tracking records” for the eight-week study/treatment period detailing the pacing and coverage of the reading fluency standards covered. These records detailed lesson objectives and GPS fluency indicators (Appendix D).

Data Analysis

At the start of the eight-week study period, a pre-test DIBELS was given and scores were collected. An alpha level of .05 was used in all analyses. Independent samples *t*-tests conducted between pre-test PSF and NWF DIBELS scores were not significant, suggesting that no differences between groups were apparent prior to the MI intervention. Preliminary analyses were conducted to ascertain if there were any violations of assumptions of singularity and multicollinearity, reported in Chapter 4. Additionally, pre-test NWF and pre-test PSF showed no correlation.

The study design originally planned use of MANCOVA, to examine both pre- and posttest DIBELS scores. Pre-test DIBELS scores would have been used as the covariate. However, based upon non-significant *t*- tests of pre-test variables, as well as the lack of correlation of these variables, the researcher decided pre-test data would not be included

in the data analysis. Separate *t*-tests on posttest NWF and PSF variables were judged to be the most pertinent alternative (Keselman et al., 1998).

T-test analysis of DIBELS posttest NWF and PSF ensued. Testing was conducted to ascertain if there were any violations of assumptions of no extreme outliers, normality, multicollinearity, singularity, and homogeneity of variance (homoscedasticity). Effect size was reported as Cohen's *d* -(Rosenthal & Rosnow, 1991) and interpreted according to Cohen's (1988) benchmarks of $d = .10$, $.30$, and $.50$ for small, medium and large effects respectively (p. 281). A *post hoc* analysis of power was also given. The results of the study will be presented in the following chapter.

CHAPTER FOUR: RESULTS

Restatement of the Purpose

The purpose of the study was to investigate the effect of MI reading instruction on reading fluency in two key indicators of the Dynamic Indicators of Basic Early Literacy Skills (DIBLES) assessment, namely phoneme-segmentation fluency (PSF) and nonsense word fluency (NWF) scores. Participants were first grade students enrolled in two public schools in Georgia. Given the current climate of educational policy decisions driven by test score performance, educational stakeholders search for innovative, creative and effective methods to improve accountability indicators. This study advances the body of relevant literature investigating one such method of creative, engaging teaching and learning. Results may be utilized by educators electing to ground policy in sound, data-driven decisions. Additionally, the study contributes to research pertaining to both music-integrated (MI) and reading instruction.

This chapter is comprised of four main sections. First, the research questions and corresponding null hypotheses that steered the study are restated. Second, demographic data for the participants are presented. Third, results are presented, comprised of reports of assumption testing followed by an examination of hypotheses one and two. Effect size and power are also reported in this section. Fourth, a brief summary of results is given.

Research Questions and Hypotheses

The following research questions were investigated:

1. To what extent does music integrated (MI) instruction have an effect on DIBELS nonsense word fluency (NWF) scores among first grade students?

2. To what extent does music integrated (MI) instruction have an effect on DIBELS phoneme segmentation fluency (PSF) among first grade students?

The Null Hypotheses include:

Null Hypothesis H₀₁: There is no statistically significant difference in first grade students' DIBELS nonsense word fluency (NWF) scores for students participating in MI reading instruction as compared to DIBELS NWF scores for students not participating in MI reading instruction.

Null Hypothesis H₀₂: There is no statistically significant difference in first grade students' DIBELS phoneme-segmentation fluency (PSF) scores for students participating in MI reading instruction as compared to DIBELS PSF scores for students not participating in MI reading instruction.

Demographics

There were a total of 115 study participants, all of whom were first-grade students enrolled in two elementary schools (i.e. "Jones" Elementary and "Smith" Elementary), within the same public school district in Georgia. Jones Elementary served as the treatment site and Smith Elementary as the control site. Students not meeting the 80% attendance rate prescribed at the beginning of the study period were excluded from the population.

Of the 115 participants, 10 were classified as special education students by meeting the criteria of having a formal Individual Education Plan (IEP) on file. Of the 10 identified special education students, 5 were located at each school. The remaining 105 participants had no formal educational plan on file. At the treatment site there were 27 male and 28 female participants. At the control site, there were 33 male and 27 female

participants. The total sample ($N = 115$) percentages by gender were 52% male and 48% female. Descriptive data detailing the race and compensatory services received by students at each school were presented in Chapter Three, Table 1.

Results

Descriptives

Table 6 presents descriptive statistics for DIBELS posttest PSF and NWF scores disaggregated by treatment and control.

