Chicago Arts Partnerships in Education
Learning Laboratory School Network
Music-in-Education National Consortium
School Report

Music Concepts that Enhance Attention, Processing, Sequence & Memory Connections between Music Literacy and Language Literacy at the Walt Disney Magnet School, Chicago, IL

Sarah Roodhouse, Digital Music Instructor and Magnet Cluster Lead Teacher

With contributions from Natalie Butler, Band Director at Bronzeville Academy and former Music Teacher at Walt Disney Magnet School

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Introduction: School Demographics; Becoming a LLSN School

With the support of Chicago Arts Partners in Education (CAPE), Walt Disney Magnet School was invited to be part of an inquiry based action research project, the Learning Laboratory School Network (LLSN) of the Music-in-Education National Consortium (MIENC). CAPE has worked with Disney Magnet School since 1999, when it became part of the network of schools working with teaching artists to integrate the arts across the curriculum. Sarah Roodhouse serves as a lead arts teacher at Disney School and has been on staff since 2005. Three Disney School staff members became involved in this research in the following ways:

- Natalie Butler (general music and band): planning research, evaluating students' videos, coordinating testing, reflecting on research process, meeting with consultants.
- Barbara Stevens (3rd grade *Fast ForWord* Lab instructor): implementing the *Fast ForWord* Lab curriculum, evaluating student progress, compiling student data generated by *Fast ForWord*, educating other participating staff members about the *Fast ForWord* program.
- Sarah Roodhouse (Digital Music and choir): implementing the Digital Music Lab curriculum (which includes the programs *Piano Suite* and *Music Ace Maestro*), evaluating student progress, compiling student data generated by *Music Ace Maestro*, planning research, evaluating students videos, coordinating/administering testing, reflecting on research process, meeting with consultants.

Walt Disney Magnet School is a Pre-K-Grade 8 school located on Chicago's northside with a total enrollment of 1,539. Dr. Kathleen Hagstrom serves as Principal overseeing a staff of 125 teachers. Disney Magnet School was one of the first magnet schools in the

City of Chicago created specifically to address racial integration through its admission policies. The school continues to have an integrated and representative student population. Disney's students are 40.7% African-American, 18.6% Hispanic, 17% Caucasian, 15.1% Asian, 8.2% Multi-racial, and 0.5% Native American. The percentage of student body receiving free and reduced-price school lunches is 72.6%. The family income profile of the student body includes those in the upper income (4%), in the middle income (21.4%), in the low income (17.5%), and below poverty level (55.1%).

The Disney Magnet School is part of the Fine and Performing Arts Magnet Cluster Program, a school improvement initiative led by the Chicago Public Schools' Office of Academic Enhancement. In particular, the Fine and Performing Arts Magnet Cluster Program seeks to improve the quality of and access to arts education in 58 arts-focused schools across the city. Schools in this network work towards overall school improvement by systematically addressing eight areas of school operation: leadership, curriculum integration, professional development, instructional effectiveness, inter-and intra-school collaboration, parental involvement, community partnerships, and opportunities for accelerated student learning. In addition to an arts focus, Disney has also incorporated a focus on technology; there are over 13 technology labs in the school. One is a state of the art Digital Music Laboratory, funded in part by the Disney family, and the other is the *Fast ForWord* lab, which is used to support students who are struggling with literacy skills. The connection between these two programs became the basis for this investigation.

