



**MUSIC AND THE BRAIN**  
Strengthening Young Minds Through the  
Language of Music

# IMPACT EVALUATION

## Executive Summary



Center for  
Arts Education Research

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# Issues in Music Education

According to a 2023 report by the Music Teacher Profession Initiative (MTPI), a task force of the National Association for Music Education (NAfME), there are a number of factors that impact diversity, recruitment, and retention in the music teacher profession. They identified several “mitigation strategies” that can help remedy these issues.

## **Challenges include:**

- Inequitable distribution of human and physical resources
- Lack of systematic cultural responsiveness in curricular content
- Isolation stemming from being the only, or one of only, music teachers in a building, or from geographical distance from other music educators.
- Eurocentric curricula
- Lack of time leading to difficulty in creating a healthful work-life balance and contributing to feelings of burnout
- Professional development is not regularly scheduled and is rarely area-specific.

## **Recommended mitigations:**

- Provide music offerings that speak to those who may not see themselves in the large ensemble path.
- Regularly scheduled professional development with topics germane to and valued by the novice music educator.
- Greater opportunities for professional development to include live streaming and video presentations at reduced costs.
- Purposeful, regular, active engagement with fellow music educators, to include both formal and informal interactions.
- Purposeful regular interactions between novice teachers and other members of the community
- Revise music teacher education curricula to reflect a greater perspective that takes into account music and practices of the people of the communities that teachers serve.
- Actively widen the path to robust music education by developing and offering school musical experiences that reflect the values and lived experiences of various communities.
- Partners (e.g., local, community, higher education) take an active role in supporting new and novice teachers.
- Development of sustainable mentoring programs, built into the contracted position to

# Music and the Brain Resources

**Music and the Brain (MATB)**, a school-day program of NYC-based nonprofit Building for the Arts NY, Inc. first active in 1997, developed a multiyear curriculum, lesson resources, and music teacher training to teach general music lessons with keyboard, sightreading, cross-curricular connections and other music skills taught throughout the entire school year. The program is taught by specialist licensed music teachers employed by the school, and includes keyboards and comprehensive digital, visual and audio resources. Students engage in a multifaceted curriculum that includes singing, theory, movement, and cultural understanding, in addition to keyboard skills. The repertoire is drawn from American vernacular music, including an emphasis on Black, Latino, West Indian, Asian and other cultures as well as European music, reflecting the diversity of American students, particularly in New York City, where the program is based. MATB also has participating schools in Philadelphia, Miami, Nashville, New Orleans, Ferguson MO, and other locations.

MATB became experienced in incorporating evolving technology in the classroom, utilizing whiteboards, and then, more recently, interactive displays of curriculum content, videos and music. The pandemic lockdowns accelerated this process, as MATB considered how they could continue to provide keyboard and music instruction to at-home or hybrid (school and home) settings. In response, MATB developed a comprehensive digital platform for their curriculum and instruction.

# Methodology

*This report presents statistical and qualitative data from our 2020-2023 program evaluation of the Music and the Brain (MATB) program. Data collection began in February 2020 and continued through June 2023. Principal methods of data collection included teacher surveys (n = 214), teacher interviews in New York City and Philadelphia, classroom observations (n = 52), observation of in-person and online professional development, examination of the MATB online instructional web platform for partner schools ([learn.musicandthebrain.org](https://learn.musicandthebrain.org)), and review of MATB videos (performances, instruction, student interviews) Observations were conducted by trained researchers using a behavioral rubric whereby the researchers assessed the percent of students demonstrating behaviors associated with achievement indicators. The behavioral rubric had an inter-rater reliability estimate of  $r = .87$ .*

*The classroom observations employed the CALT (Classroom Assessment of Learning and Teaching) observational system for assessing program implementation and student achievement. The CALT system was developed by Dr. Horowitz and yields detailed quantitative and qualitative data through unobtrusive classroom observation. Details of the development of CALT are in the VSA publication *The Contours of Inclusion* (Horowitz, 2008).<sup>1</sup> Achievement indicators on the CALT were based on a content analysis of program materials, our prior MATB research, and discussion with MATB staff.*

