NEW VENTURES IN INTEGRATED TEACHING AND LEARNING:

WORKING TOWARD A MODEL OF GENERAL SYMBOLIC LITERACY BASED ON THE GROWING UNDERSTANDING OF FUNDAMENTAL LITERACY SKILLS SHARED BETWEEN MUSIC AND LANGUAGE IN GRADES K-2

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INTRODUCTION

Most public school communities are aware of research that argues for the value of having their students participate in a music learning program both for the sake of developing their musical skills and for enhancing their learning capacities in general. However, many schools are not sure what measurable results or evidence of successful implementation to expect from their particular music programs. Indeed, research so far has failed to provide stable conceptual frameworks for understanding (a) how learning transfer works across disciplines and (b) what particular aspects of music learning, and not just general participation in arts programs, predicts learning in other disciplines, and why.

In the case of music integration programs such as the Music Ventures program explored here, the argument is made that authentic forms of music literacy can and should be learned by every child because of the fundamental concepts that are shared between music and other forms of literacy. As is the case with effective language arts or mathematical education, a comprehensive music program eventually relies on the development of fully operational and internalized symbol system skills that serve to represent form, content, concepts, and learning processes associated with diverse aspects of the domain. The question investigated in this study, relevant to any school that provides musical training for all students, can be stated as follows: *As we measure students' achievement in music literacy skill development – that is, the ability to perceive, read, analyze, compose, research, and reflect on music with genuine comprehension – does evidence of this ability also predict an increased understanding of general symbolic literacy skills that apply to other domains such as language arts?*

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This pilot study began when a public school music specialist at a K-8 Magnet Arts School and an elementary school that was challenged to improve its language literacy program agreed to work together to understand how instruction and teacher professional development designed to integrate the development of both music and linguistic literacy skills would benefit learning for all of its pupils. Working with a team coordinated by the Research Center for Learning Through Music at New England Conservatory, the music/curriculum/professional development specialist and the Beaumont Elementary school agreed to a research and evaluation plan that would provide much needed descriptive and statistical evidence relevant to the relationship between music and language literacy skills for Grades K-2.

A BRIEF REVIEW OF RESEARCH INVESTIGATING THE RELATIONSHIP OF ARTS LEARNING SKILLS TO ACADEMIC ACHIEVEMENT

The investigation of the impact of music literacy skill development on language literacy skills began with the positing of a conceptual framework for investigating assumptions about the nature and validity of music-integrated learning and teaching. These assumptions are based on the general hypothesis that the development of early music and language integrated literacy skill development can be best understood and assessed in terms of fundamental concepts and processes shared between both domains. Thus, the analytic framework for this experimental study can be understood in the context of past research focused on the contribution of arts learning to the learning process as a whole.

Evidence for the Broad Impact of Participation in Arts Learning Programs on School Achievement

In 1999, for example, the *Champions of Change* report[1] illustrated several case studies of how arts and arts-integrated learning initiatives functioned as agents of positive change in public schools. Findings from these studies forecasted a new role for arts and arts-integrated learning as 'cur-

riculum partners with other subject disciplines' for the purpose of building the capacity to learn for all students. These studies detailed diverse conditions for arts learning and its impact on school culture (Burton, Horowitz & Abeles; Catterall, et al.), the contribution of arts learning in after-school programs (Heath & Roach; Seidel), and the provision of descriptive data that highlighted growing levels of sophistication of a multitude of learning processes, competencies and dispositions associated with high involvement with arts learning. Although researchers provided evidence of how high participation in arts learning programs was linked with measures of creative process (Burton, Horowitz & Abeles) or with general academic improvement according to standardized test scores (Catterall & Waldorf; Catterall, Chapleau & Iwanaga), they did not include statistical evidence of links between *particular* arts learning skills, which would argue for targeted curricular intervention programs or assessments that would hold schools accountable for the contribution of high quality arts learning programs to the overall quality of learning across subject areas. Furthermore, while more recent research indicates that many school leaders *credit* the arts for positive outcomes on test scores[2], they offer little empirical evidence for the specific contribution of discrete arts learning skills or processes on literacy learning in other subject areas. Since many music educators and language reading specialists, for example, do informally measure specific aspects of skill development at various grade levels, music educators as a whole are left to wonder to what extent this skill development is interrelated with learning in other disciplines, especially

over time. Thus, for many schools more evidence concerning the mutual benefits of developing both music learning skills and language arts skills is needed in order to advocate for music learning programs that produce learning outcomes that contribute to linguistic learning.

Evidence for Teaching for Learning Transfer Through the Arts as a Strategy for School Change

In a recent publication on the role of the arts in education, Nick Rabkin [2005] reports in *Putting the Arts in the Picture: Reframing Education in the 21st Century* that arts-integration strategies are growing in sophistication and are thus becoming

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viable, powerful agents of change in public schools open to reinvestigating the essential role of the arts in public school education. Citing the work of the Music-in-Education National Consortium as a leading proponent of the arts for learning across the curriculum, Rabkin declares that

"We are in a position to extend this [arts and music integration] research because, over the last fifteen years or so, a dedicated group of artists, educators, and researchers has developed arts integration far beyond the work and research we examined in the early 1990s. Serious evaluation studies completed in the last few years now provide strong answers to the questions raised then. There is transfer. Students make substantial gains in the basics. Student become better thinkers, develop higher order skills and deepen their engagement and their inclusion to learn. Arts integration's effects are significant for all kinds of students, but they may be most substantial for low-achieving students." (Ibid., p.8)

Standards Based Arts Instruction Mandates Arts-Integrated Learning in Public Schools

The importance of interdisciplinary connections between learning in music and other areas of the curriculum should not be controversial. National and most state and district standards for music education argue for authentic, comprehensive, and interdisciplinary learning in and through music for all children at all grade levels. What should be controversial is that, despite research findings and the public presence of national standards, music has yet to be accepted as a core ingredient of public education in many communities[3]. This problem may stem from a lack of consensus among music educators on the purpose of music programs in schools. Some music teachers have been slow to embrace integrated learning because it is seen as opposed to the 'essentialist' position that music should only be taught for its own sake and not for the sake of learning in other subjects. According to Rabkin, Hope and others, the integrity of music-integrated learning relies on the presence of music

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learning for its own sake (e.g., symbol system skills, literature, etc.) in the curriculum, and music should never be taught exclusively for the sake of learning in other disciplines. However, reading and writing aren't just language arts skills, but rather *general symbolic skills* that apply to reading and writing music, mathematical, and linguistic symbols, let alone to the 'reading and creation' of social or emotional situations. Likewise, the learning of rhythm is not exclusively a musical skill, since it does rely on and is enriched by its application to math, science, and design.

Music-Integrated Learning as a 'Two-Way Street'

As a result of this ongoing and possibly pointless debate between the essentialist and instrumental positions on arts learning, many educators are increasingly coming to the conclusion that the forced choice between teaching music for its own sake or for the sake of learning in other subjects is based on a false dichotomy. If, for example, music integration is understood as a two-way street that reinforces learning in both disciplines, then music educators will need to see research that bridges the gap between the essentialist and the instrumentalist positions (Hope, 2000[4]; Bamberger, 2000[5]; Gardiner, 2000[6]; Scripp, 2004[7]). Thus, we argue here that Rabkin's claims for the benefits of arts integration beg for further case

studies where particular strategies for musical skill development and its integration into the academic curriculum are held accountable to specific outcomes in both areas of study. Perhaps most important to practitioners and policy makers, we believe that this research should be designed to demonstrate how the authentic, comprehensive music programs can function as catalysts for cognitive and social-emotional development across disciplines, "especially when conditions for transfer are optimized by teaching to principles and processes that engage and deepen learning across disciplines[8]."

Assessing for Predictable Interaction Among Learning Variables Consistent with Aspects of Learning Transfer of Fundamental Concepts of Literacy Across Domains

Even with agreement on the purpose of studying the impact of music-integrated learning in relation to language development, researchers may yet disagree on the interpretation of the data collected. For some researchers, for example, the strong presence of positive associations between learning in music and other disciplines is inadequate evidence for extolling the impact of music-integrated learning because it does not provide direct evidence for one-way, cause-and-effect transfer between one skill and another. Other researchers take a different view: evidence of two-way links between learning out-

comes is consistent with the circumstance and premise of integrated learning. Given the complexity of public school learning environments, it may be counterproductive to insist that any one form of music learning or skill development *causes* learning in another subject. From the point of view of this study, integrated learning can be defined, taught, and understood as an *interaction* among multiple, mutually reinforcing, skill sets when they share common underlying principles or concepts. Thus, a one-way causal model of data analysis is not to be considered an appropriate framework for measuring the impact of integrated teaching and learning in public schools.

The "two-way interactionist" position advocated here and in the Critical Links report[9] suggests that improvement in learning in either of two disciplines catalyzes, reinforces, and deepens learning in the other. Academic performance is just as likely to benefit from strong instruction in music, as music is likely to benefit from strong instruction in the academic subjects. Thus, the study of correlations

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among skills in different disciplines can indicate the *degree of association* that exists between these disciplines. Stepwise regression analyses can pinpoint more precisely the 'goodness of fit' between data patterns that explain best the variance between particular subskills in one discipline and the *predictability* of its relationship with another.

As a result of the findings reported in this case study, schools can embrace with confidence a music-integrated literacy curriculum and professional development program based on the learning of fundamental concepts of general symbolic literacy shared between music and the language arts as a model for providing both authentic music and language literacy instruction to all children in the early elementary grades. From a public school policy perspective, the shared fundamental concepts of literacy intrinsic to both music and language classrooms can become an important cornerstone of the music-infused interdisciplinary curriculum.

THE MUSIC VENTURES CASE STUDY RESEARCH METHODOLOGY

The primary objective of the Music Ventures case study was to develop and execute a comprehensive methodology [see RUBRICS CUBE System article and Case Study Reports in this section of the Journal] in order to evaluate sufficiently the interrelationships between music and language literacy learning in Grades K-2 in a public elementary school that has a high percentage of English Language (EL) Learners (41%), an extremely high percentage of low income families (97%), and no recent history of providing music instruction.

This case study report[10] focuses on the impact of the work of Anne Fennell, a highly qualified music educator from the Vista Academy of the Arts[11], who developed the Music Ventures music integration curriculum and served as the professional development specialist at the Beaumont Elementary School in Vista, California. The purpose of the Music Ventures pro-

gram was (a) to introduce authentic sequential music instruction into the Beaumont School and (b) to help classroom teachers incorporate music into their classroom practices as a strategy for enhancing early language literacy learning.

Interested in the impact of bringing a music program into an elementary school for the purpose of increasing the capacity of all students to learn both music and language literacy skills, the entire faculty and staff of the school supported and participated in the Music Ventures program by (a) providing time for teacher professional development in music and music-integrated teaching and learning; (b) incorporating live and video-taped model lessons provided by a music specialist into classroom and learning center activities; and (c) agreeing to extensive documentation of teaching and learning practices through teacher surveys, teacher interviews, pre and post music skills testing, and a battery of literacy skills tests adapted for use across all three grade levels.

This report employs both program evaluation and research methodologies. Embedded in this evaluation, therefore, are research questions intended to generate new information about the validity and impact of music and music-integrated learning as a literacy intervention strategy for lower elementary grades:

(1) What is the nature and impact of music literacy skill instruction and learning when it is integrated into the K-2 core language arts curriculum?

(2) To what extent do classroom teachers understand and support the nature of music and music-integrated learning and its connections to the K-2 language arts curriculum in the context of the Music Ventures professional development program?

(3) How can a school that previously had limited access to formal music instruction use the Music Ventures program as a way to document evidence of authentic and developmentally appropriate levels of learning in music for all students?

(4) To what extent does the level of student music literacy skill learning correlate

with measures of language literacy skills? Are there specific subskill outcomes in music literacy that best predict overall language literacy development? Are there specific subskill outcomes in language literacy that best predict overall music literacy development?

(5) Are there significant differences between the way the Music Ventures program impacts English Language (EL) Learners and English Only (EO) Learners?

(6) In what ways does the level of classroom teachers' response to professional development sessions predict evidence of music learning and its integration into the language arts curriculum?

PHASES OF THE MUSIC VENTURES PROJECT

The Music Ventures Project evolved through two phases. The *first phase* (in 2004) focused on a preliminary validity and feasibility assessment of the Music Ventures program for its curriculum design, professional development program, and capacity for data collection. Data collected in this phase were primarily from observations of professional development sessions and classroom practices associated with the Music Ventures program and from informal interviews with Anne Fennell, the program director and author, and participants in the Beaumont Elementary School.

The *second phase* of the project resulted in an extensive collection and analysis of data relevant to the impact of the Music Ventures program. Based on the RUBRICS CUBE methodology described below, data collected included four critical factors of the music-integrated literacy intervention program that resulted in:

(1) A profile analysis of the *written curriculum design* for its musical validity and its potential for enhancing language learning;

(2) An assessment of classroom teacher *professional training and professional development outcomes* primarily

through the analysis of teacher self-evaluation surveys and interview protocols that profiled attitudes and comfort with curricular implementation of the Music Ventures lesson plans (n=16);

(3) Statistical evidence of student *music learning outcomes* through pre-post assessment of listening, performance, and music symbol system skills through the New England Conservatory Music Literacy Skills test adapted for this project (n=85); and

(4) Statistical evaluation of the *relationship between music literacy skill performance tasks and a battery of language literacy skill tests* for all K-2 students (n=350).

The conditions for investigating the questions stated above were optimized through four key quality-controlled elements of the Music Ventures curriculum and professional development program designed and implemented by Anne Fennell, an experienced music specialist.[12] These elements of the program served as the basis for measuring the impact of the music-integrated language literacy instructional intervention at the Beaumont Elementary School:

(1) The presence of a highly specific and sequential framework of music lessons and activities that provided ongoing, open-ended opportunities for K-2 students to learn musical perceptual, performance, and reflective thinking skills that support both musical and language early literacy skill development;

(2) The provision of ongoing professional development sessions for classroom teachers in music and music-integrated instruction throughout the academic year in which the data collection took place;

(3) The creation of live and recorded demonstrations of each phase of the sequence of Music Ventures classroom music lessons as a resource for participating teachers; and

(4) Guidance and facilitation of Music Ventures learning center activities designed to reinforce Music Ventures demonstration sessions and to be

implemented by classroom teachers independently.

RESULTS FROM THE MUSIC VENTURES CASE STUDY PROJECT

Findings from the Music Ventures Study follow the structure and sequence of the data collection strategies.

STEP ONE
Analysis of Music Ventures Curriculum Design and Model Lessons as a Precondition for Examining Teacher Professional Development and Student Learning Outcomes

The Music Ventures Curriculum Design Profile

For many teachers interested in arts-integrated teaching, it is the lesson plans that provide clear criteria for the content and implementation of an intervention program. For researchers, the lesson plans can serve as rigorous protocols for teaching music-integrated literacy skills; the teachers' adherence to these protocols provides a necessary control for an experimental learning intervention. However, fealty to the lesson plans by classroom teachers is not likely unless, as was the case with the Music Ventures program, the teachers find the materials and demonstration lessons clearly articulated, sequenced logically, and adaptable to their classroom practices.

Rubric-based assessments were used to profile the features of the Music Ventures curriculum materials and professional development program for their relevance to teaching fundamental concepts of music literacy and their transferability to language literacy concepts, as well as their practical utility for classroom teachers.

The results of the curriculum design rubric applied to the Music Ventures curriculum [Figure 1], profiles the relative strengths and weaknesses of 23 curriculum design features relevant to any curriculum used in public schools.
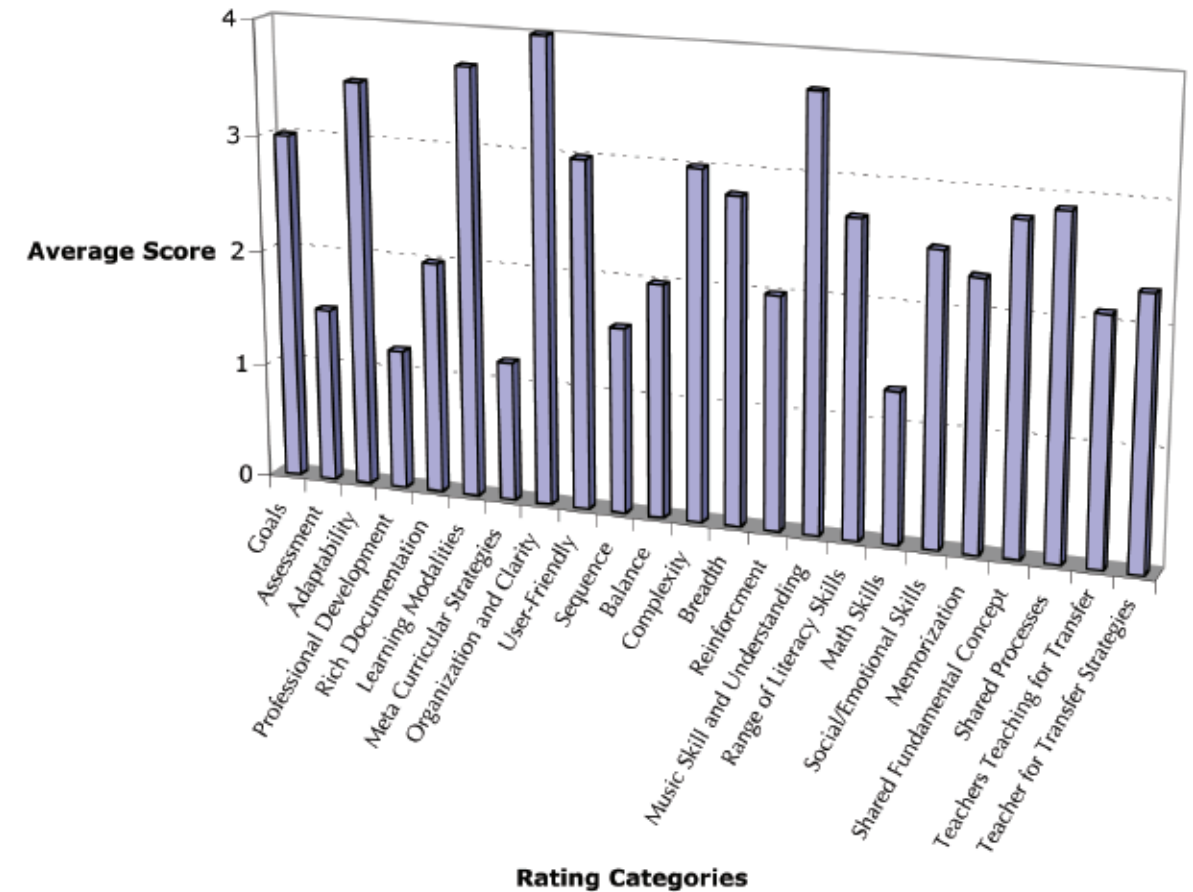

Figure 1: A profile of Music Ventures curriculum factors rated according to the MIENC Curriculum Design Rubric. With respect to this profile, the research and evaluation study focused most on issues of assessment, professional development, and meta-curricular aspects of the Music Ventures program.

The profile ratings of the Music Ventures Curriculum Materials indicate its curricular design is consonant with its goals of music learning and integration with literacy skill development. That is, the curriculum itself (a) ensures its conceptual validity by addressing authentic learning processes and concepts in both language arts and music, and at the same time (b) ensures its practical validity by virtue of its focus on organizational clarity and teacher user-friendliness.

Curriculum Implementation, Modeling, Guidance

The following inquiry questions addressed the area of quality and relevance of classroom practices to the curriculum or program design:

• How do the Music Ventures curricula or programs differ from what schools offered in literacy instruction before the project?

• What kinds of support do teachers need in order to understand high quality delivery of music instruction and teaching practices that will support music integration interventions in their classrooms?

The Music Ventures curriculum and professional development program differed considerably from what, on the average, schools like Beaumont offer in literacy instruction. As reported by teachers, incorporating music into the core language literacy curriculum fundamental differences include:

• the necessity for developing and assessing diverse elements of music literacy skills;

• the need for 'teaching for transfer' strategies for teaching fundamental skills and processes shared across contrasting domains of literacy;

• the emphasis on the flexible interchange of multiple modalities of literacy skill learning; and

• a wider range of class management skills that include differentiated instruction, learning center activities, peer assessment, and large group creative and guided inquiry processes.

Teachers reported that the differences

This vignette is the first of four illustrations included in this report from a Music Ventures program design, implementation and teacher professional development portfolio.

During the course of program implementation reflection through conversation with the professional development leader is essential. A one-page letter from a teacher to the professional development leader (included below) reveals how stimulating a music integration curriculum can be for classroom teachers who are constantly finding ways to improve the Music Ventures program in their classrooms. By the process of "review and link" of previous Music Ventures lessons, this teacher begins to create moments of instruction and invention through her reflective understanding of music stemming from the Music Ventures program. A constant stream of communication among the teachers and the professional development leader creates an ethos of constant dialogue and inquiry that may seem to threaten the consistency of the program; however, to field-based researchers, this culture of constant tinkering indicates 'buy in' from teachers as they find new approaches to adapt music into the classroom suggested by the Music Ventures program.