Walt Disney Magnet School, built in 1971, is physically structured to enhance integration and collaborative teaching. The building was designed for team teaching in a very large space that accommodates approximately 200 students. This area is known as a POD. Each POD is divided into classrooms through the use of room dividers, bookshelves, and other creative means. There is a common area in the middle for teaming and logistical school day procedures. The students involved in this research were students in the 3rd grade POD. There are a total of eight 3rd grade classrooms at Disney school. Additionally, there is one glassed-in area in every POD known as the 'direct instruction' room. In the second, third, and fourth grade PODs, this room has been transformed into the *Fast ForWord* Lab. Across the district, many schools have invested in *Fast ForWord's* instructional technology for reading. The *Fast ForWord* website describes the program as follows:

> *The Fast ForWord program develops brain processing efficiently through intensive, adaptive exercises. The Fast ForWord program develops and strengthens memory, attention, processing rate, and sequencing – the cognitive skills essential for learning and reading success. The strengthening of these skills results in a wide range of improved critical language and reading skills such as phonological awareness, phonemic awareness, fluency, vocabulary, comprehension, decoding, working memory, syntax, grammar, and other skills necessary to learn how to read or become a better reader. Fast ForWord products support existing curriculum – they don't replace it. They align to state mandates and have been an important factor in AYP success. And, most*

importantly, the gains students achieve are lasting, the result of enduring positive changes in their processing skills and learning capacity.

Students are selected to participate in the *Fast ForWord* Lab based upon their reading scores from 2nd grade. Since *Fast ForWord* is a remediation program for struggling readers, the students who participate in the *Fast ForWord* Lab typically have very low reading scores.

Creation of the Inquiry Questions

As we began our investigation, we decided to focus on the parallel learning goals and concepts (such as pitch differentiation) shared between the Digital Music Lab and the *Fast ForWord* learning program. One of the collaborating teachers in this project, Barb Stevens, helped us to develop an understanding of the program that she facilitated for the 3rd grade POD during our project. In an interview with Sarah Roodhouse, she stated: "They don't like to be called a reading program. They want to be known as a learning program. In the 3rd grade, *Fast ForWord* has a strict protocol of 50 minutes of instructional technology five days a week. The parents are notified of this to try to enhance school attendance."

Ms. Roodhouse: So this program is primarily a visual program with audio?

Ms. Stevens: It starts with audio. In the early stage exercises such as *reading prep* and *language to reading,* students have to differentiate sound. They have to be able to differentiate high pitch sounds and low pitch sounds and then be able to know which came first in sequences of two sounds all the way to a series of five sounds. [For example,] high, high, low, high, high.

Ms. Roodhouse: That is interesting in light of recent brain research. I recently went to a workshop given by *The Mind Institute* on how the brain organizes sound and particularly how music enhances patterning and problem solving processes in the brain.

Ms. Stevens: It is fascinating; the *Fast ForWord* people have really done their homework in brain research as well. I think it will be very interesting to see how these two programs can work together and what kind of student improvement might come of it. . . . You should experience how they work on phonemic identification. They elongate the sounds of sections in the words so that they don't even sound like words or at least not like the words I am using now. It is a process to develop phonemic memory because students who are struggling with phonemic identification often forget the first part of the word by the time they finish the word itself.

Ms. Roodhouse: Are those exercises directed at developing fluency?

Ms. Stevens: Yes.

Ms. Roodhouse: This might begin a new way of looking at how we teach music. In music, we call the elongation of sound *augmentation,* and maybe we need to be teaching music more conceptually and not with as much dependency on performance skills.

At the end of the interview Ms. Stevens expressed how much the students enjoyed the *Fast ForWord* program: "It's fun for them, and they love coming to the lab. There is a lot of repetition built in, which *Fast ForWord* believes is really important."

Working with this program stimulated much thinking and questions. For example, how could we connect music education to this program that uses sound and audio processing to develop learning capacity in reading? How could we communicate the development that parallels these elements of music education which can also enhance greater learning capacity? The skills of sound differentiation, decoding, and using repetition to develop working memory all seemed like a natural fit in each discipline and helped shape our basic inquiry question for this year's instruction:

- *To what extent does music literacy impact or predict success in language literacy achievement?*

Our secondary questions seemed equally as compelling:

- *What is the impact of music instruction coupled with Fast ForWord instruction on literacy development (music and language arts)*?
- *What is the impact of music instruction coupled with Fast ForWord instruction as it relates to auditory processing and cognitive development*?