*The overall objectives of this study were to determine: (1) the impact of the implementation of Music and the Brain (MATB) in areas such as music skills, social-emotional learning, and related academic subjects; (2) the characteristics of the program and the learn.musicandthebrain.org online platform delivery system that supports this impact, such as curriculum content, user experience and interface, content and program structure, collaboration with teachers and schools, and professional development.*

## Summary



According to analysis of teacher surveys, interviews and classroom observations, there was strong evidence of the effectiveness of the in-school Music and the Brain program. The materials were well sequenced and content-rich and provided a structured approach to providing high quality keyboard and music instruction. The curriculum was flexible and varied and provided multiple approaches to customizing instruction to each teacher's unique context, classroom and school.



The operational curriculum supported students' development of music skills, cultural understanding, and social emotional learning. MATB differs from most other arts collaborations through providing instruction through arts specialist teachers, emphasizing deep skills in the art form (music), providing comprehensive curriculum resources, and often working with students throughout the entire school year.

The program provided music instruction to underserved communities that might otherwise not be able to learn from a well-resourced and well-trained specialist music teacher. The music repertoire intentionally reflected cultural experiences of the students.

The [learn.musicandthebrain.org](https://learn.musicandthebrain.org) online learning platform was developed during the pandemic to support asynchronous instruction, and was highly effective in providing classroom support for well sequenced and engaging music instruction. During our observations we noted the enthusiastic participation of students with the videos, music, keyboards, and varied musical exercises. Children were clearly making gains in music skills, including decoding notation, understanding rhythms, keyboard, singing and understanding of different musical styles and characteristics. Fine motor skills and understanding of fingerings were enhanced, as well.

The program supported SEL skills through working on music together and peer learning and reflection, often in pairs at the keyboards. Students would respond positively to their peers' musical endeavors, and sometimes help with fingerings or understanding notation. They learned to be respectful of each other's creative process, as well as their physical space.

## Student Development

The teachers we observed were proficient in using the materials and engaging their class. As the warmup videos began, children would enthusiastically participate in moving, dancing, and singing. Students were highly engaged by MATB instruction, due to effective pacing of the lessons and the utilization of MATB resources. MATB supported strong gains in aspects of social-emotional learning, including collaboration, teamwork, peer relations, and respect for other's feelings.

Teachers responded very positively to surveys:

- 91% of teachers reported that their students developed collaborative skills through MATB.
- 100% of teachers reported that their students increased classroom engagement through MATB
- 94% of teachers reported that students demonstrated increased focus and task persistence.
- 98% of teachers reported that students developed self-confidence.
- 97% of teachers reported that students demonstrated respect for other students' ideas, feelings and perspectives.
- 92% of teachers reported that students relieved stress through MATB.
- 98% of teachers reported that students received positive feedback from their peers through MATB.
- 100% of teachers reported that students demonstrated a sense of accomplishment and achievement.
- 92% of teachers reported that students improved their teamwork skills through MATB.

Students developed a strong music literacy foundation through MATB instruction. They learned basic music reading skills, practiced singing and playing written music, and performed rhythms by clapping, tapping, and singing. They had a clear understanding of notation symbols, such as repeat signs, clefs, and dynamic markings. Students developed their ability to play and sing in time with a steady pulse. Students also improved their listening skills.



*“Students are engaging with it like never before. The whole concept of being able to play on the keyboard cards and then transfer that to the keyboard keeps them more focused and directed... Reading music was such a monumental task, but it's broken down very easily ... they're engaging with it and they're having so much fun with it.”*

During our classroom observations, we estimated the percent of children in each class demonstrating behaviors reflecting music skills and social-emotional learning. The researcher-observer would watch the class, documenting behaviors that indicated achievement in each area. Obviously, these are indicators that are difficult to observe. Development in areas such as Social Awareness or Self Management are primarily internal and are not necessarily demonstrated by specific behaviors during a class period. Nonetheless, it was an interesting research process that helped us focus on these areas and document behaviors demonstrating aspects of SEL and how they manifested in an MATB class. It is also interesting to note which of these indicators were most visible. Given this context, the following researcher ratings are quite high and provide additional evidence of progress in SEL through MATB.