Friday

Hi Anne!

I am at school, and for some reason, the internet isn't working---so I must send this to you via district mail.

Well, I did lesson 3.5 today. Many thanks for talking to me last night. Here is a brief outline of what I did (it went great!):

Review and link-- I pulled some examples from previous lessons on rhythm (like 2-4-6-8 meet me at the garden gate, and ti ti ta). I put up a word card with the word rhythm on it up on the white board. We talked about the definition of rhythm (from your elements of music page). Then, I reviewed pitch, giving the definition, and showing examples from previous lessons (tall, middle and low letters...). Then, I put an addition sign between rhythm and pitch, with = tune (I also put up the word melody). I gave an example of a tune.

We reread the poem, To Market. Then I put up 2 examples like this:

They were to figure out which one could be "To Market". The hands shot up! I had a volunteer come up and point to the correct one, and tell me why she chose that one. Then I had the children say the words as I pointed to the dots.

Mrs. Silk's daughter, who takes piano, was visiting. So, I had her play the next set of dots on the xylophone. The kids were to guess what tune it was. They guessed it! (Jingle bells) Then I pointed to the dots as Angela played it again.

Whew!! I was really nervous about this. But, I have to say, Angela (Mrs. Silk's daughter) really helped. I had talked to her before my students arrived.

Hope this helps. I think we need to do a lot of review, and then linking to previous lessons/concepts. Bye!!

Sharon

Figure 2: Sample communication between a classroom teacher and the Music Ventures professional development leader, Anne Fennell. Discourse and guided inquiry, focused on the incorporation of the music-integrated literacy lessons into classroom practices, invited Beaumont teachers to participate in the Music Ventures as action researchers.

Figure 3: Checklists were provided to help teachers keep track of their implementation practices as participants in the Music Ventures program. Records of collaborative teaching, independent teaching, and the facilitation of centers activities are essential for establishing implementation standards for music integration programs.

Figure 4: Display of factors related to Music Ventures demonstration lessons and rated by teachers according to the MIENC Curriculum Design Rubric. Lessons that were well-managed, enthusiastic, personable, and engaging, and which adhered closely to the vocabulary and teaching for transfer strategies in the Music Ventures curriculum, were extremely useful to teachers participating in the professional development program.

between using conventional language literacy instruction and participating in a music-integrated literacy program were at first intimidating. Thus, support for reflection through conversation with the professional development leader became an essential condition for program implementation.

For example, a one-page letter from a teacher to the professional development leader [Figure 2] reveals how stimulating a music integration curriculum can be for classroom teachers who are constantly finding ways to improve the Music Ventures program in their classrooms. A constant stream of communication among the teachers and the professional develop-

ment leader created a culture of constant tinkering that resulted in 'buy in' from teachers as they found new approaches to adapt music into the classroom suggested by the Music Ventures program.

A critical indication of meeting standards for teacher implementation was the Music Ventures weekly log. This checklist [Figure 3] allowed the professional development specialist and researchers to trace the progress and thoroughness of the program implementation.

Demonstration Lesson Ratings Profile

Fealty to the implementation guidelines for the Music Ventures curriculum was
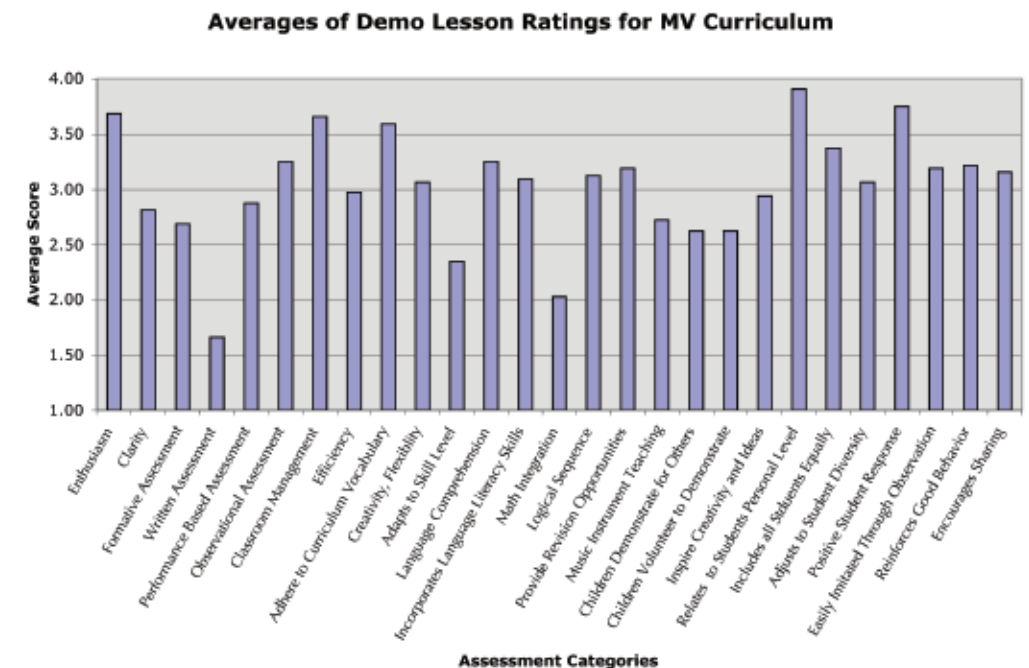
for most teachers a challenge that required modeling. The professional development sessions did not, on their own, assure the teachers that the Music Ventures curriculum could be successfully implemented in their classrooms. Therefore, Anne Fennell provided in-class workshops and a complete sequence of Music Ventures demonstration lesson recordings (1) to provide expert guidance on the teaching of the concepts and to demonstrate guidance in class management, and (2) to create a resource for teachers to employ in their classrooms and/or to reflect on their own challenges in learning and teaching musical content related to academic learning standards.

The chart above [Figure4] provides a profile analysis of the Music Ventures demonstration lessons from the point of view of 27 factors in teaching adapted in reference to the MIENC RUBRICS CUBE curriculum implementation assessment models.

The MIENC Curriculum Implementation Rubric was used to rate over twenty lesson videos by Anne Fennell for degree of presence of various factors of teaching lesson plans that provide a balanced look at high quality curriculum implementation. From this profile analysis [Figure 4], teachers

and researchers could see, for example, that relatively less time is spent on student written assessments or explicit reference to math integration in these lessons. In contrast, significantly more time is spent on eliciting positive student responses, enthusiasm, classroom management skills, and explicit adherence to the vocabulary and concepts of the curriculum package. Most importantly, teachers were able to take the time to witness demonstration lessons as a strategy for developing a common and comprehensive understanding of teaching strategies that optimize music and music-

integrated learning in elementary school classrooms.

Summary of Curriculum Design and Professional Development Outcomes Analyses

The analyses of the curriculum materials and their demonstration support the feasibility, reliability, and validity for using the Music Ventures approach to teaching music skills and the transferability of these skills to language literacy concepts. Through the use of rating scales, the Music Ventures curricu-
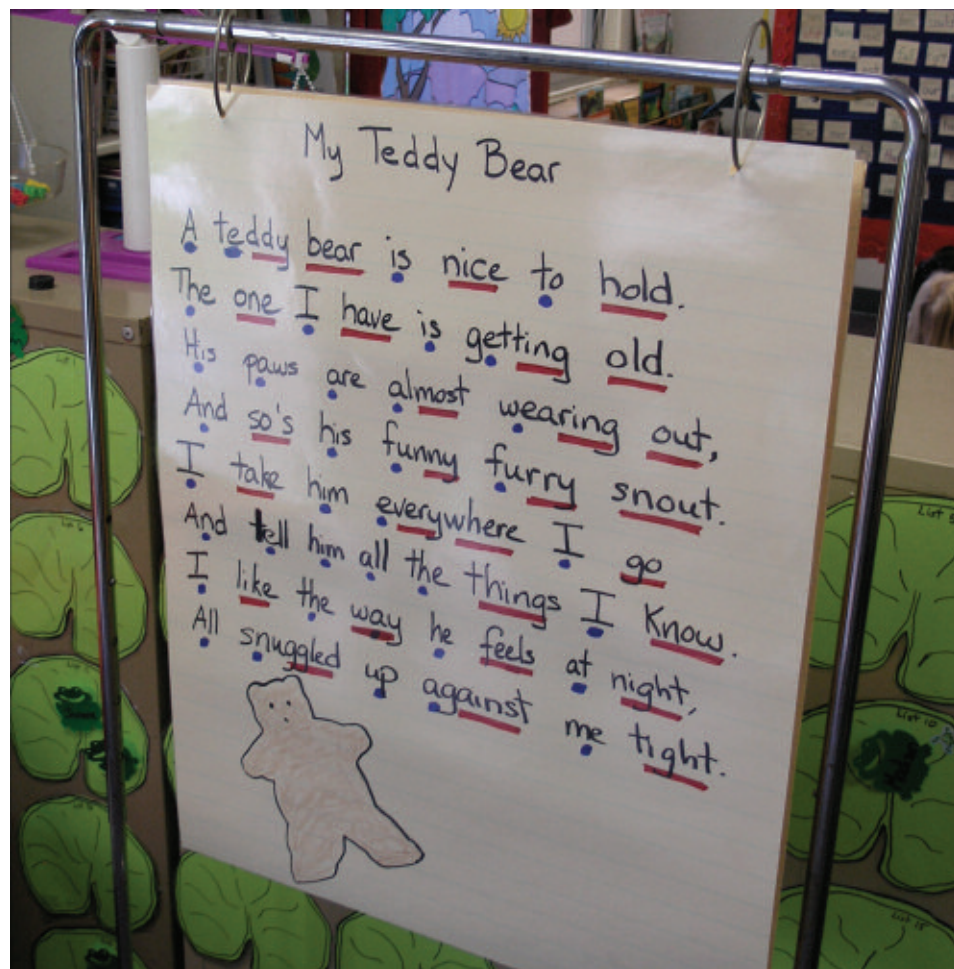
In this rhythm-poetry (prosody) lesson, students are challenged to code the words for relative duration values (• -- — = short, long, longer = 1, 2, 3 beat durations) as a way to discover the accent patterns and eventually the meter of the words before setting them to music. The 'big discovery' for the students and the classroom teachers was that the primary accent seemed to work best falling on the second word of each line! Note also that the students were the least decisive about the sixth line, which begs for a red line (long or two-beat designation) on either the word "tell" or "him," and, in either case, certainly on the word "all."

lum is a balanced, teacher friendly curriculum sample highly focused on one particular form of integration; however, like most contemporary curricular examples chosen here, Music Ventures supports broad principles of learning that integrate diverse forms of modalities and approaches to learning that can be used across disciplines.

The demonstration lessons provided by the author of the Music Ventures program illustrated to teachers the principles and management techniques of music and music-integrated instruction in the context of real classroom conditions. Teachers participating in the project were able to experience and sometimes review exam-

ples of teaching faithful to the Music Ventures curriculum as they learned to support lessons and center activities in their classrooms. Thus, baseline conditions for high quality program implementation were established through curriculum design, modeled implementation, and participation in Anne Fennell's teacher professional development program.

From the above analysis of the curricular materials and professional development program, the researchers were able to determine that the core focus of the Music Ventures project at the Beaumont Elementary School is primarily musical and language literacy skill development taking

place in general classrooms. The kinds of music knowledge and skills the Music Ventures literacy learning strategies emphasize are intrinsically musical, yet strategically connected to the essence of literacy skills shared between music and language literacy. The difference in this approach from purely music and language arts programs is the degree of 'teaching for transfer' that is stressed from the very beginning of professional development and throughout every lesson plan crafted and demonstrated in the Music Ventures sequence. Every step of the way, music and language literacy integration lessons mutually reinforced each other through an emphasis on skill development based on fundamental concepts combined explicitly in the processes of music listening, composing, and reading.

The success of any sustainable intervention in public schools depends on (a) the quality of teacher *professional training* for the introduction of new skillsets and concepts intended to solve problems relevant to the mission of the school and (b) the assimilation of these concepts into classroom practices through ongoing *professional development* that results in tangible evidence of positive transformation of teaching capacities and attitudes.

From the viewpoint of the Beaumont School community, the Music Ventures program is an intervention intended to fulfill (1) the school's need to reinforce and enhance language literacy skill development for its English Only (EO) Learners and English Language (EL) Learners in Grades K-2, and (2) the school's desire to provide access to formal musical instruction for all students. The Music Ventures program is an innovative solution to both needs because it is aimed at the integration of both language and music learning through literacy skill development in both domains. From this perspective, the Music Ventures intervention requires new levels of teachers' understanding of concepts and

processes shared between music and language and the application of this understanding through innovative multiple modality approaches of literacy skill development and 'teaching for transfer' strategies into classroom practices.

Evidence of teacher reflective understanding of the Music Ventures program and its impact on teaching practices was collected through several methods. Pre-post assessments of the evolution of teacher attitudes and comfort with music literacy skill development and the implementation of the music integration curriculum were given, using interview analysis, self-evaluation surveys, and professional assessments of teachers receiving one and two years of the professional development.

TEACHER INTERVIEW DATA COLLECTION AND ANALYSIS

Interview data is a critical feature of the study because it provides a window onto the practical aspects of program implementation with regard to future replication or adaptation in other schools. Teacher interview data analysis provides evidence of the impact of the Music Ventures professional development program on teachers' attitudes toward, and understanding of, the goals and methods of the Music Ventures project in their school. Coding and analysis of interview transcriptions, and later on, teacher survey data, makes it possible to study intricate inter-relational aspects of the teachers' reflective awareness and understanding of their roles in the Music Ventures project in their classrooms.

Teacher interviews were conducted twice during the study period. A total of 16 teachers teaching kindergarten, first, and second grades participated fully in the Music Ventures program. Interviews were based on a strict protocol and were digitally recorded, transcribed, and coded using an emergent dimension analysis procedure. The interview protocol asked teachers about their understanding of the program, what they felt they were learning, how they felt about their own musical development and abilities, classroom management issues, collaboration, professional
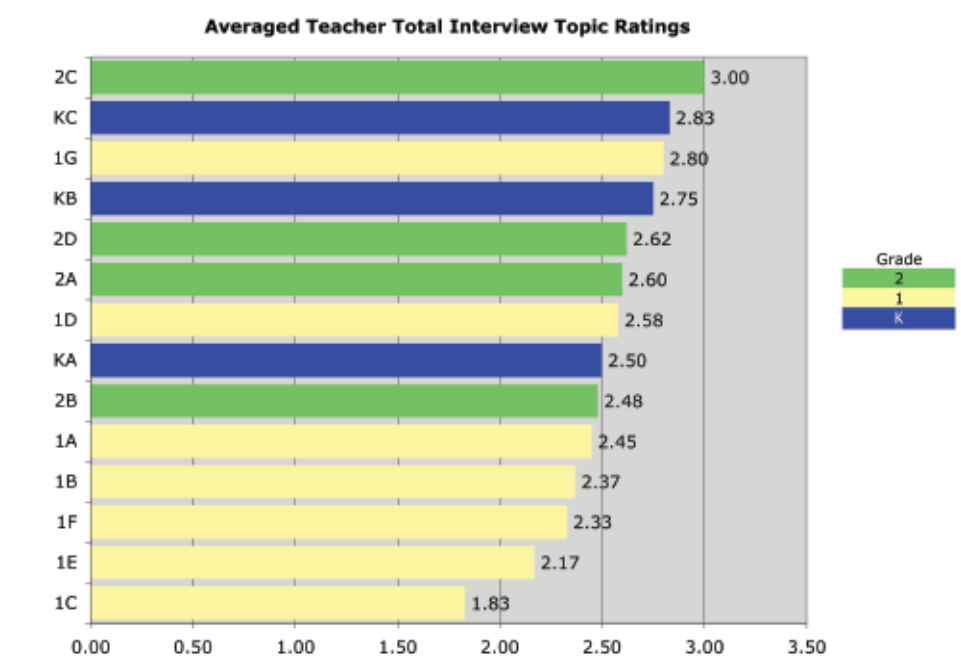

Figure 5: A display of rank ordered 'averaged teacher interview response ratings' that reflect degree of articulation or specificity of response to interview topics. Note that a cluster of Grade 1 teachers rated lower than other grade levels with respect to the articulation of and positive attitude toward the Music Ventures program. Follow-up analyses in the following charts (see Figures 6 and 8) reveal that it was in particular the program materials and their use in the classroom that puzzled the first grade teachers the most.

development, and connections made between music and literacy.

A four-point integer scoring system was used to categorize teachers' responses, in accordance with procedures used in other parts of this study. Criteria for high and low scores along each dimension included both frequency and depth, specifically for unprompted remarks.

Evidence of Teachers' Reflective Understanding

The averaged interview topic ratings [Figure 5] provide a profile of the degree to which classroom teachers can articulate their overall understanding of the Music Ventures program's purpose, goals and structure as articulated by the classroom teachers throughout the interview process.

Similar profiles of teacher interview responses provided clues about the professional development outcomes that resulted from the Music Ventures program.

Analyses of sub topics such as *understanding the premise of teaching for transfer for music and language literacy, teacher viewpoints on program design and delivery, understanding, teacher response to utility of curriculum materials and appreciating professional development mentoring* provided multiple measures of professional development outcomes.

Evidence of Professional Development Outcomes

Teachers' *level of understanding of design, delivery, and quality of materials* is a critical factor in the success of any intervention in elementary school classrooms. Responses to the Music Ventures professional development materials and workshop sessions suggest, for example, that the first grade teachers were relatively less articulate about the 'Quality of Materials' and 'Quality of Design and Delivery' of the professional development materials than they were about their understanding of the connections between music and literacy illustrated previously. A
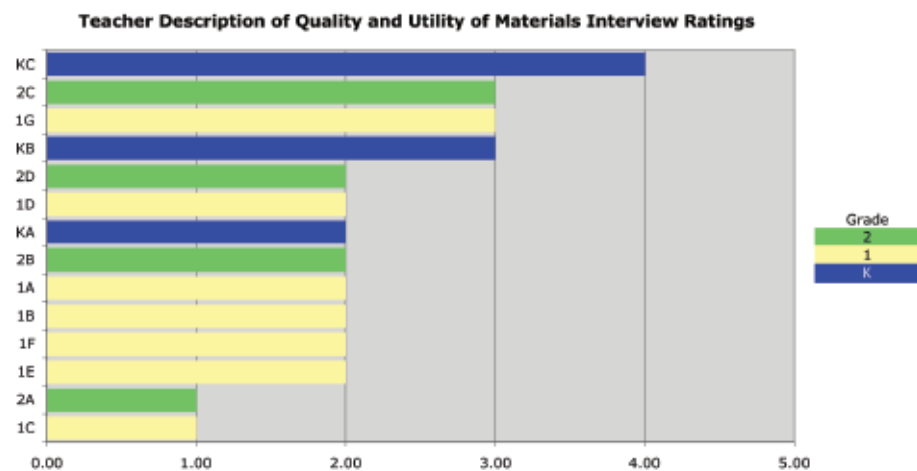
Figure 6: Data display of teacher ratings of the 'quality and utility' of Music Ventures materials. Here we can see that the first grade teachers who expressed less understanding of the program in general (Figure 5) show less appreciation for the materials and how they were to be used than do other grade level teachers. Later (see Figure 8) these same teachers registered the highest degree of gains in teacher survey responses measuring positive attitude and comfort with various factors of knowing and teaching music integration lessons in their classrooms.

relative lack of articulation of the content and purpose of the materials suggests that, from the teachers' viewpoint, more clarification and modeling of the curriculum materials may be needed to maximize the effectiveness of the program.

Another important component of professional development outcomes critical to the implementation of the Music Ventures program is the teachers' *response to the quality and utility of the curriculum materials.* Consistent and effective use of the materials provides a critical level of quality control for the consistent and coherent approach to program implementation shared across all grade levels. The data in Figure 6 indicate a wide discrepancy in the teachers' ability or willingness to articulate the utility of the program materials and approaches in their classrooms. These differences may be present due to external circumstances such as the compatibility of the Music Ventures materials with the literacy curriculum structure or materials particular to each grade level. The differences may also be due to personal teaching style issues, such as previous use of centers

structures in classrooms or comfort level with large group management issues raised by including music in the classroom.

Teachers' reflections on the effectiveness of ongoing professional development instruction provide evidence for the practical validity of the Music Ventures program. The teacher response to the professional development leadership is the highest rated aspect of the program in the interview data. Furthermore, the levels of these responses were distributed more or less equally across grade levels, suggesting that the professional development instruction was initially the most valued aspect of the programs for teachers in all grade levels. This level of response provides a strong indication that the Music Ventures program developed with considerable attention given to establishing support conditions for the classroom teachers necessary to the successful implementation of the program. This level of support will have to be supplied by music teachers in professional development roles in future replication studies in order to insure the validity and practicality of the music integration programs achieved in collaboration with classroom teachers.

