

## University of Northern Colorado Scholarship & Creative Works @ Digital UNC

---

Theses

Student Research

---

12-2016

# Creative Movement and Dance Integration: Their Connection to Learning Third Grade Math Concepts

LaShandria L. Redman

Follow this and additional works at: <https://digscholarship.unco.edu/theses>

---

### Recommended Citation

Redman, LaShandria L., "Creative Movement and Dance Integration: Their Connection to Learning Third Grade Math Concepts" (2016). *Theses*. 52.

<https://digscholarship.unco.edu/theses/52>

This Text is brought to you for free and open access by the Student Research at Scholarship & Creative Works @ Digital UNC. It has been accepted for inclusion in Theses by an authorized administrator of Scholarship & Creative Works @ Digital UNC. For more information, please contact [Jane.Monson@unco.edu](mailto:Jane.Monson@unco.edu).



© 2016

LaShandria L. Redman

ALL RIGHTS RESERVED

UNIVERSITY OF NORTHERN COLORADO

Greeley, Colorado

The Graduate School

CREATIVE MOVEMENT AND DANCE INTEGRATION:  
THEIR CONNECTION TO LEARNING THIRD  
GRADE MATH CONCEPTS

A Thesis Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Master of Arts

LaShandria L. Redman

College of Visual and Performing Arts  
School of Theatre Arts and Dance  
Dance Education

December, 2016

This Thesis by: LaShandria L. Redman

Entitled: *Creative Movement and Dance Integration: Their Connection to Learning Third Grade Math Concepts*

has been approved as meeting the requirement for the Degree of Master of Arts in College of Performing and Visual Arts in School of Theatre and Dance, Program of Dance Educator Intensive

Accepted by the Thesis Committee:

---

Sandra L. Minton, Ph. D., Chair, Advisor

---

Christy O'Connell-Black, Adjunct Professor, M.A., Committee Member

Accepted by the Graduate School:

---

Linda L. Black, Ed.D.  
Associate Provost and Dean  
Graduate School and International Admissions

## ABSTRACT

Redman, LaShandria L. *Creative Movement and Dance Integration: Their Connection to Learning Third Grade Math Concepts*. Unpublished Master of Arts thesis, University of Northern Colorado, 2016.

In education, there are various methods of instruction used to engage students and strengthen learning of academic concepts. One method that can be used is arts integration. Arts integration is a pathway to learning that integrates an art form with another subject. Using movement and dance to help teach concepts that are part of an academic discipline is dance integration. This thesis involves dance integration and examines creating and presenting a movement and dance-integrated curriculum that teaches concepts that are part of the math discipline. The study explores how the movement and a dance-integrated curriculum affects student behavior and learning, and answers three essential questions: What is the sequence of lessons to be included in a dance integrated curriculum structured for teaching third grade math concepts? Which third grade math concepts can most easily be taught using a dance-integrated curriculum? And what is the student response to the dance integrated curriculum used to teach third grade math concepts? The created curriculum includes math concepts in geometry, algebraic reasoning, and number sense and operation.

## ACKNOWLEDGEMENTS

This thesis project would not have developed into its full potential without the assistance and support of the following:

My Faith in Jesus

Third Grade Participants

Participating Third Grade Teacher

Principal of the School

My Cohort

For their professional assistance and guidance, at the University of Northern Colorado:

Dr. Sandra Minton (Research Advisor)

Christy O'Connell-Black

Richard Shore

And for their patience, love, and support, especially when I needed it the most:

My Family (husband, kids, parents,  
brother, and all my family in Houston)

## TABLE OF CONTENTS

CHAPTER I. INTRODUCTION.....	1
Goal of Thesis.....	1
Purpose of Study.....	3
Significance of Study.....	6
CHAPTER II. LITERATURE REVIEW .....	11
The Importance of the Arts.....	11
Why Movement and Dance Are Important?.....	19
Arts Integration.....	28
Dance Integration.....	30
Dance Integration Based on Math Concepts.....	32
Summary.....	36
CHAPTER III. METHODOLOGY .....	37
Introduction.....	37
Research Elements.....	37
Participants.....	38
Curriculum Design.....	38
Research Instruments.....	44
Setting.....	46
Procedures.....	47
Data Analysis.....	51
Summary.....	52
CHAPTER IV. DISCUSSION .....	53
Post-Lesson Observations.....	53
Midway Student and Teacher Interviews .....	60
Final Interviews .....	64
Addressing the Research Questions.....	67
CHAPTER V. CONCLUSION.....	69
Limitations of the Study.....	70
Future Implications .....	70
Final Thoughts .....	71
WORKS CITED .....	72
APPENDICIES.....	80



APPENDIX A: The Ten Lessons .....	80
APPENDIX B: Research Instrument Forms.....	96
APPENDIX C: Principal Approval Letter .....	100
APPENDIX D: Institutional Review Board Forms .....	102
APPENDIX E: Teacher, Parent, and Student Consent and Assent Forms.....	105

## LIST OF TABLES

TABLE 1.	Input—Output Table.....	43
TABLE 2.	Input—Output Table.....	43
TABLE 3.	Schedule for the Study.....	49
TABLE 4.	Observation Notes.....	53
TABLE 5.	A Condensation of Researcher Observations.....	57
TABLE 6.	A Condensation of the Student and Teacher Midway Interviews.....	61
TABLE 7.	A Condensation of Comments from the Final Students’ and Teacher’s Interview.....	64

## CHAPTER I

### INTRODUCTION

#### **Goal of Thesis**

The arts have an ability to be a powerful and transforming avenue for learning and when integrated with academic subjects, the arts enhance instruction, the environment, and student learning. The arts “allow students to ask questions, explore answers, and generate new questions from recent learning experiences” (Gullatt 20). An experienced advocate for the arts, Eric Jensen, stated in his book, *Arts with the Brain in Mind*:

The arts enhance the process of learning. The systems they nourish, which include our integrated sensory, attentional, cognitive, emotional, and motor capacities, are, in fact, the driving forces behind all other learning. That doesn't mean that one cannot learn without the arts; many have. The arts, however, provide learners with opportunities to simultaneously develop and mature multiple brain systems, none of which are easy to assess because they support processes that yield cumulative results. (2)

Theorists such as Gardner, Eisner and Catterall have stated that when the arts are integrated into education, the “whole child” is being taught (Gullatt 12). Students who are exposed to the arts have greater motivation to learn; they are more likely to stay in school because there is a positive relationship between academics and the arts (Melnick, Witmer, and Strickland 155). There is evidence of the benefits of arts integration, yet it is not utilized at the fullest capacity in schools or in classrooms as a method for teaching students. To continue in the effort to understand how the arts impact education and how integrating the arts into the curriculum affects students, more research and study needs to

be done. There is a need to further our understanding of arts integration to solidify the evidence of the positive relationship between the arts and the learning environment.

There is a critical need for quality studies that fully capture the downstream effects of arts integration sketched by the studies we have reviewed and a need for a richer understanding of the complex dynamic among the cognitive, social, and emotional dimensions of arts integration. (Rabkin and Redmond 150)

The transfer of learning and cognition between the arts and traditional academic subjects is mutual; learning from each discipline area complements and advances learning in the other (Burton, Horowitz, and Abeles 43). As arts advocate Eric Jensen states in his book, *Arts with the Brain in Mind*:

Education is not an either-or-scenario. It's not the arts versus a rigorous, demanding curriculum. I want learning to be engaging, challenging, rigorous, and integrated. The arts should not be a path only for the alternative learner or those who would otherwise fail, any more than math is an easy path for those who can't do the arts. I favor challenging work in all the disciplines (arts as one of them), with regular, accurate, and purposeful assessment and strong standards in learning (v).

One of the art disciplines that enhances the process of learning is dance. "Dance naturally imports ideas from many disciplines to express through movement. To embody a concept through dance is to wear it a new way" (McCutchen 296). The focus of this study is to do just as McCutchen has stated, to help students embody concepts through dance. "When students perform movements related to concepts and ideas, learning becomes more personal and concrete" (Minton ix). Students will remember what they experience because movement and dance is experiential.

One of the goals of this study was to examine the connection between creative movement and dance used as teaching tools in learning third grade math concepts. Another goal was to bring together the art of dance and movement and the academic discipline math through a created dance integrated curriculum. The essential questions

addressed in this project were: What is the sequence of lessons to be included in a dance integrated curriculum structured for teaching third grade math concepts? Which third grade math concepts can most easily be taught using a dance-integrated curriculum? and, What is the student response to the dance-integrated curriculum used to teach third grade math concepts?

Kaufmann and Dehline state:

Although the arts (visual art, dance, drama, music, and media arts) are legally defined as a core content area in U.S. education, they are commonly considered a special subject and are usually the first area to be cut to make room for something new. However, educators must never underestimate the power of the arts to inspire and delight children. Dance promotes endless pathways for children to create meaning and find fulfillment in learning (5).

### **Purpose of Study**

Arts integration can be interpreted and defined in various ways. For the purpose of this study it is defined as “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” (Silverstein and Layne). Arts integration engages strategies that develop a strong foundation for deep and meaningful learning. Students do not only acquire information, but process and apply it (Donovan, Pascale 20). Integrating the arts into classroom curricula can have a great impact on students.

A study by researchers compared arts integrated curriculum and a traditional single subject curriculum in an attempt to study the benefits of arts integration in academic classes such as social studies, math, science, and language arts. The study showed that integrated curriculum has an advantage over traditional curriculum because it is student centered resulting in an increase in motivation, teamwork, ownership, and

deeper connections from the studied topic to other subject areas. Integrated curricula provide opportunities for inquiry and problem solving (Zhbanova, Rule, Montgomery, and Nielsen 257).

Factors such as the complexity of planning integrated lessons and the pressure of an assessment driven system restrict the implementation of integrated curricula. Not to mention, in an educational system plagued with standardized testing and limited teaching time, it seems problematic to add work with arts integration. However, it is important to note that standardized testing doesn't give a complete measure of educational achievement. Many components of education such as critical thinking, creativity, and motivation are not measured in standardized testing. Arts integration has the capacity to enhance these educational components. Therefore, standardized testing creates superficial thinking among students. If the goal is for students to not just learn for the test but to also be inspired, lifelong learners, we must create opportunities for learning to take place in an environment that allows for reflection, wonder, and creativity (Donovan and Pascale 26).

Traditional teaching is also teacher centered with the teacher doing most of the talking. Arts integration stimulates learning in another more active way. In this type of teaching the students are more engaged.

Active learning is the intentional opportunity for students to engage in the learning process. It connects learners to the content through movement, reflection, or discussion, making students the center of the learning process as they take initiative to learn. It can be behavioral and/or cognitive, supporting a variety of instructional objectives from recall through synthesis. (Green and Casale-Giannola 4-5)

“Moving and dancing is a way that students can actively learn” (Minton 1).

Overall, “dance plays an important role in overall educational success of children. Study

carefully the accountability standards that dance could address in other academics so that you can build meaningful bridges to other core subjects” (McCutchen 297).

Research indicates that participating in dance positively impacts self-confidence; social intolerance; connections to history, civics and social studies; organization, creativity and non-verbal reasoning; development of individual and collaborative work skills; applications and concepts in mathematics; creative expression and learning persistence (Appel 15).

Dance integrated with core subjects serves as an avenue to the benefits of arts integration. Dance integration is meaningful instruction that combines the art form of dance with one or more content areas based on mutual concepts and connections shared by both disciplines (Kaufmann and Dehline 5). Dance integration involves using creative movement rather than specific dance steps.

Creative movement incorporates movements that are spontaneously created to express an idea or experience. Creative movement comes from the elements of dance, using the same vocabulary used by dancers and choreographers (Kaufmann and Dehline 5). The elements of dance are the foundation for movement vocabulary and skills. The elements of dance include body, time, energy, space, and action. Kaufmann and Dehline state that, “children aged 5 to 11 are natural movers and are uncomfortable sitting at desks for long periods of time. Classrooms come alive with joy when children push the desks aside and dance the math or science curriculum” (4).

So let’s narrow arts integration down to just dance and movement. How can we ask teachers to include dance integration as part of their classroom instruction when they are dealing with multiple demands during the school day? As arts advocates Lisa

Donovan and Louise Pascale state:

Teachers who integrate the arts into curriculum, whether they work in primary or secondary classrooms, tell the same story over and over: the student who would

not pick up his pencil but will now not stop writing poetry; the students who were bored by animal adaptation but are now excited about science when drama became the teaching tool; and the class that can now learn and retain geometric concepts through movement. (5)

If students are more motivated about learning and can retain information, time should be made to make the arts part of classroom activities. Donovan and Pascale also state:

Every curricular change requires an investment in time, but a single modification can lead to a lifetime return of engaged, thoughtful, interested students. This is not an educational fad soon to be eclipsed by some new flavor-of-the-month educational strategy. The arts have proven themselves to be a tool through which academic performance improves across the curriculum. (5)

The purpose of this study was to integrate movement and dance with math through a designed curriculum, and discover how students respond to this curriculum.

This study focused on the integration of dance with math concepts because dance can help to reinforce math skills. “Math is a good partner for dance because of the geometric shapes in space, patterns, symmetry, and asymmetry, and counting of phrases”

(McCutchen 315). Kaufmann and Dehline share an experience in their book of a teacher integrating dance and math:

Large geometric shapes are taped to the floor. The students stand barefoot on one side of the classroom. The teacher says, “Tip toe over to the parallelogram and make a shape in the area. Gallop over to the rhombus and make a balancing shape on its perimeter.” Geometry comes alive for students when they experience it firsthand with their bodies. (5)

### **Significance of Study**

Arts integration improves cognitive engagement and ownership of learning, attention, attendance, engagement, provides opportunities for parent and community involvement, and influences positive transformation of the school environment and culture (Appel 15).



An article written by Morgan Appel, looks at arts education in California's schools where the arts are being taken away due to budget costs, and how this impacts the students.

Appel states that, "the arts positively impact cross-curricular achievements and teachers' ability to use multiple modalities and intelligences" (15). There is evidence that lessons involving the arts address many diverse learning styles and have the ability to serve all students (Davis 27). The arts can provide visual, kinesthetic and/or auditory learning experiences for processing new information and to reinforce prior learning (Cornett 234).

Students learn and process information in different ways. These ways of learning are based on the senses and include auditory, visual, or tactile-kinesthetic. Auditory learning means getting information orally. Visual learning is understanding information through drawings, or charts and using mind pictures to understand. Tactile-kinesthetic learning means learning is done by doing and through physical interactions. The process of learning is strengthened by the arts. Sandra Minton states:

Brain research has shown there are centers in the brain that respond to specific disciplines. We have known there are language centers in the brain, but recent research demonstrates the arts also engage specific brain areas. Music affects our emotions because the nucleus basalis, a part of the mid-brain, or upper part of the brain stem, gives weighted meaning to sounds and codes them for storage in memory. Other areas of the brain help us appreciate the visual arts. (6)

Activities such as spinning and body rotation, dance steps, and cartwheels, may be key factors in the formation of critical brain areas important in controlling visual, auditory, spatial, and motor functions. When movement activity engages multiple brain systems, it accelerates learner maturation (Jensen, "Body in Mind" 47).

The arts not only engage specific brain areas, but serve as a multi-sensory approach to learning. Multi-sensory learning involves seeing, touching, hearing, moving, tasting, smelling, and feeling; therefore, connecting to the world through the senses. The

senses play an important role in learning (McIntosh and Peck 8—10). Brain research tells us that students learn best through a multi-sensory approach (Gilbert 28). Movement based learning involves a multi-sensory approach and it is effective because it “allows children to use their strengths to process new information and because it offers children varied and multiple ways to learn” (McIntosh and Peck 8). For example, while students are moving they may also be given verbal instructions or move to music, or respond to photos or pictures.

In multi-sensory teaching, one of the learning styles that directly relates to dance integration is the tactile and kinesthetic learning style. Tactile and kinesthetic learners take in information best by doing, experiencing, touching, moving, or being active. Dance integration is an effective way to address this multi-sensory approach to teaching and to offer students’ brains the best opportunity to learn. “There are many links between our brain and our body, and activating one can activate another.” So moving our body helps us to better access our brain (Jensen, “Body in Mind” 48).

There are many educational theories to explain how students learn. One of the educational theories that also supports movement based learning is the theory of Multiple Intelligences (MI). Howard Gardner originally described this theory. It involves seven intelligences, which are linguistic, musical, logical-mathematical, spatial, interpersonal, intrapersonal, and bodily-kinesthetic (Minton 4). In a classroom that uses dance integration, many of the intelligences are used and students are able to process the information in a meaningful way (Minton 5). One of the primary intelligences involved in dance is the bodily-kinesthetic. However, “dance can engage and nourish all seven of Gardner’s multiple intelligences; it is not restricted to just the bodily-kinesthetic realm”

(Gilbert 33). Gilbert gives examples of how dance can engage all of the multiple intelligences.

Having students count the number of turns done by all students divided by the number of minutes to do the turns is an example of logical-mathematical intelligence. Speaking or writing a dance vocabulary word through symbols is linguistic intelligence. Interpersonal intelligence is engaged in dance through group work or learning from a partner. Intrapersonal intelligence is tapped through self-reflection. Musical intelligence can be engaged if students sing rhymes to go with exercises and movement patterns. By having students copy others' movements, they gain an increase in movement vocabulary and use their spatial intelligence (Gilbert 30-33).

Basic activities involving spinning and turning around can strengthen early brain function, yet they are underutilized in the classroom (Jensen, "Body in Mind" 47). In Anne Green Gilbert's book, *Teaching the Three R's: Through Movement Experiences*, Gilbert discusses Piaget's theory of learning about concrete operations. Gilbert states:

Concrete operations is usually reached between the ages of seven and eleven. [Piaget] recommends that the teacher provide a very active curriculum particularly early in this stage. Children at these ages need to work with and handle many concrete objects before they can readily understand abstract verbalization. Piaget also maintains that the key to learning is not to verbalize too much during the stage of "concrete operations." The child requires a great deal of physical activity . . . If children are not ready for abstract verbalization, use non-verbalization. If children work with their bodies to solve math problems, they will better understand the concepts involved when the teacher verbalizes them. They will not only understand concepts better but will remember them longer, for when intellectual exercise is combined with associated physical activity, the impression is more lasting. (Gilbert 7-8)

Using dance with a traditional subjects such as math offers students a deeper learning process that creates the opportunity for students to think beyond getting the answer right; dance integrated with math invites students to explore the meaning of the

lessons and content presented to them and allows for the embodiment of the math concepts. In a training session, Corrine Wolfe provided an example of embodying a math concept through dance. Wolfe states:

I teach equivalent fractions by getting the teachers to create rhythms to a bar of 4/4 putting together half notes, quarter notes, eighth and twelfth notes just as we do in Tap. The only difference is that when they've created the rhythms and taught them to another pair, they then have to write down the sum and show how it adds up to a whole using common denominators. This is perfect for upper primary or lower secondary teachers. (Wolfe "Teaching Maths")

Karl Schaffer and Erik Stern, two dancing mathematicians, state that, "dance and mathematics [are] more than equals, they [are] manifestations of the same interest in aesthetics and form, thought and expression" (Schaffer, Stern and Kim 4). Schaffer and Stern also state, "when we choreograph a new dance or investigate a mathematical problem we are doing much the same thing: creatively exploring patterns in space and time with an eye toward aesthetic potential" (Schaffer, Stern and Kim 5).

