Drama + Math = Dramath

2011

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DRAMATH

by

LUCY LYNN BRYSON
BSEd Columbus State University, 2008

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ABSTRACT

Arts-Across-the-Curriculum is gaining popularity in the field of education as arts programs are being cut from schools and teachers looks for ways to incorporate art in their classroom. Most of these teachers have minimal formal arts training, but recognize the importance of introducing their students to various fine arts disciplines. These educators seek opportunities to learn new ways to bring arts to their students and may bring teaching artists into their classrooms to teach students or teachers. The clear connection between drama and the core subjects of history and literature allow teaching artists to easily create units utilizing both curriculum areas. Mathematics does not present clear connections to drama and the prevalence of mathematics anxiety, especially in the arts, prevents connections from being made.

As an educator, theatre artist and lover of mathematics, Arts-Across-the-Curriculum provides me a opportunity to meld these together as a way to help young people find excitement in their education. Partnering with a fourth grade teacher, I developed a unit of lesson plans using playwriting as a way to understand word problems that was user-friendly for a teacher with no arts training. The Dramath Unit was integrated into the class as part of regular curriculum taught by the participating classroom teacher. Based on feedback from the participating teacher, I revised the unit for future use.
For the village raising me to this point.
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INTRODUCTION

People often find my dual love of theatre and mathematics both odd and intriguing. Those interests developed early in my life and often influenced what career paths I debated taking. I pursued the possibilities of earning both a degree in mathematics education and theatre education in my undergraduate career, but because of timing, I chose to pursue the theatre education degree. However, I continued to take extra mathematics courses preparing for a time when I would be able to complete a mathematics degree and because I enjoyed them.

In the graduate class Methods of Teaching Drama, I was introduced to Arts-Across-the-Curriculum, teaching a core subject through one of the fine arts. The course included an assignment in which each student created a Drama-Across-the-Curriculum activity. I thought it would be interesting to try choosing the core subject of mathematics and began researching. My results were dismal; the only published article I could find at the time was not in English, thus I was not able to read it. Clearly Drama-Across-the-Curriculum practitioners either were not writing about using mathematics in this setting or they simply weren’t teaching mathematics at all. I took my first step on this path by creating a simple activity in which young students would explore shapes using their bodies. The lesson had major flaws, and I put it at bay until I had another opportunity to explore this idea in the following year.

ArtsBridgeUCF presented a way for me to develop ideas about teaching mathematics using drama in a classroom with the guidance of a mentor and host teacher. My host teacher was interested in how my project would affect her class, because she had the lowest scoring students in her grade. (This school switches into classes based on test scores for mathematics.) I began this 15-hour residency altering theatre games to give physical actions to represent vocabulary
words and ideas students were working on in class. We played “Captain on Deck”: a call and response game in which the facilitator acts as the Captain of a ship commanding the crew, students, to perform actions like “swab the deck,” “man the rigging” and “seasick.” Each command has a set response and members of the crew get ‘out’ if they do not act quick enough or respond incorrectly. It is similar to ‘Simon Says’. Gradually I introduced new commands like ‘right angle,’ ‘ray,’ and ‘line segment.’ The students created their own physical responses to the command based on their definitions to the words. For instance, the vocabulary term ‘ray’ was given a pose in which the standing student held out both arms, one hand balled into a fist and the other pointing to show a ray has a beginning but continues on forever. “Captain on Deck” created a fun way for the students to be on their feet and review information they struggled to remember in typical class instruction.