Overall, results of the interview analysis provide useful information about the vari-

ability of teacher responses to the Music Ventures program. The teachers in this study were most articulate or enthusiastic when talking about and applying their professional development experience to their classroom practices and less clear about the utility or application of the curriculum materials. Thus, revisions in curricular materials or in professional training may be linked to a structural weakness in assessment practices identified in the previous analysis of the curricular materials. More attention to documentation of student work and accompanying assessment rubrics may help teachers better understand what constitutes evidence of high quality learning outcomes of the Music Ventures program as the program is refined further.

The data presented here suggest also that teacher interview responses provide information necessary for assessing the teachers' various levels of capacity for incorporating music-integrated learning programs into their classroom practice. Since there are as yet no federal standards for certifying music specialists, classroom teachers, or the collaboration of both teachers in terms of their understanding and ability to 'teach for transfer', collecting teacher interview data may continue to be a useful prerequisite for predicting and sustaining the success of

such programs. In future studies, a more robust sample size of participation of teachers in professional development programs may provide statistically significant evidence of the impact of differentiated levels of reflective awareness or understanding of music-integrated literacy programs on student performance in both domains.

TEACHERS SURVEY/PERFORMANCE EVALUATION DATA COLLECTION AND ANALYSIS

For the purpose of analysis, composite variables representing regions of survey data results were created to organize the items into the following four broad categories:

(1) *Music Ventures Classroom Management*
Familiarity and comfort with Music Ventures classroom management, materials, large group sessions, and small group centers activities.

(2) *Diversity of Teaching Approaches, Processes, Standards*
Familiarity and comfort with diverse teaching approaches to interdisciplinary learning and their possible compatibility with literacy instruction integrated with music.

(3) *Comfort with Music Skills*
Comfort with standards-based music learning fostered through the Music Ventures professional development program and its application to the classroom.

(4) *Comfort with Arts & Music-Integrated Teaching*
Familiarity and comfort with all Music Ventures tasks designed to focus both on music learning and its connection with language learning in a sequential curriculum of lesson plans aligned with music and language arts standards.

Evidence That Teachers Have Increased Their Capacity to Integrate Music into the Language Arts Curriculum

The baseline and follow-up survey results reported here [Figure 7] were used to measure the effectiveness of the profes-

Overall Gains in Pre-Post Overall Gains in Pre-Post Teacher Survey Topic/ Musical Skill Ratings (Mean Score Differences within a Four-Point Scale Rubric)		Key — Prob>|Rho| No Asterisk = > 0.05; * = <0.05; ** = < 0.01; *** = < 0.001 (n=13)	
Survey Self Evaluation/Music Skill Composite Variable Ratings	Pre-Post Mean Score Differences	Survey Self Evaluation/Music Skill Composite Variable Ratings	Pre-Post Mean Score Differences
Familiarity/Comfort with Music Ventures Classroom Management		*Familiarity/Comfort with Arts & Music-Integrated Teaching*	
Know Music Ventures Classroom Management	0.5606*	Teach Discrete Music Skills	0.8737***
Familiarity/Comfort with Alternative Teaching Approaches, Processes, Standards		Know Approaches & Standards for Arts & Arts Integrated Learning	1.2121***
Know/Use Alternative Teaching Approaches	1.0893***	Know/Use Arts & Music Integrated Learning	0.5903**
Know/Teach Structured Inquiry	1.0000**	Know/Teach Rhythm & Integration Skills	0.8176**
Know/Foster Creativity	0.9091**	Know/Teach Pitch & Integration Skills	0.7014**
Familiarity/Comfort with Music Skills		Know/Teach Melody & Integration Skills	0.7755***
Prior Music Background	NA	Know/Teach Timbre & Integration Skills	1.1061***
Music Ventures Music Education Training	0.5909***	Know/Teach Dynamics & Integration Skills	0.7757**
Know Discrete Music Skills	0.8333***	Know/Teach Auditory Discrimination & Integration Skills	0.7058*
		Know/Teach All Music Ventures Integration Connections	0.8626***

Figure 7: Display of overall gains in teacher survey attitude/musical skill ratings within the two years of the Music Ventures professional development program. The survey results suggest that teachers acquired new skills and comfort with the program content and processes in the context of their ongoing professional development training and its application to their classrooms practices.

sional development program as indicated by both an increase in level of skill comfort and knowledge and, at the same time, a decrease in the 'gap of understanding' among the teachers as a whole.

Evidence of professional development outcomes obtained from the comparison between the baseline and the follow-up survey results suggests that teachers drew on both their emergent musical literacy skill development obtained in the Music Ventures program and their expanding knowledge of language literacy teaching methods to understand and support the integration of these subject areas in their classroom practice. Of particular interest

are the relatively strong gains in the survey results in teacher knowledge of diverse teaching methods[13] featured in the Music Ventures program and their relationship to arts learning standards. This finding confirms that the teachers expanded their expertise in their field of alternative teaching methods as they made the connection of literacy to the arts and music.

What is particularly germane to the validity of this music integration program is that these teachers also significantly improved their knowledge of discrete musical skills and their confidence in using these skills to complement literacy instruction. Crucial to determining the
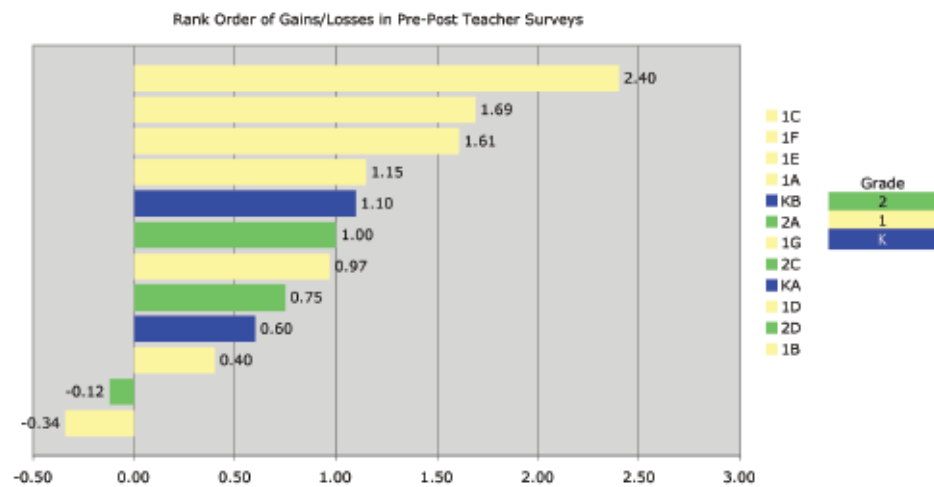
Figure 8: Rank ordering of teacher professional development outcomes according to changes in the average pre-post survey attitude responses and skill ratings. In this measure, it is clear that the first grade teachers, despite their initial doubts reflected in the interview ratings (Figures 5 and 6), demonstrated the highest change toward positive attitudes about their professional development and personal skill development.

effectiveness of the professional development program, survey results indicate that Beaumont teachers felt increasingly confident of their ability to make the Music Ventures connections to their literacy instruction, although relatively less confident about managing the activities in their classrooms.

The baseline/follow-up (pre-post) survey data gains displayed above provide statistically significant evidence (*despite* the small sample size) that the Music Ventures program has changed teacher capacity and attitudes in a relatively short amount of time. Music Ventures teachers are now more confident in their abilities to teach music and to reinforce language literacy learning through music. If we later discover a significant positive relationship between music and language literacy student learning outcomes, it now can be linked in part to a teacher preparation and implementation program designed to improve teachers' music skills and to provide music integration 'teaching for transfer' strategies throughout the course of the Music Ventures professional development program.

Evidence That Teachers Have Different Levels of Comfort with Music-Integrated Literacy Teaching and Learning in their Classrooms

The chart presented in Figure 8 displays highly differentiated pre-post gains in survey ratings and ratings provided by the professional development workshop leader, indicating individual differences in response to the Music Ventures program in terms of understanding and comfort in implementing the program. Survey responses are rank ordered by the 'degree of change' in teacher attitudes expressed as gain/loss values.

Results displayed here suggest that the function or relevance of the Music Ventures program shifts according to grade level. Although the majority of teachers demonstrate significant gains in survey ratings, the first grade teachers appear to have transformed their practices the most based on the professional development program and teaching experiences throughout the final year of the project. If this differential effect is replicated elsewhere, then it may turn out that, for example, the program is best designed for building the capacity of first grade teachers to 'teach for transfer' while reinforcing literacy skills through music skill development. Kindergarten teachers may be less inclined to see the effect of the connection of music literacy skills to students just beginning formal instruction in language literacy.

Second grade teachers may perceive the Music Ventures program more in terms of broadening their students' understanding of literacy or using music-integrated literacy as an intervention for the population of children at risk for failure. Note as well that the improvement in ratings did not occur only with a small minority of teachers, another phenomenon worth investigating further in future studies.

Patterns of Correlation as Evidence for Growing Understanding and Comfort with Music Integrated Learning

From the viewpoint of the teachers, six patterns of correlation among teacher survey topics and skill ratings provided information critical to understanding the growing coherency of the program's effectiveness over two years. Patterns of correlation among interview ratings revealed the following:

(1) A deep connection exists between teachers' positive professional development experiences and their ability to articulate their understanding of the connections between, and the classroom management of, music and language literacy learning.

(2) Comfort and familiarity with discrete

Comfort with Discrete Forms of Music Skill	Comfort with Classroom Teaching Approaches			Comfort Teaching Music & Music-Integrated Concepts and Skills			
	Know, Use Alternative Teaching Approaches	Know, Teach Structured Inquiry	Know, Foster Creativity	Teach Discrete Music Skills	Know/Use Arts & Music Integrated Learning	Know/Teach All Music Ventures Integration Connections	Know/Teach Auditory Discrimination/ Literacy Connections
Rhythm Skills	N.S.	N.S.	0.6499**	0.5703*	0.4698	0.7484***	.6287**
Pitch Skills	N.S.	N.S.	N.S.	0.6520**	0.4858	.8460***	0.7382***
Melody Skills	N.S.	N.S.	N.S.	0.8300***	0.5004*	0.7204**	0.6878**
Dynamics Skills	N.S.	N.S.	N.S.	0.7509***	0.5529*	0.7114**	0.5489*
Timbre Skills	N.S.	N.S.	0.6923**	0.6989**	0.7621***	0.8471***	0.7111**
Average All Music Skills	N.S.	N.S.	N.S.	0.8050***	0.5163*	0.6276**	0.6022**

Key
Prob >| Rhol
No Asterisk = > 0.05
* = < 0.05
** = <0.01
*** = < 0.001
N.S. = Not statistically significant

Figure 9: Table of correlations between discrete music skill ratings and teacher self-evaluation attitude ratings. The pattern of correlation indicates that teacher comfort with teaching music and music-integrated concepts and skills in the language literacy classroom is predicted best by their comfort with their own command of discrete musical skills.
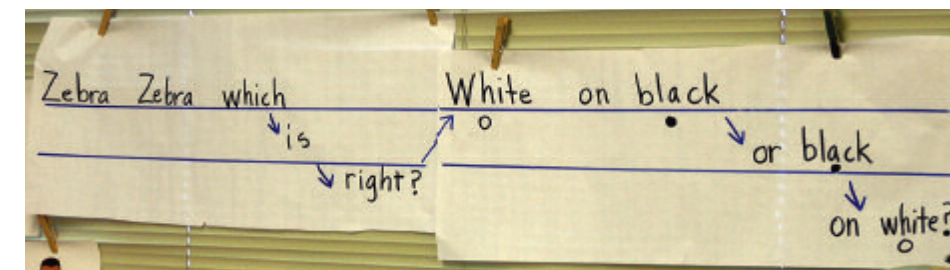
At the Empresa Elementary Learning Laboratory School in Oceanside, CA, setting poetry to music is an ongoing problem-solving task for all students. In this example, students are considering how two lines of poetry can be contrasted by the use of melodic contour. As they performed these rhythms with words and melodic contour, they discovered that the two lines of poetry contained unequal amounts of words, yet equal amounts of syllables.

music skills and arts learning standards are essential prerequisites for classroom teachers to embrace the integration of music and language literacy instruction in academic classrooms.

(3) Knowledge of diverse teaching methods linked with familiarity with arts learning standards predicts positive articulation of teacher attitudes with regard to music integration classroom management.

(4) Awareness of alternative teaching approaches, knowledge and experience with teaching through structured inquiry or through fostering creativity appears to provide critical links to success with music-integrated teaching.

(5) Teacher and instructor evaluation of skill acquisition authentic to music learning is linked to teacher comfort and constructive attitudes about the

goals of a music integration program focused on literacy.

(6) Classroom teachers regard learning and teaching music literacy skills, and the knowing and teaching of music integration skills focused on language literacy, as mutually reinforcing professional development outcomes resulting from the Music Ventures program.

Overall, these findings suggest that as teachers gain fluency with demonstrable musical skills, they take a proportionately more positive and productive view of music integration. Thus, the extremely high correlations detected in the teacher survey between music skill acquisition and confidence in music integration applications signify a fundamental connection between parallel processes and factors in language and musical literacy skills. As teachers learn to read, compose, and listen attentively to music for detail, they become more self-assured in the application of these skills to teaching language literacy. Conversely, if teachers fail to progress with their music literacy skills, they are much less likely to pursue connections between the two seemingly disparate sets of cognitive skills.

The chart presented in Figure 9 reveals pervasive evidence that Music Ventures classroom teachers regard each distinctly different music skill as a potential tool for integration with literacy studies, for the mutual benefit of both music and language arts learning.

It is likely that the alignment of correlations between musical skill and music integration emanate directly from the teachers' professional development experience of learning, watching, and supporting the Music Ventures curriculum in professional development sessions and in modeled lesson plans. Judging from the researchers' examination of materials and observations of lessons, rhythm and timbre both served as predominate entry points into the Music Ventures program, and the time spent on rhythm and timbre activities often demanded continuous creative responses from the teachers and students alike.

Implications for the data displayed above

During an interview, Music Ventures program director Anne Fennell reflected on the purposes and objectives of the music-integrated curriculum as a strategy for encouraging new forms of reflective practice on general symbolic literacy in language arts classrooms:

"I think about how can we build music skills with your children enough so that they can perform other challenges. I want the child to be receiving an authentic and powerful music education in a classroom setting, and I want that to be integrated learning, music standards and other academic standards combined.

"For example, a listening walk can produce a map of sounds that can be described in pictures and words and abstract symbols - the sound of a fan, airplane, the dog. Now you have a musical score, and someone else can be the reader, the conductor, etc.

"Relating sounds to something concrete creates powers of association of sound and symbol. Teachers can create 'listening walls' along with their/word walls, or a letter sound associated with a sound card. How could you associate sound cards with sight words? With math? Associate a music dynamic card with a word?"
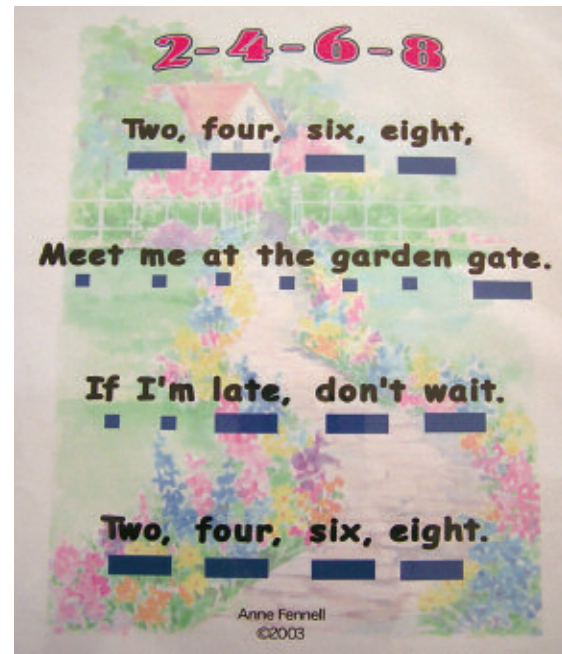
A sample Music Ventures activity sheet that challenges early elementary teachers and students to solve general symbolic literacy problems with multiple symbol systems.

In the Music Ventures program designed by Anne Fennell, students are challenged to connect rhythmic notation with words. In this example, students are grappling with the challenge of syllable accent patterns in words. Children discovered that in the name 'Carissa,' a rhythmic accent in the second syllable was needed.

are that (1) fostering creative responses from learners, from the viewpoint of the teachers, appears to be an important connection to teaching and learning music integration and its relationship with literacy, and (2) the lack of creativity or inquiry in the other variables suggests that the Music Ventures professional development program may need more creative application to pitch, melody, and dynamics to make sure these musical dimensions are connecting more substantially with literacy skill development.

Overall teacher survey results provide evidence for the impact of music-based professional development outcomes for elementary school classroom teachers. Self-evaluation of attitudes and instructor evaluation of skill development shows how teacher attitudes are linked with the acquisition of specific music skills necessary for effective use of music integration lessons focused on literacy. Thus, patterns of significant correlations seen here constitute evidence of professional development outcomes based on the interaction

Figure 10: Display of most significant correlations between Teacher Survey/Skill Ratings and Interview Response Ratings. Among the interview topics 'making connections between music and language literacy' is most relevant to teaching attitudes and skill development. In order to make these connections, teachers feel they rely most on their new 'knowledge of discrete music skills and arts integration standards & approaches,' as well as on their 'knowledge of alternative teaching approaches' such as structured inquiry.

of two independent, yet mutually reinforcing aspects of what it means to understand deeply the nature of symbolic processing skills integrated across two subject areas not usually addressed in public school classrooms.

PATTERNS OF CORRELATION AMONG FACTORS IN THE INTERVIEW AND THE SURVEY DATA

The table in Figure 10 presents a profile of correlation data that compare levels of sophistication of response in an interview setting with teachers' self-evaluations of their familiarity with concepts and skills derived from the survey data. The predominance of non-significant correlations highlights the independence of these two data sources. However, the significant correlations that do exist draw attention to factors relevant to the validity and efficacy of music-integrated instruction in elementary school classrooms:

(1) A significant pattern of correlation exists between 'comfort with music integration classroom management' and level of articulation of 'response to the Music Ventures professional development programs' derived from interview data (top of third column).

The strong link between confidence with classroom management and the ability to articulate and reflect on the goals of the professional development program is a desirable and necessary outcome for the validation of a high quality music integration program in public schools.

(2) The factor of creativity approaches significance in its relationship to understanding of program design and response to professional development sessions and guidance (fourth row from the top). It is important to consider the role of creativity as a measure of understanding when teachers are challenged to adopt new approaches to integrative learning in their classrooms outside the purview of their prior training.

(3) Articulation of the value and utility of professional development experience is tied directly to teacher positive self-evaluation of knowledge and incorporation of arts and music-integrated teaching in their classrooms (third column, third from the bottom). This linkage supports the assertion that professional development outcomes are best evaluated in the results in the classroom.

(4) Furthermore, interview comments on 'making connections between music and literacy' are strongly associated with teacher ratings of knowledge and use of diverse curriculum approaches, gains in discrete musical skills, particularly with regard to pitch, and teachers' knowledge of arts learning standards and approaches.

Differences between One- and Two-Year Teacher Participation in the Music Ventures Program

As shown previously, the impact of the Music Ventures program on the teachers' ability to articulate the principles and practices in interviews is substantial, as is their growing comfort and ability with music integration knowledge and skills on the survey ratings. Yet, judging from the patterns of correlation in the survey and interview data, there are, with one exception, virtually no distinctions between first- and second-year teachers.

Significant Differences in Correlation Between Teacher Survey Response/Skill Evaluation and Teacher Interview Average Scores According to Years Spent in the Music Ventures Program	N.S. = p>.05 *p<.05 ** = p<.01 *** = p<.001	
Paired Variables (Teacher n = 17) Class Performance Data based on n >14 per class)	Teacher in Music Ventures Program for Year 1	Teacher in Music Ventures Program for Year 2
Correlation between Teacher Interview Response Average Score and Teacher Attitude Survey /Skill Rating Average Score	N.S.	.9048**

Figure 11: The pattern of correlation indicates that the amount of time teachers spend participating in the Music Ventures program strongly predicts the degree to which they can articulate their overall understanding of the principles and methods of the music-integrated literacy intervention.

THE QUALITY RATINGS OF CURRICULUM DESIGN, DELIVERY, AND MATERIALS, PLUS STRONG STATISTICAL AND QUALITATIVE EVIDENCE OF ATTAINING SIGNIFICANT TEACHER TRAINING AND PROFESSIONAL DEVELOPMENT OUTCOMES, CAN NOW BE UNDERSTOOD AS DEFINING OPTIMAL CONDITIONS FOR THE IMPLEMENTATION OF MUSIC-INTEGRATED LITERACY INTERVENTION IN K-2 PUBLIC ELEMENTARY SCHOOL CLASSROOMS.