This study addresses the need for more inclusion of dance in education and how dance integration benefits students on multiple levels. By using integrated curriculum, teachers can make education more meaningful, student-centered, engaging, and motivational for all students no matter the age, grade, gender or social economic standing (Zhbanova, Rule, Montgomery, and Nielsen 257).

## CHAPTER II

### LITERATURE REVIEW

#### **The Importance of the Arts**

“Engagement in the arts ignites creativity and provides students with opportunities to critically interpret the world around them” (Appel 14). The arts can show positive benefits to students in developing their fine motor skills holding a paint brush or painting with their fingers, encouraging their social skills by working to express their thoughts as they work in groups, and boosting a student’s confidence (Alter, Hays, and O’Hara 2009). Educational writer, Dee Dickinson states that:

The arts are languages that all people speak, integrate the body, mind, and spirit; provide opportunities for self-expression, foster a connection between motivation, assessment, instruction, and practical application; develop collaborative and independent experiences; and provide an opportunity for every student to learn. (Dickinson “Why Are the Arts Important”)

Many important educational components that contribute to a student’s sense of personal accomplishment are provided through the arts, as the student develops and exhibits creativity (Zhbanova, Rule, Montgomery, and Nielsen 253).

According to the Search Institute, interviews with several thousand U.S. teenagers yielded more than 200 different inspirations that enrich teens' lives, excite them, and tap into their true passions. In the top 10 were participating in or leading art, dance, drama, music, writing, or other creative arts activities. (The Whole Child Organization “Arts Integration”)

All students have a chance to succeed and show their success with the arts. The arts foster the behavioral and cognitive skills for success in K-12 curriculum,

postsecondary environments, and in the workplace. The learning environment is a safe haven for inquiry through the arts. Overall, the arts have the capacity to contribute a variety of benefits to children such as stimulating the brain and thought processes, helping to develop skills needed for success in school and life, fostering self-expression and positive relationships and engaging in learning and academic achievement.

### *The Arts and Brain Functions*

In all forms, the arts stimulate the brain. Specific areas of the brain respond to different types of arts. Certain areas respond only to music while others respond to initiating and coordinating movement from running to a more delicate sway of the arms. Specialized networks in the brain that focus on spoken language and stimulate emotions are provoked through drama. The visual arts stimulate the internal visual processing system to recall reality or create fantasy (Sousa 1). As a child learns songs and rhymes, creates drawings, and finger paints, brain areas are developed (Sousa 2).

Michael Gazzaniga, a cognitive neuroscientist, discussed the exercise of the brain's attentional network to explain enhanced cognition. He stated:

We know that the brain has a system of neuro-pathways dedicated for attention . . . We know that training these attention networks improves general measures of intelligence. We can be fairly sure that focusing our attention on learning and performing an art, if we practice frequently and are truly engaged, activates these same attentional networks. We, therefore, would expect focused training in the arts to improve cognition generally. (National Endowment for the Arts 12)

Neural connections are made at a rapid rate during the brain's early years. Natural art forms such singing, drawing, and dancing are play for young children. "These activities engage all the senses and wire the brain for successful learning" (Sousa 2).

The arts are thoroughly cognitive and help to develop crucial thinking tools such as pattern recognition, mental representations of what is observed or imagined, symbolic

representations, and observation (Sousa 2). The National Assembly of State Art Agencies states that helping to develop the capacity for spatial—temporal reasoning, which is the ability to understand the relationship between objects and ideas in time and space, can be attributed to implementing certain types of musical instruction (Ruppert 12).

Spatial—reasoning can further be understood as the cognitive ability to picture a spatial pattern and understand how its pieces fit in that space. It is “the ability to visualize objects, patterns, or images in one’s mind and to be able to mentally modify or move these objects and patterns around” (Minton 5). Examples of this include putting a puzzle together, building with blocks, or playing musical instruments.

Musical instruction helps to develop spatial—temporal reasoning because it helps students visualize elements that go together such as musical notes and these skills are the same skills used in solving multistep problems. Spatial—temporal reasoning is an integral part of acquiring important math skills (Ruppert 5). Even passively listening to music stimulates spatial thinking (Sousa 3).

### *The Arts and Learning*

“To think is to use the mind. It involves the cognitive domain” (McCoubey 31). We use various types of thinking that include critical and creative thought. Critical thinking is evaluative, such as analyzing, synthesizing, and judging something. Creative thinking involves generating something new, being original, flexibility, and forming new combinations of ideas (McCoubey 31—32). The arts develop critical and creative thinking skills.

Critical thinking happens in response to a specific task, question, problematic situation, or challenge (Bailin 17). Some examples of critical thinking challenges in the

arts might include deciding on and justifying an interpretation of a play, improving the performance of a piece of music, creating a painting in a specific style, or creating a dance to convey a certain mood (Bailin 18).

Students are consistently challenged to solve problems. Many artistic creations come through problem solving. Students are challenged with questions such as: How do I turn this clay into a sculpture?; How do I portray this emotion in the dance?; or How should this character react in this scenario? Having to answer these questions and solve these problems, helps students to develop skills in reasoning and understanding (Phillips “Top 10 Skills”).

Approaching tasks from different viewpoints, thinking outside of the box, and being able to think quickly on their feet are skills that children may need in many situations. A student may be asked to create a painting that represents a memory, recite a monologue in six different ways, or compose a new rhythm to add to a piece of music; these tasks allow children to think creatively (Phillips 1).

Elliot Eisner makes a statement about the connection between the arts and these thinking skills. Eisner states:

Work in the arts develops unique and important mental skills . . . The exercise of judgment in the making of artistic images or in their appreciation depends upon the ability to cope with ambiguity, to experience nuance, and to weigh the trade offs among alternative courses of action. These skills represent not only the mind operating in its finest hour, but are precisely the skills that characterize our most complex adult life task. (McCourbey 33)

In visual arts, when students have an opportunity to create a work of art and are provided the tools needed to accomplish this task, such as paintbrushes, the artwork is not complete yet. For the student to complete the art work, they must think about the topic, decide on an image, think about how to compose it, choose how to use the paint and



tools, check their process, make changes as needed, and complete the task. All of this involves thinking, planning, checking, and adjusting. The student must critically think about what to create and creatively think about how to do it. The student must generate the art work from their thinking and creativity, not based on what someone has already done for them such as with a coloring sheet activity (McCoubey 33-34).

Elliot Eisner also states, “The making of visual art provides opportunities not only to experience the pleasures and frustration of creation, but also to practice and develop a valuable array of our most complex cognitive skills” (McCoubey 33).

Various thought processes are involved in arts participation. Those associated with the arts are: imagination, problem solving, reasoning, intuition, perception, and expression (National Assembly of State Art Agencies). Some examples of these thought processes in the arts are stated below:

In an experimental research study of high school age students, those who studied dance scored higher than non-dancers on measures of creative thinking, especially in the categories of fluency, originality and abstract thought. (Ruppert 13)

A group of 162 children, ages 9 and 10, were trained to look closely at works of art and reason about what they saw. The results showed that children’s ability to draw inferences about artwork transferred to their reasoning about images in science. In both cases, the critical skill is that of looking closely and reasoning about what is seen. (Ruppert 13)

The arts enhance the processes that support lifelong learning (Hernandez and Meyer 5).

An article from The Kennedy Center, states:

When kids feel successful in arts activities, they can imagine success in other areas as well. Plus, making art spurs research and learning from others and develops cooperation and appreciation for the talents of different people. Most importantly, making art leads to curiosity, which helps develop life-long learners. (Arts Edge, “How Arts Education Develops Life-long Learners”)

Participation in the arts helps students develop important skills for success in school and life. Some of these skills are: focus, commitment, perseverance, collaboration, and communication (Dayton “Performing Arts Students Develop Skills”).

A study shared at the 2009 Learning, Arts, and the Brain Summit reported that children showed more motivation, paid closer attention, and remembered what they learned more easily when the arts were integrated into the curriculum. (Robertson, “Arts Can Help Struggling Learners”)

The ability to focus is challenging for some students. An example of this key skill developed through the arts is shown through ensemble work. When students work together in an orchestra or dance group, they have to keep a balance between listening and contributing. Through the arts, students have an opportunity to increase their ability to focus and concentrate (Duffy 77).

Commitment is a valuable skill that students need to gain and understand. Through the arts, commitment and dedication are developed through rehearsals for a play or dance. Students are expected to follow through with their commitment to practice, and complete the tasks until finished. Many other skills are learned and developed through commitment such as work habits of being on time for rehearsals, coming prepared, putting effort into the work, having self-discipline, and finishing what has been started. Students also learn to associate commitment with a feeling of accomplishment (Duffy 77).

An important skill that coincides with commitment is perseverance. This skill is essential to achieving success because it means not giving up. An example would be when a child picks up a violin for the first time, she/he knows that playing *Bach* right away is not an option; but, when the child practices, learns the skills and techniques and does not give up, that Bach concerto is that much closer (Phillips “Top 10 Skills”).

The arts develop collaboration skills through opportunities for students to work together, share responsibility, and compromise in decision making. Collaboration in the arts is usually about teamwork. A child who has a part in a dance production can begin to see how their part contributes to the team. This skill develops social skills and can help to establish community. Students learn to value differences and the opinions of others (Zakkai 16.)

An important component of collaboration that is strengthened through the arts is positive student--teacher, administrator--teacher, and teacher--teacher relationships. They enhance teacher morale, the quality of instruction, and the school community (Burton, Horowitz, and Abeles 41).

The arts often involve multiple opportunities for collaboration among students, teachers, visiting artists, and parents, and provide an opportunity, in performances and art shows, for the entire school community to come together. Studies also show the role of the arts experience as a mediating environment enabling students who feel marginalized in other social settings to become more comfortable and active participants in group processes. (Arts Education Partnership 13)

Collaboration helps to develop communication skills. Students learn to communicate their thoughts, ideas, and opinions respectfully through group projects. Peer evaluations and constructive feedback about a performance is a way for students to learn to communicate. Non-verbal communication is also developed through theater and dance because students learn body language. An example of this is when students experience different movements and how the movements can communicate emotions (Kaufmann and Dehline 9).

*The Arts and Development  
of the Self*

James Catterall defines affective development as an increased interest in learning, self-worth, and willingness to try new things. The arts promote affective development by increasing the learner's interest, motivation, and enthusiasm for learning. The arts also have been proven to boost a child's self-image, or how a child perceives their self (Lock "Turn to the Arts"). Perceiving oneself as having worth is self-esteem. Self-esteem increases when a child feels confident in the classroom. Theater training helps children build confidence in speaking and performing in front of an audience. It encourages children to step out of their comfort zone, practice, make mistakes, learn from them, and continue, building their confidence to command the stage (Phillips "Top 10 Skills").

The ability to self-express is increased by giving children an opportunity to do so, especially in a classroom setting:

When students are working towards a common goal, they appreciate that their "voice" and interests are heard and understood by others. This joint effort creates a sense of secure acceptance that is critical to their self-esteem. Children not only become appreciators of each other's work, but also develop skills of self-reflection in the effort to bring their personal vision to fruition. (Lock "Turn to the Arts")

The arts enhance self-motivation and engagement. This can be seen through the studies with at-risk children. In the compendium *Critical Links*, James Caterall, described benefits of participation in the arts, especially benefits for economically disadvantaged children. These outcomes are discussed below:

One is a set of effects related to reading skills--basic reading comprehension for children who have in fact been left behind. An added set of effects for these children is increased achievement motivation. While motivation to achieve in school comes in various forms in the literature and across the compendium's studies, probably the most central is a tendency for the arts to promote both certain competencies for children who struggle across the curriculum as well as

genuinely grounded feelings of competence and engagement. Feelings of competence and engagement can impact outlook and approach to schoolwork more generally and research on the arts finds impacts showing both increased attendance and fewer discipline referrals. (Deasy “Critical Links”)

### **Why Movement and Dance Are Important?**

#### *Cultural and Historical Importance*

Since the earliest moments of human history, dance has been an important component in societies and cultures around the world. It takes on many forms and has many purposes from ritualistic, to spiritual, to social; dance has been a way for people to communicate and express themselves. It crosses all boundaries and serves as a universal language for mankind.

Dance continues to be one of the most expressive forms of communication and one of the major art forms used to communicate meaning about the human experience. Through dance, values, thoughts, emotions, and aspirations can be expressed. Dance enables students to learn how to create, perform, and understand movement as a means of artistic communication (NDEO “Dance Education in the United States”).

Human beings have danced to influence natural forces, to reinforce political and social orders, to pass on myths, to enact rituals, to enjoy themselves and each other, and to express themselves artistically. Dance forms from around the globe like Spanish flamenco, Native American ceremonial dances, Japanese kabuki theater, European ballet, the capoeira of Brazil, African harvest dances, Indian classical dance, and American modern dance reflect the beliefs, values, and history of the cultures they spring from. (Zakkai 19)

“The fact that dance has not perished through the ages is evidence of its value to mankind” (H'Doubler 161).

#### *Movement and Brain Development*

“Learning, thought, creativity and intelligence are not processes of the brain

alone, but of the whole body” (Hannaford 15). Movement affects the brain in many ways, and most of the brain is activated during physical activity. There is no doubt that movement and dance activate many brain areas (Jensen “Arts with the Brain in Mind” 72).

Your brain creates movements by sending a deluge of nerve impulses to the appropriate muscles. And each movement, in turn, activates cortical areas. Because each specific muscle has to get the message at a slightly different time, it’s a bit like a well-timed explosion conducted by a special-effects team. That amazing brain-body sequence is often referred to as a spatio-temporal (space-time) pattern or a cerebral code. (Jensen 72)

Cognitive learning is stimulated by dance. “It turns out that moving our muscles produces proteins that travel through the bloodstream and into the brain where they play pivotal roles in the mechanisms of our highest thought processes” (Becker 6).

The ages of four to twelve are a crucial time for a child’s brain development (Becker 6-7). Scientists now believe that to achieve the accuracy of the mature brain, stimulation in the form of movement and sensory experiences during the early developing years is required. Early movement experiences are crucial to optimal brain development.

For the maximum benefit, movement experiences should be introduced early in life and during the “windows of opportunity” (Gabbard and Rodrigues “Optimizing Early Brain”). These windows begin opening before birth and then reduce as a child grows older. Some ways to provide children with lots of sensory—motor experiences, including activities that involve fine and gross-motor movements are:

Striking, kicking, and catching. Include a variety of basic gross-motor activities that involve postural control, coordination of movements, and locomotion; crawling, creeping, body rolling, and jumping. In addition to stimulating the general wiring patterns of these fundamental skills, moderate and vigorous intensity gross-motor activity provide the brain with its chief energy source, glucose. In essence, these activities increase blood flow, which feeds the brain

and enhances neuronal connectivity during the critical period. (Gabbard and Rodrigues “Optimizing Early Brain”)

Movement and dance can also help memory. Movement is a sensual memory activator. Body memory is held deep in the muscles and sinews, released when a combination of movements trigger a familiar pathway that encoded it there in the first place (Silk 8).

### *Physical Skills*

There are various skills developed through dance and movement. The improvement of the physical body is one of the skills developed. Dance and movement are beneficial to the health of children especially in times where childhood obesity is prevalent. Children need to move and extended periods of inactivity should be discouraged; dance is a great way to get children moving and active. It is a wonderful form of exercise with opportunities to improve health (Becker 6).

Dance addresses physical development because it incorporates a wide range of motion, coordination, strength, and endurance activities. Examples of this can be seen through movement patterns that teach coordination and kinesthetic memory. Dancing involves the whole body, and, as stated before it is a form of exercise for total body fitness. Children are naturally active, and dance offers an opportunity to expand movement possibilities and skills (NDEO “Standards for Dance”).

### *Psychological Skills*

Dance is a form of expression and children have a natural inclination to express themselves through movement. Dance for children, helps them find out about themselves and their environment. Children need to look outside their own bodies to take in information about how they fit into the world. This process of establishing relationships

between oneself and the world is often referred to as self-awareness. It is a vital learning process as it helps children begin to see themselves as part of a greater whole. Much of children's understanding about how the world works is tied to their direct physical involvement, their feelings of competence, and the immediate appreciation of the moment itself (Lynch-Fraser 45).

Children learn about the world through movement and sensory awareness (Hernandez and Meyer 19). An example of this is when children experiment with movement and improvise. In doing so, they explore dynamics and, movement range, and discover how to communicate in their own way when composing movement. This process is very similar to writing a paper (McCutchen 184).

Creating a dance is a personal endeavor and allows each student to express their individuality and creativity as a mover (McCutchen 184). Creativity is:

About taking risks and making connections and is strongly linked to play. Creativity emerges as children become absorbed in action and explorations of their own ideas, expressing them through movement, making and transforming things using media and materials such as crayons, paints, scissors, words, sounds, movement, props and make-believe. Creativity involves children in initiating their own learning and making choices and decisions. Children's responses to what they see, hear and experience through their senses are individual and the way they represent their experiences is unique and valuable. Being creative enables babies and children to explore many processes, media and materials and to make new things emerge as a result. ("Creative Development")

Dance is a creative art that helps children to communicate and perceive who they are in a way that can be shared and developed, and that is fully experiential.

Dance is a tool for self-discovery and understanding of the self. Understanding of the self has three dimensions. They include learning, knowledge, and personal experiences, including an aesthetic expression of body and mind (McCutchen 92).

Children who know themselves through dance come to know themselves in a deeper and



more meaningful way. They not only know how their bodies move and respond to such stimuli as music, space, rhythm, and time; they also come to know their inner feelings, which motivate them to move with so many creative qualities (Silk 6). As stated in McCutchen's book, "by combining these three dimensions, dance engages the whole person in simultaneously moving, thinking, and feeling. Thus, dance education can enhance [a] child's physical, mental and emotional development" (92). We must educate the whole child, not just the intellectual ability. It is important for children to recognize their own inner dynamics, of their dialogue with their own selves and the physical representation of their emotions (Silk 5).