We progressed through the semester into a process drama in which the students created a town and completed missions based on letters they received from “The Council.” The missions were often tasks like creating a map to show what the explorers had discovered or explaining the errors in a budget sheet when compared to supplies the group ordered. Through the missions, students created maps of the new town using their knowledge of grids, budgets using their knowledge of adding and subtracting numbers with decimals, and an instructional video explaining how to solve word problems involving money. One of our major goals with this project was to reduce the amount of mathematics anxiety the students had and to find ways to bring life and a sense of play into the classroom without losing precious instructional time. At the end of the project, their classroom teacher and I felt we had accomplished our goal, but I still had concerns that our ideas were not fully developed: I wanted to take the project further.
The following semester I enrolled in Current Methods of Teaching Early Childhood Mathematics, setting out to gain a better perspective of mathematics instruction. The course exposed me to ways teachers were already utilizing elements of drama in their mathematics classes. Students often act out word problems, and teachers are encouraged to use teacher-in-role, where a teacher plays a character in the classroom guiding students to explore mathematics. Specifically, in one method of teaching place value, the teacher plays the part of a candy shop owner and the students must ‘package’ the candy as individual pieces, into rolls of ten and boxes of hundreds. “The Candy Shop” is considered an excellent way to teach place value and grouping and is inherently connected to drama as it encourages students to talk through their reasoning and allows the teacher a simple opportunity to teach-in-role as the shop owner (Wood). Mathematics teachers are embracing new techniques, including drama exercises without the label of ‘drama’, to improve instruction. Taking this class gave me knowledge of how to most effectively teach mathematics while also giving me new perspective on creative ways to enhance mathematics instruction.

The focus of my thesis research is the production of a unit of lesson plans using drama to teach mathematics, which are understandable and user-friendly for classroom teachers. Through interviews with the classroom teacher using the Dramath Unit, I gain feedback to guide revisions to meet the teacher’s needs. Collected samples of student work provided insight to their understanding and provided evidence of the effectiveness of the unit. An underlying and ever present purpose of my work in this field is searching for alternative ways to teach mathematics in which participants experience reduced mathematics anxiety and increased joy in their education.
LITERARY REVIEW

Mathematics Education

In 1969, Nicholas J. Vigilante complied articles to create *Mathematics in Elementary Education* as an educational text for elementary school teachers in training. This work provides a glimpse into the educational theories used at the time. Many of the contributing authors look at creative ways to use mathematics in the classroom. Sueltz notes mathematics can no longer be about memorizing facts but about “encouraging children to think, discover relationships, and to understand…” (Vigilante 21). Flournoy goes as far as suggesting teachers have students act out scenes where mathematics may be involved in a real life context:

> It is also essential that a social situation be used as a springboard in the sequence of steps taken to develop mathematical understanding. The learner must be able to relate the mathematical skill and understanding he is learning to significant social situations in everyday life in order to make the most effective application of arithmetic skills…Pupils should be given experience in constructing true-to-life problem situations which will require the use of each new arithmetic skill that is taught. (Vigilante 98-99)

Jean Piaget adds that mathematical concepts cannot be taught; Children must develop these thoughts as individuals. Finally, Johnson and Rising put forth “development of positive attitudes toward mathematics is a fundamental concern” and recommend teachers develop methods for reducing mathematics anxiety in the classroom (Sueltz 135).

Struck by the clear need for a change in the way mathematics education is approached, the National Council of Teachers of Mathematics (NCTM) released *Curriculum and Evaluation...*
Standards for School Mathematics in 1989, Professional Standards for Teaching Mathematics in 1991, and Assessment Standards for School Mathematics in 1995. These three documents have been the main catalyst for individual states to evaluate and base state standards upon. The number of standards vary greatly in each state. NCTM believes by focusing on fewer standards, students are able to develop a deeper understanding of mathematical ideas instead of having one day to learn procedures by repetition. In 2006, NCTM provided another support for this approach in Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics by citing national standards to make relocating an easier transition in the classroom for teachers and students (4). Curriculum and Evaluation Standards for School Mathematics also lays the groundwork for creative student-focused learning by recommending students become active constructors of knowledge, to be problem posers and solvers gaining confidence in their mathematical abilities. This recommendation is a clear link from the earlier thoughts of Piaget where students benefit from being active participants in their individual tracks within education.

While focused on the implications of national standards, mathematics teachers in Australia explore education from a slightly different view. Language in Mathematics makes strong connections between educational practices in literature and mathematics and how language and communication are the basis for mathematical education. Using language-learning research, Jennie Brickmore-Brand seems to be suggesting students will be able to process the abstract concepts of mathematics if they have been provided with the whole context that is meaningful in their life. Subsequent articles in Language in Mathematics describe the need to make language a priority in the classroom. Pengelly calls for “finding ways to record and communicate mathematical ideas and processes” to foster stronger mathematical thinking.
Beyond written language used in the mathematics classroom, Gawned discusses four levels of verbal language used: language of social interaction, language of classroom, specific language of mathematics components, and construction of meaning in mathematics. These are described as a pyramid with the language of social interaction as the wide base of the pyramid and the construction of meaning as the peak (Brickmore-Brand 30). Reeves focuses on how language is the medium in which mathematics must be taught:

[Math] is abstract, not context bound. But, because of immaturity and lack of experience, the only way a young child can understand and appreciate mathematical information is to have it present in contextual form appropriate to their level of experience. (Brickmore-Brand 93)

Undoubtedly influenced by the landmark documents released by NCTM, many mathematics books for education were released in the 1990s. The texts Read Any Good Math Lately? by Whitin and Wilde and How to Use Children’s Literature to Teach Mathematics by Welchman-Tischler focus on using literature in the mathematics classroom while relating their ideas to the standards published by NCTM. In the foreword to Read Any Good Math Lately?, Goodman accuses “math folks” of pushing to teach the parts of mathematics without developing “a sense of mathematical functions” (xi). He describes this text as an exploration of “mathematical aspects of the human experience and our physical world” (Read Any Good Math Lately? xii). Whitin and Wilde hearken back to Piaget as they discuss the benefits of using literature: “the more opportunities children have to alter a particular story problem, the greater their understanding of the underlying mathematical concepts” (Read Any Good Math Lately? 15). Welchman-Tischler approaches literature in the classroom with slightly different
vocabulary, identifying it as a cross-curricular environment: “interdisciplinary studies not only save time but also add to children’s insight into all curriculum areas involved – the whole is greater than the sum of the parts” (1). Despite discrepancies in vocabulary, both texts support the use of literature as an appropriate and useful tool in the mathematics classroom.

In 2000, NCTM released *Principles and Standards for School Mathematics*, a document “intended to be a resource and guide for all who make decisions that affect the mathematics education of students in pre-kindergarten through grade 12” (NCTM). As an elaboration of its predecessor, *Curriculum and Evaluation Standards for School Mathematics*, this document reflects voices of teachers, administrators, mathematicians, and teacher educators making recommendations to bring our mathematics education more cohesion nation-wide. NCTM boldly “challenges the assumption that mathematics is only for the select few” and asserts “all students should have the opportunity and the support necessary to learn significant mathematics with depth and understanding. There is no conflict between equity and excellence” (*Curriculum* 4). The document addresses each grade level in detail, describing the standards. Grades three through five are focused on multiplicative reasoning, equivalence, and computational fluency. NCTM encourages conversation and approaches to mathematics for this age range as a way to motivate and spark interest in the classroom. In an interesting dichotomy, the document cites “real-world contexts provide opportunities for students to connect what they are learning to their own environment” but follows that statement on the next page with “the value of a mathematical task is not dependent on whether it has a real-world context but rather on whether it addresses important mathematics, is intellectually engaging, and is solvable using tools the learner has or can draw on” (NCTM, *Curriculum* 200). The differences in those two statements are a glimmer
at the on-going debates about the best practices for mathematics education and the many sides to which NCTM gives voice.

In “Creating a Context for Argument in Mathematics Class,” Terry Wood looks at how a classroom teacher’s actions influenced her second grade classroom. One of the teaching tools used was “The Candy Shop,” but she began her mathematics class by discussing expectations of her students. They understood they would be expected to work together and be willing to explain their logic in solving mathematics problems, never mocking other students if they came to an answer differently. “The Candy Shop” gave the students a way to talk through their logic with concrete details instead of intangible numbers. Wood suggests by allowing students to challenge and defend their logic, “a precursor to the development of mathematical argumentation” is set in motion (189).

John A. Van de Walle, an active member of NCTM until his sudden death, authored *Elementary and Middle School Mathematics*, used as a text for teachers in training. The most recent edition released in 2010 discusses the implications of teaching in an era dominated by new standards and standardized tests. He also acknowledges the difficulty in creating student-centered activities when teachers are being told to prepare for these important standardized tests. Many of his thoughts about attitude and teaching echo mathematical texts from the past. He remarks on the importance of students and teachers having a positive attitude toward mathematics because students consumed with mathematics anxiety are held captive by their fear. Reminiscent of Reeves and Flourney, Van de Walle believes “doing mathematics in classrooms should closely model the act of doing mathematics in the real world” (13). Despite radical shifts in the past twenty years, many of the basic ideas of good mathematical education remain the
same: foster critical thinking, relate mathematical concepts to real life to give context, and a positive environment is key for the best learning.