As illustrated in Figure 11, the correlation between interview ratings and survey ratings is non-existent for one-year teachers in the program, while conversely, the correlation between survey and interview ratings for two-year teachers is extremely positive (r=.9048, explaining over 81% of the variance in levels).

This finding indicates that doubling the years of professional development training—perhaps because of refinements added to the program in the second year of implementation—resulted in teachers' ability to demonstrate reflective understanding of the program principles and practices as addressed in the interviews with the teacher survey topic ratings.

Summing Up Teacher Professional Development Outcomes

The evidence presented so far has provided the background information needed to understand how the Music Ventures program can establish replicable conditions for music-integrated instruction and learning. The quality ratings of curriculum design, delivery, and materials, plus strong statistical and qualitative evidence of attaining significant teacher training and professional development outcomes, can now be understood as defining *optimal conditions* for the implementation of music-integrated literacy intervention in K-2 public elementary school classrooms. The curriculum design and demonstration lessons effectively presented teachers with materials and teaching techniques focused on music and music-integrated learning focused on literacy in a way that is user friendly to teachers. Interview and survey data suggest that professional development outcomes were positive for most teachers

in terms of their own expansion of music concepts and discrete musical skills.

Teacher survey data results suggest that those teachers who best understood and supported the Music Ventures program in their classrooms had far more comfort and familiarity with their new understanding of arts learning standards and musical literacy skills than those who did not. From the teachers' viewpoint, learning discrete musical skills and a common vocabulary of arts learning processes and standards are inextricably linked with success in teaching integration strategies or management skills in the Music Ventures program. In sum, classroom teachers appear to agree with the music education specialist who led the program that incorporating and sustaining music-integrated learning into elementary school classrooms requires (a) the focus on specific aspects of symbolic and auditory processing skills shared between music and language literacy, and (b) a rigorous and transformational professional training program to guide that focus.

STEP 3
Analysis of Student Learning Outcomes Within the Separate Domains of Music and Language Literacy Skill Development

Having established assessment profiles for curriculum design, curriculum implementation, and teacher professional training and professional development outcomes, this section of the report now focuses on the analysis of data collected from (1) *music and music-integrated literacy skill assessments* relevant to the experimental music integration program and implemented according to a specific protocol applicable to all Grades K-2, and (2) *a battery of language literacy standardized tests* that capture a comprehensive range of language literacy learning skills in each separate grade level (K, 1, 2).

THE MUSIC LITERACY SKILLS TEST (MLST) METHODOLOGY

Assessment of musical skill development is based on the Music Literacy Skills Tests (MLST) first developed by Larry Scripp

with colleagues from the Research Center for Learning Through Music at New England Conservatory[14]. The MLST is designed to profile a rich array of authentic musical literacy skills suitable for K-5 students. The test items challenge students to invent solutions to problems that rely on multiple modalities and representations of musical perception, performance, and reflective thinking skills. Tasks are separated into rhythm, pitch, and melodic skill areas and challenge students to express their understanding of music with and without the use of symbolic and linguistic processing skills.

The scope and sequence of music literacy assessments closely follow in principle a trajectory of skill development required by pre-professional and professional music training programs[15]. The validity of its application to the evaluation of the Music Ventures project is authenticated by (a) background research studies in early musical symbolic development of preschoolers and early elementary grade level studies[16] and (b) its specific application to early elementary school settings[17].

The Music Literacy Skills Test is divided into a sequence of tasks that pose progressively more complex problems for students to listen, read, perform, compose, and detect errors with regard to rhythm, pitch, pitch interval, and melodic patterns. Each item includes an introductory set of modeled responses that allow students to solve musical problems regardless of their previous or current level of musical training. The Music Ventures adaptation of the test also included parallel tasks [see tasks labeled B in Figure 12] that pose music problems that can be solved with either music or linguistic symbol systems. The experimental protocol was developed through pilot testing of students by both the designer of the test (Larry Scripp) and the field test coordinator (Rod Contreras), who translated the instructions into Spanish as was necessary for EL Learners[18].

All together, 28 music-integrated tasks were sequenced as follows:

All music literacy subskill categories [listed above] were scored according to the same 5-point scale rubric. The rubric system

THE MUSIC LITERACY SKILLS TEST ITEMS	
RHYTHM TASKS	
1A LISTEN: Distinguish beat from rhythm by clapping/tapping pulse with rhythm patterns.	
1B LISTEN: Distinguish beat from rhythm by using words to express pulse with rhythm patterns..	
2A LISTEN/REMEMBER/PERFORM: Clap/tap back rhythm patterns with eyes closed.	
2B LISTEN/REMEMBER/PERFORM: Clap/tap back word rhythm patterns with eyes closed.	
3A READ/PERFORM: Decipher & clap/tap rhythm patterns from abstract symbols.	
3B READ/PERFORM: Decipher & clap/tap rhythm patterns from word/syllable patterns.	
4A READ/LISTEN/CORRECT: Point out and correct errors from reading abstract symbols.	
4B READ/LISTEN/CORRECT: Point out and correct errors from reading word/syllable patterns.	
5A LISTEN/WRITE: Write down dictated rhythmic patterns in abstract symbols.	
5B LISTEN/WRITE: Write down dictated rhythmic patterns in word/syllable patterns.	
6A CREATE/PERFORM/LISTEN/CORRECT: Original clapping/tapping patterns.	
6B CREATE//PERFORM/LISTEN/CORRECT: Match original clap/tapping pattern with words.	
PITCH TASKS	
7A LISTEN/DRAW: Representations of tone color of diverse musical instruments.	
7B LISTEN/DRAW: Representations of sounds of letters, letter patterns.	
8A LISTEN/PERFORM: Sing back pitches sung and played on bells.	
8B LISTEN/PERFORM: Sing back pitches sung with words and played on bells.	
9A LISTEN: Compare pitch intervals sung, played on bells as same/different (going up, going down).	
9B LISTEN: Compare pitch intervals sung with words, as same/different (going up, going down).	
MELODY TASKS	
10A LISTEN/PERFORM: Sing back increasingly long melodic patterns.	
10B LISTEN/PERFORM: Sing back increasingly long melodic patterns with words.	
11.1 COMPOSE/READ/PERFORM: Sing lyrics by changing placement of letters/word patterns.	
11.2A READ/PERFORM: Sing scale degree notes from number patterns on matrix.	
11.2B READ/PERFORM: Sing scale degree notes from word patterns on matrix.	
11.3A READ/PERFORM: From notes in standard notation.	
11.3B READ/PERFORM: From notes and words in standard notation.	
12.1 PERFORM: A favorite song and/or "Row, Row, Row Your Boat" modeled by tester.	
12.2 LISTEN/PERFORM: Learning a short song modeled by the tester.	
13 REFLECTION: Interview questions for reflections/self-assessment problem-solving processes.	

Figure 12: The scope and sequence of 28 Music Literacy Skills Test (MLST) items administered to all K-2 students. Note that B items provide opportunities for students to solve these music literacy skill tasks with words and not just abstract symbols.

THIS PATTERN OF IMPROVEMENT SUGGESTS THE MUSIC LITERACY SKILLS OF THE STUDENTS AT BEAUMONT ELEMENTARY SCHOOL ARE PROGRESSING AT A STATISTICALLY SIGNIFICANT AND SURPRISINGLY STRONG RATE WITHIN ONLY HALF AN ACADEMIC YEAR. THIS FINDING ESTABLISHES THE VALIDITY OF AUTHENTIC SEQUENTIAL MUSIC INSTRUCTION CONTAINED IN THE MUSIC VENTURES CURRICULUM AS THE BASIS FOR FURTHER ANALYSIS OF MUSIC'S INTEGRATION WITH LANGUAGE LITERACY TEACHING AND LEARNING OBJECTIVES.

Matched Pairs
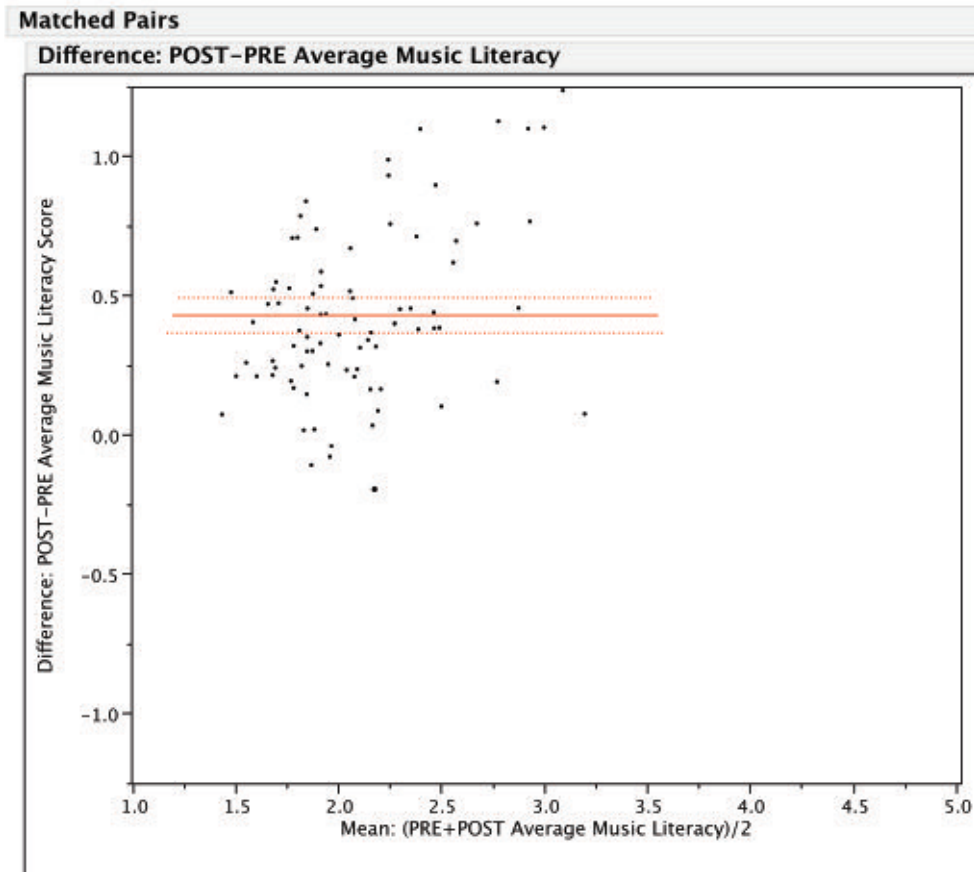**Difference: POST−PRE Average Music Literacy**

Figure 13: This scatterplot displays differences in pre-post Averaged Music Literacy Composite Skill Ratings (within a 5-point scale). These data illustrate statistically significant learning gains of K-2 students in terms of music and music-integrated literacy learning outcomes in the last five months of the Music Ventures project [n = 87; mean gain is .43 out of a 5 point scale; t-ratio + 13.49 p < .0001]. Evidence of significant progress with separate measures of music literacy skills and language literacy skills provides a valid basis for measuring the interaction between these two forms of literacy skill development.

essentially measures consistency of accuracy in the series of increasingly complex performance tasks within each test item. Thus, the whole number ratings represent categorical boundaries ranging from *no response or evidence of understanding of the task to mastery of the tasks*. The decimal ratings in between the whole numbers allowed the testers to score with more reliability within the whole number ratings (see inter-rater reliability ratings below). Testers could adjust the pace of the test, but were monitored carefully to ensure that they scored performance only according to the criteria provided and not with any regard for age or grade level.

Evidence of statistically significant growth in music literacy skill learning for all students

The scatterplot in Figure 13 indicates performance differences in music literacy skill development scores over a five-month period across grades K-2. As the chart demonstrates, the average score gain [the horizontal line on the chart] is close to .5 within a five-point rating scale. This pattern of improvement suggests the music literacy skills of the students at Beaumont Elementary School are progressing at a statistically significant and surprisingly strong rate within only half an academic year. This finding establishes the validity of

authentic sequential music instruction contained in the Music Ventures curriculum as the basis for further analysis of music's integration with language literacy teaching and learning objectives.

Despite relatively small sample sizes in the pre-post cohort, statistically significant learning effects are present at every grade level with both rhythm and pitch tasks, even though rhythm skills outpace pitch skill development at a ratio of almost two-to-one. Categorical differences in student performance (from difficulty responding in simple imitation tasks to achieving appropriate results in problem-solving, notation-based performance tasks) were achieved in this case with no music

instruction except as offered by the Music Ventures activities and centers work demonstrated by Anne Fennell and facilitated by classroom teachers in the professional development program. Thus, results reported here establish that the Music Ventures program met its instructional goal of producing music literacy related music learning outcomes at the Beaumont School, a critical step toward analyzing the relationship between music learning outcomes and language literacy outcomes presented below.

Analyses across all music literacy learning variables revealed that student performance on multi-modal music literacy tasks was positively interrelated regardless of use

Pre-Post Cohort Mean Differences in Music Literacy Skill Score Ratings (5 Point Scale) According to English Only (EO) or English Language (EL) Learner Designation	Pre-Test Mean Score	Post-Test Mean Score	Pre-Post Gains
Grade K EO Learners (n=14)			
Average All Music Literacy Skill Scores	1.63	2.08	0.44***
Average Rhythm Scores	1.69	2.24	0.55***
Average Pitch Scores	1.58	1.96	0.38***
Grade K EL Learners (n=7)			
Average Total Music Literacy Skill Scores	1.58	2.00	0.43**
Average Rhythm Scores	1.63	2.27	0.64***
Average Pitch Scores	1.53	1.79	0.26*
Grade 1 EO Learners (n=21)			
Average All Music Literacy Skill Scores	1.99	2.53	0.54***
Average Rhythm Scores	2.11	2.81	0.69***
Average Pitch Scores	1.86	2.28	0.42**
Grade 1 EL Learners (n=12)			
Average Total Music Literacy Skill Scores	1.72	1.97	0.26***
Average Rhythm Scores	1.83	2.18	0.34***
Average Pitch Scores	1.60	1.81	0.21*
Grade 2 EO Learners (n=17)			
Average All Music Literacy Skill Scores	2.24	2.72	0.48***
Average Rhythm Scores	2.35	3.01	0.65***
Average Pitch Scores	2.12	2.44	0.33**
Grade 2 EL Learners (n=16)			
Average Total Music Literacy Skill Scores	1.83	2.18	0.36***
Average Rhythm Scores	1.97	2.43	0.46***
Average Pitch Scores	1.68	1.96	0.28***

N.S. = p>.05
*p<.05
** = p<.01
*** = p<.001

Figure 14: Charting pre-post ratings of music literacy skill scores shows similar, statistically significant music literacy skill level gains among both English Language (EL) and English Only (EO) Learners at all grade levels, especially with regard to pitch.

or non-use of words or type of symbolic representation. This finding is an important indication that the development of musical language literacy skills across a wide array of musical problem-solving tasks represents a stable and coherent body of musical understanding for all young children regardless of level of formal musical training.

Nonetheless, there is strong evidence for a disparity between English Only and English Language Learners[19] as the Music Ventures program proceeded into its second year (Grades 1-2). The chart presented in Figure 14 indicates that although each grade level improved significantly in the pre-post cohort and the overall difference in achievement can be linked to the years of Music Ventures intervention, there remain important differences between the data for EO and EL Learners. It appears from these data that students struggling with English language speaking skills—although positively engaged and improving in music skill levels at the same rate across grade levels as EO students—are less able to succeed with Music Ventures tasks at the *level of achievement* that EO students demonstrate. Thus, the chart below indicates that music learning outcomes related to the Music Ventures program for both EO and EL learners are similar in kind, but dissimilar in the *degree*, of music learning literacy skill acquisition.

LANGUAGE LITERACY ASSESSMENT INSTRUMENTS

The language literacy skill assessments are of paramount interest to this study because they not only provide contextual data for understanding the level of literacy skill development and progress of the K-2 students at the Beaumont Elementary School, but they also serve as a primary student learning outcome measure needed for exploring links between music and language literacy learning.

At the Beaumont School grade level assessments administered by classroom teachers and reading specialists were made available for comparison with music literacy skill assessments. Unfortunately, many of the grade level

Cross-Grade Literacy Skills Battery:
9 Selected Dynamic Indicators of Basic Early Literacy Skills (DIBELS)[1]/Bader[2] Reading Inventory

Language Literacy Skill	Cognitive Process Base Rank Ordered by Complexity	Source
1. Hear Letter Names	Perception /Identification	Bader
2. Letter Naming Fluency	Decoding Symbols /Performance	DIBELS
3. Initial Sound Fluency	Decoding Symbols /Performance	DIBELS
4. Auditory Discrimination	Perception /Identification	Bader
5. Phoneme Segmentation Fluency	Perception /Identification	DIBELS
6. Nonsense Word Fluency Rate	Decoding Symbols /Performance	DIBELS
7. Oral Read Passage Rate	Decoding Symbols/Performance /Inference	DIBELS
8. Word Use Fluency Rate	Comprehension/Inference	DIBELS
9. Semantic Cloze	Comprehension/Inference	Bader

Figure 15: A team of language literacy specialists created a list of cross-grade early language literacy tasks chosen from the DIBELS and Bader test inventories. This battery of tests helped to measure language literacy skill development for Grades K-2 in parallel with the cross-grade Music Literacy Skills Test administered to all students at the Beaumont School.

Anne Fennell encourages early elementary school students to develop invented representations of letter sounds as part of Music Ventures music-language lessons. In this chart the student employs a wide variety of icons in order to capture differences in the performance of letter sounds. Anne finds that the students' efforts to represent the sounds of letters through iconic representations of lips, animals or words, for example, helps them later on to construct a more stable and concrete understanding of the seemingly arbitrary relationship of sounds to the set of abstract symbols known as the alphabet. Later on, students will create compositions through iconic symbols that can be translated back into letters.

results were flawed in two ways: lack of consistency in sample size within the grade levels and, in some cases, the presence of ceiling effects typical of end-of-year grade level assessments. Thus, in order to create language literacy skill assessments comparable to the assessments used in the Music Ventures program across grade levels, the research team chose to develop a test battery drawn from multiple sources that would best provide measures of basic skills that would be held constant across grade levels[20][see Figure 15]. With the administration of a consistent battery of language literacy assessments, the research team was able to compare as precisely as possible complementary profiles of music and language literacy development at the Beaumont Elementary School. The within-grade level test data were used as a comparison with the cross-grade level results.

CROSS-GRADE LEVEL LANGUAGE LITERACY TEST RESULTS

The DIBELS/Bader Language Literacy Test Inventory provided the cross-grade measure of language literacy skill development outcomes for the Music Ventures program at the Beaumont School. In contrast to the grade level data, all measures—with the exception of 'Hear Letter Names'—were normally distributed, and the sample sizes were robust and consistent across grade levels. Analogous to music literacy skill data displays, the chart in Figure 16 displays comparisons in performance at each grade level for each subskill measured in the DIBELS/Bader Inventory. The asterisks in the English Language Learner (EL cohort) data display also convey which language literacy skills the gap between EO and EL Learners is equal to or less than 10 percentage points.

Several conclusions can be drawn from the data display [Figure 16] above:

At the Beaumont School, improvement in basic language literacy skills occurred in almost every cross-grade level and grade level variable. A great majority of children are, on the average, improving significantly in a large array of specific literacy subskills at the Beaumont Elementary School. The exception to this trend is the variable 'Hear Letter Names' that already 'topped off' by the end of the Kindergarten test[21]. In future studies, the language literacy subskill patterns nearing a ceiling effect could be redesigned or replaced by other variables to include more challenging examples for the upper elementary grade levels.