Table 6

Descriptive Statistics for Posttest NWF, PSF by School (N=115)

Variable	School	<i>n</i>	Mean	Std. Dev.
Posttest PSF	Treatment (Jones)	55	52.82	10.30
	Control (Smith)	60	68.48	7.51
Posttest NWF	Treatment (Jones)	55	45.96	23.72
	Control (Smith)	60	41.68	15.45

The pre-test NWF and pre-test PSF demonstrated no correlation, $r = 0.21$. For pre-test NWF, $t(111) = -1.537$, $p = 0.127$, $d = 0.224$. For pre-test PSF, $t(111) = -1.832$, $p = 0.164$, $d = 0.237$. The null hypothesis of no difference between treatment and control populations was not supported. The non-correlation of pre-test variables, coupled with the lack of significant *t*-tests on pre-test variables, led the researcher to conclude the pre-test data would not be used in analysis of the effect of MI instruction on DIBELS fluency scores. Consequently, the planned MANCOVA would not be possible. Alternatively, independent samples *t*-tests were conducted instead (Keselman et al., 1998).

Assumption Testing

Preliminary analyses were conducted to ascertain if there were any violations of assumptions for *t*-tests. These included assumptions of no extreme outliers, normality, multicollinearity, singularity, and homogeneity of variance (homoscedasticity). To inspect for outliers, boxplots of the two dependent variables were examined. Both mild and extreme outliers were evident, specifically in the posttest NWF Jones Elementary (treatment group) data according to criteria established by Glass and Hopkins (1996). As outliers were present to varying degrees in all variables' boxplots, this assumption was not tenable.

To analyze the assumption of normality, a Kolmogorov-Smirnov (K-S) test was conducted for each posttest variable. This test of normality is preferable as both groups exceeded 50 participants (Stephens, 1974). The K-S test for normality of distribution of DIBELS posttest NWF showed $D = 0.116$, $P = 0.805$. The assumption of normality was not tenable, meaning the posttest NWF data were likely not normally distributed. This interpretation was further validated by the presence of extreme outliers in the corresponding data set (posttest NWF) as reported. The K-S test for normality of DIBLES posttest PSF showed $D = 0.668$, $P = 0.000$. The assumption of normality was tenable, meaning the posttest PSF data were likely normally distributed.

The assumptions of multicollinearity and singularity were also tested. As there were only two dependent variables (posttest PSF and posttest NWF), correlation between the two the variables was not significant, $r = 0.164$, $p = 0.193$. This lack of correlation between posttest NWF and posttest PSF indicated changes that occurred in values of one set were not likely to accompany changes in the other, at the given alpha level of .05. Put

another way, differences in posttest NWF did not correlate with differences in posttest PSF.

Scatterplots of posttest scores were examined next to test the linearity assumption. The scatterplot in Appendix E displays posttest PSF scores on the X axis and the posttest NWF scores on the Y axis without regard to group membership (treatment or control), represented the entire population. The scatterplot in Appendix F displays the posttest PSF scores on the X axis and the posttest NWF scores on the Y axis, but delineates scores by membership in treatment (Jones Elementary) or control (Smith Elementary) groups. Circles represent treatment group posttest scores, and triangles represent control group posttest scores. Consequently, each sample may be distinguished and compared. Both scatterplots show the linearity assumption was not tenable.

The final assumption included a test for homoscedasticity (homogeneity of variance). Levene's (1960) test for equality of variances was performed. For posttest NWF, $F = 1.752$, $p = .188$, which is greater than $\alpha = .05$. For posttest PSF, $F = 2.003$, $p = .160$, which is also greater than $\alpha = .05$. That is, the assumptions of homoscedasticity were tenable for both dependent variables.

Hypotheses One and Two.

Two separate independent sample *t*-tests were performed. The two *t*-tests compared DIBELS posttest NWF scores and posttest PSF scores of the treatment group (Jones Elementary) and the control group (Smith Elementary). The two dependent variables were DIBELS posttest nonsense word fluency (NWF) scores and posttest phoneme segmentation fluency (PSF) scores. The tests were to evaluate if there was a significant difference in mean scores on the two dependent variables. Reading

instruction served as the independent variable. At the treatment site (Jones Elementary) students were exposed to MI reading instruction. At the control site (Smith Elementary) students were taught using conventional reading instruction.

H₀₁ stated there will be no statistically significant difference in DIBELS nonsense word fluency (NWF) scores for students participating in MI reading instruction as compared to DIBELS NWF scores for students not participating in MI reading instruction. An independent sample *t*-test was performed to evaluate mean score differences between schools on the DIBELS NWF variable. Levene's test established that results for equal variance were used. The *t*-test comparing the two groups was not significant, $t(111) = 1.437$, $p = 0.154$, $d = 0.273$. A *post hoc* power analysis indicated that this sample size ($N = 115$), with $\alpha = .05$, yielded statistical power of 0.278 for an effect size as reported. This was below the standard desired power level of 0.80 (Cohen, 1988), meaning there was roughly a 73% chance of Type II error.