Emotional maturity is addressed because dance promotes psychological health. Children have an opportunity to express their emotions and become aware of themselves and others through creative movement. Children enter the classroom with a history of emotional experiences. "Movement within a class offers a structured outlet for physical release while gaining awareness and appreciation of oneself and others" (NDEO "Standards for Dance").

Dance and creative movement in the classroom have been documented to strengthen students' self-esteem, self-regulation, and social function. Movement and dance help teachers actively engage all students and cut down on behavior management issues (Skoning "Dancing the Curriculum" 170-172).

The greatest contribution to classroom behavior that dance can make comes as children gain more experience in focusing and concentrating, and develop higher levels of awareness of themselves and others (Duma and Silverstein 19).

Dance helps foster the development of friendships and working with others, therefore, teaching respect for others as well as themselves, which allows for an enhanced classroom environment. Dance offers opportunities for social encounters, interaction, and cooperation, which help to develop social awareness. Children learn to communicate ideas to others through body movement and through verbal communication as well (Jensen “Arts with the Brain in Mind” 80).

Integrating dance into the classroom and the curriculum has many benefits to include, but not limited to, cognitive, health, social development, and more engaged learning. Many dance advocates would agree as Kelly Becker states:

Understanding the necessity for engaging the body in learning, witnessing the need for students to move throughout the school day, and experiencing the positive effects that dance has on students’ development has led me to believe that dance should be included in the elementary curriculum. (6)

#### *Comprehension and Cognitive Skills*

According to Brenda McCutchen, dance is comprehensive. McCutchen defines comprehensive as “dance education [that] is broad in scope, covering the many facets of dance including diverse styles and experiences” (8). It is important to understand that dance is not just about learning movements to music, but it is a discipline that encompasses all aspects of dance (McCutchen 8). Dance involves dance making, critiquing, anatomy, history, technique, culture, and an array of many more elements. Since dance is comprehensive, teachers are able to use various ways to engage students to move, dance, create, critique, edit, refine, study, perform, and reflect (McCutchen 9). The activities that engage students through dance help to develop students’ skills.

For example, in dance making, students are engaging in higher order thinking and developing their cognitive skills. Lorin Anderson and David Krathwohl created a revised

cognitive taxonomy, based on Bloom's taxonomy. This revised taxonomy has levels of thinking to include: remembering, understanding, applying, analyzing, evaluating, and creating (Krathwohl 215). Heather Southard provides the following example of the connection between dance and higher order thinking based on this cognitive taxonomy.

She states:

Creating [is] generating ideas and movement relating to a topic or story.  
 Evaluating [is] assessing which of these ideas and movement "make the cut."  
 Analyzing [is] deciding how to structure the movement to best convey the meaning. Applying [is] use [of] this method to generate more ideas on a related point or supporting detail. Understanding [is] comprehending on a deep level the sequence of movement and how it develops. Remembering [is] being able to re-create the dance, the process, and the lessons learned. (Southard "Why Dance Matters")

Cognitive development is addressed when children create movement

spontaneously when presented with movement ideas or problems that can be solved using a movement response. "Movement provides the cognitive loop between the idea, problem, or intent and the outcome or solution" (NDEO "Standards for Dance"). Dance making is just one aspect of dance, but it can help students strengthen and develop their cognitive skills. As students engage in dance, many other skills and benefits can be learned or strengthened.

### *Active Learning*

Learning is a physical language that includes creative movement and dance, meaning dance is basic to learning (Griss 2). Children learn from experience and by doing. John Dewey understood this when he stated, "Action is the test of comprehension." To learn by "doing" and to act on knowledge is the basis of kinesthetic learning (Becker 7). Kinesthetic learning is experiential learning (Griss 2).

In kinesthetic learning, movement and action replace more passive forms of learning, such as listening to a lecture. Everybody has probably experienced the effectiveness of this style of learning. No matter how many years it has been since you learned, most people can still ride a bike and swim across a pool. I am able to play piano pieces that I once knew, and I remember the moves to dances I performed when I hear the music. Yet I can no longer recite the capitols of all the states or the elements in the periodic table--all information that I had memorized. No matter how much we memorize, recite, and study, our muscle memory seems to trump our brains alone. We learn best when we combine mind and body. (Sinha "Kinesthetic Learning")

Psychologist Howard Gardner defined the kinesthetic as one of the seven intelligences or ways that children are smart. Dance heavily uses kinesthetic learning and intelligence (Griss 10). However, kinesthetic intelligence is not the only intelligence used in dance, in fact, dance can be used to strengthen the other intelligences. Elements such as music, pictures, or verbal descriptions, help students use other intelligences. By combining movement with these other elements, children can process information with their dominant intelligence and the lesson becomes more meaningful to them (Minton 5). There are many ways to learn and understand information. If a teacher combines dance movement with pictures and verbal descriptions, the lesson will appeal to all learning styles—tactile--kinesthetic, visual and auditory. If a teacher combines movement, pictures, and verbal descriptions to teach about the water cycle for example, then the needs of all the learners in the class will be addressed.

Integrating dance and creative movement into the classroom can help students with different learning styles who do not learn through traditional instructional formats. Some students struggle in school because they are behind in writing or reading. Lessons that incorporate movement help these students to express ideas, engage in thinking processes, and solve problems kinesthetically. For the classroom, using creative movement and dance allows for effective instructional strategies to meet the various

needs of diverse learners. By providing a different path to subject matter, kinesthetic learning can help some children avoid academic failure (Griss 9).

Using movement and dance in the classroom is a teaching strategy called active learning. Active learning enables students to have a chance to listen, talk, write, read, and reflect, instead of taking on a passive role in the classroom. Students are experiencing the learning, which will help them remember it. This teaching strategy engages students with the content of the lesson. Active learning connects to interdisciplinary learning or integrated learning (Minton 1).

By adding movement and dance in the curriculum, students learn and express linguistic intelligence through their kinesthetic intelligence (Gilbert 35).

At least two large studies documented the effectiveness of using movement to teach basic reading and reading comprehension strategies, demonstrating the need to provide students with additional avenues for learning. Through the addition of movement and dance as an instructional strategy in the example classroom, students learn and express linguistic concepts through their kinesthetic intelligence. Students who struggle to demonstrate understanding through language are able to demonstrate understanding through movement. Often, students in this class who struggle to explain a concept on paper easily explain it with their bodies. Some of these students are able to write a response as long as they have “moved” it first. One intelligence is used to help strengthen another. (Skoning “Dancing the Curriculum” 173)

Susan Griss provides another example of teaching reading through movement and dance, she states:

Rodney is a good example. Stumbling through a paragraph that is two years beneath his grade level, his eyes wander out the window to let him escape his frustration and embarrassment. But thirty minutes later, he demonstrates with confidence and professionalism, the choreography he was taught a week before. Interpreting the nature of main character in a Dr. Seuss story, he weaves his way from upstage to downstage at the appropriate cue. . . . Rodney is developing reading comprehension skills through a kinesthetic retelling of the story. (9)

## Arts Integration

Arts integration connects an art form to another core subject using the art form to teach the subject and vice versa (Silverstein and Layne). The arts can be connected to many disciplines, encouraging advocates to believe they are a natural fit into the curriculum, that can encourage high levels of student learning. For these reasons, school officials and researchers have suggested arts integration.

There is an increasing amount of evidence that arts integration has positive outcomes for students at all learning levels and ages, both in and out of school settings (LaJevic 2).

Studies consistently show the following in schools where arts are integrated into the core curriculum: Students have a greater emotional investment in their classes; students work more diligently and learn from each other; cooperative learning groups turn classrooms into learning communities; parents become more involved; teachers collaborate more; art and music teachers become the center of multi-class projects; learning in all subjects becomes attainable through the arts; curriculum becomes more authentic, hands-on and project-based; assessment is more thoughtful and varied; and teachers' expectations for their students rise. (American Association of School Administrators)

Arts Integration recognizes the educational curriculum as a whole. It focuses on the ability of the arts to teach across and through the curriculum and go beyond the school subject boundaries (LaJevic 2). For example, school leaders can choose to ban cell phones because of cyber bullying concerns, but that response does not engage students in the process of creating a safe environment; however, giving students the opportunity to create a play that shines light on the realities of cyber bullying, allows them to construct and demonstrate their understanding of its effects (The Whole Child, "Arts Integration").

In a well documented national study using a federal database of over 25,000 middle and high school students, researchers from the University of California at Los Angeles found students with high arts involvement performed better on standardized achievement tests than students with low arts involvement. The high

arts involved students also watched fewer hours of TV, participated in more community service, and reported less boredom in school. Multiple independent studies have shown increased years of enrollment in arts courses are positively correlated with higher SAT verbal and math scores. High school students who take arts classes have higher math and verbal SAT scores than students who take no arts classes. . . . Arts participation and SAT scores co-vary, that is, they tend to increase linearly: the more arts classes, the higher the scores. (Bradley, Bonbright and Dooling 8)

“Arts Integration aims to support the curriculum and student learning” (LaJevic

3). In an arts-integration school in New Jersey, John-Mario Sevilla, found consistently higher test scores. The principal of the school stated:

Our fourth graders, since New Jersey has been doing mandated state tests, have consistently been among the highest in the state, I mean higher than some of the affluent areas where they have the big bucks to support their education. We have been 100% [in passing] across the board on the language arts, math, science, social studies. (Bradley, Bonbright and Dooling 8)

An integrated curriculum encourages student motivation (Zhbanova, Rule, Montgomery, and Nielsen 256). In the article by Zhbanova, Rule, Montgomery, and Nielsen, the authors state:

Integrated curriculum requires less behavior management than traditional curriculum. A study completed shows that the integrated curriculum setting required less teacher energy to be expended during the lesson for behavior management: the amount of questions or remarks related to student discipline was smaller in the integrated curriculum setting, most likely indicating the intrinsic motivation of students (257).

A study by *Real Visions*, commissioned by the Montgomery County Public Schools in Maryland, examined the effect of arts integration on student engagement. The results from the study showed high levels of engagement socially and academically (Duma and Silverstein 9). Clearly the arts and arts integration have multiple benefits for students that include cognitive development, but expand beyond it as well.

## **Dance Integration**

Dance integration is defined as “meaningful instruction that combines the art form of dance with one or more content areas based on mutual concepts and authentic connections shared by both disciplines” (Kaufmann and Dehline 5). Dance Integration involves students’ synthesizing or forming knowledge in two disciplines at the same time. An example of this follows:

In an integrated dance lesson on bones, the teacher encourages the students to move using various body parts while naming the bone, such as “point to your humerus. Can you lift and drop the humerus? Can the humerus initiate your movement with the rest of your body following?” Movement explorations continue, incorporating each vocabulary word in the science curriculum. (Kaufmann and Dehline 7).

Dance integration can be used as an effective tool in the classroom. It offers students an opportunity to engage in active, fun, and new ways of learning (Becker 7). Children have a limited amount of time where they can stay on task and remain in one spot, known as the attention span. Various techniques and instructional strategies have to be implemented to keep students’ attention. Since children are natural movers and learn through movement, it can be used as a teaching tool or strategy.

Janet Eilber, advisor for Arts Education in the News, states:

Early learning is all experiential. . . . we learn to move through and communicate with the world by using the basic elements of creativity: curiosity, observation, experimentation, translation, communication. No wonder sitting still and being quiet is so difficult and discouraging for many young learners. We are being asked to abandon approaches to learning with which we have had great success. (“Brain dance part one” 1)

When using the body through dance and movement to explore academic concepts, students are given an opportunity and creative outlet to deepen their understanding of the content. Students extend retention of the information (Becker 6). “Using the body and the



creative process to learn, students test ideas and take ideas further” (Becker 6). Children discover ideas that are applicable to science, social studies, mathematics, and language arts (Duma and Silverstein 9).

*Research on the Effectiveness  
of Dance Integration*

Various researchers in the field have done studies on the impact of dance and kinesthetic teaching in the classroom. In a sample of Chicago Public Schools, a study titled *Basic Reading Through Dance* program was administered to evaluate the impact of the program on first-grade students’ reading skills. The results of this study were compared to the results of instructional strategies used in other Chicago schools. “Findings from this study suggest that learning through the arts, using dance as a medium, can raise academic achievement in reading” (McMahon, Rose, and Parks 121).

Because imagery, memory, and elaboration are skills involved in both reading and dance, dance techniques designed to facilitate the steps involved in language art acquisition have the potential to improve reading skills. (McMahon, Rose, and Parks 108)

Another study looked at the use of kinesthetic approaches to teach at-risk youth spelling, writing, and reading. The study compared kinesthetic approaches to traditional instruction. The kinesthetic approach to instruction proved more effective as the at-risk or experimental group did significantly better than students not considered at-risk in a regular classroom (Grant 461).

*Ways to Integrate Dance  
and Movement*

There are many ways for teachers to integrate movement into the classroom (Becker 7). Kelly Becker describes some of the ways to integrate movement into academic class. She states:

Students can dance their action verbs, create dance pieces on any subject, experience social dances from different time periods and cultures, and explore complicated concepts using the body. Even adding a movement activity, active greeting, or physical warm-up to the morning meeting would be a great start. (8)

To include more movement and dance in the classroom, teachers could:

Use dance and movement for transition times-Dance like a ballerina to the bathroom, dance like slithering snakes to the coat cubby. Use movements to tell a story-When telling stories, use physical actions and encourage the children to act out the story with you. Sound out the dance-Move with things that make sounds, such as Velcro bands of bells attached to wrists and ankles . . . Try taping flat, metal lids to the bottom of shoes for fun tap dance sounds. To dance and draw--twirl streamers to make shapes and letters. Show drawings and pictures of shapes for children to look at first and then make with their bodies. (“Brain dance part one” 1)

### **Dance Integration Based on Math Concepts**

The excitement dance can provoke helps students understand more abstract concepts such as math. Students can learn to understand math and make meaning of it in new and concrete ways. From a natural understanding of how their own body works, a student can develop an awareness of the working of mathematics in the physical body and world (“The Rhythm of Mathematics” 3)

For example, clapping two half beats in the place of one whole beat can help children begin to understand the meaning of fractions. Learning to beat half time, quarter time, and eighth time, children can feel fractions in their own bones as they also begin to work with the larger mathematical theme of patterns and their changes. (“The Rhythm of Mathematics” 3)

Dance can help strengthen logical-mathematical intelligence. “This intelligence involves order and reordering objects and performing operations on them such as addition and multiplication.” Mathematical intelligence becomes more abstract as symbols are substituted for objects (Minton 5). Repetition is another concept that can be learned and understood through movement and dance (Gilbert 32). Repeating sequences of movement

is an example of repetition that helps to understand the math concept of patterns (Gilbert 32).

*Ways to Use Movement and Dance to Teach Math Concepts*

There are many ways to use movement and dance to teach math concepts. Some examples include:

Add and subtract movements from a dance sequence. Divide the class in half for a movement problem, then thirds, quarters, etc. Repeat patterns in movement sequences and have students identify them. Create two and three-dimensional shapes with the body. Explain division of beats in music in terms of fractions. (Cravath 12)

Think about mathematical concepts like translation, reflections and rotations.

They have a direct application to the physical space. By using dance, students will already be exploring in three-dimensional space. For example, to demonstrate translation, students can just move by sliding from one spot to another. Reflection can be demonstrated by having two students face each other and mirror or copy each other's movements. Rotation can be demonstrated through movement by having students turn around in one spot. (Abbott "Teach MATH Through DANCE")

Many teachers integrate movement and dance with math. For example, Kelly Becker, states:

In one exercise called "math dance," I divide the students into groups and give them the task of creating a movement piece that includes a shape, parallel lines, balance, and imbalance, and over and under. They agree on movements, sequencing, and music, and then perform for their peers. This process allows them to practice creativity, collaboration, and problem solving. Math dance and other movement activities are also fun, which is perhaps the most important reason why they should be included in the school day. (Becker 7)

In thinking about using dance to teach math concepts, it is important to understand that it requires planning, preparation, and time to create integrated lessons. It

is a good idea to order concepts in a lesson by sequencing them according to increased complexity and to group similar concepts together (Minton 87). Observing each concept and understanding the meaning will help to transform them into movement. Most math concepts can be transformed using literal methods (Minton 87). Literal method means to move or shape the body like the concept (Minton 130). An example using movement in a literal transformation follows:

Position can be used to compare and sequence objects according to length or height. To do this, have a group of students hold pictures of the objects to be compared. Then, ask the students to compare the objects by their length or height by moving into the appropriate position from left to right. This means the pictures of the objects will be arranged from the smallest or the shortest from left to right. (Minton 87—88)

The movement component, position, is “placement of the body or an object relative to other bodies, objects, or aspects of the surrounding environment” (Minton 132).

A study conducted by Linette Werner was designed to engage students in math in ways that reached students’ multiple intelligences and encouraged students to make connections and try new problem solving techniques. The study was designed to answer the question “How does integrating math and dance, affect student attitudes toward learning math?”

Overall, there was a significant difference between the attitude toward math of the dance/math students and the non-dance/math students. On the motivation inventory post-test, dance/math students scored significantly higher than their non-dance/math counterparts. Where the non-dance/math students became more negative or stayed the same, the dance/math students became more positive or stayed the same. Both groups of teachers asserted that dance/math students were more likely to be completely engaged in math and have more forms of expressing their mathematical knowledge than non-dance/math students. The dance/math teachers also stated that their students were better able to make connections among diverse subjects and pieces of knowledge than they were before the project, which made learning math more interesting and applicable to everyday life. (Werner 2)

*Examples of Math/Movement Programs*

There are many programs employing the power of integrating movement and dance with math. Two prominent examples are: *Math in Your Feet* and *Maths Dance*. When most people think of geometry, they think of triangles, circles, or other flat shapes on the Cartesian plane, but, after spending some time in a *Math in Your Feet* workshop, they may start thinking of geometry as the angle of a step, the arc of a leap, or the symmetry of arms spread wide. Students can also create patterns with their movements. The *Math in Your Feet* program is a product of teaching artist Malke Rosenfeld, a professional percussive dancer. The program is designed for elementary school students. It teaches everything from fractions by learning the difference between a quarter- and a half-turn, congruence by dancing in unison, and reflection symmetry by taking opposite, but equal steps (Whitney “Taking the Leap”).

*Maths Dance* is a program founded in 2013 by Panorea Baka, based out of the United Kingdom. It is offered to students up to the ninth grade. The program travels to schools, offering workshops that focus on teaching mathematical concepts such as, ratios, shapes, probability, combinations and permutations, and number patterns through choreography and movement (Whitney “Taking the Leap”).