Similar to the music literacy test results, patterns of significant change in language literacy skill performance suggest that an interaction exists between exposure to the Music Ventures intervention and ongoing instruction in language literacy. In cross-grade analysis of literacy skill development, educators can assume that significant differences should obtain among Grades K-2 due to years of language literacy skill instruction. However, analysis of variance (ANOVA) in these data reveals that significant differences in mean scores on the DIBELS/Bader are more likely to occur between Kindergarten and Grade 1, than between Grade 1 and Grade 2[22]. This finding coincides with the fact that the Kindergarten cohort received only one

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Analysis of Variance of Cross-Grade Language Literacy Tests

DIBELS/Bader Language Literacy Tests by Language Learner Designation	Mean Score Percentiles by Grade Level			ANOVA Alpha=.05 Significant Differences in Levels Separated by Parentheses
	Kindergarten	Grade 1	Grade 2	
All Students				
Hear Letter Names	.82	.87	.90	(K-2)
Letter Naming Fluency	.27	.40	52	(K) (1) (2)
Initial Sound Fluency	.43	.51	.59	(K) (1) (2)
Auditory Discrimination	.76	.87	.92	(K) (1) (2)
Phoneme Segmentation Fluency	.42	.56	.59	(K) (1-2)
Nonsense Word Fluency Rate	.19	.42	.59	(K) (1) (2)
Oral Read Passage Rate	.05	.17	.26	(K) (1) (2)
Word Use Fluency Rate	.32	.53	.56	(K) (1-2)
Semantic Cloze	.74	.82	.89	(K) (1) (2)
Average DIBELS/Bader Score	.45	.58	.64	(K) (1) (2)
English Only Learners (EO Cohort)				
Hear Letter Names	.82	.93	.94	(K) (1-2)
Letter Naming Fluency	.33	.50	.61	(K) (1) (2)
Initial Sound Fluency	.50	.58	.63	(K) (1-2)
Auditory Discrimination	.78	.89	.95	(K) (1-2)
Phoneme Segmentation Fluency	.47	.57	.63	(K) (1-2)
Nonsense Word Fluency Rate	.22	.46	.59	(K) (1) (2)
Oral Read Passage Rate	.06	.20	.29	(K) (1) (2)
Word Use Fluency Rate	.37	.59	.61	(K) (1-2)
Semantic Cloze	.86	.88	.92	(K-2)
Average DIBELS/Bader Score	.49	.63	.67	(K) (1-2)
English Language Learners (EL Cohort)				
Hear Letter Names	.78**	.84*	.85*	(K-2)
Letter Naming Fluency	.15	.24	.41	(K) (1) (2)
Initial Sound Fluency	.31	.42	.54*	(K) (1) (2)
Auditory Discrimination	.72*	.83*	.89*	(K) (1-2)
Phoneme Segmentation Fluency	.32	.53**	.55**	(K) (1) (2)
Nonsense Word Fluency Rate	.15*	.36*	.60**	(K) (1) (2)
Oral Read Passage Rate	.03**	.14*	.22*	(K) (1) (2)
Word Use Fluency Rate	.23	.46	.51*	(K) (1) (2)
Semantic Cloze	.52	.72	.84*	(K) (1) (2)
Average DIBELS/Bader Score	.36	.50	.60*	(K) (1) (2)

*Gap equal or less than 10 Pct. Points between EO and EL Cohorts
**equal or less than 5 Pct. Points
N.B. Subskills measured by 'rate' or 'fluency' are calibrated by lowest and highest performance in K-2. Outliers have not been exclu[ded]

Figure 16: Comparisons of DIBELS/Bader Language Literacy Inventory test results show that students in the Music Ventures project demonstrate statistically significant differences in language literacy subskill scores across most grade levels. Analysis of the data reveals that EL Learners narrow the gap in language literacy skills by the third grade (see asterisks in the lowest section of the table).

STEP 4
Analysis of the Relationship Between Music and Language Literacy Skill Outcomes

year's exposure to the Music Ventures program, while students in Grade 1 and 2 both received the same two-year exposure. In future studies, if evidence of more significant differences between second- and third-year language literacy occurs, then these changes could be traced to increased incidence in integrated music literacy skill based on the Music Ventures program.

There is evidence that the initial gap between English Only (EO) Learners and English Language (EL) Learners is closing by Grade 2. When comparing performance data between EO and EL student cohorts, we should not be surprised that there are significant differences especially in the first two years of language instruction (Kindergarten and first grade). However, the asterisks in the EL cohort indicate that, over time, the gap between the EL Learners and the EO Learners is closing, especially with regard to the Phoneme Segmentation tasks – tasks clearly designated for explicit reinforcement in the Music Ventures curriculum [see foot-

PATTERNS OF SIGNIFICANT CHANGE IN LANGUAGE LITERACY SKILL PERFORMANCE SUGGEST THAT AN INTERACTION EXISTS BETWEEN EXPOSURE TO THE MUSIC VENTURES INTERVENTION AND ONGOING INSTRUCTION IN LANGUAGE LITERACY.

notes in Figure 16]. The average DIBELS/Bader Inventory score is clearly closing to within 10 percentile points by Grade 2. Particularly encouraging to Beaumont teachers are indications that the Oral Reading Passage Rate gap between EO and EL learners has not increased throughout the K-2 grades. As we shall see below, the Music Ventures program may be linked with this finding as we test for the relationships between music and language literacy skill outcomes over time.

So far we have determined that statistically significant evidence of skill development has taken place within the domains of music and language literacy. Findings of strong patterns of prediction across domain literacy variables in this step of the analysis will bring important implications into the purview of this study. These implications can be divided into four main inquiry questions and their corresponding points of evidence needed for schools to decide to replicate innovative music integration programs in their schools:

THERE IS BROAD AND HIGHLY SIGNIFICANT STATISTICAL EVIDENCE THAT THE LEVEL OF MUSIC AND MUSIC-INTEGRATED LITERACY SKILLS IS POSITIVELY LINKED WITH A BROAD BATTERY OF INDICATORS OF LANGUAGE LITERACY SKILLS

Figure 17: This scatterplot maps the relationship between (y axis) language literacy skill performance (percent accuracy/fluency rate) based on DIBELS/Bader Test Inventories and (x axis) the Music Literacy Skill Test ratings (averaged within a 5-point scale) administered to all students at the Beaumont Elementary School [n=344]. These data illustrate the strong positive link [r=.59] between music and language literacy skills in the context of the Music Ventures music integration program [r2=.35; ANOVA F-ratio = 184.20 p <.0001].

INQUIRY 1

To what extent does the overall level of student music skill learning predict success in early elementary school language literacy skill development?

Music-Language Literacy Finding 1: **There is broad and highly significant statistical evidence that the level of music and music-integrated literacy skills is positively linked with a broad battery of indicators of language literacy skills.**

In the scatterplot in Figure 17, the pattern of overall performance outcomes in language literacy skills is fitted against overall music literacy skill outcomes from data collected from 344 students more or less equally distributed across three grade levels. The literacy skill data is based on the percentage of correct responses from a battery of tests chosen from the DIBELS/Bader inventories, and the music literacy skill data is calibrated to a 5-point scale rubric (both described earlier). As described earlier, the same music test and the same language tests were given to all K-2 students.

The scatterplot reveals a general look at the positive and statistically significant link
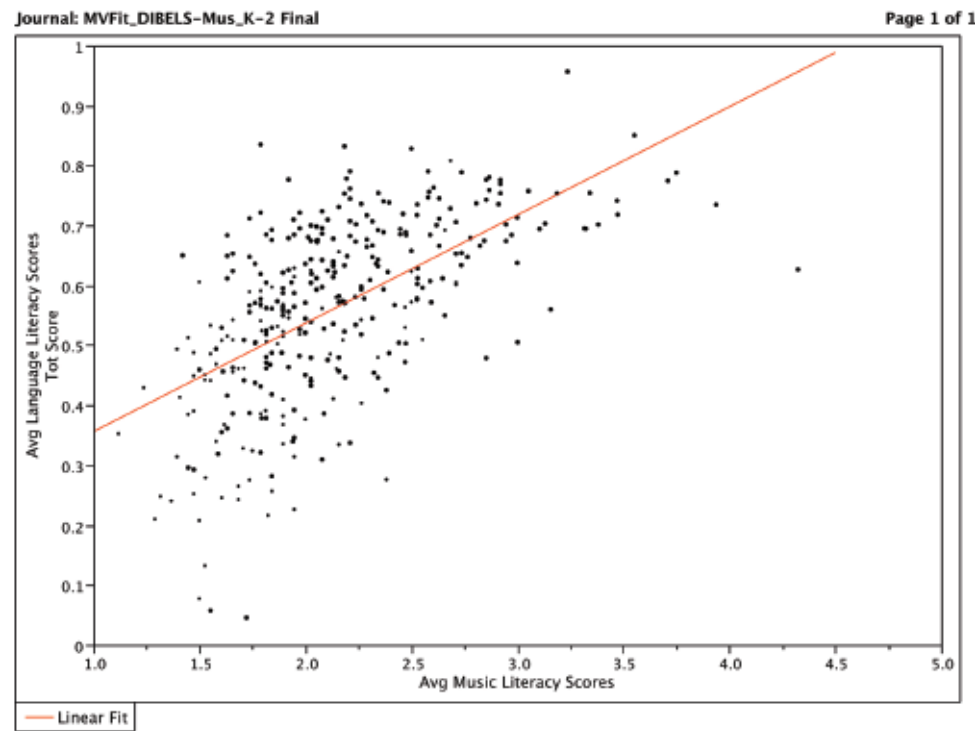
(F-ratio = 184.20 p <.0001) between music and language literacy skills for most K-2 students participating in the Music Ventures program. Regardless of grade level, the preponderance of students who achieve high levels of accuracy or fluency in various measures of music literacy skills after one or two years of the Music Ventures program are more likely to be able to demonstrate high levels of language literacy skill development. Conversely, those students unable to perform well on music literacy tasks are more likely not to perform well on language literacy tasks. The shape of the data points suggests a strong (yet far from a one-to-one) correlation between the two domains of literacy skills. That is, the correlation explains approximately 35%, (r2=.35) and not 100% of the overall variance between music and language literacy skill performance.

The results displayed in the chart [Figure 17] are crucial to the determination of a

strong and positive relationship between music and language literacy skill development. The interpretation of these results warrants one or more of the following conclusions:

(1) the level of music literacy skill development resulting from an intervention predicts performance on language literacy tests;

(2) the simultaneous and positive interaction of music and language literacy instruction is mutually beneficial to both domains of study; and/or

(3) evidence of correlations between literacy skill development, from the point of view of the conceptual framework of music-integrated learning identified here, is consistent with the notion that there are basic fundamental literacy skills shared between music and language literacy, yet they are not identical skill sets.

In addition, the shape of the data indicates again that concepts and processes intrinsic to both music and language literacy are mutually reinforcing in that the correlation appears to get tighter as music literacy skills improve. Thus, in the context of teaching for transfer across literacy skill domains, as literacy skill in music develops, it becomes increasingly linked to skill development in language literacy skills.

INQUIRY 2

To what extent do the separate patterns of literacy development in music and language—and the interaction between music and language literacy development—differ between English Only Learners and English Language Learners?

Music-Language Literacy Finding 2: **There is substantial evidence that the pattern and sequence of music literacy skill development and its correlation with language literacy skills differs considerably between English Only (EO) Learners and English Language (EL) Learners, providing further insight into the nature of music-integrated learning and its interaction with language literacy skill development.**

As described earlier, all K-2 students were given a test for musical literacy and two different test batteries for language literacy skills. The table in Figure 18 provides more detail than the previous chart by displaying the relationship between three composite music literacy skill scores (overall average, rhythm, and pitch literacy skill scores) and overall scores from two language test batteries according to the designation of the language learner (EO or EL) and grade level. The chart also provides an index of the correlation between the within-grade and cross-grade language literacy test batteries for both EO and EL Learners in Grades K-2.

In addition, the two independent measures of language literacy skill development reveal the striking difference in the pattern of correlation between music and language literacy skills depending on the learner designation (EO or EL), the grade level of the student, and the type of language literacy tests administered.

Significant Correlations Among Music Literacy Composite Skills and Two Language Literacy Test Batteries by English Only (EO) Learners & English Language (EL) Learners	N.S. = p>.05 *p<.05 ** = p<.01 *** = p<.001	
Cross-Grade Music Literacy Skills Test Scores	*Within-Grade Language Literacy Average Scores*	*Across-Grade DIBELS/Bader Average Scores*
Grade K *English Only (EO) Learners*		
Average Total Music Literacy Score	.4022**	.4507***
Average Rhythm Score	.4140***	.5097***
Average Pitch Score	.3399**	.3388***
Within Grade Language Literacy Average Scores	-	.6674***
Grade K *English Language (EL) Learners*		
Average Total Music Literacy Score	N.S.	N.S.
Average Rhythm Score	N.S.	N.S.
Average Pitch Score	N.S.	N.S.
Within Grade Language Literacy Average Scores	-	N.S.
Grade 1 *English Only (EO) Learners*		
Average Total Music Literacy Score	.4289***	.5562***
Average Rhythm Score	.3687**	.4970***
Average Pitch Score	.4065***	.5588***
Within Grade Language Literacy Average Scores	-	.4977***
Grade 1 *English Language (EL) Learners*		
Average Total Music Literacy Score	N.S.	.3647**
Average Rhythm Score	N.S.	.5285***
Average Pitch Score	N.S.	N.S.
Within Grade Language Literacy Average Scores	-	N.S.
Grade 2 *English Only (EO) Learners*		
Average Total Music Literacy Score	N.S.	.4785***
Average Rhythm Score	.2118*	.4521***
Average Pitch Score	N.S.	.4053***
Within Grade Language Literacy Average Scores	-	.4188***
Grade 2 *English Language (EL) Learners*		
Average Total Music Literacy Score	N.S.	.4182**
Average Rhythm Score	N.S.	.3778**
Average Pitch Score	N.S.	.2934*
Within Grade Language Literacy Average Scores	-	N.S.

Figure 18: The pattern of significant correlations between (a) music literacy composite skills and (b) two different language literacy test batteries. Results displayed in the table suggest that the DIBELS/Bader battery is far more related to music literacy subskills than the grade level benchmarked tests, especially for EL Learners.

In general, it appears that English Only (EO) Learners' music literacy performance assessments are much more likely to be correlated to within-grade language literacy skill assessments (Figure 18, *column 2*) than are English Language (EL) Learners' assessments. This finding indicates that the connection between music and language literacy skill tasks supported by the Music Ventures program is clearer to students more experienced with speaking English proficiently than those who are learning English in school.

However, a closer examination of the cross-

grade language literacy skill [Figure 18, *column 3*] outcomes tells a different story. That is, when tests are administered more consistently and the tasks are held constant across grade levels, we are able to see EL Learners closing the 'correlation gap' [see the fourth row in italics at the bottom of each grade level] with EO Learners as the grade level progresses. Whereas analysis of the cross-grade DIBELS/Bader inventories administered by the research field team discerned the increasingly strong relationship between music and language literacy skill development over time for EL Learners, analysis of the grade level literacy tests

Anne Fennell's professional development program embeds the interplay of rhythm and speech, expression and melody, and vowels and tone color, in simple tasks that are engaging to classroom teachers and children alike. As one participant describes it,

"Anne had us look about four lines of a poem and think about how these words suggested sound imagery. At first no one seemed to understand what that could possibly mean. It was intimidating at first, because the first reaction to her questions was that words already have sounds. Teachers demonstrate the phonemes of words all the time in our classes, how they combine or how they can be segmented. But we had never thought that these sounds had color or texture or sense of melody to them that would bring to mind a certain imagery or character of the words. Little by little, through guided inquiry and our gradual willingness to open up our collective imagination, we were able to match the words with sounds and perform what we thought was a tone poem. By the end of this exhaustive yet stimulating process, we clapped loudly at our creativity and our success of making music with words!"

During the completion of this task, moments of shared inquiry between the guide and the teachers became more and more frequent. At one point, Anne Fennell asked the participants what they thought about doing this activity with their children, and one teacher replied, "I see now that rhythmic speech is so important – it's about fluidity [and] tracking, and with special needs children, the rhythm just isn't there."

The key role Anne Fennell played during the professional development session was to demonstrate to the participants how to adapt the difficulty and pace of each task. In fact, the effectiveness with which she dealt with the teachers' initial embarrassment as they struggled with the tasks modeled how the teachers could include all children in the music-integrated learning.

Of particular interest to teachers was the relationship between the quality of focus and pace of the activities. Soon they all discovered that the increased pace of the tasks didn't suggest less accuracy in performance, but rather a measure of more focused engagement with the materials:

"The activity seemed to go carefully and quickly at the same time. I think this happens because we seem to be doing so many things at once when we combine music with words or instruments, and we have to figure out ways to invent and perform our musical performance maps."

Anne Fennell's demonstration lessons illustrate the translation of speech into rhythm and the setting of text to rhythm as a guided inquiry into the music composition process. Later on, the tasks can be focused on accent, dynamics, and melodic contour.

administered by the school did not. Without giving the same test across grade levels and insisting on standardized administrative procedures with high levels of inter-rater reliability, these findings would have remained undetected.

Also of note are differences in the correlation between the two language test batteries that at first depended on the age and orientation of the language learner. Although English Only (EO) student performance on both language literacy tests were highly correlated, English Language (EL) Learners' test performance on the two language literacy tests were not. This finding indicates that for EL students, performance on one set of literacy skill tests did not predict performance on the other, thus revealing a lack of an initial understanding of the literacy connections between music and language arts. Thus, in this study the cross-grade adaptation of the DIBELS/Bader inventories appear to be an appropriate tool for capturing literacy skills in relation to music. This is because as EL Learners' language literacy skills improve, the language literacy tests of highly specific subskills held constant across grade levels are more likely to reveal connections with similarly configured music literacy subskills as they develop for any population of students.

Finally, breaking down the assessment of

Differences Between English Only Learners and English Language Learners in terms of Mean Test Score Gains and Correlations Between Tests of Music and Cross-Grade Language Literacy Skill Development												NS = p>.05 * = p<.05 ** = p<.01 *** = p<.001
	Music Literacy Skill (MLST) Mean Scores (5 Point Rating Scale Average Score)		Percent Gains (from previous grade level)		DIBELS /Bader Language Literacy Skill Mean Scores (Pct. Accuracy /Fluency Average Rating)		Percent Gains (from previous grade level)		Significant Correlations Between Music and Language Literacy Skills		Percent Gains (from previous grade level)	
Grade K (1 year of MV)	Mean Scores	Diff	Gain	Diff	Mean Scores	Diff	Gain	Diff	Mean Scores	Diff	Gain	Diff
English Only (EO) Learners	1.91	-		-	.49	-		-	.4507***	-		-
English Language (EL) Learners	1.73	-		-	.36	-		-	N.S.	-		-
Differential Between EO and EL Learners		0.18		-		.13		-		∞		-
Grade 1 (2 years of MV)												
English Only (EO) Learners	2.33		22%		.63		29%		.5562***		23%	
English Language (EL) Learners	2.02		17%		.50		39%		.3647**		∞	
Differential Between EO and EL Learners		0.31		5%		.13		-10%		.1915		∞
Grade 2[1] (2 years of MV)												
English Only (EO) Learners	2.48		6%[1]		.67		6%		.4785***		-16%	
English Language (EL) Learners	2.12		5%[1]		.60		20%		.4182**		15%	
Differential Between EO and EL Learners		0.36		1%		.07		-14%		.0603		-31%

Figure V-24: Data display of differences between English Only Learners and English Language Learners in terms of both mean test score gains and correlations between tests of music and language literacy skill development by grade level and by association with either one or two years of the Music Ventures curriculum and professional development intervention.

[1] Because the Music Ventures program was only in place for two years and Grades 1 and 2 received the same duration of exposure to the Music Ventures curriculum, it is reasonable to assume that Grade 2 gains in music literacy skills would be greater overall after three years of exposure and that the gap between English Only and English Language Learners might be further reduced.

Figure 19: Data display of differences by grade level between EO Learners and EL Learners in terms of both mean score gains and correlations between tests of music and language literacy skill development. Note that differences in the degree of correlation between the literacy tests in music and language with respect to EO and EL Learners narrows over time (column 6-7, 10-11, Grades 1 and 2).

musical literacy skills into rhythm and pitch skills reveals that both types of music skills are associated with the overall music literacy skill development in terms of their correlation with language literacy skill development. Thus, the combination of rhythm and pitch tasks in classroom lessons appears to reinforce a common understanding between overall music and language literacy skill processes.

Music-Language Literacy Finding 3: **Further analysis of differences in patterns of correlation between music and language literacy skill development according to the designation of language learner indicates that the gap between EO and EL Learners is closing according to their grade level progress.**

The second table in this section [Figure 19] summarizes grade level differences between English Only Learners and English Language Learners (column 1) in terms of:

(1) **mean scores** and **gain scores** resulting from Music Literacy Skill Tests (columns 2-3);

(2) **mean scores** and **gain scores** resulting from DIBELS/Bader measures of language literacy skill development (columns 4-5);

(3) measures of correlation and gains in the correlations between the music and language literacy skill tests (columns 6-7); and

(4) **the differential between EO and EL Learners**[23] (the third row under each grade level).

More detailed analysis of the data display above can be organized in three ways:

(1) **Music Literacy Mean Scores Show No Significant Gap in the Rate of Improvement Over Time Between EL and EO Learners.** At first, the mean scores resulting from Music Literacy Skill Tests (column 2) indicate that, as reported earlier, a gap exists between English Only (EO) and English Language (EL) Learners throughout the two years of the Music Ventures program in all three grade levels. However, there is no significant difference in the rate of gains between EO and EL Learners in terms of music skill development across grade levels (column 4).

(2) **Language Literacy Mean Scores Indicate that the Achievement Gap Between English Only Learners and English Language Learners is Narrowing Significantly According to Grade Level.** In Kindergarten, the difference in accuracy or fluency of language literacy subskills is 13%, whereas by Grade 3 the difference is reduced to 7% (column 7). Furthermore, the rate of gain for English Language Learners significantly outpaces the English Only Learners (by 10% from K to Grade 1; by 14% from Grade 1 to Grade 2) (column 9). This chart confirms that, in the context of the Music Ventures program music literacy outcomes, the patterns of improvement in language literacy skill development favor EL Learners as they narrow the gap between the initial differences with EO Learners over time.