H₀₂ stated there will be no statistically significant difference in DIBELS phoneme segmentation fluency (PSF) scores for students participating in MI reading instruction as compared to DIBELS PSF scores for students not participating in MI reading instruction. An independent sample *t*-test was performed to evaluate mean score differences between schools on the DIBELS PSF variable. Levene's test established that results for equal variance were used. The *t*-test comparing the two groups was significant, $t(111) = -9.191$, $p = 0.000$, $d = 0.747$. The effect size was large (Cohen, 1988) and was computed using *t*-test values (Rosenthal & Rosnow, 1991). Inspection of means and SD for treatment ($\bar{X} = 52.82$, $SD = 10.30$) and control ($\bar{X} = 68.48$, $SD = 7.51$) revealed a difference that indicated a probable effect of MI instruction on the skills the DIBELS PSF

scale measured, specifically that of segmenting whole words into correct phonemic units in a fluent manner. The large effect size indicated this was substantially so.

A *post hoc* power analysis indicated that this sample size ($N = 115$), with $\alpha = .05$, yielded statistical power of 0.837 for the effect size as reported. This was above the standard desired power level of 0.80 (Cohen, 1988), meaning there was roughly a 17% chance of Type II error.

Summary

The purpose of this study was to determine the effect of MI reading instruction on first graders' reading fluency. The differences in DIBELS NWF and PSF mean scores were examined for students taught using MI reading fluency instruction and those taught reading fluency using only conventional methods. This research indicated that there is no significant effect of MI reading instruction on DIBELS NWF scores. It also indicated that there is a significant effect of MI reading instruction on DIBELS PSF scores. Effect size for DIBELS PSF was large (Cohen, 1988).

CHAPTER FIVE: SUMMARY AND DISCUSSION

This chapter provides a summary and discussion of the findings of the study. The chapter is divided into the following sections: statement of the problem, purpose of the study, summary of results, discussion of results, implications, limitations, and recommendations for further research.

Statement of the Problem

American teachers struggle for autonomy from the pressing demands of ever increasing testing goals mandated by No Child Left Behind (NCLB) (USDOE, 2002). Many believe that NCLB legislation has caused a radical shift of emphasis in educational policy since its passage, restricting teachers' instructional creativity. This is substantiated by the following statement from the Center for Educational Policy (2006): "Most case study districts had become more prescriptive about what and how teachers were supposed to teach. Most encouraged teachers to follow pacing guides [...] while others hired instructional coaches to observe teachers, demonstrate model lessons, and give teachers feedback" (p. 4).

In the process, non-assessed subjects that are not part of states' federally required accountability reporting have been greatly reduced or are disappearing altogether. Pederson (2007) asserted, "The law [NCLB] put immediate radical emphasis on the content areas of math and reading. However, social studies, writing, arts, humanities, and technology are glaringly absent" (p. 288). While teachers of assessed subjects, particularly reading, contend with arduous accountability requirements, teachers of non-assessed subjects, such as music, search for relevance in this difficult educational climate.

Music-integrated (MI) instruction may offer a solution to both dilemmas. However, the implementation of any instructional initiative should be grounded in empirical evidence. Can MI be effective at both accomplishing greater academic performance, particularly in the teaching of reading fluency, and also provide instructional creativity? The impetus for the present study.

The review of literature in Chapter 2 revealed that, in general, empirical research in MI instruction and reading is disparate in terms of methodology, focus, and scope. Meta-analyses reviewed portrayed this body of research as incongruous too, as cited by Chang (2000): “It seems that the relationship between music and language reading remains undecided, given the research reported is remarkably inconsistent” (p. 30). Despite a lack of well-integrated, cohesive MI and reading research, over the past 30 or so years, significant affirmations of the potential for MI instruction to solve the accountability-creativity conundrum have surfaced: “The subsequent power of pairing an intensive literacy programme with scaffolded music instruction might work in tandem so that the learning of one mutually enhances the learning of the other” (Piro, 2009, p. 34).

Purpose

The purpose of the study was to investigate the effect of MI reading instruction on first grade students’ fluency DIBELS scores. Through appropriate generalizations drawn from this research, the purpose was to contribute to the growing body of knowledge pertaining to the effectiveness of MI instruction. Understanding the potential of MI, and more broadly arts integration, provides a sound basis for policymakers to implement effective, conceptually-grounded decisions regarding instruction that is both effective and creative.

Summary of Results

Research Question One

The quasi-experimental, pre- and posttest study examined to what degree music integrated (MI) reading fluency instruction had an effect on two indicators of first graders' reading fluency as indicated by the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) test. The two dependent variables were posttest DIBELS nonsense word fluency (NWF) scores and phoneme segmentation fluency (PSF) scores. Students at two elementary schools in Georgia, Jones and Smith Elementary (pseudonym school names assigned for confidentiality), were instructed for eight weeks in reading fluency. Jones Elementary served as the treatment school site, utilizing music integrated (MI) instruction, while Smith Elementary served as the control, using only conventional reading fluency instruction. The research population ($N = 115$) was comprised of three classes of first grade students at each school. The Jones sample was $n = 55$ and Smith sample was $n = 60$.

Research question one inquired to what degree MI reading fluency instruction had an effect on DIBELS posttest NWF scores. An independent sample t -test comparison of group means for DIBELS posttest NWF scores was not significant. This indicated that MI instruction had no effect upon reading fluency regarding the first dependent variable (i.e. DIBELS NWF scores).