Arts-Across-The-Curriculum

Arts-Across-the-Curriculum is a tricky subject to discuss because it is applied in innumerable models and identified by many names including ‘arts integration,’ ‘arts inclusion’ and ‘creativity across the curriculum’ (Russell-Bowie, Craft, Burnaford). Adapting Nellie McCaslin’s definition of Drama-in-Education (DIE) to allow for all arts, Arts-Across-the-Curriculum is the use of arts as a means of teaching other subject areas. McCaslin identifies the objective of DIE as “understanding rather than playmaking, although a play may be made in the process. Attitudes rather than characters are the chief concern” (10). As a parallel, the goal for most Arts-Across-the-Curriculum planning is to teach the core content using the arts as a tool by which to learn. At the Robinson School in Vermont, which has received national attention for their integration of the arts across every subject and grade, Principal Daniel Noel comments on how arts have improved the school but they “never overlook accountability” when it comes to state and national standards (Raymond 39).

Russell-Bowie identifies three major models for arts integration: service connections, symmetric correlations, and syntegration. The different models highlight some of the choices that must be made when planning arts across the curriculum. Service connections involve one subject helping to teach the second subject. Symmetric correlations use one piece of material to teach two separate outcomes. Lastly, syntegration, uses a theme to teach all subject areas. Syntegration is reminiscent of Dorothy Heathcote’s, a pioneer in drama education, work with
process drama which she explains as “not engaging in creative drama…but rather consciously employing the elements of drama to educate – literally to bring out what children already know but do not yet know they know” (Wagner 1). Although each model has benefits for learners, Russell-Bowie advocates for syntegration because it fully connects all subjects and encourages critical thinking. Donahue and Stuart delve into the idea of connected curriculum and how that changes the educational experience of students:

When arts are central to the lesson’s purpose, students are more likely to see how thinking in art connects to, furthers, or challenges thinking in the disciplines you teach. Similarly, they see how thinking in other disciplines connects to, furthers, or challenges thinking in art (5).

By connecting the pieces of curriculum, educators present a whole concept instead of disjointed pieces that may or may not connect in a student’s mind.

The past twenty years has witnessed an extraordinary amount of research on the outcomes of arts education. Champions of Change studies seven projects involving the arts in different educational settings across the country. The compellation of studies all indicated students involved in the arts, in any capacity, outperformed students without arts education. Appel provides a summary of the outcomes of arts inclusion:

Research indicates that arts inclusion enhances cognitive engagement among students; provides a better sense of ownership of learning; improves attention, engagement, attendance and perseverance among students; provides unique avenues for parents and community involvement; and inspires positive transformation of school community and culture (15).
These ideas are further supported by Gallagher when discussing teaching for deep understanding by focusing on the “learner, who, in this case of drama, uses the medium of language, gesture, and movement in space to give form to tacit understandings” (Leithwood 81).

Howard Gardner’s Theory of Multiple Intelligences is used to support arts across the curriculum. This theory identifies nine different ways people learn: spatial, linguistic, logical-mathematical, bodily-kinesthetic, musical, interpersonal, intrapersonal, naturalistic, and existential. Each person has slightly different optimum learning styles based on their intuitive connections to the nine Intelligences. Gardner puts forth his theory “may help us to understand better the reasons for the effectiveness – or the ineffectiveness – of various programs designed to help individuals realize their potential” (368). The impact of his theory cannot be understated. In teacher training, Educators are now urged to touch on as many of the Intelligences as possible within lessons and incorporating the arts presents a path.

Despite research and support, tensions still exist with arts across the curriculum. The greatest challenge is monetary (Appel, Raymond). Where do schools in this economy find the resources to provide effective professional development? Another concern is often the amount of time needed to successfully implement Arts-Across-the-Curriculum. Beyond the time spent in professional development, teachers would be expected to overhaul their lesson plans for the whole year to create arts integrated lessons on top of their day-to-day responsibilities in the school. Gallagher notes “the process of learning through drama takes time” (Leithwood 76). What may have taken one hour of class time in a lecture situation may take days for students to fully explore in a class learning through and with the arts, adding extra pressure for a teacher and
administrator facing standardized testing and No Child Left Behind. Art-Across-the-Curriculum is a time investment made by administration, teachers and students. Craft notes another tension that arises: classroom management. How do you successfully manage a classroom when you are teaching your students to think creatively and possibly bending the rules? If the class is dramatizing a scene from a history book, how do you control the level of sound? Or do you find ways to make these potential problems a classroom discussion where students make decisions about boundaries and respect? Collectively, these tensions make administrators and teachers lose their excitement about the possibilities created with Arts-Across-the-Curriculum (Appel).