These questions were classroom-based because they dealt with the Illinois Learning Standards in music and reading as set out in the School Improvement Plan. They were school-based as a collaborative investigation and professional development between two disciplines, 3rd grade classrooms, and several teachers**.**

Student work in the Digital Music lab was used to gain a sense of the participating students' achievement level in music literacy skills. We also used student work in the *Fast ForWord* lab to gain a sense of the participating students' achievement levels in language literacy skills. Both labs generated large quantities of data on each student detailing student progress on skills relating to *memory, attention, processing, and sequencing* in music and language. These sets of data were then used to evaluate, compare, and make suggestions about the relationship between music and language literacy.

Additionally, the Music Literacy Skills Test-MIENC Version 5 (MLST) was administered to students and was used to measure for evidence of music learning, processing, and skills. The test was administered to students by a consultant. Video recordings of student testing were used to help score students on tasks in the MLST. The resulting data was based on composite scoring of students. The goal of the process

became to help students enhance cognitive capacity related to sequencing and memory while strengthening visual and auditory skills through the following:

- ***Attention*** by developing the ability to focus on tasks and ignore distractions.
- ***Processing*** skills so that students could see images and distinguish sounds quickly enough to discriminate their differences.
- ***Sequencing*** skills through exercises that required the use of order to comprehend information and help identify missing parts.
- ***Memory*** by having the student hold information in working memory while retrieving picture-concept associations from long-term memory.

Testing and Analysis

As music educators, we were faced with a dilemma. There was a clear understanding among us that studying the language of music created positive changes in learning capacities for students and helped them score better on standardized tests. However, we were so constricted by time—with only a 40-minute instruction session one day per week and students given to us through unselected scheduling—that we could not always absorb how this understanding affected our teaching and how we communicated it to others.

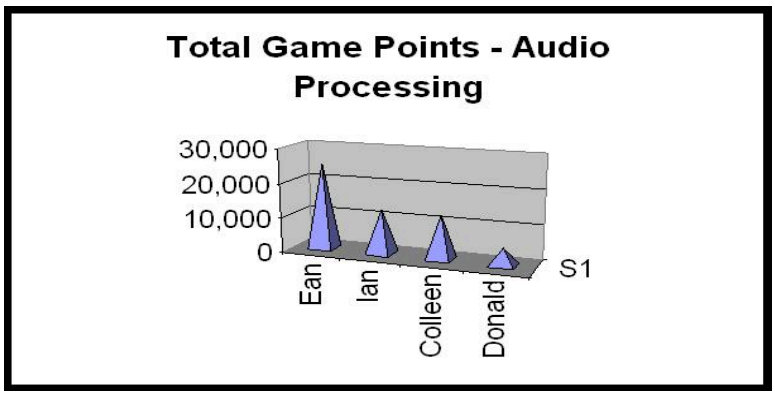
This inquiry process thus offered us an opportunity to explore what we knew to be true about music and learning capacity and to adapt our program to the strategies that were already being utilized with students who were struggling with their learning capacities in reading. In addition to the four identified audio processing skills listed above, learning skills such as sound differentiation, decoding, repetition, ordering, and working memory are identified as critical in reading. These are skills utilized in developing music literacy as well. We wondered if focusing on these aspects of music cognition might contribute to a new perspective of music and cognitive development to those who teach music and those who do not.