Two other prominent artists and teachers who promote using movement and dance to teach math are Erik Stern and Karl Schaffer. They state:

Choreographic and mathematical thinking are composed of similar building blocks: noting changes, remembering sequences, asking if things are bigger or smaller, checking your work to see if it’s consistent and so on. (Stern and Schaffer “Teaching Math through Movement”)

**Summary**

Overall, the arts offer many benefits to students and integrating the arts into the classroom has proven effective. Furthermore, dance as one of the arts, also offers students many opportunities to develop and enhance skills needed for life. One significant benefit of dance is the ability to integrate it into other academic subjects such as math.

Integrating dance and creative movement with an academic subject like math, allow students to absorb their learning and understanding in a physical and kinesthetic way.

Since dance and math have many common processes of thought, they can be integrated to create curriculum that teaches math and dance concepts simultaneously.

## CHAPTER III

### METHODOLOGY

#### **Introduction**

This chapter describes the research design and specific methodology used in this study. The goal in this research was to create and teach a movement and dance integrated curriculum based on math concepts in order to study its effects on student behavior and learning.

#### **Research Elements**

##### *Research Type*

This study used qualitative methodology to answer the research questions motivating the study. Data was gathered in the form of class observations, and interviews with the teacher and students to assess their response to the curriculum.

##### *Research Perspective*

This research study was curriculum-based. It involved a series of movement and dance-based lessons that could be used to teach targeted concepts that are part of the math discipline. Qualitative methodology focuses on meaning and understanding and usually occurs in natural situations (Joyner, Rouse, and Glatthorn 73).

Qualitative research studies qualitative values. These experiential values were concretely defined as: educational, social, cultural and cross-cultural, developmental, linguistic, aesthetic, mythological, symbolic, and so on. . . . Qualitative methods are particularly applicable to dance in its multivalent nature. (Fraleigh and Hanstein vii-viii)

This means dance and teaching strategies using movement and dance can have many interpretations or meanings.

### *Research Questions*

The research will seek to answer the following questions: What is the sequence of lessons to be included in a dance integrated curriculum structured for teaching third grade math concepts? Which third grade math concepts can most easily be taught using a dance-integrated curriculum? What is the student and teacher response to the dance-integrated curriculum used to teach third grade math concepts?

### **Participants**

The participants in this study were fourteen third grade students in one class and their classroom teacher. The students were ages eight and nine years old. The socioeconomic background of the students was diverse. However, the majority of the participants were from middle class families. The ethnic background of the participants varied, but the majority were Caucasian. The student participants had a range of academic strengths and needs in math. Two of the student participants qualified for special education services. The participants' experience with dance and integrated curriculum was limited.

### **Curriculum Design**

While thinking and trying to answer the first two questions of the research study, the first step in the process was to develop the curriculum. In order to design the curriculum, the researcher referred to the Oklahoma third grade math standards, and since Oklahoma does not have standards for dance at the elementary age level, the researcher referred to the *ArtsEdge* Dance Standards that reference the National Arts Standards. The



researcher used the *ArtsEdge* Standards because they are produced by the Kennedy Center, which is an organization that works with the local school district to offer voluntary teacher training in the arts.

The Oklahoma third grade math standards have five major standards with various objectives in each: algebraic reasoning, number sense and operation, geometry, measurement, and data analysis. Based on prior knowledge, research, a short meeting with the classroom teacher, and the allotted time to complete the study, the researcher began to choose the math standards to address in the integrated curriculum.

As a result, the researcher chose three math standards to focus on in her curriculum. These included: geometry, algebraic reasoning, and number sense and operation. The researcher chose the geometry standard because geometry has many concepts that can be embodied through movement and dance such as symmetry, asymmetry, shapes, and lines. Algebraic Reasoning involves patterns and relationships. The goal in this standard is to have students use problem solving strategies to create and extend patterns. Dance and movement can be used to create and embody patterns and help to understand relationships in patterns. The researcher also chose Number Sense and Operation because it involves using numbers and number relationships to acquire basic facts. The processes involved with counting, adding, and multiplying involves number sense and operation, for example, and can be taught through movement and dance.

Once the researcher identified which standards to address through movement and dance, the next step was to specify which concepts within the areas of geometry, algebraic reasoning, and number sense and operation could be used to create lessons. The researcher had to study and find the meaning of the concepts within each standard

and “play” with the concepts in her body. This exercise helped the researcher determine how aspects of movement and dance related to the math concepts, and how the math concepts could be best taught using this method. The concepts that could be best taught through movement and dance were then identified.

The researcher determined that within the geometry standard, math concepts such as line, line segment, ray, intersecting and parallel lines, polygons, symmetry, asymmetry, and coordinate plane, were easy to teach through movement and dance. The concepts within the algebraic reasoning standard that were easy to teach through movement and dance, were patterns, and the input/output number operations. The researcher concluded that the concept within the number sense and operation standard that could be taught using this same method was multiplication.

The researcher created five lessons based on geometry because these concepts were easier to transform into movement and dance. The students were also at a time in the school year when geometry was scheduled to be taught; so the researcher created five lessons based on the geometry concepts. Two lessons based on the algebraic reasoning concepts were created next, and then three lessons based on multiplication were created last. This means a total of ten lessons were created. Each lesson builds upon content from a previous lesson, or spirals into the next one within each math standard. A similar approach was used with the dance standards. Each lesson included a title, the materials based on the standards, the lesson description, and an informal assessment.

### *Lesson 1*

The first lesson was titled, “What’s in a line?” The objectives in the lesson

were for students to explain what a line, line segment, and ray are, and how non-locomotor and locomotor movements could be used to illustrate these concepts (see Appendix A).

### *Lesson 2*

The second lesson was designed to help students understand the difference between intersecting lines and parallel lines. Students demonstrated movements on a straight pathway. They also created pathways that demonstrated their understanding of intersecting and parallel lines. This lesson built upon the concept of line and movement from the first lesson (see Appendix A).

### *Lesson 3*

The next lesson in the sequence was titled, “Dance of the Polygons.” This built upon lesson two because shapes are made of lines, movement can be done at many levels, and lines can be created in many ways. The lesson focused on creating shapes, understanding the attributes of those shapes, and creating shapes at three different movement levels (see Appendix A).

### *Lesson 4*

“Got Symmetry?” was the title of this lesson. The objectives were for students to differentiate between symmetrical shapes and asymmetrical shapes, demonstrate the partnering skills of copying, leading, following and mirroring, and create symmetrical and asymmetrical shapes with their bodies (see Appendix A).

### *Lesson 5*

In this lesson students were to identify the location of ordered pairs on a grid, use improvisation to discover and invent movement and solve movement problems, and use

movement to describe paths between points. This lesson was titled, “Coordinate Chance Dance” (see Appendix A).

### *Lesson 6*

This lesson was the first lesson to address a concept in the algebraic reasoning standard. It was titled, “Patterns in Motion.” Students had to extend and create patterns, create a dance phrase and accurately repeat it, and demonstrate a pattern using movement elements. This lesson built upon the movement elements students had learned and experienced in the previous lesson (see Appendix A).

### *Lesson 7*

This lesson focused on the concept of input/output values or students’ understanding of what happens to a number when it starts as one value and changes to another value. For example, when the number starts as seven, but then changes to three; students had to determine what was happening or what numerical operations were applied to the number as it changed. This concept is another way to explore patterns because students had to figure out the numerical operation that was repeated and produced a change in the original number. For instance, in a series of subtraction examples, the students needed to figure out that four or two was being subtracted in each time. An example of this is shown in table 1 and 2.

Students had to use movement to show their understanding of what happens to the number and what the pattern is. This lesson involved solving problems to determine values for input and output tables, demonstrating kinesthetic awareness, concentration, and focus in performing movement skills, and taking an active role in a class discussion about reactions to a class dance (see Appendix A).

Table 1 below is an example of an input/output table that has four subtracted from the input value each time and the output value is the result.

Table 1

Input—Output Table

Input	Output
23	19
15	11
12	8
7	3

Table 2 below is an example of an input/output table that uses a pattern of counting by twos for the input and output values. This also shows that the input value has two added each time.

Table 2

Input—Output Table

Input	Output
6	8
8	10
10	12
12	14

### *Lesson 8*

This is the first lesson of three about multiplication, which is a part of the number sense and operations standard. The researcher decided to focus on multiplying by three since the students were beginning to learn about multiplication and were at various levels of understanding the concept. The lesson was titled, “Understanding the Threes.” The objectives for this lesson were for students to solve multiplication problems using multiples of three. Students had to demonstrate kinesthetic awareness, concentration, and

focus in performing movement skills while they improvised, created, and performed movement phrases based on multiplication facts. This lesson incorporated movement and a movement game (see Appendix A).

#### *Lesson 9*

This lesson was titled, “Dancing the Threes.” The lesson was an extension of learning and understanding multiples of three facts. The researcher used a popular song in which the lyrics were changed to teach about the threes facts. This lesson involved learning the words to the song, and the start of learning a dance to the song (see Appendix A).

#### *Lesson 10*

The last lesson in the curriculum design was the culmination of learning about the threes facts. This lesson was an extension of content taught during the previous week. The students finished learning the dance from lesson nine and performed the dance for their teacher (see Appendix A).

### **Research Instruments**

The research instruments used in this study were post-lesson observation sheets that were used following each lesson, teacher and student midway interviews, and teacher and student final interviews.

#### *Post-Lesson Observation Sheets*

The researcher developed a post-lesson observation sheet to be completed by the researcher after each lesson was taught. The observation sheet included six questions created by the researcher to help guide the researcher’s observations of the students’ responses to the lesson. The six questions created for the observation sheet were: What

did I notice about student participation? In which part of the lesson were the students most engaged? What seemed to work well in the lesson? What could be improved or didn't seem to work well? What did I observe that indicated the students grasped or did not grasp lesson content? How could the overall student response to the lesson be described? In developing this post-lesson observation sheet, the researcher sought to create open-ended questions that required more thought and more than a one-word answer (See Appendix B).

#### *Midway Teacher Interview*

The midway teacher interview questions were created to assess the teacher's ongoing and current responses to the curriculum, and his or her observations of the students' responses as well. The researcher developed the following open-ended interview questions: How do you feel students are responding to the creative movement/dance integration lessons? What changes have you noticed in students (i.e. behavior, participation, engagement, learning gains, and confidence)? Do you think the lessons are supporting student understanding of math concepts? Please explain. Which lessons seemed most effective or helpful to student learning? (See Appendix B)

#### *Midway Student Interviews*

The interview questions were created to assess each student's response to the curriculum at this point in the sequence of lessons. The questions were as follows: What do you like about the creative movement/dance and math lessons? What do you not like about the creative movement/dance and math lessons? Do you think the lessons help you to understand math? Why or why not? and How is learning different for you since we began the creative movement/dance and math lessons? (See Appendix B)

### *Final Teacher Interview*

The final teacher interview questions created were: 1) How have the creative movement/dance integrated lessons supported student understanding of math concepts? 2) What changes have you noticed in students (i.e. behavior, participation, engagement, learning gains, and confidence)? 3) Would you use creative movement/dance integration in your math lessons and other subject areas on a regular basis? Please explain. (See Appendix B)

### *Final Student Interviews*

The final student interview questions created were as follows: 1) What do you like the most about learning math using movement and dance? 2) Do you think the lessons helped you to understand the math concepts? Please explain. 3) How do you feel about creative movement/dance? 4) Which lesson was the most interesting or the most fun? (See Appendix B)

### **Setting**

The study took place in one of the local public elementary schools in the Enid, Oklahoma Public School District. The researcher taught the lessons in the third grade classroom, which was of a standard size and set-up for elementary school classrooms with students' tables and chairs arranged in rows and the teacher's desk located toward the back of the room, but facing the students. The classroom was well-organized with reasonable technology and resources to include: a smart board, three computers, and a speaker system. The students' tables and chairs were moved to the side. The space created for this study was limited yet adequate. This study covered a three-month period, from February to May 2016.



## **Procedures**

In completing the research study, several specific procedures were used. These procedures included obtaining approval, teaching the lessons, and collecting the data.

### *Approval*

The researcher had to gain access and approval to conduct this research study from the principal of the school, the Internal Review Board, the teacher, parents, and the students.

#### **Principal of the School**

Once the researcher identified a school in which to conduct this study, she contacted the principal and set up a meeting to discuss her intentions. The principal and the researcher discussed the research study, and the principal agreed to allow the researcher access to complete the study. The principal wrote a letter of approval for the researcher to conduct the study at the school. This letter had to be submitted to the IRB as a part of the proposal application for this study. (See Appendix C)

#### **Internal Review Board**

Before this research study could be conducted, it had to be approved by the IRB, which is a committee at the University of Northern Colorado that approves research involving human subjects. The researcher created a research proposal and applied for approval to conduct this study. The IRB approved this study and sent an approval letter. (See Appendix D)

#### **Teacher, Parent, and Student Consent**

Since the researcher gained approval from the principal and the IRB, the next step was to gain consent from the teacher, parents, and students to be a part of the study. The

researcher created a consent form for the teacher and for the parents of the students in the third grade class because the students were minors. An assent form using student friendly language was created for the students as well, so they could express their approval of being in the study. (See Appendix E)

The researcher met with the teacher to explain the study in detail and gain his or her consent. The teacher signed the consent form and was given the parent and student consent forms to distribute to the students. The researcher collected all of the returned consent and assent forms.

### *Teaching the Lessons*

Once the researcher collected all of the consent forms, she met with the teacher to discuss lesson content, the teaching schedule, and times for interviews.

### **Schedule**

A schedule was created based on the classroom schedule, the amount of time needed for each lesson, and the number of lessons to be included in the math curriculum. The researcher taught a one-hour lesson each week for ten weeks. The lessons were taught consecutively until the seventh lesson; this was due to spring break and state testing on the school schedule. The schedule for the research study is shown in table 3.

Table 3

## Schedule for the Study

Lesson	Date
Lesson 1	February 3, 2016
Lesson 2	February 10, 2016
Lesson 3	February 17, 2016
Lesson 4	February 24, 2016
Lesson 5	March 2, 2016
Teacher and Student Midway Interview	March 2-4, 2016
Lesson 6	March 9, 2016
Lesson 7	March 23, 2016
Lesson 8	March 30, 2016
Lesson 9	April 27, 2016
Lesson 10	May 4, 2016
Teacher and Student Final Interview	May 10-11, 2016

### Teaching Atmosphere

The researcher tried to create a classroom atmosphere that was inviting for participants to express themselves and be creative. Since the participants' experience in dance was limited, it was important for the researcher to create an atmosphere conducive for learning and encouraging for participants to be open to a new experience. The atmosphere created was celebratory, safe, structured, yet fun and exploratory. The researcher allowed participants to make choices, work together, and ask questions.

### *Collecting the Data*

The collection of data was achieved through post-lesson observations, teacher and student midway interviews, and teacher and student final interviews. The details of each data collection method are described below.

#### **Post-Lesson Observations**

After each lesson was taught, the researcher completed a post-lesson observation sheet. The observation sheet was completed at a table in the classroom or at a table in the hallway of the school directly following the lesson. The observation notes included written responses to the guiding questions on the observation sheet and any other significant notes written by the researcher.

#### **Teacher and Students' Midway Interviews**

After teaching the fifth lesson in the study, the researcher conducted midway interviews with the teacher and students. The researcher interviewed the teacher after school within two days after the fifth lesson was taught. The students were interviewed later in the school day on the same day that the fifth lesson was taught, or on the next day if more time was needed. The interviews were conducted individually at the school in a quiet room either in the classroom or in another quiet room in the school. The researcher created a code number for each participant and used that code number to refer to the participant during the interview. Each participant was asked the midway interview questions and the responses were audio recorded. The student interviews were about two to three minutes in length. The teacher interview was about six minutes in length.

### **Teacher and Students' Final Interviews**

The final interview with the teacher and students was conducted after the tenth lesson was taught. The researcher interviewed the teacher after school in the classroom within the next week after the tenth lesson was taught. The students were interviewed individually in a quiet area of the classroom within the week after the tenth lesson was taught. The same code number created by the researcher for the midway interview was used to refer to each participant again. All of the participants were asked the final interview questions and their responses were audio recorded. The teacher interview was about six minutes in length and each student interview was about two to three minutes in length.

### **Atmosphere for Interviews**

For both the midway and final interview, the researcher tried to create an atmosphere that was quiet, safe, relaxed, and inviting so that participants could respond to the interview questions without distraction. The researcher restated and clarified questions if necessary as well as allowed participants the time needed to respond to each interview question.

### **Data Analysis**

The data were analyzed using several strategies. The researcher analyzed data from post-lesson observations, teacher and student midway interviews, and teacher and student final interviews.

The post-lesson observations were analyzed first. The researcher read and carefully reviewed her observation notes to identify themes and patterns that emerged from the observations. The researcher compared observation notes from the first half of

lessons taught to the second half of lessons taught. Lessons in which students seemed engaged, that worked well, and which seemed easier for the students to understand were also identified.

Next, the researcher transcribed all of the midway and final interviews for both the teacher and the students using Microsoft word. Then, she read and carefully reviewed the midway student interview transcripts to identify themes that emerged from the data. To aid in identifying themes and patterns in the interviews, the researcher used a highlighter and a journal to record key words. The researcher identified overall themes from the student midway interviews. The midway teacher interview was read and themes were also identified. The researcher compared the themes identified from the student and teacher midway interviews to determine similarities and differences.

Themes were then identified in the final student interview transcriptions after careful review. The final teacher interview transcription was read and themes were again identified. Themes identified from the final student and teacher interviews were compared and contrasted as well. The researcher used all of themes that emerged to draw conclusions and interpret the meaning of the data.

### **Summary**

This chapter has explained the methods used in this study to create and teach a movement and dance integrated curriculum based on math concepts in order to study its effects on student behavior and learning. The next chapter presents the results and identified themes that emerged from those methods.

## CHAPTER IV

## DISCUSSION

As stated in earlier chapters, this study sought to answer questions regarding the use of a movement and dance integrated curriculum to teach third grade math concepts. Observations and interviews were used to collect the data, and qualitative methods were used in the analysis found in this chapter.

**Post-Lesson Observations**

Through the post-lesson observations, the researcher documented the students' responses to the lessons such as: what was noticed about student participation, in which part of the lesson students were the most engaged, what worked well, what could be improved, and how the students showed that they grasped the concepts?

Overall, the results from the observations indicated that students were engaged in the lessons, many lessons worked well, and there were specific lessons that seemed easier for students to understand. The details of this data are shown in table 4.

Table 4

Observation Notes

<b>Most Engaging Lessons</b>	<b>Lessons that worked well</b>	<b>Easiest Lessons for Student Understanding</b>
Lesson 2-Geometry Pathways	Lesson 2-Geometry Pathways	Lesson 1-What's in a Line?