Using Drama To Enhance Mathematics Education

Dorothy Heathcote often incorporated mathematics into her process drama work with children by using the class’s situation. In a class exploring Egypt, Heathcote introduced they would be planning to build a pyramid. Students were left with the responsibility of planning the construction, including all of the mathematical calculations for materials, labor, and financial support needed to properly build a pyramid. Heathcote extended this work to many classes to help students with exceptionalities to understand size and measuring, counting and shapes (Wagner). Jane Holden, a drama consultant, partnered with a mathematics high school teacher having trouble with a low-achieving class. Together they used Heathcote’s process drama method allowing students to act as lawyers defending cases involving allegedly mishandled money. The students experienced a great deal of success, several students moving to higher level classes. Holden accredits the class’ success to many factors, but feels process drama played a part (Holden).
Patrick Kariuki and Steven G. Humphrey conducted a one-week study looking at the effect of teaching geometry with creative dramatics. The participants physicalized the lesson’s concepts instead of drawing, as they would have done in a traditional mathematics class. Their results “indicated that the experimental group receiving instruction using drama performed significantly lower on the final test (17).” Their research did not show a significant attitude change towards class as a result of the integrated drama elements. In their discussion, the researchers question when it is appropriate to use nontraditional methods to teach mathematics and if the length of the study was a disadvantage as well. They go on to state “the students needed to first feel successful attempting a drastic assignment or activity or feeling confident in its execution before they would even be able to make the connection between the dramatic activity and the math concept it was attempting to teach (19).”

Mathematics performance surfaces in many areas. Ufuktepe and Özel report on the workings of the Mathematics Society at the Izmir Institute of Technology. The Mathematics Society created the “The Math Show” as an alternative way to approach teaching mathematics using the talents of students in the club to create an interactive show involving music, technology and improvisational acting to teach mathematical concepts. In three years, the show was presented to over 10,000 students, teachers and parents. Participants filled out surveys, serving as the basis of their research. According to the study, students had a positive experience, thus lessening their math anxiety. Also, “the show enabled teachers to realize that their teaching styles did not always match the learning styles of their pupils, and that a broader, more varied approach can increase pupils’ attention and interest during lessons (7).” Similarly in the United
States, schools book productions like *School House Rock Live!*, which creates an experience in which audiences learn fun songs with mathematical facts as song lyrics.

Another side to mathematics performance is student-created and presented. George Gandanidis is a leading force in the push to research the concept of “*students as performance mathematicians*” in Canada (*I Heard this Great Math Story* 45). Students use their imagination to create performance pieces including dramatic scenes, songs and poems. These performances are motivated by the annual nation-wide Math Performance Festival for Teachers and Students. Teachers and students are invited to submit a recording of their performances, which will be judged by a panel that includes award-winning musicians and actors. Winning videos are posted on their website. In 2008, Gandanidis and Hughes published *Performing Mathematics: A Guide for Teachers and Students* to help teachers who were interested in the festival, but feeling ill-equipped, to submit. The competition was created as a way to spark dialogue about mathematics in daily life. Through his work, Gandanidis finds “teachers report…students work so well, they have ownership of their work, even those who usually struggle…surprised that so many students get to the higher level thinking of the activities…(45).”

