

Academic Improvement for Students with Significant Disabilities

Elise S. Sobol – Ed. D., NYSSMA® Chair, Music for Special Learners

It is a challenge for educators at all grade levels to impact positively both student report card and school district annual performance reviews for students on New York State Alternate Assessment.

Positive impact is possible. However, there is a need for research that will focus on providing meaningful data to our school districts on academic improvement of high school aged (16-21) students with moderate-severe cognitive and language delays, including those with autism spectrum disorders.

This innovative dissertation research study, conducted in partial fulfillment of the requirements for Doctorate of Education in the Department of Administrative and Instructional Leadership of The School of Education, St. John's University, took place in the last eight weeks of the academic school year, May-June 2013.

Design of the study

Seventy-seven high school aged special education students with significant cognitive/language delays, including autism spectrum disorders, from the Rosemary Kennedy School, Nassau BOCES, participated in the mixed methodology study. The study was a non-experimental design with pre-tests, music treatment and post-tests.

The students came from all 56 of our Nassau County school districts and represented racial, ethnic, cultural and socio-economic diversity. A purposeful sample of six students was selected for case studies from the research participants. Pre-tests and post-tests were given in two areas: music aptitude and mathematics.

Primary Measures of Music Audiation® (PMMA) was used to test music aptitude. The New York State Common Core Learning Standards for Math and Music Data Sheets were used to record quantitative prompting measures of teacher-designed math tests.

The researcher in her 28 years of K-12 public school teaching had seen that the music classroom is an engaging, fun, safe, secure and successful environment to build confidence, maximize learning potential and assist children in reaching developmental goals (Sobol, 2001, 2008).

The cognitive level of the research subjects was PreK-2. Their Common Core Learning Standards in mathematics include counting and cardinality, operations and algebraic thinking, number and operations in base

10, measurement and data, identifying and describing shapes, and analyzing, comparing, creating, and composing shapes in geometry (EngageNY, 2013).

The significance and importance of this study was to demonstrate through evidence-based data research the role that music aptitude can play in impacting learning for students with significant cognitive/language delays. This could then open a positive conversation in school district communities that can assist this subgroup of students in their academic progress in cross-curricular areas such as mathematics for reaching current P-12 Common Core Learning Standards for Mathematics.

The research objectives

To start to fill this need and to provide data for, perhaps, a paradigm shift of expectations on what we can expect this student population to achieve, researcher set out to investigate four research questions.

Two research questions directed the quantitative portion of the study:

- 1) Can music aptitude be measured in students with significant cognitive/language delays including autism spectrum disorders?

- 2) How does rhythmic and tonal training help students with significant cognitive/language delay including autism spectrum disorders make developmental/academic gains in basic math?

Two research questions directed the qualitative portion of this study:

- 1) What does teaching and learning look like in a MLE (mediated learning experience) music classroom?
- 2) What other cross-curricular academic benefits can be evidenced by student work to indicate higher levels of independent functioning and cognitive understanding.

The theoretical framework to support this study came specifically from two developmental cognitive psychologists: Dr. Howard Gardner, Theory of Multiple Intelligence (MI) and the late Dr. Reuven Feuerstein, Theory of Structural Cognitive Modifiability (SCM).

Music as an entry point

According to Gardner, the musical rhythmic aptitude

 The significance ...of
 this study was to
 demonstrate... the role
 that music aptitude can
 play in impacting
 learning for students

is innate and can be developed through schooling and learning (Gardner, 1983, p. 334). Musical intelligence may be exploited as a means of transmission, an entry point or catalyst for learning all manner of content (Gardner, 1993, 1995a, 1996). According to Gardner, music learning is on par with processes that take place in studying languages, mathematics and sciences.

Dr. Gardner's enlightening research on birdsongs, published in 1983, helped to shape researcher's techniques to reach special learners who had language processing issues. His work was pivotal to understanding and developing teaching strategies for working with students with cognitive and language processing issues.