Table 4, continued

<b>Most Engaging Lessons</b>	<b>Lessons that worked well</b>	<b>Easiest Lessons for Student Understanding</b>
Lesson 3-Dance of the polygons	Lesson 5-Coordinate Chance Dance	Lesson 2-Geometry Pathways
Lesson 4-Got Symmetry?	Lesson 6-Patterns in Motion	Lesson 5-Coordinate Chance Dance
Lesson 5-Coordinate Chance Dance	Lesson 8- Understanding the Threes	Lesson 6- Patterns in Motion
Lesson 8-Understanding the Threes	Lesson 9- Dancing the Threes	Lesson 9- Dancing the Threes
Lesson 9- Dancing the Threes	Lesson 10- Dancing the Threes (continued)	Lesson 10-Dancing the Threes (continued)
Lesson 10-Dancing the Threes (continued)		

The results displayed in table 4, indicate that the lessons that engaged students the most were lessons that addressed geometry and number sense and operation. These lessons also incorporated group work, music, learning dances, movement games and performance opportunities for students. Some of the lessons that engaged students the most were also lessons that worked well and that seemed to be the easiest lesson for students to understand. The lessons that carried over into all three of the above analysis areas (student engagement, ease of delivery, and student understanding) were lesson two about intersecting and parallel lines, lesson five about coordinate plots, and lesson nine and ten about multiples of three.

There was commonality among all four of the lessons that explains why they carried over into all three of the above analysis areas. Each of the four lessons involved students working with each other, incorporated elements such as music, and involved



students in learning or creating a dance. Therefore, the students were not performing single unrelated movements, but were learning or creating movements that were connected to produce sequences or patterns.

In these four lessons, the majority of time was spent having the students learn or create a dance. Students were up and moving versus sitting and having more discussion time. This component left little to no room for down time, as well as, students being engaged, meaning the lessons worked well and the objectives were met.

The concepts from all four lessons were not new concepts for students even though some students had not mastered them yet. The lessons also involved the students becoming or embodying the concepts. For example in lesson five, students became the coordinate plot and the classroom floor became the coordinate plane. The students moved on the coordinate plane addressing the tactile/kinesthetic learning style. The students saw the coordinate plot written on the board, which addressed the visual learner, and the students listened to the coordinate plot information as it was described to them, which was the auditory component of the lesson. The students were moving, seeing, and hearing about concepts to which they had previous exposure, making it possible to understand them in a new way.

One research question addressed in the post-lesson observations was which third grade math concepts can most easily be taught using a dance-integrated curriculum? The results from table 4, indicate that lessons teaching concepts such as: lines, coordinate plots, multiples of three, and patterns seemed to work well and were easiest for students to understand; therefore, indicating that these concepts can most easily be taught using dance and movement integrated curriculum.

One reason the above lessons were easier to teach is because the students can become the concept. The students can feel, see, and move as the concept. For example: students can get into two groups of three to show the meaning of a multiple of three, or students can become a pattern when they create a repeated movement phrase. Not only can these concepts be embodied, but also they can be observed in the real world. Lines can be seen all around in the classroom, and it is one of the main ways students travel throughout their day at school. These concepts are also introduced in earlier grades and students have some exposure to them.

*Themes that Emerged from  
the Observations*

In reviewing the post-lesson observations, there were common themes that emerged. Table 5, presents a condensation of the researcher's observations from the first half and the second half of post-lesson observations.

Table 5

A Condensation of  
Researcher Observations

<b>Observations from Lessons 1-5</b>	<b>Observations from Lessons 6-10</b>
Students were engaged, but lost focus or energy toward the end of lessons	Student participation continued to increase
Students enjoyed the warm-up with music	Students were more engaged and had more endurance to stay focused throughout the whole lesson
Students liked to volunteer	More space was needed to move and dance
Student behavior, participation, and engagement increased as each lesson was taught	Students made verbal connections to the math concepts and dance.
Students were able to understand the concepts and demonstrate understanding, but had some difficulty with some concepts in lessons	Students liked working with others
Student creativity and expressiveness was bound and reserved	Students enjoyed the movement games and learning dances
Students liked to perform in groups for their peers	Students were more shy about performing alone versus with their peers, but liked to watch each other perform
	Students were able to demonstrate understanding with little to no difficulty

### **Theme 1: Student Engagement**

Table 5 shows many similarities among the notes in the observations. One theme that emerged was an increase in student engagement and participation as each lesson progressed. Even though, there was student engagement during the first half of the lessons, students began to lose their focus and energy toward the end of lessons. In the

second half of the lessons, students demonstrated more engagement and endurance to stay focused to the end.

Engagement seemed to increase in relation to specific parts of the lessons, which students liked or to which they made a connection. This is evidenced by a statement from a student participant during lesson eight, in which the student stated, “This is helpful. It really can help us learn multiplication.”

### **Theme 2: Students’ Relationships with Each Other**

Students seemed to enjoy working with each other. In the majority of the lessons, students either worked with a partner, in a small group, or as a class. The observation notes indicated that students were most engaged in the lessons when they were working with each other. For example in lesson four, the researcher noted that students were most engaged throughout the whole lesson because they were working with a partner. The notes also indicated that having students work together was a component of the lessons that worked well. Students liked to perform with their peers and to watch each other perform.

### **Theme 3: Students’ Response to Aspects of the Lessons**

There were many aspects of the lessons that students enjoyed, or which created a good response. Some lesson aspects that seemed to illicit positive student responses were: volunteer opportunities, the warm-up, using props, movement games, and the music. In lessons eight and nine, students participated in movement games to learn the multiples of three. This was noted as an aspect of the lessons that students enjoyed and in which they were engaged. Students liked the music used during the warm-up and in dances taught by

the researcher. For example, in lesson ten, students learned a dance to a popular song that was changed to teach about the multiples of three, and it was noted that all students participated and were having fun.

The use of props had a positive response as it was noted in lesson seven that “students were excited about using the dance scarves.” Throughout the first half of the lesson, the warm-up was noted as an aspect of the lessons that engaged students and worked well. The students also were eager to volunteer during demonstrations and in those moments, the students who watched were paying close attention to the demonstrations.

The researcher noted that one aspect of the lessons produced a negative response. This was the limited amount of space in the classroom. In lesson two, students needed more space to create their pathways and as the lessons progressed, lesson concepts such as coordinate plots, patterns, creating polygons, and learning a dance about the multiples of three required more movement space.

#### **Theme 4: Student Understanding of Concepts**

The lessons addressed math concepts and dance concepts as well. Students showed an ability to demonstrate understanding of the concepts, but struggled in lessons taught during the first half of the sequence of classes. This is shown in the observation notes in lesson three. The researcher noted that students could “move from one level to the next, but need to work on smoother transitions and creativity.” Moving at different levels is a dance concept. In this lesson, the students understood the math concepts, but needed to improve their performance of some of the movements. In the same lesson, the

researcher stated, “they knew how many sides were in the polygons and how to make them. It got difficult to make some polygons, but with help they figured it out.”

Thus, the students understood the math concepts, but struggled in more challenging areas such as using their bodies as a group to create shapes like a heptagon. However in lesson six, the students could demonstrate a pattern in their bodies with limited to no assistance. The students seemed to struggle more with creating shapes with multiple sides because it involved having to creatively think about how to use their bodies and multiple people in their group to create the shape. The lesson about patterns seemed to require less assistance because it involved students individually creating patterns using their bodies.

The dance concepts were used not only to teach math, but to introduce students to dance as well. An important component of dance is creativity. In the first half of the lessons, student creativity and expressiveness seemed limited or reserved, yet during the second half of lessons students appeared to have more freedom in their expression and were taking chances in their creative work. In the first half of lessons, when students were creating movements, their movements seemed to mimic the researchers’ or their peers, but as time progressed their movements became original. By the tenth lesson, students had confidence to dance and the class used the dance they learned in the last lesson for the school talent show.

### **Midway Student and Teacher Interviews**

Interviews were conducted after the fifth lesson to determine what the students’ and teacher’s responses were to the movement and dance integrated curriculum.

After reviewing the transcriptions of the midway interviews, the researcher identified various themes that emerged. Table 6 displays the condensation of the students' and teacher's comments from which themes emerged.

Table 6

A Condensation of the Student  
and Teacher Midway  
Interviews

Students	Teacher
The lessons were different from what they have been doing which is the paper and pencil method	Students were learning in a different way than usual
They liked to learn in this way, using movement and dance to learn math	Students enjoyed the lessons
They liked to dance and move	Students were relating to and referring back to the lessons and concepts
The lessons helped them understand the math concepts	This class needs movement and movement breaks, so the lessons appeal to the kinesthetic learner
Lesson 5, the Coordinate lesson was specifically named as a lesson that was helpful	The lessons helped students get their energy out
The lessons were fun and interesting	Students were engaged and participating
The students liked creating movements and being creative	The lessons helped students understand the math concepts easier
The lessons helped students get their energy out	Lesson 5, the coordinates lesson was enjoyed by students the most
Students learned things they didn't know or understand well	Lesson 4 which was about symmetry and asymmetry, was a difficult lesson for students to grasp because asymmetry is not studied in depth at this grade level
	Great Review/Introduction to concepts

As shown in table 6, there are many comments that are similar between the students' interviews and the teacher's interview. These included the fact that both identified the lessons as: a different way of learning, enjoyable, a way to release energy, and understand math concepts with one lesson identified as being the most helpful.

The lesson that was mentioned as the most helpful for students was lesson five, the coordinates lesson. The teacher stated, "I would say, really all of them . . . the coordinates definitely, they really enjoyed that lesson. Many students mentioned that specific lesson as well. In response to this lesson, one student stated: "I like doing the X, Y and the point, I like that song, I like dancing to it." From these comments, themes emerged and will be discussed further.

### **Theme 1: Student Behavior and Engagement**

The teacher noted that the students were engaged and participated during the lessons. In the interview transcription, the teacher stated, "When you are here, students that normally don't participate, or raise their hand to engage are more willing to raise their hand and come up and interact with the lesson." The teacher also commented on student engagement by stating: "they are very engaged. I feel like they're staying a lot more focused during the lesson. It's nice to see them break out of their shell and do things that they're not used to doing all the time."

### **Theme 2: Students' Understanding of Concepts Taught**

The teacher noticed that the lessons were helping students understand math concepts more easily, and the students were referring back to what they had learned. As the teacher stated in the midway interview, "I think that they are responding to and



connecting to the information. If it comes up again they are going back and relate to it. I find that watching them, they are getting the concept much easier through the song and the dance by the end.”

The students also felt the lessons helped them learn math concepts. As one student commented in the interview, “I think the lessons help me understand math because I’ve been really behind because I’ve been moving and stuff and they got me caught up on shapes and other stuff too, I think they’ve really helped me.” Another student said that the lessons helped understand math “because it gets something in your head so you can remember it with something, like movement you can remember the things with the movement.”

### **Theme 3: Students’ Need for and Response to the Lessons**

The teacher stated in the interview that, “they very much look forward to you coming into the classroom. These students tend to need a lot of movement and movement breaks in order to keep their attention.”

The data shows that students enjoyed the lessons and learning in this way. Many thought the lessons were fun and interesting. In response to a question about what they liked about the lessons, one student commented, “I like that we can get a lot of energy out of them and learn a whole bunch from them.” Another student indicated, “I like to move and have fun,” and a third student said, “I like how it’s still fun and you still learn something, like how we learned lines, but with our arms and things.”

The data from the midway interviews also indicated that students like creating movements and being creative. Many students felt that creating and using their minds and

creating their own movements in the lessons was something they liked about the lessons. For example, a student found: “you can choose any movements that you want, I chose to do [a] crab walk and part of the Russian dance.”

The students’ also noted that learning is different and they are learning math in a new way. One student discovered: “it’s different for me because I’ve never really been taught that before and um, we’ve been learning different stuff in school than that.”

Another student responded to the difference in movement-based lessons, commenting, “it’s more interesting and how we like use music and dancing while doing our math lessons.”

### **Final Interviews**

Final interviews were conducted after the tenth lesson was taught to determine the teacher’s and students’ responses to the integrated curriculum.

#### *Themes that Emerged*

Themes were identified in the final interview data. The condensation of comments from the students’ and teacher’s final interviews are displayed in table 7.

Table 7

A Condensation of Comments  
from the Final Students’ and  
Teacher’s Interview

<b>Students</b>	<b>Teacher</b>
Students liked to dance and move	Student confidence increased
The lessons were fun	Great review and way to learn new concepts
The lessons helped students understand math more	Students were referring back to the lessons

Table 7, continued

<b>Students</b>	<b>Teacher</b>
Creativity increased	Students were fully engaged and participated and it increased over the ten weeks
Students were able to get energy out and gain energy	The lessons related to kids that needed to move
Lesson 5, 9, and 10 were their favorite lessons	Wants to use this in the classroom next year
Students enjoyed the movement game	This was an effective way to learn
Students enjoyed learning dances	Students enjoyed the lessons

### **Theme 1: Student Behavior and Engagement**

The comments shown in Table 7 indicate that both the students and teacher enjoyed the lessons. The teacher noted that the students were fully engaged in the lessons, and that engagement increased over the ten weeks. The teacher also felt the students' confidence increased, and the lessons were an effective way to learn. In the final interview, the teacher said, "the participation and their confidence in the dance integration greatly grew over the ten weeks. They always looked forward to it. Participation was 100% every time and they were completely engaged, which isn't something that always happens in class."

### **Theme 2: Students' Understanding of Concepts Taught**

The lessons helped students understand the math concepts. The teacher believed the lessons helped the students understand math concepts. She discovered, "especially towards the end they would constantly refer back to the things that they were learning or

responding back to the lesson you had taught . . . kind of like generating memory so it was another tool for them to relate back to.” In response to an interview question, a student said, “yes the lessons helped me understand the math concepts because math is my hardest skill I haven’t learned yet and I’m starting to get really better because you’re here to help us with it.”

### **Theme 3: Students’ Need for and Response to the Lessons**

The final student interview comments show that students responded positively to the integrated curriculum. Overall, students liked to dance and move, felt their creativity increased, and noted a few lessons that were their favorite. The data indicated that the lessons were a great way to get energy out and related to students that needed to move. The teacher observed: “I think dance helped relate to those kids that need to move around and get up.”

The lessons students felt were their favorites were lessons nine and ten. Lesson nine was a lesson in which students started learning a dance about the multiples of three. A continuation of lesson nine, lesson ten involved learning the dance and performing for the teacher. The students enjoyed the game aspect in lesson nine in which they played a game created by the researcher called *factor, factor*. In lesson ten, the students learned a dance to the popular song *Uptown Funk*, in which the words were changed to teach about the multiples of three. In response to these two lessons, a student commented, “the most interesting was the factor, factor where are you game, and the most fun was the dance that we did.” Another student said, “I think *Uptown Funk* was the most fun, and I like it because I dance around and learn.”

## **Addressing the Research Questions**

The data accumulated in this study answered the research questions in the following ways. Many implications and interpretation can be gleaned from the data.

### *Question 1*

The first research question was what is the sequence of lessons to be included in a dance-integrated curriculum structured for teaching third grade math concepts? The answer to this question was primarily addressed in the research and creation of the curriculum. As the curriculum was created, the concepts, sequence, and content of the lessons were discovered. This question was also addressed through the post-lesson observations because the researcher discovered which concepts and lesson sequences worked, and which ones did not work as well in relation to the curriculum structured for teaching third grade math concepts.

### *Question 2*

The second research question was which third grade math concepts can most easily be taught using a dance-integrated curriculum? In addressing this question, the data presented in the observation notes and comments, and the midway teacher interview helped to answer this question as stated earlier in this chapter.

It seems that concepts that are simpler, such as lines, are easier to teach and for students to understand than concepts like asymmetry. As noted by the teacher, “the symmetry one they got but, not the asymmetrical, it’s not something that we go that in depth with, we focus on the symmetrical versus the asymmetrical, so maybe that’s why it was so foreign.” Concepts that students have worked with before such as patterns can be interpreted from the data as easier to teach using the integrated curriculum as well as

concepts that they have been introduced to, but in which they may not have a solid foundation. This was evidenced by a student interview, in which a student stated the following response to question two. When answering whether the lessons helped understand math, one student said, “they help because I’ve kind of been struggling with geometry coordinates, that’s stuff I’ve pretty much got down.”

### *Question 3*

This research question was what is the student and teacher response to the dance-integrated curriculum used to teach third grade math concepts? In reviewing the data from the post-lesson observations, and the midway and final interviews, the results show that the responses were largely positive. Overall, the students’ and the teacher’s responses indicated: the students were engaged and engagement increased over time, the lessons helped the students understand math concepts, and the students enjoyed learning in this way. In the final interview, students described why they liked learning math using movement and dance. One student noted, “that it gets us moving while we’re learning in school because while you’re learning at school you usually sit down on the carpet like a couch potato.”

## CHAPTER V

### CONCLUSION

The findings in this study add to the body of research that addresses the value of arts integration in the classroom. The findings in the study could provide some valuable information for classrooms where arts integration is not used. As the data indicated, the movement and dance-integrated curriculum engaged students and helped them to understand the math concepts in ways they hadn't experienced before. The goals of this study were to create a movement and dance-integrated curriculum, teach the curriculum and determine the curriculum's effects on student behavior and learning. The goals of this study were achieved and the curriculum was successful in most respects.

Overall, the curriculum had an affect on students, and the responses from both the teacher and students were positive. Success of the curriculum is noted in a statement from a student responding to a question about what do you like most about learning math using movement and dance. This student stated: "that we get inspired and that we learn different stuff like new problems and we can solve them out." Success of the curriculum can also be noted by the teacher's comments in the final interview. The teacher commented, "as far as the dance and the movement . . . it would definitely be put into my lessons next year."

### **Limitations of the Study**

This study was limited in that the participants came from one elementary school with a small population of students. There were only fifteen participants in the study and the data collected from the participants may not represent perceptions of all third grade students and teachers. Another limitation of the study is that the researcher developed the research questionnaires. In addition, the study might have resulted in different conclusions if the researcher had taught different math concepts to the third graders, or used movement and dance to teach math to a different age group.

### **Future Implications**

Additional studies are needed to understand how a movement and dance integrated curriculum affects student behavior and learning. Further studies and work with movement and dance-integrated lessons in the elementary school classroom should be done to contribute to the value and need for this type of curriculum. These studies can help educators advocate for movement and dance integration.

Suggested recommendations for future studies like this one would be to include multiple third grade classrooms to gain a greater understanding of the students' and teacher's response to the integrated curriculum with a larger population of participants. It would also be important to teach the lessons for a longer period of time, and continue to use open-ended questions in the interviews, but include a question that asks students to describe their experience with the curriculum. Other researchers might include a control group in their studies in which more traditional methods are used so it would be possible to compare the effects of the two types of curricula.