Research Question Two

Research question two inquired to what degree MI reading fluency instruction had an effect on DIBELS posttest PSF scores. Another independent sample t -test comparison of group means was conducted, but this time examining DIBELS posttest PSF scores.

The *t*-test group mean score comparison in this case was significant. This indicated that MI instruction had some effect upon reading fluency regarding the second dependent variable (i.e. DIBELS PSF scores).

Discussion of Results

Reporting of mandated testing required by NCLB (USDOE, 2002) has inadvertently placed a burden upon teachers to produce increasingly higher benchmarks in mandated areas of student achievement. Most germane to the present study are those benchmarks required in the area of reading achievement on the elementary level. This exacerbation of pressure to perform on testing indicators has had far-reaching consequences, including an effect on property values and housing prices in school neighborhoods (Amrein & Berliner, p. 3), non-tested subjects' funding (Pederson, 2007, p. 288), and radical allocations of instructional time to reported subjects at the expense of non-tested ones (Center for Educational Policy, 2007, p. 4).

Of most concern to educators that strive to offer engaging instruction, yet meet increasing test score demands, is the concomitant effect of state mandates required by NCLB that have squelched creativity in teaching and learning. The diminishing of activities that kept many children interested in school, particularly at-risk populations, has been a source of concern for educators, parents, and all stakeholders. As Pederson (2007) noted, "Nontested subject areas are further disenfranchised [. . .] as it is too expensive to pursue other areas because of the demands of NCLB" (p. 289).

The current research was predicated upon the idea that MI instruction may provide an avenue to meet both higher testing standards and satisfy many educators' desires to provide engaging instruction in the area of reading. The review of literature in

Chapter Two by and large found that research establishing the use and effect of MI instruction in reading is diffuse and fragmented (Bolduc, 2008; Standley, 2008; Chang, 2000). However, evidence persists over a broad period of time providing positive outcomes in various applications of MI instruction in reading (Anvari, Trainor, Woodside, & Levy, 2002; Friedman, 1978; Burton, Horowitz, & Abeles, 1999). The current research examining the effect of MI on reading fluency extends that trend of related literature but within the current context of meeting accountability goals.

Implications

The results of this study may impact educators and policy-makers seeking to ground instructional design in empirically-based investigation. In the modern educational climate, precious little time for administrators and other decision-makers is available for instructional leadership, usurped in large part by two categories: “30 percent is spent on administrative activities including student supervision, scheduling, and compliance issues; and just over 20 percent is spent on organizational management tasks [...] less than 10 percent of principal time is spent on instructional-related activities” (Rice, 2009, pp. 2-3). Thus, there exists now more than ever a need to assess and implement teaching models that have demonstrated efficacy in promoting student test scores, while simultaneously fostering creativity and engagement of teachers and students.

In this study, data were not collected regarding learner and teacher engagement or on-task behavior rates. However, through observation, teacher accounts, and researcher experience, one can easily see that these qualities are enhanced in a well-planned MI lesson. Absent this empirical proof, but assuming these observations are valid, it has

further been established that “affective TSRs [teacher-student relationships] are associated with increases in both students’ school engagement and achievement” (Valiente, Lemery-Chalfant, Swanson & Reiser, 2008, p. 515). The propensity for dynamic, creative teaching that MI-trained teachers possess could be leveraged to produce increases in student reading achievement. This study could play a role in the increased knowledge base that would be required for such a trend to begin.

The results of the two primary outcomes in this study – one of significance (MI effect on DIBELS PSF scores) and another failing to achieve statistical significance (MI effect on DIBELS NWF scores) – could contribute to implementing research-based strategies. The inclusion of the results of this study in designing better research in MI and reading can serve a valuable purpose. It could affect decision making in implementing research-based strategies, as this kind of empirical investigation furthers more focused inquiry in subsequent efforts.

One particular area of concern in the NCLB-dominated educational landscape is schools’ ability to achieve adequate yearly progress (AYP), a designation that is a keystone of accountability under the legislation (USDOE, 2002; Center for Educational Policy, 2007). Schools failing to earn AYP status are placed on notice and subject to a spiral of interventions to bring test scores up to mandated standards. One subgroup of concern with many schools’ failure to achieve AYP is that comprised of students with disabilities: “When states use student- and school-accountability systems, ultimately requiring every student to achieve the same high standard, one likely result is disproportionately high dropout rates among at-risk students, particularly those with disabilities” (Allbritten, Mainzler & Seigler, 2004, p. 154). Fluency instruction is

essential for students with disabilities, as fluency serves as the gateway to comprehension (Kim, Petscher, Schatschneider & Foorman, 2010). Reading skill precludes success in many other subject areas dependent upon a student's ability to read and process lexical information. Targeting reading fluency skill with this subgroup has shown to have wide-ranging success with this student population, one that has proven to be especially challenging for many schools achieving or maintaining AYP status (Chard, Vaughn & Tyler, 2002). Especially promising is the demonstrated success that MI instruction has shown with special education students, as it provides the ideal alternate assessment vehicle and tactile/kinesthetic sensory outlet on which many in this subgroup thrive (Olson, 2008).