Implementation

Disney has a 30,000 square foot annex facility called the Communication Arts Center (CAC). This expansive space is used for large scale integrated arts projects and culminating activities. The periphery of the space is lined with studios and independent project spaces. One of these spaces was converted into a state of the art Digital Music Lab in the fall of 2005. It is interesting to note that in a building full of open spaces offering collaboration, this collaborative project originated from two closed-in classrooms that support Disney's technology focus. Homeroom classes are assigned to attend Digital Music based upon the schedule created by the school's administrative team. The students involved in this research were in the 3rd grade POD who were scheduled to have Digital Music as a year-long facility and who were also selected to participate in *Fast ForWord* for the school year. The 3rd grade *Fast ForWord* students selected to participate in this inquiry project again utilized instructional technology through facilitated activities in the Digital Music Lab. One of the programs offered in the

Digital Music Lab is *MusicAce Maestro*, an ear training, music reading and composition program. Students can work at their own pace on sessions with instruction and facilitation provided by the teacher. *The Music Ace Maestro* program consists of three constructed learning environments known as *Lessons, Games,* and the *Music Doodle Pad*. A student opens a *Session,* which is organized by musical concepts into *Lessons and Games*. Each *Lesson* contains multi-level activities which are introduced with a mini-lesson by the teacher and facilitated through individualized instructional technology and the instructor. All students use headsets for optimum listening. The *game* section then sharpens musical skills and improves retention of important lesson concepts. Students can only make four (4) errors in a timed sequenced activity to be successful in the *game* section.

Out of 18 total sessions worked on throughout the school year, 6 were chosen to be included in this project's data set for their focus on audio processing skills that had a parallel focus in the *Fast ForWord* lab. Figure S1 shows the total game points scored on these six selected sessions in *Music Ace Maestro* involving four identified students. Because the exercises are in game format, the students did not realize that they were really being tested for retention in these activities. The *Games* proved very effective in evaluating students in the elements of sequence and memory due to the built-in repetition of exercises. If a student was not successful in the retention of the sequenced process in the time allotted, she/he had to return to the beginning of the sequence and begin again. The faster the student retained the process, the higher the scored points.



This is vastly different than the *Lesson* section where students could make many mistakes with the only consequence being that they were redirected to a repetition of the concept and more practice. Often the repetition of the concept is presented in a new paradigm with different musical examples during the *Lesson* section. The *Games* exercises involve mastery of the music material repeated identically every time. The music educator thus gets the most information through the evaluation of the two exercises, *Lessons and Games,* paired together.

The educator's edition contains a suite of tools that can be used to create, manage, and customize the instructional lesson sequence, import assessment data, centralize management of student and group instructions options, export assessment data in

industry-standard format and archive student and group assessment data. The teacher can select novice or advanced difficulty settings in these exercises. Only novice settings were used in this project.

The students enjoyed coming to the digital music lab, which features 30 personal computers equipped with a MIDI keyboard, letter keyboard, mouse and head sets in the lab. The students became engaged in the program which enhances their ability to focus on the tasks at and hand and to ignore distractions. This unique type of music instruction coupled with teaching energy and the specifically designed learning components allowed students to attend to their assignments with an increased motivation to learn. Lesson topics covered for this study included: the staff, pitch recognition, rhythm, notation, treble staff note reading, and dynamics. The sessions of *Music Ace Maestro* were chosen for their audio processing components, and those correlations are listed in the table below.

Session	Music Concepts	Audio Processing Skill
The Staff	**Higher/Lower Pitches** **Lines/Spaces** **Bass/Treble relationships** **Analyze High/Low** **Match High/Low – 1-4 note interval clusters**	**Sound Differentiation** **Attention** **Processing**
Playing w/Pitch	**Same/Different Pitches** **Higher/Same/Lower Pitches** **Matching Pitches – Staff** **Matching Pitches – Keyboard**	**Sound Differentiation** **Attention** **Processing** **Sequencing**
Hearing Rhythms	**Define Rhythm** **Same Different/Rhythm** **Define Echo** **Echo one-measure examples** **Echo one –eight measure examples**	**Attention** **Sound Differentiation** **Processing** **Sequencing** **Working Memory**
Basic Rhythmic Notation	**Define/Identify quarter notes/eighth notes** **Echo and perform 4-beat rhythm** **Hear a pattern and notate it**	**Attention** **Processing** **Sequencing** **Memory**