(3) **The Patterns of Correlation Between Music and Language Literacy Mean Scores Point Toward Significantly Stronger Relationships Between These Two Domains of Symbolic Literacy with Every Advancing Grade Level.** In Kindergarten, significant correlations between music and language only exist for English Only Learners. Later on, the gap between EL and EO Learners in the

A Comparison of Correlations between Music Literacy Skill Test Scores and Two Types of Language Literacy Skill Test Inventories			N.S. = p>.05 *p<.05 ** = p<.01 *** = p<.001
	Correlation between *Music Literacy Skill* and *Grade Level* Language Literacy Test Scores	Correlation between *Music Literacy Skill* and *Cross-Grade* DIBELS/Bader Language Literacy Test Scores	Correlation between *Grade Level* Literacy and *Cross-Grade* DIBELS/Bader Language Literacy Test Scores
All Students			
Grade K	.3791***	.4683***	.6093***
Grade 1	.3040**	.5874***	.4858***
Grade 2	N.S.	.4785***	N.S.
English Only Learners			
Grade K	.4022***	.4507***	.6674***
Grade 1	.4289***	.5562***	.4977***
Grade 2	.4211***	.4101***	.4188***
English Language Learners			
Grade K	N.S.	N.S.	N.S.
Grade 1	N.S.	.3647**	N.S.
Grade 2	N.S.	.4182**	N.S.

Figure 20: A comparison of statistically significant correlations between music literacy skill outcomes and two types of language literacy skill outcomes suggests striking differences in the pattern of correlation between EL and EO Learners. For EO Learners all tests are intercorrelated, whereas for EL Learners these tests are not significantly linked, except for the connection between music literacy skills and the DIBELS/Bader in Grades 1 and 2 (third column, last two rows). Note that overall, results from the Music Literacy Skill Test correlate more highly with the DIBELS test scores than results from the DIBELS test score correlate with the grade specific language literacy tests.

THESE FINDINGS ARE CONSISTENT WITH THE PREMISE OF THE MUSIC VENTURES PROGRAM THAT INEXTRICABLE COMMONALITIES BETWEEN MUSIC AND LANGUAGE LITERACY ARE MUTUALLY REINFORCED THROUGH 'TEACHING FOR TRANSFER' IN EARLY ELEMENTARY GRADES.

'degree of correlation' between music and language literacy skills is reduced significantly between Grade 1 and Grade 2 (columns 11, 13).

These three findings provide evidence for the positive *interaction* between music and language skill development over time for both English Only and English Language Learning K-2 students. These findings are consistent with the premise of the Music Ventures program that inextricable commonalities between music and language literacy are mutually reinforced through 'teaching for transfer' in early elementary grades. Keeping measures of music and language literacy constant across three grade levels, results in this study indicate that as both language and music skill increase, the relationship between these skills grows stronger and the gap narrows between EO and EL Learners progressively over time. Taking into account that the Music Ventures program was only implemented for two years at the Beaumont

School, we may project with some confidence that these effects would be even greater with ongoing Music Ventures instruction.

Furthermore, the results shown in the table below suggest the possibility that language and music literacy skill outcomes are linked more strongly to each other than the two measures of literacy within the domain of language arts, especially for English Language Learners [Figure 20].

Considering student outcomes for 'all students', for example, the correlation between music and the DIBELS/Bader Inventory is very strong across Grades K-1. By Grade 2, however, the two Grade level tests in language literacy appear to be unrelated to the music literacy skill outcomes.

When looking at the breakdown of scores by English Only (EO) and English Language (EL) Learners, we see that the lack of correlation between language and music literacy skills primarily is linked to the initial disadvantage of those students who come to school not speaking English. That is, the statistically significant correlation between musical and language literacy skills for EO Learners is delayed until Grades 1 and 2 (and only apparent with respect to the DIBELS/Bader assessments). This deferred correlation can stand as proxy for the belated understanding of fundamental concepts and processes shared between these two domains by English Language Learners. Thankfully, the gap between the EL and EO students is narrowed completely after participating in the Music Ventures program for two years. Unfortunately for the English Language (EL) Learners, however, this determination would have gone undetected by conventional testing practices that include neither a longitudinal music literacy skills assessment nor a cross-grade language literacy skill test designed to measure basic concepts shared between these two domains.

INQUIRY 3

To what extent do particular music literacy subskills predict overall language literacy skill development over time? To what extent do particular language literacy subskills predict overall music literacy skill development over time?

In this study, stepwise regression techniques[24] were employed to determine which specific factors best fit with overall patterns of music and language literacy skill development. A progression of findings based regression data displays are listed below.

Regression Analysis Finding 1: **Analysis of the data as a whole (all K-2 students at once) reveals that the notation-based rhythm tasks best predict overall early language literacy skill development.**

Considering the K-2 population as a whole, stepwise regression of the aggregate data reveals that the level of rhythm literacy skill performance is the primary predictive factor of language literacy skill development [Figure 21, column 2]. Furthermore, it is the composite rhythm notation tasks (averaged across reading, dictation, and error detection), and not non-notational rhythm tasks (finding the beat, repeating clapping patterns) that best predict overall language literacy development for all students.

In addition, the data displayed below demonstrate that rhythm literacy performance emerges as the skill set most highly associated with early language literacy development, especially for EL students. This was expected, as prior musical cognitive development research in young children's representations of music has shown that rhythm skills most often precede those that involve pitch in terms of performance, perception, and reflective thinking skills.[24] The later emergence of pitch is due to the added complexity of adding a second cognitive dimension to rhythm. That is, pitch tasks inevitably involve the rhythmic aspects of the timing and ordering, whereas rhythm tasks need not engage pitch aspects whatsoever.

Regression Analysis Finding 2: **Analysis of music literacy skill outcome data according to grade level suggests a developmental view of music's literacy skill link with overall language literacy skill achievement.**

Findings distilled from the display in Figure 22 indicate that

(1) notation-based and linguistic-integrated

Most Significant Regression Factors Fitted Between 11 Music Literacy Composite Skills and DIBELS/Bader Early Literacy Averaged Total Outcomes by All Grade Levels and by Language Learner Designation			N.S. = p>.05 * = p<.05 ** = p<.001 *** = p<.001
11 Music Literacy Composite Skill Test Scores	DIBELS/Bader Average Language Literacy Score Goodness of Fit (F Ratio)		
	ALL STUDENTS	English Only (EO) Learners	English Language (EL) Learners
Grade K -2			
1. Total Average Music Literacy Skills	N.S.	N.S.	N.S.
2. Average Total Rhythm	N.S.	N.S.	N.S.
3. Average Rhythm without Words	N.S.	N.S.	N.S.
4. Average Rhythm with Words	6.049**	115.562***	N.S.
5. Average Rhythm without Notation	N.S.	N.S.	N.S.
6. Average Rhythm with Notation	6.574**	55.630***	N.S.
7. Average Total Pitch	N.S.	N.S.	N.S.
8. Average Pitch without Words	N.S.	N.S.	N.S.
9. Average Pitch with Words	N.S.	N.S.	N.S.
10. Average Pitch without Notation	N.S.	N.S.	N.S.
11. Average Pitch with Notation	N.S.	N.S.	N.S.

Figure 21: This table identifies significant regression variables fitted between music literacy composite skills and overall DIBELS/Bader Language Literacy Test outcomes when combining all grade levels (K-2). In this calculation it appears that music rhythm literacy skills best predict language literacy skill achievement, especially for EO students (music skill factors 4 and 6).

At the Empresa School, the 'Music Center' is a corner of the second grade classroom where students can choose one or two of a large variety of percussion instruments to perform rhythm pattern sequences posted on the wall or written on scrolls stored in plastic folders. Children are also challenged to explore 'multiple ways' of coding rhythms, dynamics, or the contours of word or letter pronunciation through inventive use of large and small dots, question marks, exclamation points, and periods.

rhythm tasks are the most present language literacy predictors across the progression of grade levels for all students;

(2) pitch literacy skill, with and without notation skills, emerges as a significant, though less predictive measure for language literacy for all students across all grade levels; and

(3) by the first grade, the presence or absence of words affects the predictive value of rhythm literacy skills according to the language learning designation of the students.

The first finding based on grade level analysis [Figure 22, column 2-4, rows 3,4,6 all grades] confirms rhythm to be the most present language literacy predictor across the progression of grade levels for all learners. However, the presence of pitch as a predictor for language skill development for All Learners [column 2, rows 10-11, the second finding, suggests that pitch literacy skills also can provide a significant link with language literacy skills in later grade levels.

The third finding indicates that the ability to integrate words into the rhythmic task responses becomes more predictive of general language literacy skills over time for EO Learners (Grades 1-2). From a developmental perspective, it appears the EO Learners have already understood the connection of rhythm to word segmentation as a concept shared between the two domains of literacy. For English Language (EL) Learners, however, the rhythm tasks without words best predict a strong association with English language literacy skill development in Grades 1-2, suggesting that an understanding of underlying principles of rhythmic literacy skills themselves (segmentation, grouping, parts and whole) is overall a better early predictor of language literacy skill development than the initial ability to employ word reading skills while performing rhythm tasks.

As EL Learners gain proficiency in English by Grade 2, the ability to integrate rhythm skills *with words* is most highly predictive of Grade 2 language literacy skills when looking at the data based on all students averaged together [Figure 22, column 2, Grade 2, row 4]. Based on the relatively delayed level of

Significant Regression Variables Fitted Between Modes of Task Response Music Literacy Composite Skills and Overall DIBELS/Bader Language Literacy Test Outcomes within Grade Levels			N.S. = p>.05 *p<.05 ** = p<.01 *** = p<.001
11 Music Literacy Composite Test Scores	DIBELS/Bader Average Language Literacy Score Goodness of Fit (F Ratio)		
	ALL STUDENTS	English Only (EO) Learners	English Language (EL) Learners
Grade K			
1. Total Average Music Literacy Skills	N.S.	N.S.	N.S.
2. Average Total Rhythm	N.S.	N.S.	N.S.
3. Average Rhythm without Words	N.S.	N.S.	N.S.
4. Average Rhythm with Words	N.S.	N.S.	N.S.
5. Average Rhythm without Notation	N.S.	N.S.	N.S.
6. Average Rhythm with Notation	20.400***	17.864***	N.S.
7. Average Total Pitch	N.S.	N.S.	N.S.
8. Average Pitch without Words	N.S.	N.S.	N.S.
9. Average Pitch with Words	N.S.	N.S.	N.S.
10. Average Pitch without Notation	N.S.	N.S.	N.S.
11. Average Pitch with Notation	3.922*	N.S.	N.S.
Grade 1			
1. Total Average Music Literacy Skills	N.S.	N.S.	N.S.
2. Average Total Rhythm	N.S.	N.S.	N.S.
3. Average Rhythm without Words	N.S.	N.S.	16.546***
4. Average Rhythm with Words	N.S.	7.617**	N.S.
5. Average Rhythm without Notation	N.S.	N.S.	N.S.
6. Average Rhythm with Notation	N.S.	N.S.	N.S.
7. Average Total Pitch	N.S.	N.S.	N.S.
8. Average Pitch without Words	N.S.	N.S.	N.S.
9. Average Pitch with Words	N.S.	N.S.	N.S.
10. Average Pitch without Notation	4.891*	N.S.	N.S.
11. Average Pitch with Notation	6.198**	N.S.	N.S.
Grade 2			
1. Total Average Music Literacy Skills	N.S.	N.S.	N.S.
2. Average Total Rhythm	N.S.	N.S.	N.S.
3. Average Rhythm without Words	N.S.	N.S.	11.725***
4. Average Rhythm with Words	18.100***	4.787*	N.S.
5. Average Rhythm without Notation	N.S.	N.S.	N.S.
6. Average Rhythm with Notation	N.S.	N.S.	N.S.
7. Average Total Pitch	N.S.	N.S.	N.S.
8. Average Pitch without Words	N.S.	N.S.	N.S.
9. Average Pitch with Words	N.S.	N.S.	N.S.
10. Average Pitch without Notation	3.967*	N.S.	N.S.
11. Average Pitch with Notation	N.S.	N.S.	N.S.

Figure 22: Significant regression variables fitted between music literacy composite skills and overall DIBELS/Bader Language Literacy Test outcomes are displayed at each grade level. This more fine-grained analysis detects a shift toward "Rhythm Integrated with Words" as a major predictor of language literacy skills for EO Learners.

music and language literacy skill performance for English Language Learners, we can conclude that the difference in the ability to integrate words with music can be seen as developmentally ordered.

Regression Analysis Finding 3: **Grade Level Analysis of music literacy subskill learning outcomes suggests that the increasing level of complexity of specific music literacy tasks responses predicts overall language literacy outcomes.**

The stepwise regression of discrete music literacy subskill outcomes fitted to overall measures of language literacy test scores provides a more detailed view of the developmental aspects of the fit between music and language literacy skill learning trajectories over time [Figure 23].

When paring down the analysis to discrete rather than composite or averaged music literacy task performance in Kindergarten, for example, there are no major predictors

Most Significant Regression Factors Fitted Between 11 Discrete Music Literacy Skill Tasks and overall DIBELS/Bader Early Literacy Skill Outcomes by Language Learning Designation			N.S. = p>.05 *p<.05 ** = p<.01 *** = p<.001
11 Music Literacy Subskill Test Scores	DIBELS/Bader Average Language Literacy Score Goodness of Fit (F Ratio)		
	ALL STUDENTS	English Only (EO) Learners	English Language (EL) Learners
Grade K			
1) *Echo Clap (non-notation)*	N.S.	N.S.	N.S.
2) *Find Beat and Rhythm (non-notation)*	N.S.	N.S.	N.S.
3) *Read Rhythm Patterns*	N.S.	N.S.	N.S.
4) *Write Down Performed Rhythm Patterns*	N.S.	N.S.	N.S.
5) *Rhythm Reading Error Detection*	N.S.	N.S.	N.S.
6) *Match Pitch (non-notation)*	N.S.	N.S.	N.S.
7) *Compare Pitch Interval Patterns (non-notation)*	N.S.	N.S.	N.S.
8) *Sing Progressively Longer Melodies (non-notation)*	N.S.	N.S.	N.S.
9) *Sing/Error Detect Pitch Patterns w Numbers/Matrix*	N.S.	N.S.	N.S.
10) *Sing/Error Detect Pitch Patterns w Word Patterns*	N.S.	N.S.	4.350*
11) *Sing/Error Detect From Standard Notation*	N.S.	N.S.	N.S.
Grade 1			
1) *Echo Clap (non-notation)*	N.S.	N.S.	N.S.
2) *Find Beat and Rhythm (non-notation)*	N.S.	N.S.	N.S.
3) *Read Rhythm Patterns*	3.997*	8.879**	N.S.
4) *Write Down Performed Rhythm Patterns*	N.S.	N.S.	8.566**
5) *Rhythm Reading Error Detection*	4.599*	N.S.	N.S.
6) *Match Pitch (non-notation)*	N.S.	N.S.	N.S.
7) *Compare Pitch Interval Patterns (non-notation)*	N.S.	N.S.	N.S.
8) *Sing Progressively Longer Melodies (non-notation)*	N.S.	N.S.	N.S.
9) *Sing/Error Detect Pitch Patterns w Numbers/Matrix*	N.S.	N.S.	N.S.
10) *Sing/Error Detect Pitch Patterns w Word Patterns*	5.618*	N.S.	5.254*
11) *Sing/Error Detect From Standard Notation*	N.S.	N.S.	N.S.
Grade 2			
1) *Echo Clap (non-notation)*	N.S.	8.086**	N.S.
2) *Find Beat and Rhythm (non-notation)*	N.S.	N.S.	N.S.
3) *Read Rhythm Patterns*	N.S.	5.159*	N.S.
4) *Write Down Performed Rhythm Patterns*	N.S.	N.S.	N.S.
5) *Rhythm Reading Error Detection*	4.049*	N.S.	14.572***
6) *Match Pitch (non-notation)*	N.S.	N.S.	N.S.
7) *Compare Pitch Interval Patterns (non-notation)*	N.S.	N.S.	N.S.
8) *Sing Progressively Longer Melodies (non-notation)*	N.S.	N.S.	N.S.
9) *Sing/Error Detect Pitch Patterns w Numbers/Matrix*	N.S.	7.648**	N.S.
10) *Sing/Error Detect Pitch Patterns w Word Patterns*	N.S.	N.S.	N.S.
11) *Sing/Error Detect From Standard Notation*	7.415**	8.206**	N.S.

Figure 23: The display captures a progression of discrete music literacy subskill variables as they become more predictive of overall levels of language literacy skill development across Grades K-2. According to this chart, a shift occurs by the end of first grade as strong associations between music and language literacy increase with the improved performance on both music and language literacy tasks.

of language literacy skill development for all students. In Kindergarten, no one music subskill predicts language literacy development more than another. Later on, however, several strong indicators of interaction between discrete musical task outcomes and language literacy skill development emerge that provide a new window onto the developmental order of integrated skill learning.

The music literacy tasks were structured in their order of sophistication and coordination of problem-solving skills needed to solve the pitch or rhythm problems posed. In light of the development order of the music tasks in terms of complexity, the chart below suggests also that as discrete music literacy skills grow in complexity, they emerge as strong predictors of lan-

guage literacy outcomes as students progress through grade levels.

In the chart displayed here, we find, for example, that reading or writing rhythm patterns [Figure 23, Skills 3-4] or the ability to detect deviations from the rhythm notation [Skill 5] are more predictive of overall language literacy skills in later grades than simply being able to find the beat or clap back rhythms 'by ear.' Likewise, the ability to sightsing and spot errors in the performance of notated pitch patterns [Skills 5, 9-11] is more predictive than the ability to match pitch or sing melodies without notation. Thus, the ability to work with diverse kinds of musical symbol systems at a high level of cognitive complexity—reading notation and spotting errors in performance at the same time—emerges as the significant connection point between music and language literacy skill development in Grades 1-2.

Besides affirming the general trends of predictive factors for music for all students, differences between the student cohorts in the chart reveal a surprising degree of task sensitivity for English Language (EL) Learners that did not surface in the averaged or composite variables [Figure 23, column 4]. For example, the integration of words and numbers with singing pitch patterns [Skill 10] surfaced as a significant task predictor for language literacy skill development for Grade K-1 EL students. These data also revealed for the first time the possibility that purely performance data, such as clapping back increasingly complex rhythm patterns for EO Learners, may signal new associations for music and literacy once earlier associations with language are ironed out [column 3, Grade 2, Skill 1]. Overall, these fine-grained differences between English Only and English Language Learners suggest the value of being alert to different entry points into the process of understanding of music's connection to language literacy.

Regression Analysis Finding 4: **Analysis of the data as a whole (all K-2 students at once) reveals that the language subskill tasks most analogous with music literacy skills best predict overall early music literacy skill development.**

Incorporating music integration teaching and learning into the elementary school classroom requires establishing a classroom culture of performance as evidence of understanding. In demonstration lesson sessions, teachers see that students are challenged constantly to demonstrate performance understanding of both new elements of the lesson plan and its synthesis with previous instruction. In the centers activities, students made 'xylophone or clapping' pieces using varied long/short patterns learned in the previous lesson. In effect, the demonstration lesson shows that students do not just experience music integration concepts in a linear fashion; rather, there is constant 'play' in the system as children learn to explore musical literacy concepts in the language literacy classroom.

Anne and a collaborating classroom teacher encourage the students to compose rhythm instruments with new cards for rests, musical silence, to be interspersed with long-short rhythm patterns. Later on, students explain their compositions to their classmates and teachers and then perform them.

Most Significant Regression Factors Fitted Between 9 DIBELS/Bader Early Literacy Subskills and Overall Averaged Total Music Literacy Composite Score Outcomes Across Grade Levels and by Language Learner Designation			N.S. = p>.05 *p<.05 ** = p<.01 *** = p<.001
9 DIBELS/Bader Subskills *Language Literacy Test Scores*	Average Music Literacy Skill Test Score Goodness of Fit (F Ratio)		
	ALL STUDENTS	English Only (EO) Learners	English Language (EL) Learners
Grade K - 2			
1) Hear Letter Names	N.S.	N.S.	N.S.
2) Letter Naming Fluency	N.S.	N.S.	N.S.
3) Initial Sound Fluency	N.S.	N.S.	N.S.
4) Auditory Discrimination	7.129**	4.257*	8.755**
5) Phoneme Segmentation Fluency	6.249**	6.201**	9.346**
6) Nonsense Word Fluency Rate	N.S.	N.S.	N.S.
7) Oral Read Passage Rate	33.412***	55.587***	10.246**
8) Word Use Fluency Rate	N.S.	N.S.	N.S.
9) Semantic Cloze	N.S.	N.S.	N.S.