The following table shows the ratings for each SEL indicator, derived from 15 classroom observations. The highest ratings were in the areas of engagement and motivation, focus, and self-management.

<b>Social- Emotional Learning</b>	<b>Average Percent of Students Observed Demonstrating Each Indicator Per Class</b>
Cooperative Learning Skills or Collaboration	58.5%
Engagement or Motivation	87.7%
Focus	77.7%
Self-management	74.6%
Social Awareness	73.1%
Personal Responsibility	63.3%
Perseverance or Task Persistence	62.3%

SEL skills are inherent to musical development. Students learn to interact, express themselves through different modalities, and become more aware of how their actions (physical and musical) affect others. They also become more cognizant of how they feel about their learning and their growing expressive abilities, and how they can communicate this to their peers. A key advantage of the program is that music teachers can differentiate instruction, providing opportunities for individualized attention.

The curriculum provides opportunities for students to talk about music in relation to their feelings. The teachers encouraged students to share personal experiences and ideas (or “wonderings” in a low-risk setting where there were no wrong answers. Students had many opportunities to share their learning or feelings, and sometimes were able to take leadership roles encouraging others and leading musical expression.

We observed students sharing ideas with their class and intently listening to each other speak and musically express themselves. There was often a buzz in the air and a feeling of excitement as the class progressed. Pairs of children would work together, helping each other as they were playing keyboards, sightreading notes and singing along with fingerings or lyrics. Most of the students worked productively in pairs at the keyboards. As a whole class, they would dance, sing in unison, and clap the rhythms of the song together. They learned to express their ideas, feelings, and musicality in tandem with the overall group, their pairs, and by themselves. Most of the students worked productively in pairs at the keyboards. They were asked to be mindful of their personal space and interact in a constructive way, both physically and musically.

The activities are very varied and the instructional pacing was often exceptional. Children were very engaged. They would rise and dance to the warm-up videos without prompting. They would participate in singing, movement, reading notation, rhythms, pitches, listening, singing lyrics, as well as keyboards – all in one class. They were often eager to demonstrate what they were accomplishing. Other students seemed supportive as they listened and encouraged their peers.



Teachers reported significant development of music reading, listening, keyboard, and fine motor skills through MATB.

- 99% of teachers reported that their students increased keyboard skills through MATB.
- 99% of teachers reported that their students increased music reading skills through MATB.
- 97% of teachers reported that students increased listening skills through MATB.
- 100% of teachers reported that students increased fine motor skills through MATB.

MATB songs and materials exposed children to varied musical traditions. Instruction was culturally relevant to students and often reflected their own cultures and musical traditions.

- 86% of teachers reported that their students demonstrated an increase in understanding of varied cultures and traditions.
- 75% of teachers reported that their students' own cultures and musical traditions were represented through MATB songs.
- 83% of teachers reported that MATB songs and materials were culturally relevant to their students.

*“The music selections are often culturally responsive, serving as mirrors and windows for students, both of which the students love! Students love the texts that they can make connections to, such as Duerme Pronto. They are excited to make personal connections and share stories from home. With songs like Sorida students can make cross-cultural connections and share other hand-clapping games played during recess, such as “chocolate.”*

*“I think students loved the contemporary music, cool rearrangements of classic songs, and music from diverse cultural backgrounds.*

## English Language Learners



- MATB helped English language learners develop literacy skills through song lyrics and description of musical concepts. The new vocabulary and its application was more likely to “stick” because students were engaged through the music and enjoyed their growing ability to sing and perform the songs.
- Music instruction through MATB was particularly valuable for students with special needs.