The late Dr. Reuven Feuerstein, protégé of Jean Piaget, started developing his Theory of Structural Cognitive Modifiability (SCM) in the 1940s through his belief in the positive potential for all learners (Feuerstein, et al, 1988; Feuerstein et al, 2002).

His Theory of Structural Cognitive Modifiability (SCM) had three basic ideas. First, three forces that shape all human beings are environment, human biology and mediation. Second, behavior is determined by emotional, intellectual and learned activities. Third, the brain is plastic and can generate new structures through a combination of external and internal factors (Feuerstein, Feuerstein, Falik & Rand.)

Now supported by the scientific evidence of neural-plasticity of the brain, existence of mirror neurons and practice of mediated learning environments (MLE), (Feuerstein, 2010) his Theory of Cognitive Structural Modifiability is now proven.

Conducting the research

Extensive review of literature was instrumental in helping to design three pilot studies prior to the dissertation study. Each study, grounded in the theoretical framework of Feuerstein and Gardner, related to how standards-based music learning in special education could assist students with moderate-severe developmental, cognitive and language delays in improving their academic and functional skills for greater self-efficacy and functional independence.

Each study pointed toward the need and the methods for more formalized research that would benefit higher education and enrich our professional learning communities. (Sobol, Spring, 2011; Spring 2012; Summer, 2012).

To develop an original and innovative way to raise academic improvement in math instruction in the music classroom, three teaching methods were combined: rhythmic tapping developed from the Lindamood® Phonemic Sequencing Program (LIPS) for Reading, Spelling and Speech; universal design for learning (UDL) for multiple means of representation for action, expression and engagement, and the mediated learning experience (MLE) as a method of instructional delivery.

Since this study took place in the researcher's music classroom to avoid bias, external reviewers were used to add validity. Cronbach's Alpha-Based Reliability Statistics were used to verify the inter-rater reliability of each reviewer to understand the specific student population and the step-by-step Mediated Learning process for each of the six case studies.

This, combined with quantitative statistical analysis (SBSS Version 21.0, Paired Sample T-Test used to compare pre- and post-rhythmic/tonal test results.), supported best practices of current trends for research.

Research findings through both inferential statistical and descriptive analysis of data pointed toward student improvement with large effect size for standards-based classroom music instruction taught through mediated music learning experiences. Significant growth from prompt dependence to functional independence was seen in pre and post basic math counting skills with the musical treatment intervention.

(See Tables below).

Pre Math Test Prompts Beginning of Musical Treatment Intervention

Prompt used				
	Frequency	Percent	Valid Percent	Cumulative Percent
Absent	5	6.5	6.5	6.5
Visual Prompt	1	1.3	1.3	7.8
Audio/Visual Prompt	14	18.2	18.2	26.0
Valid Verbal Prompt	11	14.3	14.3	40.3
Independent	8	10.4	10.4	50.6
Hand over Hand Assistance	38	49.4	49.4	100.0
Total	77	100.0	100.0	

Post Math Test Prompts Used After Musical Treatment Intervention

Prompt used				
	Frequency	Percent	Valid Percent	Cumulative Percent
Absent	3	3.9	3.9	3.9
Visual Prompt	9	11.7	11.7	15.6
Audio/Visual Prompt	8	10.4	10.4	26.0
Valid Verbal Prompt	16	20.8	20.8	46.8
Independent	20	26.0	26.0	72.7
Hand over Hand Assistance	21	27.3	27.3	100.0
Total	77	100.0	100.0	

Several important recommendations for the teaching of music in special education settings can be shared for academic improvement of students with significant disabilities.

- 1) There are instructional techniques effective through mediated learning experiences that can promote music learning with target population.
- 2) Music learning can be measured and demonstrates a positive impact on mathematics concept development.
- 3) Music lessons can incorporate learning activities and dialogue across a variety of curricular areas.
- 4) Music instruction can be designed in a way that promotes increased levels of independent functioning for the target population.