Figure 24: The analysis of factors fitted between 9 DIBELS/Bader early literacy subskills and averaged music literacy outcomes across combined grade levels suggests that the abilities to discriminate beginnings and endings of words, to parse syllables, and to read passages are most aligned with overall music reading skill.

Given the 'interactionist' or 'two-way learning transfer' view of the music integration learning outcomes described in the introduction of this study, the analysis of student outcomes would be incomplete without probing the predictive power of discrete language literacy subskill variables on music literacy development. Questions rarely, if ever, addressed in public schools yet investigated in this study include: What language literacy subskills most contribute to overall music literacy skill development?

To what extent do the language skills most predictive of musical skills resemble skills required for musical literacy skill processes?

The investigation of this 'reverse' causal link analysis is demonstrated in the chart in Figure 24. Considering all grade levels at once, stepwise regression of the aggregate data reveals that for all K-2 learners, auditory discrimination, phoneme fluency, and oral reading rates are most closely linked with overall music literacy skill development [Figure 24; Skills 4,6,7]. This finding is an important affirmation of the premise of the Music Ventures curriculum and professional development program — i.e., that it is primarily these processing skills that music best reinforces in integrated instruction. The connection between auditory discrimination and pitch timbre discrimination is stressed in professional development music-integration sessions and classroom tasks. Phoneme segmentation and rhythmic division of beats are constantly in play, as students in class and in learning center activities are challenged to set text to music. Critical reading and dictation of rhythm passages are constantly featured in demonstration and follow-up

Most Significant Regression Factors Fitted Between 9 DIBELS/Bader Early Literacy Subskills and Averaged Overall Music Literacy Test Outcomes by Language Learner Designation Across Grade Levels			N.S. = p>.05 *p<.05 ** = p<.01 *** = p<.001
9 DIBELS/Bader Subskill *Language Literacy Test Scores*	Average Music Literacy Skill Test Score Goodness of Fit (F Ratio)		
	ALL STUDENTS	English Only (EO) Learners	English Language (EL) Learners
Grade K			
1) Hear Letter Names	N.S.	N.S.	N.S.
2) Letter Naming Fluency	N.S.	N.S.	N.S.
3) Initial Sound Fluency	N.S.	N.S.	N.S.
4) Auditory Discrimination	7.254**	N.S.	8.936**
5) Phoneme Segmentation Fluency	4.508*	N.S.	6.183*
6) Nonsense Word Fluency Rate	N.S.	N.S.	N.S.
7) Oral Read Passage Rate	7.139**	6.175*	N.S.
8) Word Use Fluency Rate	N.S.	N.S.	N.S.
9) Semantic Cloze	N.S.	N.S.	N.S.
Grade 1			
1) Hear Letter Names	N.S.	N.S.	N.S.
2) Letter Naming Fluency	N.S.	N.S.	N.S.
3) Initial Sound Fluency	N.S.	N.S.	N.S.
4) Auditory Discrimination	N.S.	N.S.	N.S.
5) Phoneme Segmentation Fluency	N.S.	N.S.	N.S.
6) Nonsense Word Fluency Rate	N.S.	N.S.	N.S.
7) Oral Read Passage Rate	16.291***	11.625***	5.773**
8) Word Use Fluency Rate	8.389**	10.414**	N.S.
9) Semantic Cloze	N.S.	N.S.	N.S.
Grade 2			
1) Hear Letter Names	N.S.	N.S.	N.S.
2) Letter Naming Fluency	N.S.	N.S.	N.S.
3) Initial Sound Fluency	N.S.	N.S.	N.S.
4) Auditory Discrimination	N.S.	N.S.	N.S.
5) Phoneme Segmentation Fluency	N.S.	4.185*	4.283*
6) Nonsense Word Fluency Rate	N.S.	N.S.	N.S.
7) Oral Read Passage Rate	5.512*	11.823***	N.S.
8) Word Use Fluency Rate	N.S.	N.S.	N.S.
9) Semantic Cloze	N.S.	N.S.	4.892*

Figure 25: Grade level analysis determining the most significant regression factors fitted between 9 DIBELS/Bader early literacy subskills and averaged music literacy outcomes suggests that, as grade level progresses, correlations between music and language literacy task results differ according to the level of sophistication of the literacy tasks.

analyzed as a whole population regardless of grade level or language learner designation. The chart in Figure 25 suggests that a focus on grade level language literacy skill development provides a much clearer view of the developmental links between discrete measures of language and overall music literacy skill development. Grade by grade, the predictive linguistic factors of phoneme segmentation, auditory discrimination, and oral reading tasks predict overall music literacy skills according to a progression of growing cognitive complexity for all students [Figure 25; Skills 5-7].

Figure 25 suggests that Kindergarten students in the first year of the Music Ventures program have a very different understanding of the fit of literacy skills with music literacy task performance than students in Grades 1-2. In Kindergarten, all students are more apt to understand the music tasks in terms of pre-reading skills having to do with auditory perception skills and phoneme segmentation fluency [Figure 25, K, Column 2, Skills 4-5]. From the perspective of the Music Ventures curriculum and professional development program, phoneme segmentation and auditory discrimination in language literacy draw upon analogous musical skills of rhythmic understanding (beat segmentation, groupings) and pitch awareness (discrimination of auditory and phonemic qualities of instrumental and vocal melodic patterns). For all students in Grade 1 and 2 [Column 2, Skills 7-8], the relatively higher level of sophistication required for oral reading and semantic fluency tasks are linked with overall music literacy skill processes.

For English Only Learners, the most constant predictor of music literacy scores across the progression of oral reading skills is oral reading proficiency. It is as if the more literate English Only Learners can already make the connection between general oral reading and music literacy skills in Kindergarten, while the English Language Learners are connected to music reading tasks through language pre-reading skills; only later on in first grade do EL Learners shift their attention to the more comprehensive aspects of reading. This delay in making higher order language literacy connections to music processes appears to be synchronous with EL students' lower mean scores

lessons sequenced throughout the Music Ventures curriculum. Language literacy tasks not as linked across literacy domains — word list fluency and semantic cloze, for example — do not show up here as major predictors of understanding of music literacy tasks.

Thus, the regression analysis of Grades K-2 as a whole provides a first draft picture of the primary links between discrete language literacy subskills and overall level of music literacy skill achievement. Evidence of these relationships is consistent with the

premise that fundamental concepts and processes shared between language and music literacy account for their mutual reinforcement in the context of music and music-integrated teaching and learning.

Regression Analysis Finding 5: **Grade level analysis of language literacy subskill learning outcomes suggests that a developmental progression of a cognitive complexity of the language literacy tasks best predict overall music literacy outcomes.**

In the previous analysis, Grades K-2 were

and weaker patterns of correlation reported earlier, especially as indicated in Grades K-1.

The analysis of differences between types of literacy learners provides diagnostic value for the Music Ventures program for determining differentiated forms of language literacy instruction. For example, the data presented above suggest that teachers implementing music/language literacy interventions in the future would do well to differentiate instruction for English Language Learners by 'teaching for transfer' between auditory discrimination and phoneme segmentation skills before expecting the students to understand the connection between reading oral passages and solving music literacy skill tasks.

INQUIRY 4

What is the relationship between Music Ventures professional development outcomes and classroom student performance? Do classroom student learning outcomes reveal significant differences in the degree of integration between language and music literacy skill development?

The final inquiry concerns the possible influence of teacher professional development outcomes with student learning outcomes in music and language literacy. For the most part, the questions raised in this inquiry require either a much more precise measure of differences among teachers or a much larger sample size than was available in this study. Whereas nearly the entire population of K-2 students provided a large enough sample size to determine significant differences in most of the results presented here[25], the maximum sample size for classroom performance data analysis was 16. Thus, most comparisons between teacher professional development outcomes and their classroom outcomes were statistically insignificant, either due to the lack of statistical power and effect size of the teacher outcomes, or to the fact that no such relationship existed in the Music Ventures program.

Nonetheless, the individual classroom profiles of the relationships between language and music literacy skill tests provide an

Classroom Profile of Correlation of Music Literacy Skill Scores and DIBELS/Bader Language Literacy Scores by Language Learner Majority Designation			N.S. = p>.05 *p<.05 ** = p<.01 *** = p<.001 ****p<.0001	
Classroom Designated as Primarily English Only (EO) Learners or English Language (EL) Learners	Correlation Between Music Literacy Skills and Grade Level Language Literacy Test Scores	Correlation Between Music Literacy Skills and DIBELS/Bader Language Literacy Test Scores	Correlation Between Grade Level and DIBELS/Bader Cross Grade Language Literacy Test Scores	Majority of Designated Learners (EO or EL)
Grade K				
Class A (n=32)	.3719*	.4705**	.7195****	EO
Class B (n=29)	N.S.	N.S.	N.S.	EL
Class C (n=31)	.3717*	.5350***	.5573***	EO
Grade 1				
Class A (n=18)	.8316****	.7012***	.6887**	EO
Class B (n=18)	.5170*	.4686*	.4781*	EO
Class C (n=12)	N.S.	.4576*	N.S.	EL
Class D (n=18)	N.S.	N.S.	N.S.	EO
Class E (n=20)	N.S.	N.S.	N.S.	EL
Class F (n=20)	.5051*	.4816*	.6255**	EO
Grade 2				
Class A (n=15)	N.S.	.6293**	.6484**	EL
Class B (n=16)	N.S.	N.S.	N.S.	EL
Class C (n=17)	N.S.	N.S.	.5686*	EL
Class D (n=17)	.7558***	.5915**	.6814**	EO
Class E (n=20)	N.S.	N.S.	.7118***	EO
Class F (n=19)	N.S.	N.S.	.7195****	EO

Figure 26: Data display of differences by grade level between EO Learners and EL Learners in terms of both mean score gains and correlations between tests of music and language literacy skill development. Note that differences in the degree of correlation between the literacy tests in music and language with respect to EO and EL Learners narrows over time (column 6-7, 10-11, Grades 1 and 2).

intriguing glimpse of differences between classroom performance with respect to the music-integrated goals of the Music Ventures project. In Figure 26, we can determine the following general trend: *English Language (EL) Learner classrooms are less likely to demonstrate high correlations among the music and language literacy student performance outcomes.* This finding corroborates grade level analysis reported previously.

Regression Analysis Finding 6: **Difference in the Degree of Correlation between Music and Language Literacy Skill Development in 'Classroom by Classroom' Analysis Represents Qualitatively Different Levels of Integrated Learning and Teaching.**

From the point of view of music-integrated learning outcomes, Figure 26 indicates that despite broad, school-wide evidence of

strong correlations between music and language literacy outcomes, there are highly significant differences in individual classroom performance. 'Kindergarten classroom C,' 'Grade 1 classroom A,' and 'Grade 2 classroom D' illustrate extremely strong relationships among all forms of literacy, indicating a very high standard for integrated understanding of multiple literacies supported by the Music Ventures curriculum and professional development program. Other classrooms register no statistical evidence of music literacy learning connections with language literacy. Some English Language Learner (EL) classes register high correlations among literacy scores, and some do not.

The chart in Figure 27 summarizes how teacher classroom performance can be categorized according to the relative strength and significance of correlation between (1) the

Music and classroom teachers often worry about the validity of music-integrated teaching in their classroom and centers activities. Anne Fennell's demonstration lessons in the teachers' classrooms illustrate how music literacy skills can be taught and reinforced by teachers both for the sake of the skills themselves and for the purpose of their integration with language literacy concepts and processes. After one demonstration lesson, Anne was asked to differentiate between teaching a music lesson at Beaumont from the approach she takes when she teaches at the Vista Academy Magnet School for the Arts.

> "There really is no difference. I teach my professional development lessons to the teachers and the demonstration lessons to the children the same way I would if I were teaching at the Academy. The difference here is that it is collaborative teaching and the emphasis is on integration. But, in order to teach music integration, you have to teach music authentically by focusing on processes – listening, performing, reading, and writing – that also can be seen by the classroom teachers as connected to the teaching of language literacy as well."

Anne Fennell working with group composition processes with language literacy challenged children. After observing this lesson, Rodney Goldenberg, former Principal of the Vista Arts Academy and now Principal of the Empresa Elementary School in Oceanside, comments that "To understand the potential for music-integrated learning in public schools for all students, parents and educators need to see to what extent literacy challenged students challenge themselves through music reading exercises in the Music Ventures program."

grade level and the cross-grade level language literacy test results, and (2) music literacy test results and language literacy test results from both types of language literacy tests.

The categorization of individual classroom performance from this chart can be understood as four types of profiles:

(1) Top Left: HIGH correlations between two different language literacy tests and HIGH correlation between music and language literacy.

[This category suggests that literacy skills in both domains (music and language) are predictive, integrated, and mutually reinforcing.]

(2) Bottom Left: HIGH correlations between two language literacy tests and a LOW (non-significant) correlation between music and language literacy.

A Profile of Classroom Performance Profiles Organized by Four Categories of Correlation Among Language and Music Literacy Test Scores		Correlation between Both Language Literacy Tests	
		High*	Low
Correlation between Music and Language Literacy Tests	High*	K: A, C; Grade 1: A, B, F Grade 2: A, D	Grade 1: C
	Low	Grade 2: C, E, F	K: B; Grade 1: D, E Grade 2: B

*Statistically significant correlations p<.05}

Figure 27: A comparison of statistically significant correlations between music literacy skill outcomes and two types of language literacy skill outcomes suggests striking differences in the pattern of correlation between EL and EO Learners. For EO Learners all tests are intercorrelated, whereas for EL Learners these tests are not significantly linked, except for the connection between music literacy skills and the DIBELS/Bader in Grades 1 and 2 (third column, last two rows). Note that overall, results from the Music Literacy Skill Test correlate more highly with the DIBELS test scores than results from the DIBELS test score correlate with the grade specific language literacy tests.

[This category suggests that literacy skills are cohesive and stable within the domain of language yet are not related to, integrated with, or predictive of music literacy skill development.]

(3) Top Right: LOW (non-significant) correlations between the two language literacy tests and a HIGH correlation between music and language literacy.

[This category suggests that two measures of language literacy skills are unstable and unpredictive of one another, yet are related to, integrated with, and predictive of music literacy skill development.]

(4) Bottom Right: LOW (non-significant) correlations between the two language literacy tests and LOW (non-significant) correlation between music and language literacy.

[This category suggests that two measures of language literacy skills are unstable and unpredictive of one another, and that language and music literacy skill development are not related to, integrated with, or predictive of each other.]

Many questions are raised through the profile analysis [Figures 26-27] of the relationship between two domains of literacy learning in the early elementary school classroom. Why are there enormous differences in correlations between music and language literacy learning among classrooms? Is there a connection between teacher attitudes, skills, professional training or professional development outcomes that may account for these discrepancies? Do indications of 'high correlation' in learning result from particular 'teaching for transfer' strategies, skills, or attitudes of the teacher? Given the choice, under what conditions would administrators, teachers, and parents prefer that students understand literacy through the integration of both music and language literacy instruction?

The significant differences in levels of integration derived from the student outcomes reported here are relevant to future measures of school accountability. Rather than holding school communities accountable

only to standards of language literacy achievement or improvement, the results from student music and language literacy tests suggest that communities can responsibly choose to invest in high standards of music-integrated literacy teaching and learning for the benefit of all students. Not only can classroom teachers use music-integrated literacy instruction to reinforce language literacy concepts and processes in their classrooms, but music teachers can use language literacy skills to gain insight into the development of music literacy skills. Students ultimately benefit from a far deeper and multi-dimensional understanding of general symbolic literacy skills through music's intersections with language skill development.

The high quality professional development and rigorous assessments of multiple literacies across grade levels as demonstrated in this study strongly suggest that we can expect 'teaching for transfer' across dual forms of literacy systems to emerge as an important alternative to the more narrow forms of instruction that may be failing to engage many of our public school students today. Based on the results of this study, more field research will be needed to refine the implementation of programs similar to the Music Ventures program before proceeding forward with district-wide implementation, particularly in the area of (a) teacher professional development outcomes and their relation to classroom performance; (b) longitudinal research on the stages of literacy skill development for both EO and EL Learners;

(c) the collection and rigorous assessment of music-integrated literacy work samples; and (d) the creation of music-integrated literacy skill interventions designed to maximize opportunities for English Language Learners who need to overcome their delay in language literacy skill development.

SUMMARY AND IMPLICATIONS

SUMMARY AND IMPLICATIONS OF THE PROGRAM RESULTS IN RELATION TO THE GUIDING RESEARCH QUESTIONS

(1) *What is the nature and impact of music literacy skill instruction and learning when it is integrated into the K-2 core language arts curriculum?*

The results from the Music Ventures program provide evidence for a compelling model of music- and language-integrated literacy teaching and learning. This model is based on the premise that music and language literacy skill development depends on the growing understanding of fundamental skills and processes shared between these two domains of symbolic literacy. Although the representation, meaning, and modalities of expression are commonly thought to be different between music and language literacy in public schools today, the Music

Ventures curriculum and professional development program broadened awareness of language literacy skill achievement at the Beaumont Elementary School to include concepts shared with music literacy skill development.

From this theoretical perspective, results from patterns of correlation and from regression analyses of student learning outcomes constitute evidence that the integration of music and language learning literacy instruction involves shared understanding of fundamental concepts and processes such as

- **analogous elements of literacy** (notes/intervals/melodies analogous to letters/words/sentences; sung and spoken phonemes; phrases and passages; compositions and stories, etc.);

- **parallel decoding processes** (analogous translation of discrete symbol to sound, sound to symbol, segmentation, grouping of sounds, etc.);

- **auditory perception discrimination skills** (discrimination of vocal and instrumental timbre/articulation of sound analogous to discrimination of vowels/consonants, sound segmentation, pattern recognition, error detection); and

- **internalization of literacy processes** (silent hearing of music analogous to silent comprehension of text).

The study also points out that the success of music's integration with language literacy skill development is dependent on emerging literacy skill expertise that can be measured and interpreted as an understanding of interdisciplinary cognition through analogous concepts and processes developed in both domains. In the Music Ventures program, teachers and students can take advantage of music learning as an alternative model of literacy skill development that offers a unique contribution to a broader and deeper view of general symbol literacy.

(2) *To what extent do classroom teachers understand and support the nature of music and music-integrated learning and its connections to the K-2 language arts curriculum in the context of the Music Ventures professional development program?*

Evidence of pre-post professional development outcomes suggests that teachers can draw on their growing comfort and familiarity with musical literacy skills and their prior extensive knowledge of language literacy teaching to understand and support the integration of these subject areas in their classroom practice. Of particular interest are the

relatively strong gains in teacher knowledge of diverse teaching methods and their relationship to arts standards. This finding confirms that the teachers improved most in their field of primary expertise, knowledge of teaching, and its connection to the arts and music. What is particularly germane to the validity of the Music Ventures intervention is that these teachers significantly improved their knowledge of discrete musical skills and their confidence in using these skills to complement literacy instruction, a result crucial to determining the effectiveness of the professional development program.

Analysis of professional development outcomes also indicates that persuading experienced classroom teachers to invest in the Music Ventures program requires a carefully crafted, user-friendly curriculum and considerable guidance from music educators before conventional literacy instruction practices can be enhanced through music. Differentiated modes of literacy teaching and learning is the process by which the Music Ventures program defines and makes discrete musical skills available for use by the classroom language teacher. Through a period of guided investigation, general symbolic literacy skills become understood as concepts and processes that can be synthesized into literacy processes grounded by the encoding and decoding of symbols shared between music and language. Thus, phonemic awareness, auditory discrimination, sound segmentation, syntax, form, oral reading comprehension — and their counterparts in music literacy skill development — are all examples of a *graduated scale of cognitive processes* that can become more richly understood when defined both linguistically and musically in literacy instruction. In the Music Ventures program, music literacy skills function as 'cognates' for deeper understanding of language, and vice versa, linguistic skills become cognates for a large range of musical capacities.

(3) *To what extent can a school that previously had limited access to formal music instruction use the Music Ventures program as a way to document evidence of authentic and developmentally appropriate levels of learning in music for all students?*

Results from this study show that the

ANALYSIS OF PROFESSIONAL DEVELOPMENT OUTCOMES ALSO INDICATES THAT PERSUADING EXPERIENCED CLASSROOM TEACHERS TO INVEST IN THE MUSIC VENTURES PROGRAM REQUIRES A CAREFULLY CRAFTED, USER-FRIENDLY CURRICULUM AND CONSIDERABLE GUIDANCE FROM MUSIC EDUCATORS BEFORE CONVENTIONAL LITERACY INSTRUCTION PRACTICES CAN BE ENHANCED THROUGH MUSIC.