Teachers reported development of other academic skills through MATB, with improvement in ELA, math, speaking, special needs and ELL.

- 92% of teachers reported that MATB supported development of English language skills, through exploring and singing lyrics to songs.
- 82% of teachers reported that MATB developed students' mathematical skills.
- 75% of teachers reported that MATB improved students' public speaking and communication skills.
- 88% of teachers reported that MATB improved skills of students learning English as a second language.
- 91% of teachers reported that MATB improved skills of students with special needs.

## Achievement on Standardized Tests

In order to examine the potential impact of MATB instruction on ELA and Math achievement, we selected five NYC public elementary schools that met these criteria:

- (1) They had several years of MATB participation in kindergarten, 1st and 2nd grade.
- (2) MATB instruction in these schools was provided to almost all kindergarten, 1st and 2nd grade students.
- (3) The schools were elementary schools, only, and did not have grades above 5th grade (no 6th, 7th or 8th grades).
- (4) The schools had an economic need index of at least 75%.
- (5) NYC Department of Education had publicly available 2019 ELA and math test data, as well as data for comparison groups for each school.

The comparison group students were identified by the NYC Department of Education using these factors: Grade 3 ELA scores, Grade 3 Math scores, school's percent of students with an IEP, school's Economic Need Index, and the school's percent of ELL students.

The percentage of MATB students who scored 3 (proficient) or 4 (excel) on ELA and Math was compared with similar scores in the comparison group.

According to an independent samples t-test of equivalence of means, the MATB students had a significantly higher percentage of students scoring in the proficient range of 3 or 4 for ELA and Math. ELL MATB students also made significantly more progress than comparison group students.

NYC Standardized Tests		N	Mean	Std. Deviation	Significance
ELA	MATB	985	54.4365	6.79612	P <.01
	NYC Comparison	985	48.6487	4.57353	
Math	MATB	985	55.3959	12.58175	P <.01
	NYC Comparison	985	51.3817	8.70499	
ELL	MATB	985	60.4599	6.54617	P <.01
	NYC Comparison	985	59.4254	1.32394	

# MATB Online Platform Resources

The MATB online learning platform ([learn.musicandthebrain.org](http://learn.musicandthebrain.org)) transformed teachers' ability to provide multi-dimensional music instruction in classrooms and at home. The platform placed all resources in one easy to disseminate location, facilitating well-paced and well-resourced classroom instruction. Teachers were easily able to use classroom technology to utilize warm-up and song videos, note reading exercises and other varied tasks. Students were able to continue learning at home, if that process was structured within the class. The student accounts feature facilitated individualized instruction and reflective assessment.



The [learn.musicandthebrain](http://learn.musicandthebrain.org) online learning platform was exceptionally useful as an aid to classroom and at-home music instruction.



- 100% of teachers reported that the MATB web platform elevated their lesson productivity
- 99% of teachers reported that the MATB web platform lesson added deeper cross curricular elements to their teaching.
- 100% of teachers reported that the MATB web platform video content and activities increased student engagement and comprehension.
- 97% of teachers reported that MATB lesson pedagogy improved classroom management.
- 100% of teachers reported that MATB resources improved their lesson planning.
- 100% of teachers reported that MATB resources improved the scope and sequence of their lessons.

Effectiveness of MATB Resources	Yes
Structure	100%
Organization	98.4%
Multi-year sequence	86.9%
Personal support/Classroom Visits/Consultations	93.2%
Comprehensive General music + instrument instruction	100%
Decreased planning time	98.4%
Classroom management	95.2%
Time management	96.8%
Scope and sequence	100%
Performances	83.3%
Student Assessment	98.4%
Self-Assessment	96.8%
Comfort with Technology	93.1%
Diversity/Inclusion/Representation	93.5%
Cross-Curricular elements	98.4%

Teachers identified the components of MATB resources that they believed were most useful in improving their instruction.