Limitations

Campbell and Stanley (1963) eloquently cited the vagaries imposed upon quasi-experimental research, stating the researcher should

design the very best experiment which the situation makes possible. He should deliberately seek out those artificial and natural laboratories which provide the best opportunities for control. But beyond that he should go ahead with the experiment and interpretation, fully aware of the points on which the results are equivocal. While this awareness is important for experiments for which "full" control has been exercised, it is crucial for quasi-experimental designs. (p. 34)

In this quasi-experimental research, limitations fell into two categories: those under the control of the researcher (which were controlled through design) and those outside the purview of the researcher. This section lists limitations of both types and describes the resultant controls to minimize threats to validity.

Limitations under Control of Researcher

Implementation threat was controlled in part by ensuring that treatment and control groups were taught the same curricular content during the treatment period. The content was governed by standards developed by the Georgia Department of Education (GDOE), labeled the Georgia Performance Standards (GPS) (GDOE, 2008). Each GPS had a corresponding DIBELS fluency score indicator or combination of indicators that measured the ability of the learner to demonstrate achievement in meeting the standard. The use of teacher “weekly tracking records” offered by the researcher provided proper control through self-monitoring by participating teachers. The tracking records provided a tangible record of reading curriculum pacing. The tracking records also were monitored by the grade-level chair at each school to assist the researcher in ensuring the content and relative speed of content coverage were as similar as possible during the eight-week study period.

As the research design necessarily employed pre-existing first grade classes, three classrooms per school at both the treatment and control sites, a primary concern was selection bias and its possible threat to internal validity. Nesselroade and Thompson (1995) referenced such a concern by saying, “When the groups being compared are naturally rather than randomly constituted, the comparisons are susceptible to the influence of confounding variables. These confounds threaten the validity of conclusions” (p. 271). As shown in Table 1, Chapter Three, the selected sites were remarkably demographically similar. Additionally, the participating classes were randomly chosen from a larger grade level of available first grade classes, itself a control for selection threat to some degree.

Measures were put in place to control experimenter threats. The proposed measures were implemented to varying degrees of success. Educational backgrounds and certification levels of the treatment and control participating teachers were, for the most part, similar. At both research sites, one of three participating teachers had earned a post-undergraduate degree. Consequently, teacher certifications were consistently commensurate with educational levels.

Just prior to the start of the study, however, one participating Jones Elementary teacher that had agreed to participate as a qualified MI instructor was re-assigned to another grade level. This made necessary the participation of a highly experienced instructional coach whose educational level and experience skewed instructor similarity between sites. An instructional coach is a semi-administrative position typically held by highly experienced educators in the district. As opposed to recruiting a less experienced teacher at the treatment site with perhaps not as much MI training and experience, the researcher chose to recruit the willing, highly-experienced instructional coach instead. Still, the argument may be made that higher comfort levels and experience with MI instruction and teaching reading in general at Jones Elementary may have biased results.

Instrumentation remained consistent throughout the study, as teachers in both treatment and control groups had experience and training in administration of the dependent variable instrument, the DIBELS test. The assessment was commonly used throughout both sites. Teachers at both sites conducted the tests in the same period of days in parallel fashion using different forms.

Threats from novelty effects were controlled by the common recurrence of DIBELS test administration itself at both school sites. Students in both treatment and

control classes are given various local and state-mandated benchmark tests of various designs throughout the year, one of which is the DIBELS test. Many forms of the test are available and used in each administration, helping to ensure that test sensitization is minimized.

Subjects in the treatment group had previous exposure to arts-integrated instruction at the kindergarten level as the treatment school implemented the ArtsNOW initiative throughout the school in 2008-2009. This exposure included arts-integrated instruction in all areas using all fine arts (i.e. music, drama, visual art, movement/dance); however, it did not include music integration in teaching reading exclusively. The students' familiarity with the MI instructional approach was an important control for novelty effect.

This is an important consideration as the nature and character of most MI instruction is such that students' engagement and enthusiasm levels, particularly upon first participating in it, typically are quite high. When first employing MI techniques, teachers commonly spend considerable effort learning how to effectively ensure attention level, class decorum, and student behavior are appropriately maintained. The physical movement, singing, use of body percussion, instruments, etc. are instructional techniques inherent to MI that are marked departures from conventional reading instruction or any other kind of instruction. Adaption to these kinds of techniques by teachers and students in the treatment classes, brought on by routine use of and desensitization to MI, was leveraged as a valuable control for what would have been a substantial novelty effect. Without this familiarity with MI, the first few weeks of the research period at the treatment site would likely have been spent acclimating teachers' delivery and students'

behavior to its use, rather than on focused reading fluency instruction incorporating MI as part of normal class routine.