RESULTS FROM THIS STUDY REVEAL THAT AS THE LEVEL OF MUSIC LITERACY SKILL LEARNING INCREASES, IT MORE LIKELY PREDICTS THE LEVEL OF LANGUAGE LITERACY ACHIEVEMENT OVER TIME, ESPECIALLY FOR EO STUDENTS AT FIRST, AND LATER ON FOR EL LEARNERS. THUS, CLOSING THE GAP BETWEEN EO AND EL LEARNERS IN THE CONTEXT OF A MUSIC-INTEGRATED LITERACY PROGRAM IS DEPENDENT ON THE POSITIVE INTERACTION OF SKILLS IN BOTH MUSIC AND LANGUAGE LEARNING.

Music Ventures curriculum and professional development program succeeds in providing a music-integrated language literacy intervention as an effective strategy for fostering authentic and developmentally appropriate music and language literacy skills for all students. The alignment of the Music Ventures program with national standards of teaching literacy skills is possible in this context because (a) the curriculum is modeled and supported by a highly qualified music and music integration professional development specialist; (b) the curriculum is geared toward teaching fundamental concepts shared between both music and language literacy skills; and (c) most classroom teachers were willing to take the time to become familiar and comfortable with arts learning standards, inquiry-based teaching methods, creativity strategies, music integration 'teaching for transfer' techniques, and, most importantly, the personal acquisition of discrete musical literacy skills in order to incorporate music effectively into their classroom language literacy instruction.

(4) *To what extent does the level of student music literacy skill learning correlate with measures of language literacy skills? Are there specific subskill variables in music literacy outcomes that best predict overall language literacy development?*

Are there specific subskill outcomes in language literacy that best predict overall music literacy development?

From the point of view of this study, music's contribution to language literacy skills in schools depended on support for and evidence of music literacy skill development for its own sake. Of critical importance, therefore, was the determination of positive pre-post gains in ratings for musical rhythm and pitch literacy skills for all students within all grade levels that indicated substantial music literacy skill learning had taken place in the context of the Music Ventures program. Positive interrelationships among a diverse set of music and language literacy skills represented additional substantive and cohesive measures of musical understanding related to the Music Ventures program.

Strong and pervasive evidence for the statistical connection between music and language literacy skill development was crucial to the validation of the music-integrated model of general symbolic literacy. Thus, evidence of strong patterns of correlation between music and language literacy skill variables across grade levels for all students becomes a necessary, if not sufficient, validation for the incorporation of music-integrated literacy programs into the core elementary school curriculum.

Determining which music subskills best predict overall language literacy skill development *and* which language skills best predict overall music literacy development is critical to the application of this study toward diagnosing cross-domain literacy skill problems and providing targeted interventions designed to address those problems.

Detailed results from regression analysis of *music literacy skill outcomes* revealed that (a) the notation-based rhythm tasks best predict overall early language literacy skill development in the context of the Music Ventures program, and (b) the level of complexity of the music literacy tasks predicts overall language literacy outcomes according to grade level. Thus, notation-rich and cognitively challenging music reading, writing, and error detection skills are most likely to predict overall language literacy skill development in later grade levels.

Detailed results from the regression analysis of language literacy skill outcomes revealed that the language tasks most analogous to music literacy best predict overall music literacy skill development. That is, phoneme segmentation and auditory perception skills were most clearly linked with music development in the early grades, and the association of oral reading skills was best matched to the more advanced aspects of music literacy processes in later grades. What is not linked as closely across literacy domains — word list fluency and semantic cloze tasks, for example — proved not to predict skilled performance of music literacy tasks at any grade level.

Overall, results from patterns of correlation and regression analysis provide a much clearer view of the developmental links between discrete measures of language and overall music literacy skill development. Grade by grade, the emergent order of early language literacy skill development is matched closely with the progression of growing cognitive complexities of musical skill development.

(5) *Are there significant differences between the way the Music Ventures program impacts English Language (EL) Learners and English Only (EO) Learners?*

This study reveals that the pattern and
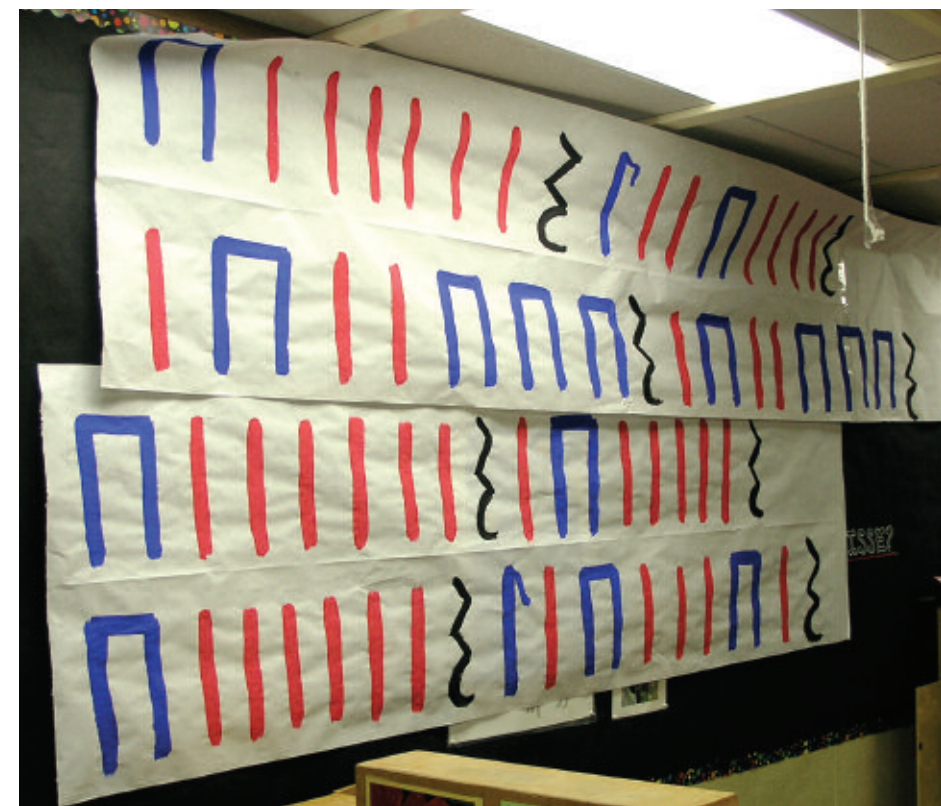
At Empresa Elementary in Oceanside, CA, a MIENC Learning Laboratory School, students are challenged to read rhythm patterns displayed on the walls of the classroom. As students progress, they can perform larger and larger segments of the entire rhythmic composition, both individually and in groups.

sequence of music literacy skill development and its correlation with language literacy skills differs considerably between English Only (EO) Learners and English Language (EL) Learners for music and language literacy skill development, a disparity that provides further insight into the nature of music-integrated learning and its interaction with language literacy skill development.

Analysis of music literacy test results, for example, provides extensive evidence that EL Learners are more likely at first to lag behind EO Learners in their musical literacy skill achievement, although both cohorts improve to a similar extent over time. The difference in music literacy performance outcomes became germane to this study because it demonstrated to participants in this project that the literacy skill challenge for EL students in music, much like the challenge they face in English language literacy, is a matter of establishing a cohesive and interrelated understanding of the symbol systems. That

is, students delayed in their development of formal knowledge of literacy skills in English are initially less likely to understand relationships among musical literacy skills as well.

Yet results from this study reveal that as the level of music literacy skill learning increases, it more likely predicts the level of language literacy achievement over time, especially for EO students at first, and later on for EL Learners. Thus, closing the gap between EO and EL Learners in the context of a music-integrated literacy program is dependent on the positive interaction of skills in both music and language learning. For students initially limited in their English language skills, there will be a delay in the measurable impact associated with music integration. This deferred correlation can now be understood as evidence for the belated understanding of fundamental concepts and processes shared between these two domains by EL Learners.

TEACHER PROFESSIONAL DEVELOPMENT IN THE AREAS OF MUSIC-INTEGRATED TEACHING OR 'TEACHING FOR TRANSFER' STRATEGIES APPLIED TO MUSIC LITERACY MAY ESTABLISH NEW STANDARDS OF ACCOUNTABILITY FOR MUSIC-INTEGRATED INSTRUCTION IN PUBLIC SCHOOLS IN THE FUTURE.

Fortunately, results from the Music Ventures reported here indicate that substantial progress toward closing the gap between the learning cohorts is achieved by the second grade. In future studies, therefore, researchers should look more closely at when, how, and under what conditions music integration strategies can help EL learners close the literacy gap sooner. Based on information from this study, teachers implementing music/language literacy interventions in the future would do well to target differentiated instruction for EL Learners toward 'teaching for transfer' between music notation tasks and auditory discrimination or phoneme segmentation skills before expecting the students to make the connection between reading oral passages and solving music literacy skill tasks.

(6) *In what ways does the level of classroom teachers' response to professional development sessions predict evidence of music learning and its integration into the language arts curriculum?*

Results from this study indicate that the

personal and classroom incorporation of music literacy skills into literacy instruction practices are crucial factors for the validity and the replicability of a high quality music-integrated literacy intervention. Yet ratings of teacher attitudes and success with music integration were highly variable according to evidence of their attitudes and comfort with music literacy skills revealed in teacher surveys and interviews. Unfortunately the small sample size of teacher data most likely prevented any determination of a significant relationship between professional development outcomes and classroom performance.

There were, however, statistically significant differences among individual teachers in terms of classroom performance as measured by 'degrees of correlation' between music and language arts learning. Although it was found that EO classrooms generally demonstrate a higher 'degree of correlation' between music and language literacy skills, nonetheless there were instances of extraordinary evidence of integrated learning in individual classrooms with a relatively low percentage of EL students. Thus, teacher professional development in the areas of music-integrated teaching or 'teaching for transfer' strategies applied to music literacy may

establish new standards of accountability for music-integrated instruction in public schools in the future.

FURTHER IMPLICATIONS FOR RESEARCH AND POLICY IN THE FIELD OF MUSIC-INTEGRATED LEARNING

The importance and practical significance of the Music Ventures music integration program in the final analysis will be judged by its contribution to the fields of music and general education research and policy. From this perspective, we will discuss several major implications of the Music Ventures study.

New Research Methodologies

This case study demonstrates the effectiveness of more comprehensive research methodologies needed to explore the evolving and increasingly complex field of music-integrated learning in public school programs[26]. The evaluation of the Music Ventures program employed a comprehensive methodology that allowed educators to understand the inter-relationships among multiple program and learning variables from diverse perspectives. Analyses of curriculum design, curriculum implementation, and teacher professional development assessment rubrics provided the contextual data needed for understanding the relationships between student participation in the Music Ventures program and test results in both music and language literacy skills. This multiple perspective approach is important because, as argued in the Critical Links Compendium,[27] studies that take place out of, or else ignore, the complexities of school environments provide little practical significance for application of research findings into public school classrooms. Thus, this study advances a theoretical as well as practical model of investigating the impact of music and music-integrated learning on overall school performance.

Music-Integrative Learning as Mutually Beneficial to Each Domain

This pilot study suggests strongly that music instruction integrated with early

elementary language arts learning is best understood as a two-way street. Evidence of significant correlations from this study supports a general principle of music integration; i.e., that music and language literacy skill development in young children appear to draw on shared fundamental concepts and learning processes embedded in both disciplines.[28]

However, supporters of music education in schools cannot use this study to claim that exposure to music instruction teaches language literacy skills directly. Nor can they claim that music integration programs will enhance performance on literacy tests for students regardless of the level of student music literacy skill development. Only when students progress in their music literacy skill development does the correlation between the two literacy domains emerge or increase, especially for students classified as English Language Learners. Conversely, only when students possess a functional understanding of language literacy processes will music integration instruction take effect. Thus, this study provides considerable support for teaching musical literacy skills in elementary schools, not only for the sake of improving musical understanding, but for the sake of reinforcing or enhancing general symbolic literacy skills across the curriculum.

Rethinking Music's Role in Public Education

Findings from this study hold implications for resolving contesting stances regarding the value and purpose of music education in public schools. Music educators, classroom teachers, parents and administrators sometimes argue that music should be taught only for its own sake. In this study, we voice the claim that learning resulting from genuine and comprehensive engagement in music learning intrinsically — and perhaps inextricably — involves interdisciplinary thinking and learning processes that can be used to enhance understanding of concepts shared with other forms of cognition and social-emotional development.

Thus, this study supports the notion that music should be taught both for its own sake and for the sake of learning transfer, reinforcement, or enhancement across

disciplines, as in the case of language literacy demonstrated here. Classroom teachers or music teachers who responsibly reinforce music-integrated literacy skill development in their classrooms by learning music skills for themselves and by learning to 'teach for transfer' across these disciplines are signaling to students, parents, and administrators the value of music's deep connection to other literacy domains. By showing that music and music integration builds on the capacity to learn within all children, music's role in education evolves into a place of central importance for public schools.

Limitations and Next Steps

Ultimately the Music Ventures case study is most concerned with the potential for school improvement through strong music and music integration programs. As a point of departure for further dissemination, this report summarizes the results of a single pilot study that demonstrates the power and efficacy of innovative music integration school intervention programs that are aligned with the national standards of music and language arts learning and can be evaluated through rigorous data collection and assessment methods. The conceptual *power* of music integration lies in the pluralization of literacy processes away from a fixed, separate, or narrow concept of language decoding skills toward a deeper and broader view of literacy based on multiple, mutually reinforcing, symbol system skills through music. The *efficacy* of this research-based program lies in its

demonstrated practical significance for teacher professional development programs and as a curriculum that benefits all students in a low income or predominantly EL Learner populated school.

As a pilot study, this report serves as a preliminary blueprint for dissemination of music-integrated language literacy programs in public elementary schools already committed to the value of music's role in the core curriculum. Only by overcoming several limitations of this study will researchers be able to validate further the possible success of music and language literacy integration as a strategy for large-scale school reform. Limitations of this study have defined the following needs:

- More longitudinal data to study the long-term effects of music-integrated literacy in the upper elementary grades and to determine its relationship to standardized achievement tests.

- A larger sample size of teachers to measure significant effects of professional development outcomes on school culture and student performance.

- The development of specific interventions for severely challenged students at risk for literacy failure in order to ensure music integration strategies do not exclude learners who may need the benefits of this program the most.

- An expanded range of literacy integrations to include math, science, other art forms, and issues of social-emotional development.

- Continued refinement and development of curricular materials and assessment instruments for multiple literacies beyond K-2 that include measures of arts literacy processes outside of music.

- The study of the process of dissemination and sustainability of music-integrated literacy both locally and nationally.

- The creation of a national professional development team to provide materials, service and consultations with public school communities wishing to incorporate music and music-integrated literacy programs in their schools.

- Collection, assessment, and dissemination of a wide range of student work samples related to music-integrated curriculum.

- The creation of innovative assessments that require multiple symbol systems to solve problems.

Organizations such as the Music-in-Education National Consortium and its partnership organizations[29] are supporting the work of schools interested in becoming 'learning laboratories' for expanding the presence of music and music-integrated teaching, learning, and assessment practices, so that other schools will benefit from the research reported here. Implications for follow-up studies include plans for further development of music and music integration programs, based on the principles and practices associated with the Music Ventures project, to be dis-

ORGANIZATIONS SUCH AS THE MUSIC-IN-EDUCATION NATIONAL CONSORTIUM AND ITS PARTNERSHIP ORGANIZATIONS ARE SUPPORTING THE WORK OF SCHOOLS INTERESTED IN BECOMING 'LEARNING LABORATORIES' FOR EXPANDING THE PRESENCE OF MUSIC AND MUSIC-INTEGRATED TEACHING, LEARNING, AND ASSESSMENT PRACTICES, SO THAT OTHER SCHOOLS WILL BENEFIT FROM THE RESEARCH REPORTED HERE.

seminated to schools with classroom teachers and full-time music teachers who will work together to find the optimal balance between music instruction for its own sake and for the sake of its integration with early language and math skills. Of primary concern will be the development of (a) practical program assessment rubrics that provide more sensitive measures of professional development outcomes for teachers who participate in the program in schools, and (b) the design of music integration intervention strategies that will benefit English Language Learners in their academic studies in the early elementary school grade levels.

Follow-up experiments with regard to this study should therefore focus on the expanding roles and responsibilities of music teachers as curriculum, assessment, and action research agents for innovation in schools. The need for innovative curricula and assessment practices based on music integration can start with music. Language literacy choirs and creating opera in schools, for example, in which students learn to sing while they speak English, will take on new significance for communities who see music learning as a two-way benefit for literacy challenged children's learning and social-emotional development. Continued innovative curriculum design and teaching and assessment that will address the challenge of integrating traditional music skills such as ensemble performance, composing and improvisation can contribute to a better understanding of 'optimal conditions' needed to integrate literacy in language, math, and music learning in our public schools. Music and music-integrated learning, coupled with more extensive measures of cognitive and social-emotional development factors affecting young children's abilities and attitudes as learners, will be able to demonstrate with increased clarity and predictability that all students can benefit from music-integrated learning beyond what has been demonstrated initially here in the two-year pilot study of the Music Ventures project in Vista, California. ¶

FOLLOW-UP EXPERIMENTS WITH REGARD TO THIS STUDY SHOULD THEREFORE FOCUS ON THE EXPANDING ROLES AND RESPONSIBILITIES OF MUSIC TEACHERS AS CURRICULUM, ASSESSMENT, AND ACTION RESEARCH AGENTS FOR INNOVATION IN SCHOOLS.

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[6] Gardiner, Martin, *Music*, Learning, and Behavior: A Case for Mental Stretching in the *Journal for Learning Through Music* vol.1, [2000; Music-in-Education.org].

[7] Scripp, Larry *Overview of Research on Music and Learning in Critical Links: Learning in the Arts and Student Academic and Social Development* report [Deasy, Ed., 2004; aep-arts.org].

[8] Ibid.

[9] Ibid.

[10] Results from this pilot project now serve as a case study model for future implementation of music-integrated literacy programs throughout the Music-in-Education National Consortium's network of laboratory school programs.

[11] Full-time Music Director, Music Educator of the Year award from the State of California, state and professional certification.

[12] Anne Fennell, the creator of the Music Ventures program and its professional development provider, serves as the full-time music director at the Vista Magnet School for the Arts and has received the Music Educator of the Year award from the State of California.

[13] In particular 'structured inquiry' and the facilitation of creative processes in the context of literacy instruction.

[14] Results from previous studies can be examined in Scripp, L. (2003) Critical Links, Next Steps: An Evolving Conception of Music and Learning in Public School Education in *Journal for Learning Through Music* (music-in-education.org).

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[18] EL Learners is an abbreviation for English Language Learners (otherwise known as Limited English Proficiency or English Second Language Learners) who are receiving remediation service.

[19] EO Learners (English Only Learners) designates students who speak English fluently. As previously indicated EL Learners is an abbreviation for English Language Learners, otherwise known as Limited English Proficiency or English Second Language Learners who are receiving remediation services.

[20] With the assistance of Nancy Walmsley and Tom Lawrence, reading specialists in the Vista School District.

[21] Note that in Figure V-20 'Hear Letter Names' shows no significant differences in test performance among all grade levels as indicated by (K-2) in the column to the far right.

[22] Note well that, in Figure V-20 the indication '(K)(1-2)' in the final column on the right indicates that there is a significant difference in test performance only between and Grades 1-2.

[23] Note that the calculation is the EO score minus the EL score; thus a minus score indicates the difference favors the EL Learners.

[24] Stepwise regression procedures as outlined in Sall, J., Creighton, L. & Lehman, A. (2005), A Guide to Statistics and Data Analysis Using JMP Software (SAS), Brooks/Cole-Thomson, CA.

[25] Davidson & Scripp (1992). *Surveying the Coordinates of Musical Development* in Colwell, R. (Ed.), The Handbook for Research on Music Teaching and Learning, Schirmer Press.

[26] For DIBELS/Bader and Music Literacy Skill Tests: All K-2 n = 349; EO cohort n = 205 ; EL cohort n = 144.

[27] The RUBRICS CUBE Program Evaluation System, described earlier in this *Journal* and used as a guideline for the evaluation design of this study, outlines the need for multiple layers of data collection in school-based research by the Music-in-Education National Consortium's Laboratory School Network.

[28] Ibid.

[29] See Critical Links essay previously cited and other articles by Jeanne Bamberger, Larry Scripp, Martin Gardiner in the *Journal for Learning Through Music* (volume I, II) (music-in-education.org).

[30] Metropolitan Opera Guild (New York), Chicago Arts Partnerships in Education, Music in Schools Today (San Francisco), Learning Through Music Consulting Group, Los Angeles Music Center, New England Conservatory, Georgia State University, Florida Atlantic University and their public school partners.

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The musical rhythm pattern wall at MIENC LLSN School Empresa Elementary in Oceanside, California, is musically analogous to 'word walls' seen in many elementary schools. The 'wall' challenges students to internalize literacy processes inherent in language learning, while integrating these processes with their parallel musical counterpart, such as silent hearing (of music) vs. silent comprehension (of text). Empresa students work daily to make connections between speech and rhythm, providing evidence that understanding shared fundamental concepts between literacy and musical language can be enforced through initiatives like the Music Ventures professional development program led by Anne Fennell.