	Identify rhythm from two notated choices	
The ABCs of the Treble Staff	**Matching keyboard notes to notes on the Staff** **Higher and lower on the staff and keyboard** **Locating pitches on staff and keyboard** **Identifying pitches on staff and keyboard** **Space/Line names** **Naming space notes** **Naming line notes**	**Attention** **Processing** **Sequencing** **Memory** **Sound Differentiation** **Decoding** **Repetition** **Working Memory**
Dynamics/Pitch	**Same/Different w/dynamics** **Higher/Lower w/dynamics** **Matching dynamic** **Matching notes w/dynamics**	**Attention** **Processing** **Sound Differentiation** **Memory**

Timeline

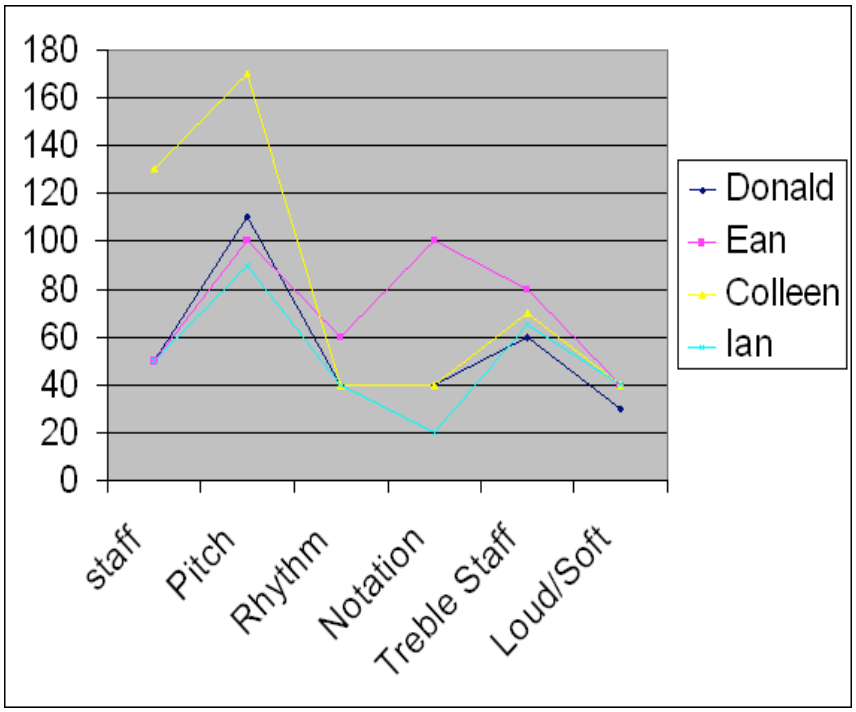
Both programs involved year-long instruction of both Digital Music and *Fast ForWord*. The 3rd grade students in *Fast ForWord* met everyday for 50-minute sessions. The students in Digital Music met one day each week for 40-minute sessions. The Music Literacy Skills Test was administered during the last quarter of the school year.

A compelling story began to emerge from the data collected in this study. The graph shows four student participants highlighted in blue. The chart is based on data from both programs, *Fast ForWord* and *Music Ace Maestro*. Through a collaborative relationship of the instructors in the *Fast ForWord* Lab and the Digital Music Lab, analysis and blind recommendations of the students were made. The students were evaluated as shown. Colleen, Ean, Ian and Donald emerged as low achievers in reading and *Fast ForWord* and high achievers in Digital Music. This finding caused us to follow-up on the student work of these four students.