One aspect of the study that the researcher found challenging was getting a clear response from the third grade students when answering the interview questions. It was difficult for some students to express their answers, and the questions had to be restated or reworded in a different way. So keeping open ended, student friendly language in the interview questions is important and being able to break the questions down into a simpler form is necessary as well.

### **Final Thoughts**

This study developed from the researcher's curiosity to understand how movement and dance-integrated lessons would affect student behavior and learning of math concepts. To explore these questions, a movement and dance integrated curriculum was created and implemented in a third grade classroom. The researcher never anticipated that her curiosity would lead to a deeper passion for arts integration, strengthen her perspective on the power of using movement and dance to teach academic concepts, and show that movement and dance-integrated lessons can have a positive effect on teachers and students.

Movement and dance-integrated lessons can help students understand math concepts, but they also have the ability to inspire students and ignite a love for dance. The researcher recalled a final student interview in which a student responded about how they felt about creative movement and dance, the student replied, "it's really fun and it's inspiring to me because when I get home, I tell my parents to dance and sometimes I just put on songs and start making my own dances."

## WORKS CITED

- Abbott, Miranda. "Teach MATH through DANCE." *Beyond Movement EBook by Dance Equations*. N.p., n.d. Web. 29 Sept. 2016. <http://danceequations.com/>.
- Alter, Frances, Terrence Hays, and Rebecca O'Hara. "The Challenges of Implementing Primary Arts Education: What our Teachers Say." *Australasian Journal of Early Childhood*, 2009.
- Appel, Morgan. "Arts integration across the curriculum: Engagement in the arts ignites creativity and provides students with opportunities to critically interpret the world around them." *Leadership*, 2006, pp. 14-17.
- ArtsEdge, The Kennedy Center. "How Arts Education Develops Life-long Learners: Grades 3 to 5." *ARTSEdge: How Arts Education Develops Lifelong Learners: Grades 3 to 5*. N.p., n.d. Web. 13 Sept. 2016. <<https://artsedge.kennedy-center.org/families/at-home/cae/grades-3-to-5>>.
- Arts Education Partnership. 2004, [www.aep-arts.org/](http://www.aep-arts.org/). Accessed 10 September 2016.
- Bailin, Sharon. "Critical Thinking in the Arts." *British Columbia Art Teachers Association*, vol. 34, no. 1, 1994.
- Becker, Kelly Mancini. "Dancing Through the School Day: How Dance Catapults Learning in Elementary Education." *Journal of Physical Education, Recreation and Dance*, vol. 84, no. 3, 2013, pp. 6–8. doi:10.1080/07303084.2013.763665. Accessed 3 August 2016.

- Bradley, Karen, Jane Bonbright, and Shannon Dooling. "Evidence: A Report on the Impact of Dance in the K-12 Setting." National Dance Education Organization, July 2013, <https://www.arts.gov/sites/default/files/research-art-works-ndeo.pdf>. Accessed 5 September 2016.
- "Brain Dance Part 1: Children's Natural Explorations through Movement." *Better Kid Care (Penn State Extension)*, 2016, <http://extension.psu.edu/youth/betterkidcare>.
- Burton, Judith, Robert Horowitz, and Hal Abeles. "Learning in and Through the Arts: Curriculum Implications." *Champions of Change*, 1999, pp. 36-46.
- Cornett, Claudia E. "Center Stage: Arts-Based Read-Alouds." *The Reading Teacher*, vol. 60, no. 3, 2006, pp. 234–240. doi:10.1598/RT.60.3.3
- Cravath, Erika. "Creative Dance Integration Lesson Plans by Erika Cravath." [education.byu.edu/arts/.../educational\\_movement.pdf](http://education.byu.edu/arts/.../educational_movement.pdf). Accessed 2 August 2016.
- Davis, Jessica Hoffman. "Nowhere, Somewhere, Everywhere: The Arts in Education." *Arts Education Policy Review*, vol. 100, no. 5, 1999, pp. 23–28. doi:10.1080/10632919909599472.
- Dayton, Treyva. "Performing Arts Students Develop Skills Needed for Life and Work" Dec. 2015, <https://www.nfhs.org/articles/performing-arts-students-develop-skills-needed-for-life-and-work/>. Accessed 3 September 2016.
- Deasy, Richard J. *Critical Links: Learning in the Arts and Student Academic and Social Development*. Arts Education Partnership, 2002.

- Dickinson, Dee. "School of Education Johns Hopkins University Why Are the Arts Important." *School of Education Johns Hopkins University Why Are the Arts Important*, 1993, [education.jhu.edu/pd/newhorizons/strategies/topics/arts in education/dickinson\\_why\\_arts.htm](http://education.jhu.edu/pd/newhorizons/strategies/topics/arts%20in%20education/dickinson_why_arts.htm).
- Donovan, Lisa, and Louise Pascale. *Integrating the Arts Across the Content Areas*. Huntington Beach, CA: Shell Education, 2012. Print.
- Duffy, Bernadette. *Supporting Creativity And Imagination In The Early Years*. Maidenhead: McGraw-Hill Education, 2006. *eBook Collection (EBSCOhost)*. Web. 7 Sept. 2016.
- Duma, Amy, and Lynne Silverstein. "A View into a Decade of Arts Integration." *EScholarship*, Journal for Learning through the Arts, 2014, [escholarship.org/uc/item/3pt13398](http://escholarship.org/uc/item/3pt13398).
- Fraleigh, Sondra Horton, and Penelope Hanstein. *Researching Dance: Evolving Modes of Inquiry*. University of Pittsburgh, 1999. Print.
- Gabbard, Carl, and Luis Rodrigues. "Optimizing Early Brain and Motor Development Through Movement." Excelligence Learning Corporation, 2008, [earlychildhoodnews.com/earlychildhood/article\\_view.aspx?articleid=360](http://earlychildhoodnews.com/earlychildhood/article_view.aspx?articleid=360).
- Gilbert, Anne Green. *Teaching the Three Rs through Movement Experiences: A Handbook for Teachers*. Minneapolis: Burgess Pub, 1977. Print.
- . "Toward Best Practices in Dance Education Through the Theory of Multiple Intelligences." *Journal of Dance Education*, vol. 3, no. 1, 2003, pp. 28–33. doi:10.1080/15290824.2003.10387226. Accessed 5 August 2016.

- Grant, S. M. "The Kinesthetic Approach to Teaching: Building a Foundation for Learning." *Journal of Learning Disabilities*, vol. 18, no. 8, Jan. 1985, pp. 455–462. doi:10.1177/002221948501800803.
- Green, Linda Schwartz, and Diane Casale-Giannola. *40 Active Learning Strategies for the Inclusive Classroom, Grades K-5*. Thousand Oaks: Corwin, 2011. Print.
- Griss, Susan, and Victoria Merecki. *Minds in Motion: a Kinesthetic Approach to Teaching Elementary Curriculum*. Portsmouth, NH, Heinemann, 1998.
- Gullatt, David E. "Enhancing Student Learning Through Arts Integration: Implications for the Profession." *The High School Journal*, vol. 91, no. 4, 2008, pp. 12–25. doi:10.1353/hsj.0.0001.
- Hannaford, Carla. *Smart moves: Why learning is not all in your head*. Great River Books, 2005.
- H'Doubler, Margaret Newell. *Dance: A Creative Art Experience*. Madison, WI: U of Wisconsin, 1957. Print.
- Hernandez, Barbara, and Fran Meyer. "Dance Education: What Is It? Why Is It Important?" *National Dance Association*. (n.d.). Reston, VA. Print.
- Jensen, Eric. *Arts with the Brain in Mind*. Alexandria, VA: Association for Supervision and Curriculum Development, 2001. Print.
- . *Learning with the Body in Mind: The Scientific Basis for Energizers, Movement, Play, Games, and Physical Education*. San Diego, CA: Brain Store, 2000. Print.
- Joyner, Randy L., William A. Rouse, and Allan A. Glatthorn. *Writing the Winning Thesis or Dissertation: A Step-by-step Guide*. Thousand Oaks, CA: Corwin, 2013. Print.

- Kaufmann, Karen A., and Jordan Dehline. *Dance Integration: 36 Dance Lesson Plans for Science and Mathematics*. Champaign, IL: Human Kinetics, 2014. Print.
- Krathwohl, David R. "A Revision of Bloom's Taxonomy: an Overview." *Theory into Practice*, 22 Sept. 2002.
- LaJevic, Lisa. "Arts Integration: What Is Really Happening in the Elementary Classroom?" *EScholarship*, Journal for Learning through the Arts, 2013, [escholarship.org/uc/item/9qt3n8xt](http://escholarship.org/uc/item/9qt3n8xt).
- Lock, Cheryl. "Turn to the Arts to Boost Self-Esteem." *PBS*, ArtsEdge, [www.pbs.org/parents/education/music-arts/turn-to-the-arts-to-boost-self-esteem/](http://www.pbs.org/parents/education/music-arts/turn-to-the-arts-to-boost-self-esteem/).
- Lynch-Fraser, Diane. *Playdancing: Discovering and Developing Creativity in Young Children*. Pennington, NJ: Princeton Book, 1991. Print.
- McCoubey, Sharon. "To Think or Not To Think." *British Columbia Art Teachers Association*, vol. 34, no. 1, 1994.
- McCutchen, Brenda Pugh. *Teaching Dance as Art in Education*. Champaign, IL: Human Kinetics, 2006. Print.
- McIntosh, Edgar, and Marilu Peck. *Multisensory Strategies: Lessons and Classroom Management Techniques to Reach and Teach All Learners*. New York: Scholastic, 2005. Print.
- McMahon, Susan D, Dale S. Rose, and Michaela Parks. "Basic Reading Through Dance Program: The Impact on First-Grade Students' Basic Reading Skills." *Evaluation Review*, vol. 27, no. 1, Jan. 2003, pp. 104–125. doi:10.1177/0193841x02239021.

- Melnick, Steven A, Judith T. Witmer, and Martha J. Strickland. "Cognition and Student Learning through the Arts." *Arts Education Policy Review*, vol. 112, no. 3, 2011, pp. 154–162. doi:10.1080/10632913.2011.566100.
- Minton, Sandra Cerny. *Using Movement to Teach Academics: The Mind and Body as One Entity*. Lanham, MD: Rowman & Littlefield Education, 2008. Print.
- NDEO. *National Dance Education Organization*, [www.ndeo.org/](http://www.ndeo.org/). Accessed 7 August 2016.
- National Endowment for the Arts. "The Arts and Human Development." 2011. Accessed 17 September 2016.
- Phillips, Lisa. "Top 10 Skills Children Learn from the Arts." *Washington Post*, The Washington Post, [www.washingtonpost.com/news/answer-sheet/wp/2013/01/22/top-10-skills-children-learn-from-the-arts/](http://www.washingtonpost.com/news/answer-sheet/wp/2013/01/22/top-10-skills-children-learn-from-the-arts/). Accessed 20 September 2016
- Rabkin, Nick, and Robin Redmond. *Putting the Arts in the Picture: Reframing Education in the 21st Century*. Chicago: Center for Arts Policy at Columbia College Chicago, 2004. Print.
- Robertson, Katrin. "How the Arts Can Help Struggling Learners." *PBS*. PBS, n.d. Web. 10 Sept. 2016. <<http://www.pbs.org/parents/education/music-arts/how-the-arts-can-help-struggling-learners/>>.
- Ruppert, Sandra S. *Critical Evidence: How the Arts Benefit Student Achievement*. The National Assembly of State Arts Agencies, 2006.

- Schaffer, Karl et al. *Math Dance: with Dr. Schaffer and Mr. Stern: Whole Body Math and Movement Activities for the K-12 Classroom*. Santa Cruz, CA, MoveSpeakSpin, 2001.
- Schaffer, Karl, Erik Stern, and Scott Kim. *Math Dance: With Dr. Schaffer and Mr. Stern*. United States: Schaffer, Stern, Kim, 2001. Print.
- Silk, Geraldine. *Dance, the Imagination, and Three-Dimensional Learning*. Lanham, MD: Scarecrow, 1996.
- Silverstein, Lynne B, and Sean Layne. "What Is Arts Integration." *ARTSEEDGE: Arts Integration: The Kennedy Center's Perspective*, 1996, <https://artsedge.kennedy-center.org/educators/how-to/series/arts-integration/arts-integration>. Accessed 2 August 2016.
- Sinha, Kirin. "Kinesthetic Learning: Moving Toward a New Model for Education." *RSS*. N.p., 24 July 2014. Web. 02 Sept. 2016.  
<<https://www.edutopia.org/blog/kinesthetic-learning-new-model-education-kirin-sinha>>.
- Skoning, Stacey. "Dancing the Curriculum." *Kappa Delta Pi Record*, vol. 46, no. 4, 2010, pp. 170–174. doi:10.1080/00228958.2010.10516548. Accessed 2 August 2016.
- Sousa, David A. "How the Arts Develop the Young Brain." *School Administrator*, 2006. Accessed 14 September 2016.
- Southard, Heather. "Why Dance Matters: Survival of the Fittest." *Dance Advantage*, 12 July 2012, <http://www.danceadvantage.net/why-dance-matters-survival-of-the-fittest/>. Accessed 3 September 2016.



Stern, Erik, and Karl Schaffer. "Teaching Math through Movement." TedEx, Manhattan Beach. Lecture.

"The Rhythm of Mathematics." *Classroom Compass* 4.2 (1998): 1-10. Web. 12 Sept. 2016. <[http://www.sedl.org/pubs/classroom-compass/cc\\_v4n2.pdf](http://www.sedl.org/pubs/classroom-compass/cc_v4n2.pdf)>.

The Whole Child Organization. "Arts Integration." [www.wholechildeducation.org/what-works/featured-topics/arts-integration](http://www.wholechildeducation.org/what-works/featured-topics/arts-integration). Accessed 12 September 2016.

Whitney, AK. "Taking the Leap: Teaching Math Through Dance." *Noodle*. N.p., 13 Nov. 2015. Web. 28 Sept. 2016. <<https://www.noodle.com/articles/these-3-programs-are-integrating-math-and-dance-in-school165>>.

Wolfe, Corinne. "Did You Know You Are Teaching Maths?" - *Imperial Society of Teachers of Dancing*. N.p., 17 Mar. 2014. Web. 05 Aug. 2016. <<http://www.istd.org/news/industry-news/did-you-know-you-are-teaching-maths/>>.

Zakkai, Jennifer Donohue. *Dance as a Way of Knowing*. York, Me., Stenhouse Publishers, 1997.

Zhbanova, Ksenia S., Audrey C. Rule, Sarah E. Montgomery, and Lynn E. Nielsen. "Defining the Difference: Comparing Integrated and Traditional Single-Subject Lessons." *Early Childhood Education Journal* 38.4 (2010): 251-58.

**APPENDIX A**  
**THE TEN LESSONS**

Creative Movement and Dance Integration:  
Their Connection to Learning Third  
Grade Math Concepts

**Lesson: 1**

Title: What's in a line?

Time: 45 min - 1 hour

Materials and Resources: dry erase marker, list of locomotor movements, list of non-locomotor movements, cards for grouping, the cd Music for Creative Movement and Modern dance by Chris Cawthray

Oklahoma Math Content Standards: S3- Geometry-The student will use geometric properties and relationships to recognize and describe shapes.

ArtsEdge Dance Standards: S1-Identifying and demonstrating movement elements and skills in performing dance

Objectives: Students will be able to explain what a line, line segment, and ray is.

Students will be able to demonstrate non-locomotor and locomotor movements.

Lesson Description:

Introduction-I will briefly review our participation behavior expectations which are: respect others personal space and body, respect our ears by listening, respect our eyes by paying attention, and respect our time by participating and doing our best. I will tell the students what we will be doing today. I will tell them that we always start with a warm-up to get our bodies and brains ready. Students will stand up and get into their own bubble space and the warm-up will consist of isolations, non-locomotor and locomotor movement that can be used later in the lesson. As we do each movement I will tell the students what the movement is ( i.e. jump, skip, hop, turn, bend, walk, run, march, slide, twist, crawl, stretch, swing). This warm-up will be done using the music for creative movement and modern dance.

Modeling: I will demonstrate some non-locomotor movements that we used in the warm-up and explain what non-locomotor movements are and I will demonstrate some locomotor movements and explain what they are. Next we are going to form a line. I will choose two volunteers to help me show how we are going to form the line. Each volunteer will pick one locomotor movement and do that movement to get into a line behind me. (The students will know to do their movement and form a straight line. Once they are in line their movement stops)

Guided Practice: I will ask each student to pick a locomotor movement. When I say go everyone will do their locomotor movement until they get into the line. When we form the line, students will copy the locomotor movements that I do as we move in a line

around the classroom switching directions to show that a line goes on and on in opposite directions in a straight path. After we move in a line, we talk about how a line is a collection of points along a straight path. I will draw a line on the board and points on the line. Each student is a representation of a point on the line. We will move again as a line with this concept in mind. Next, I will draw a ray on the board and ask students if they know what it is. I will explain what a ray is and ask students for suggestions of which locomotor movement we can do to move as a ray in one direction. We will practice moving as a ray in one direction that we choose and I will represent the endpoint. After that, I will draw a line segment on the board and explain what it is. I will choose three volunteers to help show us how to create a line segment with our bodies. I will guide the volunteers through this and talk about using non-locomotor movement. (Music is used)

Then, I will have students get into groups of three (modify if needed) by choosing a card that has one line/side of a triangle and they have to find the other lines/sides to form a complete triangle in their group.

Independent Practice: In their groups, students will create line segment using their bodies, choose one locomotor movement to do as a ray in only one direction, and a different locomotor movement to do as a line moving. Students will practice their movements as a group and prepare to share (perform) for us.

Assessment/Evaluation: I will observe students working in their groups and I will observe group presentations of their representation of a line, ray, and line segment. I will also observe to determine if students can perform non-locomotor and locomotor movements.

## **Lesson: 2**

Title: Geometry Pathways

Time: 45 min - 1 hour

Materials and Resources: dry erase marker, list of locomotor movements, list of non-locomotor movements, paper, pencils, the cd Music for Creative Movement and Modern dance by Chris Cawthray

Oklahoma Math Content Standards: S3- Geometry-The student will use geometric properties and relationships to recognize and describe shapes.

ArtsEdge Dance Standards: S1-Identifying and demonstrating movement elements and skills in performing dance

S2-Understanding choreographic principles, processes, and structures

Objectives: Students will be able to describe the difference between intersecting lines and parallel lines.

Students will be able to create pathways that demonstrate their understanding of intersecting and parallel lines.

Students will be able to demonstrate movements in straight pathways.

