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STEM Education

Moving



Through



Math

**Gallagher-Bluedorn
 Performing Arts Center
 Waterloo Community School District
 University of Northern Iowa**



The focus of STEM (science, technology, engineering and mathematics) preparedness for K-12 students has risen dramatically these past few years--both nationally and state-wide. The Gallagher-Bluedorn Performing Arts Center (GBPAC) at the University of Northern Iowa has partnered with the Waterloo Community School District since 2008 to address these needs. The program *Moving Through Math* provides professional development for classroom teachers with side-by-side coaching, classroom demonstration and teacher reflection. The GBPAC anticipates providing the program for at least two more years in partnership with the district.

"Students were able to retain, transfer, and understand concepts like patterns, skip counting, and money more fluently and more efficiently than students in the past."
 WCSD teacher

What is Arts Integration?

"Arts integration is an approach to teaching in which students construct and demonstrate understanding through an art form. Students engage in a creative process which connects an art form and another subject area and meets evolving objectives in both." The John F. Kennedy Center for the Performing Arts.

How Do Students Learn Best?

The best way for students to learn math is to actively experience math concepts. In *Moving Through Math* students see, hear, discuss and

even feel math concepts. Brain research shows that students develop deeper understandings when they connect concepts in mathematics to experiences in movement.

When students learn mathematics using a wide spectrum of learning modalities, their comprehension is deep and long lasting. *Moving Through Math* specifically incorporates multiple learning modalities.

Waterloo Community School District

Waterloo Community School District (WCSD) has embarked on a new partnership to enhance mathematics instruction for all of its K-2 grade students. *Moving Through Math* began in 2008, when a key group of teachers (cohort group) attended a summer institute and began implementing arts-integrated mathematics instruction in their classrooms. Since then, the district has recognized the impact that the implementation of these instructional practices has had on student learning.



As a result, WCSD has expanded the program from self-selected participation to essential participation. *Moving Through Math* is now an integral part of Waterloo's professional development for all K-2 grade teachers, along with the newly adopted math curriculum, *Investigations*. The district believes that the quality of the math content,

the model of active instruction and learning, and the in-depth teacher training provided by *Moving Through Math* significantly moves its teachers forward in their content and pedagogical knowledge as math instructors.

Waterloo educators learn strategies for teaching geometry, symmetry, pattern and grouping

concepts, number lines, addition and subtraction, place value, skip counting, time, coin concepts and more. All of these concepts are identified as Iowa Core Standards for K-2 students. This training also supports the expectations described in the Iowa Core's Characteristics of Effective Instruction.

"I am better at diagnosing learner gaps. I can observe a student's representation of the concept and recognize misconceptions in their thinking." WCS D teacher

Moving Through Math

Math moves off the page and into students' minds and bodies when mathematics instruction is integrated with rhythm, movement and the creative imagination. Nationally renowned arts educator Marcia Daft spent 20 years developing *Moving Through Math*. This innovative approach to teaching mathematics engages all students, including



English-language learners, academically challenged students, highly active children, and gifted and talented students. Integrating the arts with the teaching of math makes full use of students' aural, kinesthetic, visual, analytical, creative and social intelligences.

Method and Description

Using the Iowa Professional Development Model, *Moving Through Math* allows classroom teachers:

- 1. Theory** – Participants attend a three- or four-day summer institute with Marcia Daft.
- 2. Demonstration** – Marcia Daft returns in the fall for four (4) consecutive days of demonstration teaching lessons in classrooms with Waterloo students.
- 3. Practice** – Participants teach *Moving Through Math* lessons on their own.
- 4. Coaching** – Marcia Daft returns in the spring for four (4) consecutive days for side-by-side teaching and coaching.
- 5. Feedback** – On the last day of her residency in both the fall and spring, teachers gather all day with Marcia for reflection and feedback.

"I have become a lot more aware of the progression of thinking that students go through in math. The (Moving Through Math concepts) has allowed me to pinpoint holes in student thinking more accurately and has taught me how to address them. It has allowed me to be much more hands on with my students when it comes to math." WCS D teacher

Goals of Moving Through Math

Educators will:

Know

- The difference between mathematical memorization and comprehension.
- How to articulate mathematical thinking through clear and concise language.

Be able to

- Facilitate lessons in which students use their bodies to represent mathematical concepts.
- Facilitate lessons in which students collaborate with their peers to collectively represent and explain mathematical concepts.

Appreciate

- The joy of learning mathematics from a creative and experiential perspective.
- How different students can represent mathematical thinking in diverse ways.

Gallagher-Bluedorn Performing Arts Center

The GBPAC is a resource to enrich the artistic and cultural environment of the university, the region and the state of Iowa. The GBPAC seeks to complement the university's educational mission by presenting an artistically and culturally diverse series of visiting artists each season, that contribute to the artistic,

educational and cultural growth of the many communities it serves. The GBPAC values the power of the arts to influence and transform the lives of all people, strengthening and improving its communities.



Marcia Daft

Marcia Daft is the founder of *Moving Through Math* and *Moving Through Science*. Her company, Missarmia Productions, produces and publishes award-winning children's books, instructional materials and videos that bring arts integrated learning to life in the classroom. Marcia's unique teaching methods have been used in schools throughout the United States for 20 years.

Marcia is a national workshop presenter for the John F. Kennedy Center for the Performing Arts in Washington, D.C. She worked in Head Start, Montessori, High Scope

and other early learning programs across the U.S., training educators to integrate the arts with early childhood teaching.

Ms. Daft graduated Phi Beta Kappa in bio-medical engineering from Duke University. She was a Century Fellow at The University of Chicago, where she earned a Master's Degree in music. She studied piano performance at the Mozarteum in Salzburg, Austria, and holds both a Certificate and License in Dalcroze Eurhythmics - a technique of integrating music and dance.

John F. Kennedy Center for the Performing Arts Kennedy Center

The Partners in Education program of the John F. Kennedy Center for the Performing Arts is designed to assist arts organizations throughout the nation develop and/or expand educational partnerships with their local school systems.

The partnership focuses on the professional development of classroom teachers by offering interactive workshops that focus on teaching in and through the arts, by integrating an art form with a curriculum area. The Kennedy Center model includes:

- Instruction involving students in active learning by drawing on students' multiple intelligences and various learning styles.
- Each lesson containing identifiable objectives and is linked to national and/or state standards of learning. Objectives identify what students will know, be able to do and appreciate in each discipline.
- Arts-integrated instruction involves active students; they observe and respond, imagine, analyze, hypothesize, create, reflect, revise, evaluate and revise again.