For further discussion of these recommendations and specific details about the innovative research, including a complete list of works cited, please access researcher's complete dissertation: Sobol, E.S. (2014). *Autism research: Music aptitude's effect on developmental/academic gains for students with significant cognitive/language delays*. (Order No. 3581407, St. John's University (New York), School of Education and Human Services). *ProQuest Dissertations and Theses*, 127).

References cited in article

- Engage^{NY}. (2013). *New York State P-12 common core learning standards*. Retrieved from <http://www.engageny.org/resource/new-york-state-p-12-common-core-learning-standards>
- Engage^{NY}. (2013). *New York State pre-kindergarten foundation for the common core, domain 5: Cognition and knowledge of the World. Mathematics*. Retrieved from <http://www.engageny.org/sites/default/files/resource/attachments/nyslsprek.p>
- Feuerstein, R., & Y. Rynders, J. E. (1988). *Don't accept me as I am*. New York; Plenum Press.
- Feuerstein, R. Falik, L. H., Feuerstein, F. S. & Rand, Y. (2002). *The dynamic assessment of cognitive modifiability: The learning propensity assessment device: Theory, instruments, and techniques*. Jerusalem, Israel: ICELP
- Feuerstein, R., Feuerstein, R.S. , Falik, L., & Rand, Y. (2006). *The Feuerstein instrumental enrichment program: Part 1 and Part 2*. Jerusalem: ICELP Press.
- Feuerstein, R., Feuerstein, R. S., & Falik, L. H. (2010). *Beyond smarter mediated learning and the brain's capacity for change*. New York: Teachers College Press.
- Feuerstein, R. & Lewin-Benham, A. (2012). *What learning looks like: Mediated learning in theory and practice, K-6*. New York: Teachers College Press.
- Feuerstein, R. (2013). Retrieved from <http://www.en.feuerstein-global.org>
- Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic Books.
- Gardner, H. (1993). *Frames of mind: The theory of multiple intelligences* (2nd ed.). New York: Basic Books.
- Gardner, H. (1995). Multiple intelligences as a catalyst. *English Journal*, 84 (8), 16-18.
- Gardner, H. (1996). Probing more deeply into the theory of multiple intelligences. *NASSP Bulletin*, 80 (583), 1-6.
- Gardner, H. (2013). Multiple intelligences. Retrieved from <http://www.howardgardner.com/multiple-intelligences>
- Gordon, E. E. (1986). *Primary measures of music audiation manual (kindergarten – grade 3) and intermediate measures of music audiation (grade 1 – grade 5)*. Chicago, Ill: GIA Publications.
- Lindamood, P. C. & Lindamood, P. (1998). *The Lindamood* phoneme sequencing program for reading, spelling, and speech* (3rd ed.). Austin, TX: Pro-Ed Publishers.
- Sobol, E. S. (2001). *An attitude and approach for teaching music to special learners*. Raleigh, N.C.: Pentland Press.
- Sobol, E. S. (2008). *An attitude and approach for teaching music to special learners* (2nd ed.). Lanham, MD: Rowan & Littlefield Education in partnership with National Association for Music Education.
- Sobol, E. S. (2011). Music learning in special education: Focus on autism and developmental disabilities. In R. Colwell and P. Webster (Eds.) *MENC Handbook of Research on Music Learning*, II, vi, 233-255.
- Sobol, E. S. (2011). Use of music to increase cognitive development in math and reading for students with severe learning disabilities. Unpublished manuscript, Department of Education, St. John's University, Queens, New York.
- Sobol, E.S. (2012). *Ethnography: Standards-based music instruction to enhance literacy with students with severe developmental disabilities*. Unpublished manuscript, Department of Education, St. John's University, Queens, New York.
- Sobol, E. S. (2012). *Autism music research: Guitar instruction to enhance numeracy skills for students with developmental disabilities*. Unpublished manuscript, Department of Education, St. John's University, Queens, New York.