### Lesson Description:

Introduction-Students will stand up and get into their own bubble space and the warm-up will consist of isolations, non-locomotor and locomotor movement that can be used later in the lesson. As we do each movement I will remind the students what the movement is ( i.e. jump, skip, hop, turn, bend, walk, run, slide, twist, crawl, stretch, swing). This warm-up will be done using the music for creative movement and modern dance.

I will tell students what our goal for the day is and what we will be doing. I will ask them what they know about parallel and intersecting lines. We will discuss these lines and I will draw examples of the lines on the board. I will talk to the students about pathways and how we can create pathways to make dances (choreography) and to represent parallel and intersecting lines.

Modeling: I will tell students that we will work with a partner to create a pathway that is parallel and a pathway that is intersecting. I will choose one volunteer to help me show how we will do this. I will use the whiteboard as my paper, my volunteer is my partner, and we will decide how we want to draw our parallel lines on the paper. We will draw our parallel lines on the paper and decide which side of the line we want to begin moving from. We will write down our notes about the details of our plan. We will next decide which locomotor movements we want to do on our parallel pathway. We can choose to do only one movement the whole time or have more movements along the pathway. Once we have decided which movements to do and have written down our notes, we will practice moving on our pathway, remembering that parallel lines do not cross or touch and stay the same distance apart. After we have practiced our parallel pathways, we will create our intersecting pathways.

Guided Practice: Students will be able to choose a partner in a countdown from 10 to 0. Each group will have a piece of paper and pencils to draw their pathways and write down notes. Groups will draw their intersecting pathways and decide which locomotor movements they want to do on their pathways. I will walk students through the steps and use the whiteboard to show examples. For intersecting lines, they have to cross or touch at a point, so students will have to decide how they will show that intersecting point. I will give examples of what they could do and ask for ideas as well. (i.e. high five, connect arms, tap feet together) Students will practice moving on their intersecting pathway.

Independent Practice: Working with their partner, students will draw parallel lines, create parallel pathways and go through the steps as they did with the intersecting pathways. Groups will practice both parallel and intersecting pathways and prepare to perform/share with us.

Assessment/Evaluation: I will observe students working in their groups and I will observe group presentations of their parallel and intersecting pathways. I will observe students' performance of locomotor movements. I will collect and observe papers with notes and pathways.

**Lesson: 3**

Title: Dance of the Polygons

Time: 45 min - 1 hour

Materials and Resources: dry erase marker, list of non-locomotor movements, African Drums-Dance of the Soul music by James Asher, grouping cards, polygon chart

Oklahoma Math Content Standards: S3-The student will use geometric properties and relationships to recognize and describe shapes.

ArtsEdge Dance Standards: S1-Identifying and demonstrating movement elements and skills in performing dance.

Objectives: Students will be able to recognize and describe regular polygons (triangle, square, pentagon, hexagon, heptagon, octagon). Students will be able to create shapes at low, middle, and high levels.

Lesson Description:

Introduction-I will tell the students what we will be doing today. Students will stand up and get into their own bubble space and the warm-up will consist of non-locomotor movements at low, middle, and high levels as well as arm movements that trace different polygon shapes in the air and foot movements that trace polygon shapes. This warm-up will be done using the African Drums music.

Modeling: I will talk to students about the three levels we can move at in dance-low, middle, and high- and demonstrate each level. I will show students some ways that we can move from one level to the next focusing on moving smoothly from one level to the next. I will have students stand up and move from one level to another as I call out the levels.

Guided Practice: I will tell students that today we are going to create shapes (regular polygons) at low, middle, and high levels. We will discuss what a regular polygon is and I will put the polygon chart on the whiteboard. The polygon chart has pictures and a brief description of each polygon like the number of sides and angles it has. Polygons are 2-dimensional shapes. They are made of straight lines, and the shape is "closed" (all the lines connect). If all angles are equal and all sides are equal, then it is regular. We will review the polygons we will be creating using our bodies which are triangle, square, pentagon, hexagon, heptagon, octagon). We will be using our hands, arms, legs, and whole bodies to create these shapes at different levels. We also want to move smoothly from one level to another as we create our shapes.

Students will get into groups of 3 (modify if needed) by picking a card with either a number 1, 2, or 3 and find two other people with the missing numbers to form a group of 3. (i.e. if a student picks a card with the number 3, then that student will find a student who has number 1 and a student who has number 2). In groups, students will work together to create the polygon at the level that I name. (i.e. I will say create a pentagon at

the low level or create a triangle at the high level) All groups will create the shapes at levels at the same time and I will walk around and check their shapes. I will be observing students as they create the polygons in their groups. I will play the music from the warm-up in the background as students work to create the polygons.

Assessment/Evaluation: I will observe students working in their groups as they create the shapes at different levels. I will check their created polygon to make sure it has the right characteristics of a polygon and the right number of sides, angles, and that the sides and angles match.

#### **Lesson: 4**

Title: Got Symmetry?

Time: 1 hour

Materials and Resources: peanut butter and jelly grouping cards, Party Rock Anthem by Kids Bop, Happy from Despicable Me 2, Music for Creative Movement and Modern Dance by Chris Cawthray, Combination 3-Original Music for Modern Dance Class by Michael Roberts

Oklahoma Math Content Standards: S3- Geometry-The student will use geometric properties and relationships to recognize and describe shapes.

1. Identify and compare attributes of two and three dimensional shapes and develop vocabulary to describe the attributes (e.g., count the edges and faces of a cube, the radius is half of a circle, lines of symmetry).

ArtsEdge Dance Standards: S1-Identifying and demonstrating movement elements and skills in performing dance

S2- Understanding choreographic principles, processes, and structures

Objectives: Students will be able to differentiate between symmetrical shapes and asymmetrical shapes.

Students will be able to demonstrate the following partner skills: copying, leading, following and mirroring.

Students will be able to create symmetrical and asymmetrical shapes in using their bodies.

Lesson Description:

Introduction-I will tell students our goals for the day. Students will stand up and get into their space for warm-up. The warm-up will be a freeze dance. Each time the students hear the music, they can move/dance any way they choose-locomotor movement or non-locomotor movement and they can move/dance at any level they choose using locomotor

and non-locomotor movements performed at any level. Once the music stops, the students must freeze in a shape. Then we will repeat many times.

Next, we will do the freeze dance again, but while copying the shape of a student close by. Students will move/dance when the music is playing, once the music stops-students will freeze, but copy the freeze shape of another student close to them. We will repeat this many times.

Modeling: I create a symmetrical shape with my body and ask students if my shape is symmetrical. We will discuss what symmetry is and I will ask a volunteer to come and draw an imaginary line down the center of my shape to show the line of symmetry. I will change my shape, making some of my shapes symmetrical and some asymmetrical and we will discuss the difference. I will talk to students about symmetrical shapes being balanced and asymmetrical being unbalanced as well as showing what each looks like in the body.

I will ask students to stand and create their own shapes in their bodies both symmetrical and asymmetrical as I guide them. Next, we will talk about reflection symmetry like a mirror image. What do we see in the mirror? I will have a volunteer come and we will do some mirroring using our bodies. I will lead first and then we will switch leaders. The focus is to look the same and do the same movements-to be symmetrical. I will tell students how we can use mirroring to create a nice dance and we can do it with music that has a slow tempo or an upbeat tempo. I will choose a volunteer to do mirror dancing with me to the slow tempo music and chose another volunteer to do mirror dancing with me to the upbeat tempo music.

Guided Practice: Students will work with a partner and be grouped by peanut butter and jelly grouping cards. If a student picks the peanut butter card, then they must find another student with the jelly. Peanut butter will lead first and partners will practice mirror dancing. Then we will switch leaders and continue practicing leading and following focusing on symmetry. I will have students practice mirror dancing with their partner to the slow tempo music and the upbeat tempo music.

Next, partners will create asymmetrical shapes together.

Independent Practice: Partners will create a symmetrical and asymmetrical movement phrase based on the shapes they create. They can use mirroring and/or create movements that are symmetrical. They must have 6 movements/shapes that are symmetrical and 2 movement/shapes that are asymmetrical. They must use at least two levels-low, middle, or high and move smoothly (transition) from one level to the next. They will create and practice their shapes/movements and prepare to share (perform). They will need to decide if they want to move to the slow tempo music or the upbeat tempo music we have been working with during class.

Assessment/Evaluation: I will observe students working in their groups and I will observe group presentations checking for the criteria I gave for the independent work.



**Lesson: 5**

Title: Coordinate Chance Dance

Time: 45 min - 1 hour

Materials and Resources: dry erase marker, Coordinate Plane Song-Rock to the Core K-5 Math, different tempo instrumental songs for chance dance music, chart with coordinate grid, cards with ordered pairs and level, list of locomotor movements, tape for carpet (numbers, X and Y axis, non-locomotor movements), colorful rectangle or square carpet for coordinate grid,

Oklahoma Math Content Standards: S3- Geometry-The student will use geometric properties and relationships to recognize and describe shapes.

3. Make and use coordinate systems to specify locations and shapes on a grid with ordered pairs and to describe paths from one point to another point on a grid.

ArtsEdge Dance Standards: S1-Identifying and demonstrating movement elements and skills in performing dance

S2-Understanding choreographic principles, processes, and structures

Objectives: Students will be able to identify the location of ordered pairs on a grid.

Students will be able to use improvisation to discover and invent movement and to solve movement problems.

Students will be able to use movement to describe paths between points.

Lesson Description:

Introduction-I will tell the students our goals for the day. Today our warm-up will be moving to the Coordinate Plane song. Students will follow me the first time and then I will show them each movement as we learn the song and movement without the music. Then we will do the movements with the music. The song is simple and the movements repeat for a simple dance with the song.

I will talk to students about grid coordinates and show them a large chart with a coordinate grid. We will discuss the X,Y axis and ordered pairs (2,4). We will practice graphing ordered pairs and look at how to determine what the ordered pair would be for a point already on the graph.

Modeling: I will tell students that we are going to turn our colorful rectangle carpet into a coordinate grid and we are going to become points on the grid. We are going to dance and move as the coordinates. I will talk to students about improvisation and something called chance dance that is used in dance making. I will model for students how to move across the X axis first and then the Y axis. I will ask volunteers to show us how we can

use locomotor movements to travel on the coordinate grid and non-locomotor movement when we reach our point.

**Guided Practice:** Today we will be doing some chance/improvisation dancing. We will split into groups of four. I will count up to four and give each student a number that they must remember. If I give the student a 3 then they will be with all the other 3s. (All 1s together, 2s together, 4s together) Each student will choose a card that has an ordered pair and a level they must move at. (i.e. (4,3 low) Each student will do any locomotor movement they want as they move along the X and Y axis to the coordinate point. Once they get to their coordinate point, there will be a non-locomotor movement written on the point that they must do and repeat until I say stop. Each group will move together. So all the 3s will move on the coordinate grid at the same time to get to their point creating an improvised group dance. The students will choose their cards when it is their groups turn to move. As each group moves/chance dances, the other groups will watch to see what happens and what is created. After each group we will discuss briefly what we saw, and check to see if students ended on the correct points. For each group, I will also incorporate music to add another element to the chance dances. We will repeat if time permits, with students changing locomotor movements and adjusting any issues we had the first time. (i.e. bumping into each other)

**Assessment/Evaluation:** I will observe students moving along the X and Y axis to their points. I will observe students using locomotor movement and levels. I will observe if students are participating and understand.

## **Lesson: 6**

**Title:** Patterns in Motion

**Time:** 1 hour

**Materials and Resources:** Following Directions With Exercise by Mark D. Pencil and Friends, paper, pencils, dry erase marker

**Oklahoma Math Content Standards:** S1-Algebraic Reasoning: Patterns and Relationships- The students will use a variety of problem-solving approaches to extend and create patterns.

1. Describe (orally or in written form), create, extend and predict patterns in a variety of situations (e.g., 3, 6, 9, 12..., use a function machine to generate input and output values for a table, show multiplication patterns on a hundreds chart, determine a rule and generate additional pairs with the same relationship).

**ArtsEdge Dance Standards:** S1-Identifying and demonstrating movement elements and skills in performing dance

S2-Understanding choreographic principles, processes, and structures

**Objectives:** Students will be able to extend and create patterns.

Students will be able to create a dance phrase and accurately repeat it.

Students will be able to demonstrate a pattern using movement elements.

#### Lesson Description:

**Introduction-**I will tell students our goals for the day. Students will get in their bubble space and we will warm-up by following the directions in the exercise song. I have movements that we will do to accompany the directions given in the song. The students will follow me. I chose this song for warm-up because it has some patterns in it and is a quick warm-up song. I will ask students if they recognized any patterns in our warm-up song/movements. I will show students some of the movements that created a pattern in the song.

**Modeling:** We will discuss what a pattern is and where we can find patterns. I will show students an example of a pattern using my body ( clap, reach up, turn around) and repeat it. I will ask students which movement will come next if I stop at the reach up. I will have students stand up and do this pattern with me. I will draw a pattern on the board using four balls (football, basketball, baseball, and soccer ball) and repeat it. I will ask students which ball would come next. I will write a number pattern on the board (sequence)-2, 4, 6, 8 or 3, 6, 9, 12 and ask which number would come next. I will show students how this number pattern can be shown using movements. I will ask for four volunteers. I will show each volunteer what movements to do. The first volunteer will do two movements for the number 2, the second volunteer will do the same two movements but add two different ones for the number 4, and so forth. The patterns are formed by two movements each time as we count by twos. I will tell students that we can use movement and dance to create patterns. Today we are going to use some movement elements like levels, direction, size, shapes, and speed. We will also use non-locomotor and locomotor movement.

**Guided Practice:** Students will spread out in the space. I will guide students through each movement element and we will practice each one as well as create patterns within each element. We will do this together as a class. The first element is levels-high, middle, low. We will create a pattern of low, high, middle, high, low, high, middle, high. The next element is direction-forward, backward, sideways, diagonal, front, back, side right or left. The next element is size-small, medium, large. The next element is shapes-rounded, angular, symmetrical, asymmetrical. The next element is speed-fast, medium or slow. With each element we will create patterns and practice moving in that pattern. We will use locomotor and non-locomotor movement to create patterns and within the movement elements. (i.e. jump, bend, slide, kick, jump, bend, slide, kick or skip, skip, hop, skip, skip, hop)

**Independent Practice:** Each student will work independently to create a pattern. The pattern must have at least 4 parts and use at least 2 movement elements. The students must repeat the pattern three times. (i.e. arms straight out to the sides with one knee on the ground and one knee up facing forward, stand up and bring arms straight up over head and hands clap, turn and face side right, bend facing front and REPEAT) (My pattern can repeat, I have used direction, levels, and shapes. I will show students my

example and how I would write it down on my paper and then practice. Students create their pattern, write it out and then practice.

Assessment/Evaluation: Students will share their pattern with the class. I will observe student pattern presentations. I will collect student's papers with their written pattern.

### **Lesson: 7**

Title: Number Machine Dance

Time: 1 hour +

Materials and Resources: Dance A Story All In A Day's Work 4-4 (Music for Movement and Imaginations), dry erase marker, paper, pencils, math problem sheet for teacher, wrist ribbons,

Oklahoma Math Content Standards: S1-Algebraic Reasoning: Patterns and Relationships- The students will use a variety of problem-solving approaches to extend and create patterns.

1. Describe (orally or in written form), create, extend and predict patterns in a variety of situations (e.g., 3, 6, 9, 12..., use a function machine to generate input and output values for a table, show multiplication patterns on a hundreds chart, determine a rule and generate additional pairs with the same relationship).

ArtsEdge Dance Standards: S1-Identifying and demonstrating movement elements and skills in performing dance

S2-Understanding choreographic principles, processes, and structures

Objectives: Students will be able to solve problems to determine values for input and output tables.

Students will be able to demonstrate kinesthetic awareness, concentration, and focus in performing movement skills.

Students will be able to take an active role in a class discussion about reactions to a class dance.

### Lesson Description:

Introduction-I will tell students our goals for the day. Today we will be working with wrist ribbons. I will show students how we use the ribbons appropriately. I will give each student a ribbon and we will warm-up using the ribbons. The students will follow what I do. We will focus on smooth/sustained movements, sharp/percussive movements, and all the other movement elements we have already worked with in the warm-up using the ribbons. We will move to Dance A Story All In A Day's Work 4-4 (Music for Movement and Imaginations). (The music will be looped to make it longer)

Modeling: Students will place their ribbons in the ribbon bag and sit on the carpet. I will review the qualities of movement we did in the warm-up-sustained/smooth and percussive/sharp. Today we are going to guess some rules and solve some input and output machine problems. I will write a problem on the board (i.e. 4 goes in and 1 comes out, 5 goes in and 2 comes out. What is the rule for this number machine?) We will discuss the rule and what is happening to the numbers. I will put another problem on the board (24, 20, 16, 12 and ask What is the rule? What would be the next number?) We will discuss this problem and the rule? Another problem is-9 goes in and 11 comes out, 5 goes in and 7 comes out, 6 goes in and 8 comes out, if 12 goes in what will come out? What is the rule?) I will continue with a few more problems with different rules like multiply by 2, add 5, and subtract 6.

We will now show how we can turn these problems into movement and dance. We can put these problems into our body. I have six volunteers come and show us a problem. (6 students go in, and 3 students come out, 4 students go in and 1 student comes out. The rule is subtract 3).

Guided Practice: As a class we will perform a number machine dance. We will use some of the problems we have already solved and use them to make our dance. We are going to use the ribbons and the song from our warm-up. We will all move together as the number machine with sustained movement and percussive movement when the music changes. I will assign students to be a part of a problem and represent the numbers in the problem. (i.e. 5 goes in, 7 comes out. There will be 5 students and 2 more students added to them) We will have counts for when we all dance as the machine and when we represent the problem. The dance will be pre-choreographed beforehand with room for student suggestions. We will work on transitions in and out, as well as moving with the music, and practicing the movements.

Independent Practice: Students will write a reflection about our class dance.

Assessment/Evaluation: I will observe students as we work together as a class. I will observe students as they perform the class dance. I will listen to student responses in our class discussion. I will collect student reflections of our class dance.

## **Lesson: 8**

Title: Understanding the three's

Time: 1 hour (First lesson in the lessons on multiplying by three)

Materials and Resources: Stand In Place and Move song by Mark D. Pencil and Friends, dry erase marker, paper, pencils, cards with numbers (2-10)

Oklahoma Math Content Standards: S2-Number Sense and Operation-The student will use numbers and number relationships to acquire basic facts. The student will estimate and compute with whole numbers.

2. Number Operations- b. Multiplication Concepts and Fact Families

ii. Demonstrate fluency (memorize and apply) with basic multiplication facts up to  $10 \times 10$  and the associated division facts (e.g.,  $5 \times 6 = 30$  and  $30/6 = 5$ ).