Limitations not Controllable by Researcher

Some study limitations were outside the scope of the researcher's influence. These included (a) the necessary use of pre-existing classes, not randomized groups; (b) unmeasured variance in student motivation and maturity levels that could have impacted results; (c) pre-existing differences in socio-economic status; (d) variances in instructional style and delivery between treatment and control group teachers; and (e) differences in treatment and control settings. Such limitations may have affected results.

The choice of measuring reading fluency as the dependent variable, though based on a varied and robust body of related research and common theoretical connections, was itself potentially a limitation. Research involving music-integrated instruction and its effect on other areas of literacy such as phonemic awareness, vocabulary, comprehension, or verbal sequencing has substantiated significant outcomes (Anvari, Trainor, Woodside, & Levy, 2002; Bradley & Bryant, 1985; Douglas & Willats, 1994; Lamb & Gregory, 1993). Piro (2009) reported the specific use of music training affecting verbal sequencing and vocabulary in primary age students. This research suggests that the choice of measuring reading fluency itself may have altered results, as well as advanced topics for further research.

Intentional withholding of apparent instructional best practices from students would have been ethically undesirable for the sake of research. It was necessary to include all ability levels of subjects in the treatment and control groups. This may have had a mitigating effect on results as suggested by extant research involving lower-ability

or special education groups (Atterbury, 1985; Bradley & Bryant, 1985; Jordan-DeCarbo & Galliford, 2001). Such research has demonstrated a more pronounced effect of music integrated instruction when utilizing these populations. Students were classified as such for the purposes of this study by simply having a formal IEP on file. Distribution and assignment of these students is often governed by teachers' proclivity for handling the different needs of these students, which tends to make their class assignments occur in blocks within one or two classrooms per grade level. As reported, however, five students at each school (a total of 10 between both schools) participated in the study, serendipitously providing an even distribution of this sub-population in the study.

Limitations characteristic of quasi-experimental designs, and thus outside the control of the researcher, were present. Primary among them, the use of non-randomized study populations was an ever-present concern that possibly impacted external validity, reliability, and generalizability of findings. Additionally, pressure induced by the passage of NCLB in 2002 and its concomitant emphasis on "scientific" or randomized designs has stirred debate about the validity and reliability of quasi-experimental educational research in general. As Rudd and Johnson (2008) pointed out, "evaluators submitting proposals to evaluate federally funded programs attain higher scores when proposing an evaluation design that is experimental and includes random assignment" (p. 180). Researchers have responded with renewed vigor in defending non-randomized educational research, primarily on the basis that "there are too many mediating and moderating variables to contend that simple or basic experimental designs are the best way to understand the complex cause and effect relationships that characterize programs implemented in educational settings" (Chatterji, 2004, p. 8). The present study,

nonetheless, is inarguably as susceptible as any quasi-experimental study conducted in an educational setting. Unobserved, implicit confounds are possible in this study as unseen factors masquerading as treatment effects, thus increasing fallibility of results and ultimately decreasing the generalizability of findings.

Recommendations

The researcher recommends that future studies employ a mixed-methods approach. The shortcomings of the study from a quantitative viewpoint could be remedied by lengthening the study period, from eight weeks to perhaps an entire semester or school year. Similarly, longitudinal follow-up of subjects participating in the study would lend detail and breadth to future study of MI instruction in reading.

However, neither this recommendation, nor any conceivable quantitative one, would reasonably give voice to the object of benefit for educational research, namely the students themselves. Mixed observational methods, perhaps case study paired with quantitative methods, might collaboratively paint a much broader picture of the dynamic nature of learning through music and learning in general.

The present study, limited by the nature of quantitative investigation, but also empowered by its potential to generalize or transfer to other settings, contributes to the field of MI instruction, reading, and arts integration in general. The reason that much of human experience, and perhaps the most human of all experiences, learning, “escapes our capacity to make models of it” (Law & Urry, 2003, p. 7), may be more completely described by research that would capture both qualitative, individual perspectives, paralleled with replication-oriented quantitative examinations.

The collection of data to substantiate student engagement, motivation, and/or interest level presents an opportunity to augment the application of the study's findings. As MI instruction inherently heightens these valuable aspects of effective teaching and learning, the need becomes obvious to quantify the trait that is so apparent. Collection of this kind of data could proceed through the use of behavior inventories, student interest surveys, teacher observational reports, etc. Effective, engaging instruction has been a significant predictor of increased student achievement, a notion validated by Dotteree and Lowe (2011) who established that "classroom context and school engagement are significant predictors of academic achievement. These factors are particularly important for academically at-risk populations."

Other recommendations involve aspects particular to the study methodology and design. Increases in sample size would add replicability to the study. Repeated sampling of the same population of participants across a longer study period, perhaps across grade levels, would lend considerable validity to the study. Finally, multivariate analysis, as was the intent of this study in proposal, is the optimal choice to investigate interaction of variables. This could increase power further with the inclusion of covariate data in the form of DIBELS pre-tests, or other similarly related reading measure. Pre-test DIBELS scores were collected for this study, but were unable to be utilized as covariates due to the change from multivariate analysis to *t*-tests.