- *I am more organized, and I have learned a more effective way of planning my lessons.*
- *Planning, planning, planning! I can plan for activities, questions, and feedback through the platform. I can also use the unit workbooks for proof of learning.*
- *The structure of MATB is a godsend.*
- *My time and classroom management skills have definitely improved because of MATB.*
- *I believe that having my students be more hands-on helped them succeed much faster.*
- *I am more organized.*
- *The program has made my lessons smoother and more engaging for the students.*



# Professional Development

MATB Professional development included hands-on modeling of instruction, partnering and reflection, web instruction, networking, peer review, and lesson planning. Teachers had ample opportunities to share experiences with others and develop mentoring relationships.

Professional Development	Yes	Somewhat	Not Sure	Not Really	No
Did MATB professional development and/or resources improve your teaching?	83.6%	11.5%	4.9%	0%	0%

- MATB teacher professional development was highly effective in preparing teachers to use the MATB learning platform and incorporate it into their lesson’s scope and sequence. Professional development included hands-on modeling of instruction, partnering and reflection, web instruction, networking and peer review, and lesson planning. Teachers had ample opportunities to share experiences with other and develop mentoring relationships.

- Teachers described MATB professional development as exceptionally valuable. They appreciated the rigorous content, lesson modeling, technical support, and the opportunity to network with other music teachers. They particularly valued the opportunity to learn from the experience of other teachers and their introduction to the MATB learning platform.

- Teachers attributed significant growth in their teaching to MATB professional development. They learned to effectively use the MATB Learning platform and incorporate varied instructional strategies into their lesson planning. They gained focus and expertise at teaching keyboards, applying music from different cultures and supporting an effective and collaborative learning environment.



- The MATB Facing Mirrors (self-assessment) workshop helped teachers reflect on and improve their practice, through improving classroom management, lesson and curriculum planning, and incorporating feedback.

- Participating in MATB and their use of the MATB learning platform and professional development significantly improved the pedagogical practice of the music teachers. The resources, web platform, and insights into classroom management and lesson planning have

provided an effective structure for music instruction that teachers expect to use for the rest of their career.

- Teachers that used the student accounts feature of the MATB learning platform described it as an invaluable resource for individualized instruction, assessment, at-home learning, and student engagement.

# Conclusions

According to analysis of teacher surveys, interviews and classroom observations, there was strong evidence of the effectiveness of the in-school Music and the Brain program. The materials were well sequenced and content-rich and provided a structured approach to providing high quality keyboard and music instruction. The curriculum was flexible and varied and provided multiple approaches to customizing instruction to each teacher's unique context, classroom and school. The operational curriculum supported students' development of music skills, cultural understanding, and social emotional learning. MATB differs from most other arts collaborations through providing instruction through arts specialist teachers, emphasizing deep skills in the art form (music), providing comprehensive curriculum resources, and often working with students throughout the entire school year.

The MATB program provided music instruction to underserved communities that might otherwise not be able to learn from a well-resourced and well-trained specialist music teacher. The music repertoire intentionally reflected cultural experiences of the students. The online learning platform was highly effective in providing classroom support for well sequenced and engaging music instruction. During our observations we noted the enthusiastic participation of students with the videos, music, keyboards, and varied musical exercises. Children were clearly making gains in music skills, including decoding notation, understanding rhythms, keyboard, singing and understanding of different musical styles and characteristics. Fine motor skills and understanding of fingerings were enhanced, as well.

The program supported SEL skills through collaborative learning and reflection, often in pairs at the keyboards. Students would respond positively to their peers' musical endeavors, and sometimes help with fingerings or understanding notation. They learned to be respectful of each other's creative process, as well as their physical space. SEL characteristics, such as social awareness and personal responsibility, are inherent to the music learning process. This was evident in both the classroom instruction and the children's development.