ArtsEdge Dance Standards: S1-Identifying and demonstrating movement elements and skills in performing dance

S2-Understanding choreographic principles, processes, and structures

Objectives: Students will be able to solve multiplication problems for three's facts.

Students will be able to demonstrate kinesthetic awareness, concentration, and focus in performing movement skills.

Students will be able to improvise, create, and perform movement phrases based on multiplication facts.

Lesson Description:

Introduction-I will tell students our goals for the day. Warm-up will be done using the Stand In Place and Move song by Mark D. Pencil and Friends. If needed we will finish lesson 7.

Modeling: We are going to focus on multiplication. I will ask students if they know the answer to  $0 \times 3$ ,  $1 \times 3$ , and  $3 \times 2$ . I will write the problem  $3 \times 4$  on the board and talk about how  $3 \times 4$  is 3 groups of something. I will draw a picture of three groups with 4 apples in each group. I will also ask three volunteers to come up and show us  $3 \times 4$  by having each volunteer do a movement 4 times. We will briefly review the threes facts (  $3 \times 0$ ,  $3 \times 1$ ,  $3 \times 2$ ,  $3 \times 3$ ,  $3 \times 4$ ,  $3 \times 5$ ,  $3 \times 6$ ,  $3 \times 7$ ,  $3 \times 8$ ,  $3 \times 9$ ,  $3 \times 10$ )

Guided Practice: Students will get into groups of three. I will show students a game called house. All students will walk around the space and when I say house, the students try to find others to create a house. A house is made of three students-two who touch with their hands up in the air like the roof of a house and a third who stands in the middle between them. The three students who make up a house will therefore be a group. I will give each group a card with a number on it, a piece of paper and pencil. Each group will multiply the number of people in the group times the number on their card. (i.e.  $3 \times 6$ ) Each group will then choose one movement. The groups will decide if they want each person to do the movement at the same time (unison) or one after another. Then groups will practice by performing the number of movements that results from the multiplication problem. (IF GROUPS GET A SMALL NUMBER OR FINISH EARLY AND WANT TO TRY AN EXTRA NUMBER THEY HAVE THAT CHOICE) The groups will also write down the answer to their problem on their paper.

Each group will share their movement phrase as the class observes. After each group shares, we will answer these questions. How many dancers were there in the group? How many movements did each dancer do? What is the multiplication equation? How many movements total? I will write the answers out on the board. (i.e.  $3 \times 7 = 21$ )

Assessment/Evaluation: I will observe students as we work together as a class. I will observe students as they share movement phrases.

### **Lesson: 9**

Title: Dancing the Threes

Time: 1 hour (Second lesson in the lessons on multiplying by three)

Materials and Resources: Three Times Table Song (Cover of Uptown Funk by Mark Ronson and Bruno Mars) by Mr. DeMaio, African Drums-Dance of the Soul ( James Asher ), dry erase marker, product cards, equation cards, tape

Oklahoma Math Content Standards: S2-Number Sense and Operation-The student will use numbers and number relationships to acquire basic facts. The student will estimate and compute with whole numbers.

#### 3. Number Operations- b. Multiplication Concepts and Fact Families

- ii. Demonstrate fluency (memorize and apply) with basic multiplication facts up to  $10 \times 10$  and the associated division facts (e.g.,  $5 \times 6 = 30$  and  $30/6 = 5$ ).

ArtsEdge Dance Standards: S1-Identifying and demonstrating movement elements and skills in performing dance

S2-Understanding choreographic principles, processes, and structures

Objectives: Students will be able to solve multiplication problems for three's facts.

Students will be able to demonstrate kinesthetic awareness, concentration, and focus in performing movement skills.

Students will be able to demonstrate accuracy in moving to a musical beat and responding to changes in tempo.

#### Lesson Description:

Introduction-I will tell students our goals for the day. Warm-up will consist of isolations, locomotor movements such as skips, hops, turns, jumps and non-locomotor movement such as bending, twisting, and stretching. I will use the African Drums-Dance of the Soul song.

Modeling: I will ask students if they know what the numbers are called in a multiplication equation. We will discuss this (factor x factor = the product,  $3 \times 6 = 18$ ). I will write this example on the board. We will review all of the 3s facts. Today we are going to play a movement game. There are two different equations on cards taped to the floor in a circle. Each student will sit behind the equations and one student will stand in the middle. So there will not be enough spaces for every student. The student in the middle will pick a card that has a number on it and is the product for some of the

equations. The student in the middle says, “I am a product, I’m the number \_\_\_\_” and the class says, “Factor, Factor where are you, factor factor come on through.” The students with the factors/equations that equal that product will move according to a pre-given movement. The students who move are trying to get into another empty space and the student in the middle is trying to get into an empty space as well. The student, who does not get into a space, will be in the middle and pick a product card. We will repeat this and vary the movements. (i.e. crawl, hop, jump, turn)

Guided Practice: We will begin to learn choreography and words to the Three Times Table Song (Cover of Uptown Funk by Mark Ronson and Bruno Mars).

Assessment/Evaluation: I will observe students as we play the movement game. I will observe students as they learn the choreography.

### **Lesson: 10**

Title: Dancing the Threes

Time: 1 hour (Third and Culminating lesson in the lessons on multiplying by three)

Materials and Resources: Three Times Table Song (Cover of Uptown Funk by Mark Ronson and Bruno Mars) by Mr. DeMaio, African Drums-Dance of the Soul ( James Asher ),

Oklahoma Math Content Standards: S2-Number Sense and Operation-The student will use numbers and number relationships to acquire basic facts. The student will estimate and compute with whole numbers.

#### 4. Number Operations- b. Multiplication Concepts and Fact Families

- ii. Demonstrate fluency (memorize and apply) with basic multiplication facts up to  $10 \times 10$  and the associated division facts (e.g.,  $5 \times 6 = 30$  and  $30 / 6 = 5$ ).

ArtsEdge Dance Standards: S1-Identifying and demonstrating movement elements and skills in performing dance

S2-Understanding choreographic principles, processes, and structures

Objectives: Students will be able to solve multiplication problems for three’s facts.

Students will be able to demonstrate kinesthetic awareness, concentration, and focus in performing movement skills.

Students will be able to demonstrate accuracy in moving to a musical beat and responding to changes in tempo.



### Lesson Description:

**Introduction-**I will tell students our goals for the day. Warm-up will consist of isolations, locomotor movements such as skips, hops, turns, jumps and non-locomotor movement such as bending, twisting, and stretching. I will use the African Drums-Dance of the Soul song.

**Modeling:** I will review the movements of the choreography that we have already learned. We will practice it without the music and with the music. Our focus is on learning the movements and moving accurately to the beat. We are also learning the words with a specific focus on the 3s facts in the song. The song is repetitive and fairly simple.

**Guided Practice:** We will continue to learn choreography and words to the song. We will practice and finally perform for each other. The class will be split in half. One group will perform and the other will be the audience and then we will switch.

**Assessment/Evaluation:** I will observe students as they learn the choreography. I will observe student performances looking for accuracy in movement, focus, and if they know the facts.

**APPENDIX B**

RESEARCH INSTRUMENT FORMS

CREATIVE MOVEMENT AND DANCE INTEGRATION:  
THEIR CONNECTION TO LEARNING THIRD  
GRADE MATH CONCEPTS LESSON  
OBSERVATION FORM

Code Number: \_\_\_\_\_

Date: \_\_\_\_\_

Lesson Title:

---

Math Concept(s) Taught:

---

What did I notice about student participation?

---

In which part of the lesson were the students most engaged?

---

What seemed to work well in the lesson?

---

What could be improved or didn't seem to work well?

---

What did I observe that indicated they grasped or did not grasp lesson content?

---

How could the overall response to the lesson be described?

---

CREATIVE MOVEMENT AND DANCE INTEGRATION:  
THEIR CONNECTION TO LEARNING THIRD  
GRADE MATH CONCEPTS STUDENT  
INTERVIEW QUESTIONS

Code Number: \_\_\_\_\_

Date: \_\_\_\_\_

Student Interview Questions:

(Mid-way)

1. What do you like about the creative movement/dance and math lessons?
2. What do you not like about the creative movement/dance and math lessons?
3. Do you think the lessons help you to understand math? Why or why not?
4. How is learning different for you since we began the creative movement/dance and math lessons?

Student Interview Questions:

(Final)

1. What do you like the most about learning math using movement and dance?
2. Do you think the lessons helped you to understand the math concepts? Please explain.
3. Did you like learning about math in this way? Why or why not?
5. How do you feel about creative movement/dance?
6. Which lesson was the most interesting or the most fun?

CREATIVE MOVEMENT AND DANCE INTEGRATION:  
THEIR CONNECTION TO LEARNING THIRD  
GRADE MATH CONCEPTS TEACHER  
INTERVIEW QUESTIONS

Code Number: \_\_\_\_\_

Date: \_\_\_\_\_

Teacher Interview Questions:

(Mid-way)

1. How do you feel students are responding to the creative movement/dance integration lessons?
2. What changes have you noticed in students (i.e. behavior, participation, engagement, learning gains, confidence)?
3. Do you think the lessons are supporting student understanding of math concepts?  
Please explain.
4. Which lessons seemed most effective or helpful to student learning?

Teacher Interview Questions:

(Final)

1. How have the creative movement/dance integrated lessons supported student understanding of math concepts?
2. What changes have you noticed in students (i.e. behavior, participation, engagement, learning gains, confidence)?
3. Would you use creative movement/dance integration in your math lessons and other subject areas on a regular basis? Please explain.

**APPENDIX C**

**PRINCIPAL APPROVAL LETTER**

November 9, 2015

LaShandria Redman has approval to work with the third grade students at our school. She has explained her math units:

*Creative Movement and Dance Integration:  
helping students to build their connection to learning third grade math concepts.*

We welcome her into the classroom to help our students build math concepts and develop the skills to be strong math students.

**APPENDIX D**

**INSTITUTIONAL REVIEW BOARD FORM**





*Institutional Review Board*

DATE: January 21, 2016

TO: LaShandria Redman  
FROM: University of Northern Colorado (UNCO) IRB

PROJECT TITLE: [826700-3] Creative Movement and Dance Integration: Their Connection to Learning Third Grade Math Concepts

SUBMISSION TYPE: Amendment/Modification

ACTION: APPROVED

APPROVAL DATE: January 21, 2016

EXPIRATION DATE: January 21, 2017

REVIEW TYPE: Expedited Review

Thank you for your submission of Amendment/Modification materials for this project. The University of Northern Colorado (UNCO) IRB has APPROVED your submission. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on applicable federal regulations.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of January 21, 2017.

Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact Sherry May at 970-351-1910 or [Sherry.May@unco.edu](mailto:Sherry.May@unco.edu). Please include your project title and reference number in all correspondence with this committee.

**Thank you for your patience with the UNC IRB process. Dr. Roehrs, the first reviewer, has provided approval based on the additional and revised materials submitted in your modification packages. I've subsequently reviewed your original and modified as well as additional materials and am also providing approval.**

**Please be sure to use all materials developed and modified in this review process in your participant recruitment and data collection.**

**Best wishes with your research.**

**Sincerely,**

**Dr. Megan Stellino, UNC IRB Co-Chair**

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Northern Colorado (UNCO) IRB's records.

**APPENDIX E**

TEACHER, PARENT, AND STUDENT  
CONSENT AND ASSENT  
FORMS

UNIVERSITY of  
NORTHERN COLORADO



College of Performing and Visual Arts  
School of Theatre Arts and Dance

**CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH**

**UNIVERSITY OF NORTHERN COLORADO**

**(Teacher Consent)**

**Thesis Title:** Creative Movement and Dance Integration: Their Connection to Learning Third Grade Math Concepts

**Researcher:** LaShandria Redman, Graduate Student at the University of Northern Colorado

**Contact Information:**

**Research Advisor:** Dr. Sandra Minton, University of Northern Colorado,  
sandra.minton@unco.edu

You are being asked to take part in a research study of the effectiveness of a creative movement and dance integration curriculum and its effect on student learning and behavior. Please read this form carefully and ask any questions you may have before agreeing to take part in the study.

**What the study is about:** The goal in this research is to create and teach a dance integration curriculum in order to study its effects on student behavior and learning. Dance integration involves using movement and dance to help teach concepts that are part of an academic discipline. I will be creating and implementing dance integrated lessons and conducting interviews with the teacher and students to assess their response to the curriculum. There will be a total of ten dance integrated lessons. I will also keep a record of my class observations, but only those students for whom I have permission will be interviewed or described in my observation notes. Student interviews will take about 10 minutes for each student. The teacher interview will take about twenty minutes. My research will seek to answer the following questions: 1) What is the sequence of lessons to be included in a dance integrated curriculum structured for teaching third grade math concepts? 2) Which third grade math concepts can most easily be taught using a dance integrated curriculum? 3) What is the student response to the dance integrated curriculum used to teach third grade math concepts? The secondary goal in this research is the effectiveness of the created curriculum.

**Risks:** The risk for participation in this study is minimal. There would be no more risk than participating in a regular movement class. As part of this study, you will be

participating in various movement/dance activities and other types of hands-on activities with your students, observing your students' responses, participating in two interviews, and working with the researcher to know which math concepts will be taught.

**Your answers will be confidential:** No identifying information will be used for presentation or publication of study results. Only coded or fictitious names will be used. All data will be stored in a locked file cabinet in the researcher's home. All audio tapes, other data, and consent forms will be retained for three years and then destroyed.

**Taking part is voluntary:** Participation in this study is completely voluntary.

**If you have questions:** The researcher conducting this study is LaShandria Redman. Please ask any questions you have now. If you have questions later, you may contact me with the information listed above. Please retain one copy of this letter for your records.

Participation is voluntary. You may decide not to participate in this study. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask any questions, please sign below if you would like to participate in this research. A copy of this form will be given to you to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact the Office of Sponsored Programs, 25 Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-1910.

**Statement of Consent:** I have read the above information, and have received answers to any questions that I had. I consent to take part in the study.

---

Teacher's Full Name (please print)

---

Teacher's Signature

Date (month/day/year)

---

Researcher's Signature

Date (month/day/year)

---

Printed Name of Researcher Obtaining Consent

Date (month/day/year)

All consent forms and data will be stored in a locked file cabinet at the researcher's home. The researcher is the only person who will have access to the locked cabinet.

UNIVERSITY of  
NORTHERN COLORADO



*College of Performing and Visual Arts  
School of Theatre Arts and Dance*

**CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH**  
**UNIVERSITY OF NORTHERN COLORADO**  
**(Parent Consent)**

**Thesis Title:** Creative Movement and Dance Integration: Their Connection to Learning Third Grade Math Concepts

**Researcher:** LaShandria Redman, Graduate Student at the University of Northern Colorado

**Contact Information:**

**Research Advisor:** Dr. Sandra Minton, University of Northern Colorado,  
sandra.minton@unco.edu

Your child is being asked to take part in a research study of the effectiveness of a creative movement and dance integration curriculum and its effect on student learning and behavior. Please read this form carefully and ask any questions you may have before agreeing to allow your child to take part in the study.

**What the study is about:** The goal in this research is to create and teach a dance integration curriculum in order to study its effects on student behavior and learning. Dance integration involves using movement and dance to help teach concepts that are part of an academic discipline. I will be creating and implementing dance integrated lessons and conducting interviews with the teacher and students to assess their response to the curriculum. There will be a total of ten dance integrated lessons. I will also keep a record of my class observations, but only those students for whom I have permission will be interviewed or described in my observation notes. Student interviews will take about 10 minutes for each student. My research will seek to answer the following questions: 1) What is the sequence of lessons to be included in a dance integrated curriculum structured for teaching third grade math concepts? 2) Which third grade math concepts can most easily be taught using a dance integrated curriculum? 3) What is the student response to the dance integrated curriculum used to teach third grade math concepts? The secondary goal in this research is the effectiveness of the created curriculum.

**Risks:** The risk for participation in this study is minimal. There would be no more risk than participating in a regular movement class. As part of this study, your child will be participating in various movement/dance activities and other types of hands-on activities.

**Your answers will be confidential:** No identifying information will be used for presentation or publication of study results. Only coded or fictitious names will be used. All data will be stored in a locked file cabinet in the researcher's home. All audio tapes, other data, and consent forms will be retained for three years and then destroyed.

**Taking part is voluntary:** Participation in this study is completely voluntary. Participation in the study will not be required for participation in the class. If your child decides to take part in this study, he or she is free to withdraw at any time.

**If you have questions:** The researcher conducting this study is LaShandria Redman. Please ask any questions you have now. If you have questions later, you may contact me with the information listed above. Please retain one copy of this letter for your records. Participation is voluntary. You may decide not to allow your child to participate in this study and if (s)he begins participation you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask any questions, please sign below if you would like to participate in this research. A copy of this form will be given to you to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact the Office of Sponsored Programs, 25 Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-1910.

Statement of Consent: I have read the above information, and have received answers to any questions that I had. I consent for my child to take part in the study.

---



---

Child's Full Name (please print)

Child's Birth Date ( month/day/year)

---

Parent/Guardian's Signature

Date ( month/day/year)

---

Researcher's Signature

Date ( month/day/year)

---

Printed Name of Researcher Obtaining Consent      Date (month/day/year)

All consent forms and data will be stored in a locked file cabinet at the researcher's home. The researcher is the only person who will have access to the locked cabinet.

UNIVERSITY of  
NORTHERN COLORADO



College of Performing and Visual Arts  
School of Theatre Arts and Dance

**ASSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH**

**UNIVERSITY OF NORTHERN COLORADO**

**(Child Assent Form)**

Hi!

My name is LaShandria Redman and I am a dancer and a teacher. I do research on creative movement and dance and how we can use it to help students learn math. That means I get to use movement and dance to teach math. I would like to work with a lot of third graders and use creative movement and dance to help them learn and understand math. If you want, you can be one of the kids I work with.

If you want to work with me, you will be apart of the ten lessons that I create using movement and dance to help you understand math. We will be using music, fun hands on materials, and you get to learn math in a new way. As we move around the room and learn math, I will be making notes in my mind and use those notes later in my journal. I will also ask you some questions. This isn't a test or anything like that. The questions are about what you think about the lessons and using movement and dance to learn math. I really want to know what you think about my lessons. I will use a tape recorder to copy your answers. You don't have to say your name when I ask you the questions. No one will know that you are answering the questions or what your answers are. It will take about 10 minutes for you to answer my questions.

If you work with me, it won't hurt you. We will have to be careful because we will be moving around a lot though. Your parents have said it's okay for you to work with me, but you don't have to. If you say "yes" but then change your mind, you can stop at any time. Do you have any questions for me about my research? If you want to work with me and be in my research, sign your name below and write today's date next to it. Thank you!

---

Student

Date

---

Researcher

Date