Summary

Results of this study provided data demonstrating the effect of MI instruction on first graders' DIBELS NWF and PSF reading fluency scores. Results yielded somewhat contradictory inferences as to the effect of MI instruction on the outcome variables. Low

effect size and power diminished the study's replicability, though implications for research based upon the relative success or shortcomings of this study are important as described.

Recommendations for future research incorporating mixed qualitative and quantitative investigation were offered, along with treatment period or longitudinal study suggestions. Finally, music integrated instruction continues to offer promise as an instructional methodology that might bridge the extant gap in educational practice forcing onerous accountability measures and prescriptive teaching on one hand, while on the other hand, allowing teachers to rediscover their pedagogical autonomy and creativity.

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APPENDIX A: INSITUTIONAL REVIEW BOARD APPROVAL

From: IRB, IRB
Sent: Wednesday, February 23, 2011 9:19 AM
To: Bryant, Kerry Gilbert
Cc: Lampport, Mark Alan; IRB, IRB
Subject: IRB Conditional Approval 1057: Effect of Music-Integrated Instruction on First Grade Reading Fluency

Good Morning Kerry,

The Liberty University IRB has granted you approval for the above named study.

If you have any questions regarding your approval, please do not hesitate to email me. Best wishes as you seek approval from each school!

Sincerely,

Tiffany Hartin, M.A.
IRB Coordinator
Liberty University
1971 University Blvd
Lynchburg, VA 24502
Fax (434) 522-0506

irb@liberty.edu

APPENDIX B: “JONES” ELEMENTARY SCHOOL APPROVAL FOR STUDY

March 21, 2011

To Whom It May Concern,

It is my pleasure to accept Mr. Kerry Bryant’s request to conduct research at Elementary School for the 2011-2012 school year. We are very interested in the data that will come out of his study of the relationship between music and early reading skills.

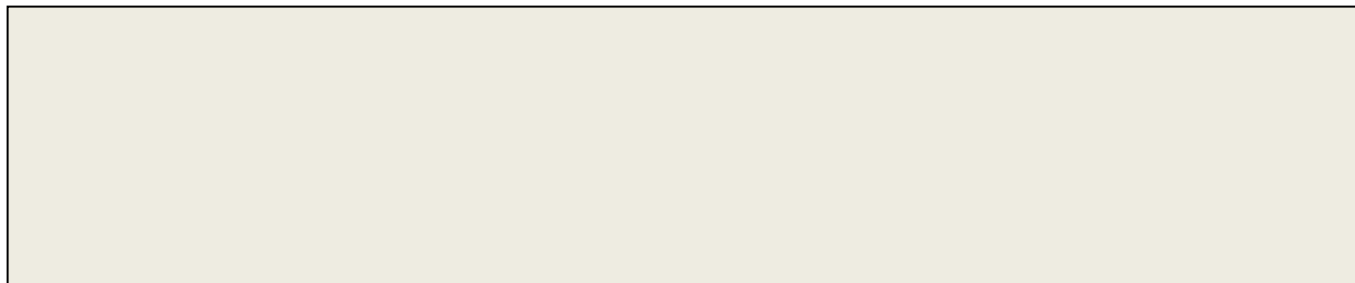
It is my understanding that Mr. Bryant will be conducting various assessments with our students who are engaged in learning activities that integrate music into the reading curriculum. Elementary school is deeply involved in integration of music and other art forms into our daily instruction. The data collected will be very useful to our teachers as they continue to improve upon their own practice.

If I can be of any further assistance, please do not hesitate to call upon me.

Respectfully,



Principal, Elementary School



APPENDIX C: "SMITH" ELEMENTARY SCHOOL APPROVAL FOR STUDY

[REDACTED] ELEMENTARY SCHOOL
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
Principal

[REDACTED]
Assistant Principal

March 1, 2011

Liberty University
Institutional Review Board

It is both a privilege and a honor to endorse Mr. Kerry Bryant's proposed research at [REDACTED] Elementary for the coming 2011-2012 school year.

In conversation with Mr. Bryant, I understand he will work with one or more of our early grade teachers in administering the DIBELS and this will serve as Mr. Bryant's control pre-test and also serve the needs of the other grade one teachers for a benchmark test at that time in the school year. My understanding is the DIBELS will be given again at the end of a eight week period. All of this is in line with our established protocols for establishing literacy guidelines and student progress.

I should also state that Mr. Bryant is a valuable member of our school faculty. He has a genuine willingness to help our school and our students. In addition, he devotes many hours beyond those demanded in the classroom to help our students experience success.

If I can be of further assistance or if additional information is needed, I encourage you to contact me.