## Quotes from MATB Teachers

*"MATB has given me a structure and a method to deliver to my students a solid foundation in a large classroom setting. Most other methods are for private use and do not work in a class setting. I have tried almost all them! MATB is also a living curriculum that takes suggestions and improves based on teacher feedback, not what is profitable or what one or two "gurus" think is good. I continue to learn with this method and am challenged to improve my teaching skills. The past 5 years have been amazing compared to the 15 before I discovered MATB."*

*"I used to go into a classroom with a song, have the kids write four or eight lines of lyrics, talk about the song a little bit, and sing it, with me strumming the guitar. Some of the girls and very few boys would sing. It was fun, and I did it for many years, but now that I am teaching MATB with my own classroom I feel like a real music teacher. It has been very satisfying."*

*"Students who arrived from various countries don't speak English so playing the piano helped them to integrate into a school community easier. Music is a universal language."*

*"The most important part of the MATB learning for ESL and low learners is the finger numbers. They can begin to be successful at playing music on the piano because the numbers 1-5 are easy to learn in English and put together with the number strips on the keyboards they can make music successfully. This leads to confidence and confidence leads to other learning."*

*"I have used MATB in solely ICT classrooms, and the method is very scaffolded and multi-sensory. The curriculum can also be really flexible, so I found it easy as a teacher to make this program successful for students with special needs. It provided a sense of accomplishment."*

*“The MATB leaders and staff always do a tremendous job of demo-ing new elements and concepts and making sure that teachers in the MATB platform are comfortable. I greatly enjoy any professional development sessions that MATB provides.”*

*“I have been able to standardize my lesson plans. Students crave routine. Having MATB help with classroom management ideas, pacing and identifying the reasons for each of the songs included in the book has been invaluable. Having multiple activities and resource/slides allows me to customize my lessons. Getting ideas on how to use those resources to help students learn – priceless!”*

*“Absolutely! I am a much better teacher because of MATB. I have all the resources that I need at my disposal. This allows me to spend my planning time thinking about how to tweak the lessons and embed more differentiation to meet the needs of my students instead of scrambling to find resources that don’t always result in a well-crafted lesson.”*

*“It’s the most wonderful thing that has happened to us in Miami Dade County. We get to enjoy our passion stress-free and we see actual progress in students as well as more engagement during instruction.”*

*“MATB gives access to all students. I am thrilled that I can say that every student in my school is learning to play an instrument. Having a MATB as the foundation of the general music curriculum has improved student musicianship and motivation to get better. My junior band and violin students this year already walked into my classroom with so much knowledge, and they were able to transfer what they learned to their instruments. MATB is leveling the playing field one classroom at a time. Thank you!”*

*“There were students that were so excited about completing challenging songs which helped their self-esteem and gained the respect of their classmates. They experienced a sense of great accomplishment and pride.”*

*“I saw students, who either could not speak English or had a social or emotional disadvantage, blossom while working with a peer. The peer helper exhibited patience and compassion which allowed the partner to try something new and succeed.”*

*“I use MATB ideas and add some of my own. It is helpful not to have to search out versions of songs since they are already there. It is also good to have someone to “have my back.” Music teachers are often alone in the school building. I don’t feel alone.”*

*“Being a new teacher, I felt unprepared in the realm of curriculum development but MATB has provided a solid foundation upon which I can expand my offerings. Its concepts and framework are not limited to keyboard instruction and have been useful in other musical areas, as well.”*

*“I really did enjoy the way everything was sequentially structured. I’ve used many other things in the past for music teachers, but Music and the Brain made it very easy to set up every lesson. It was the easiest methodology for me to follow and it fell into place where the more I used it the more routine it became, and the better it worked for the students.”*

## **Quotes from MATB Students**

*“I can tell my piano skills are improving because I used to go really slow and I’d keep messing up and now I can go at the right pace and it’ll sound alright.”*

*“Something I like about playing the piano is it’s a way for me to relax when I’m upset or angry about something. It gives me something to do. When I become bored I can try and make something up on the piano.”*

*“It’s really relaxing and there’s endless things you can do on the piano. It’s just very intriguing.”*

*“It makes me feel calm and happy.”*

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