	Low		**High**	
Fast ForWord	**Ian**	Haleema	Francis	Colby
	Tiana	Shirley	Delina	Sahinab
	Jicah	Anthony	Chanel	Starisha
	Ean	Sarah	Aaron	
	Donald	DeVonte	Khadijah	
	Colleen	Kyla	Bryan	
	Deseree			

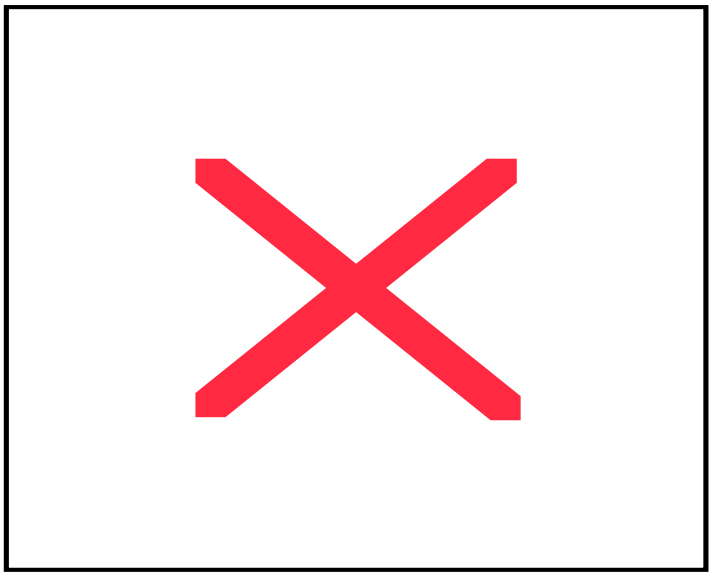
Digital Music	*Kyla* *Deseree* *Sarah* *DeVonte* *Haleema* *Shirley* *Anthony*	*Tiana* *Jicah*	***Ian*** *Colby* *Sahinab* *Starisha* *Aaron* ***Colleen*** *Khadijah*	*Francis* *Delina* *Chanel* ***Ean*** *Bryan* ***Donald***

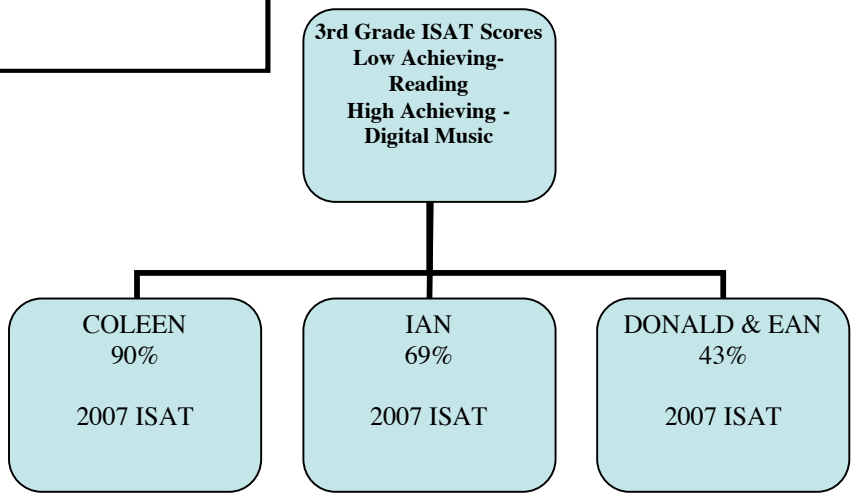
The line graph shows the progress of these four students in the Digital Music Lab as it addressed the four components of audio processing that were also covered in the *Fast ForWord* Lab: *attention, processing, sequencing,* and *memory.* As is shown, Colleen far exceeded the other students in *attention* and *processing*, exemplified in understanding the staff (High/Low) and Pitch (Differentiation). As the progress proceeded to *sequencing* and *memory* (exemplified in Rhythm and Notation), the students diversified and then rejoined in the culmination of the four components of audio processing, reading the treble staff, and combining staff reading with dynamics. The students succeeded somewhat equally in these culminating sessions.



Even more compelling is how these four students scored on this year's Illinois Standards Achievement Test (ISAT) in reading. Especially revealing is how Colleen scored at the 90th percentile. She is considered a low achiever in *Fast ForWord* and a high achiever in Digital Music.

Does this address the question of how music literacy impacts or predicts of success in language literacy?