Thank You,

[REDACTED]
[REDACTED]
Principal

[REDACTED] Elementary School

APPENDIX D: WEEKLY TRACKING RECORD TEMPLATE

WEEKLY TRACKING RECORD
Music Integration and Reading Fluency Study

INSTRUCTIONAL TIME: This section of the record is to establish the amount of instructional time spent teaching GPS for reading fluency.

INSTRUCTIONAL TIME LOG

Please log mins. spent teaching reading fluency

Monday _____ Tuesday _____ Wednesday _____ Thursday _____ Friday _____
WEEKLY TOTAL MINS. TEACHING FLUENCY: _____

GPS IN READING FLUENCY COVERAGE: This section of the record is to establish the coverage and timing of GPS for reading fluency. Please write the GPS for fluency covered for each day of the week. Below the sample are the GPS in reading fluency excerpted directly from the GA DOE web page for your reference.

Example:

Monday ELA1R4 b, c

Tuesday ELA1R4 a, b, e

FLUENCY ELA1R4 The student demonstrates the ability to read orally with speed, accuracy, and expression. The student

- a. Applies letter-sound knowledge to decode quickly and accurately.
- b. Automatically recognizes additional high frequency and familiar words within texts.
- c. Reads grade-level text with appropriate expression.
- d. Reads first-grade text at a target rate of 60 words correct per minute.
- e. Uses self-correction when subsequent reading indicates an earlier misreading within grade-level text.

STANDARDS COVERED LOG

Monday ELA1R4 _____
Tuesday ELA1R4 _____
Wednesday ELA1R4 _____
Thursday ELA1R4 _____
Friday ELA1R4 _____

At the conclusion of each week of the study, please turn this weekly tracking record in to your grade level chair. He/she will complete the information in the header. Thank you.

**APPENDIX E: SCATTERPLOT, LINEARITY WITHOUT CONSIDERING
GROUP MEMBERSHIP**



Figure 4.1. Scatterplot representing linearity without considering group (treatment or control) membership. PostNWF = posttest nonsense word (NWF) fluency scores. PostPSF = posttest phoneme segmentation fluency (PSF) scores.

**APPENDIX F: SCATTERPLOT, LINEARITY CONSIDERING GROUP
MEMBERSHIP**

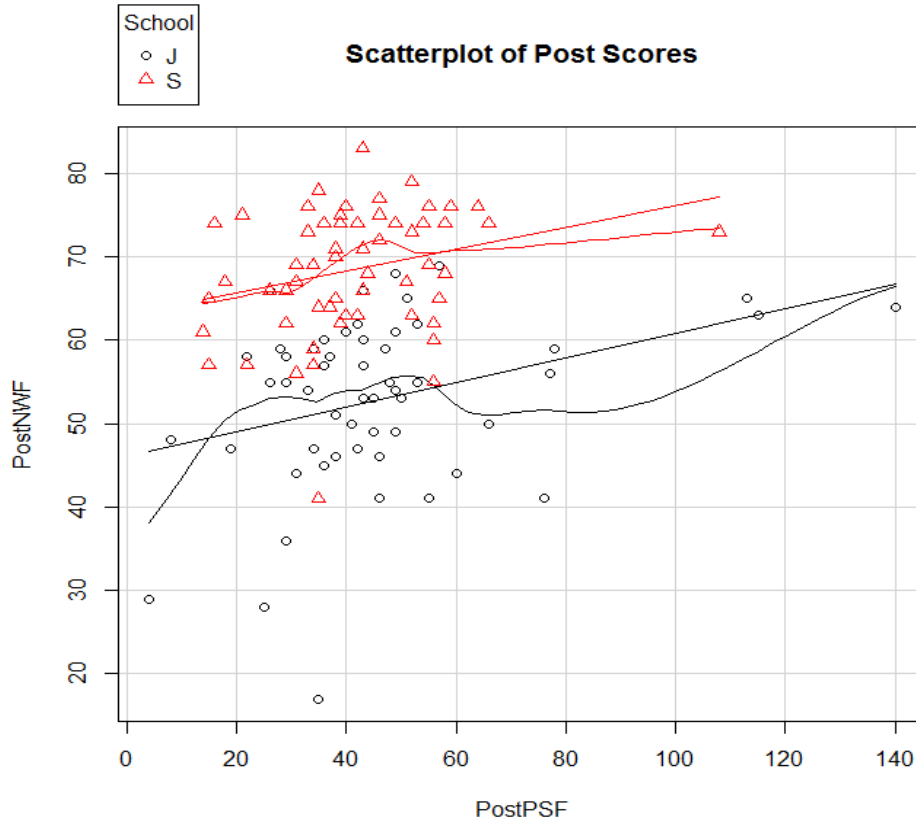


Figure 4.2. Scatterplot representing linearity considering group (treatment or control) membership. J = Jones Elementary (treatment), indicated as circles. S = Smith Elementary (control), indicated as triangles. PostNWF = posttest nonsense word (NWF) fluency scores. PostPSF = posttest phoneme segmentation fluency (PSF) scores.