The Music Literacy Skills Test-MIENC Version 5 (MLST) was administered to the 3rd grade students involved in this research project. The test was used to measure for evidence of music learning, processing, and skills, and its data contributed to the evaluation and ranking of the students. It was given on a one-to-one basis by an outside consultant toward the end of the year. The test was paired with video recordings of the students as they were being tested; these recordings were part of the scoring process of the students on tasks in the MLST. Donald was identified as one of the four students who were ranked as low achieving in reading and *Fast ForWord* but high in Digital Music. We realized that Donald had the most complete set of data (including *Fast ForWord* progress reports, *Music Ace* progress reports, video of the MLST, and teacher anecdotal information) out of all the students in our group. For this reason we looked more deeply at the information his work provided. While successful in digital music, Donald was the least able to transfer his enhanced capacity to reading exercises and testing. In his video, we observed a young man with closed body language and an aloof attitude that did not

allow for smiles. However, he was able to answer questions in music literacy correctly (even if only through a mumble). His skills at rhythmic dictation and error detection were quite defined, and as he realized he was doing well in this section, he began to relate to the test giver ever so slightly. He began to make eye contact with the test giver and even began to smile. Donald would thus be an excellent candidate for follow-up evaluation in both programs.

Reflections on Our Data

Based upon the information we have gathered about these 22 third grade students, we noticed the following about the links between music and language literacy:

- Since there were no students who were low achieving in Digital music and high achieving in *Fast ForWord*, one might wonder if a student who can't differentiate sounds (e.g. high vs. low) will have difficulty acquiring language literacy skills.
- Some students were able to achieve high levels of understanding in the areas of *memory, attention, processing*, and *sequencing* as it relates to skills (i.e. pitch differentiation in music), yet were unable to achieve the same success when it came to applying those same skills to language literacy. Colleen, Donald, Ean, and Ian fell into this category, and they comprised 18.2% of our group.
- There were some students who were able to acquire language literacy in a holistic sense, but who were unable to demonstrate their understanding when the language literacy skills were presented in isolation. For example, Sarah was low achieving in *Fast ForWord* (and Digital Music as well), but somehow she was still able to achieve 69% on the state mandated standardized test in reading.
- More research would need to be done in order to answer our primary research question, *To what extent does music literacy impact or predict success in language literacy achievement?* We can see that there is some correlation between music and language literacy, since 81.8% of the students we investigated had the same level of achievement in both Digital Music and *Fast ForWord* (e.g. Jicah who was low in both areas, or Francis who was high in both areas).

Scaling Out

In most schools, space is important. This is especially true at Disney due to its design. These programs literally happen at the fringes of the POD and the fringes of the CAC, and communication is sometimes a challenge. This makes sense, since colleagues who are in a team can communicate more easily than those who are teaching on the fringes. There is not a lot of extra time for planning or scaling out new programs. Time spent on professional development changes due to decisions made from the district, from the union representation, and from within the school itself. For example, this year the time that teachers spent in professional development together as a staff was cut in half.

However, we have found other ways to get the word out. The digital music lab enjoys great support from the administration at Walt Disney and is a frequent stop on school tours, which have given us an opportunity to talk about the project. When the parents come through, we give them the basic idea of the project by using charts and a 30-second

speech. When various dignitaries have come through, they are interested to hear that the digital music lab offers potential enhancement of learning capacities for the students in other areas such as reading. When the President of the School Board visited, he responded by saying that “This is why we need the arts in our schools.”

I also talk to colleagues about the project whenever I can. For example, a kindergarten teacher recently asked me my opinion regarding a student we share who seems unable to connect to many of her learning activities. “I know your lab is a good way to catch problems in audio processing,” she said, and I assured her I would look carefully at the student’s progress in this area.

It is often through such simple interactions that change really starts to happen at a school. A conversation, a few students, and sharing practices can go a long way in creating improvement in student outcomes and advancing music for changing times.