ArtsEdge, a program through the Kennedy Center, provides lesson plans outlines to all K-12 teachers to enhance the creative use of technology and the arts in the classroom. Teachers can search for lessons combining any core subject with an art discipline. Currently, six lesson plans are provided combining mathematics and theatre for the grade band K-4. Only one of these lessons specifically addresses mathematics and the arts. The other five have connections in four or more subjects. The age grouping is split, half are recommended for second grade and below while the other half are third and fourth grade.
Using story and storytelling to teach mathematical concepts has gained popularity due to the surge in literature written specifically for this purpose. Poetry has emerged in a similar way showing “children can develop a different understanding of the vocabulary of mathematics through poems that explore numbers, counting, and mathematical processes” (Chatton 51). Whitin and Wilde view their use of literature in the class as learning “as a consequence of social interaction…a tool for telling and remembering, not reciting and memorizing (It’s the Story That Counts xii).” Teachers using these tools become storytellers and invite students to imagine mathematics in a concrete way. In the opening address to the Mediterranean Conference of Mathematics Education in 2003, Apostolos Doxiadis called for educators to embrace what he calls ‘paramathematics,’ which “provides[s] mathematic as we know it with context and thus meaning…integration with thought, history and society (17).” By sharing the whole story of mathematics, not just the written product, educators can give meaning to the study. Doxiadis believes this is “where the great work done in mathematics can find a form that is understandable and relevant to our world” and gives a new way to discuss mathematics (18). His objective for paramathematics is “to try and move people some distance on the scale, from hate towards love” while creating the desire to embrace and learn about mathematics.

Reflection On Research

Having previously written the Dramath Unit, researching these topics provided an understanding of where this project falls into the wider scope. Initially I was thrilled because many of the ideas expressed across all three sections supported my thinking and ideas, but eventually less favorable results emerged. The research brought to light the general push for new
ways to teach mathematics expressed by Vigilante and his contemporaries, focusing on student centered learning, critical thinking and incorporating dramatic activities like acting out word problems. Despite the success of “The Math Show” and the Performing Mathematics Competition, the difficulties faced in Kariuki and Humphrey’s residency gave rise to concerns. My project would be taught in a similar time frame, which they cite as a potential reason for unfavorable results. Ultimately, I believe creating the *Dramath* Unit based on personal experience allowed me a freedom to explore the possibilities of merging mathematics and theatre which may have been lessened had I completed the bulk of my research before writing the lessons.

Across the board, it appears nobody has reached a consensus of best practices yet, which fuels educators’ needs to continue to try new approaches. My research did not yield a clear idea about the eventual success or failure of the *Dramath* Unit, nor did the balance between support and opposition lead me to question the validity of the unit. Also, the research raised new questions about how much time would truly be needed to fully explore the ideas presented and if I was merging these ideas at an appropriate point in the mathematics curriculum. The big ideas expressed in each area of research came back to who, what, where, when and why? Who benefits from this kind of instruction? What is more important: How to solve a problem or why solve a problem? Where are the school systems, administrators and teachers willing to fully implement these ideas? When is it appropriate to cross mathematics with other subject areas? Why tackle these challenges at all and do the benefits outweigh the effort needed to make them a success?
Although the research does not yield clarity for the success or failure of the project, it does support actively trying new ways to teach mathematics and the arts in hopes of finding better paths to true understanding.
**DRAMATH UNIT**

Overview of the Unit

The nine-lesson unit focuses on writing mathematical word problems as scenes and paragraphs. In Lessons One and Two, students begin by writing simple scenes with a given format. ADDDAD, the format used, creates the simple structure


A - Jennifer walks to a counter in a coffee shop.

D - Cashier: Can I help you?

D - Jennifer: Yes, I’d like a cup of coffee.

D - Cashier: That’ll be two dollars.

A - Jennifer hands Cashier two dollars.

D - Cashier: Thanks.

Each scene has two characters and must happen in real time. In Lesson Three, students begin adding mathematical components into their scenes which will be acted out in class. These scenes still use the ADDDAD structure:

A – Byron drops a bag of marbles and they roll all over the floor.

D – Bruce: I bet I can pick all of those up with one hand.

D – Byron: No way, there’s 26 marbles.

D – Bruce: Watch me.

A – Bruce picks up 20 marbles.

D – Byron: Told you! You left 6 of them on the floor.
Lessons Four and Five give copious opportunities for sharing and acting out these word problem scenes to help students develop an understanding of how text translates into the physical world. Students are also exposed to a greater degree to make sense of other student’s thought processes, opening up opportunities to learn from peers. In Lesson Six, students shift the scenes they have written into paragraph format, resembling traditional word problems. Continuing with the example ADDDAD scene from Lesson Three:

Byron drops a bag of marbles and they roll all over the floor. Bruce thinks he can pick them all up with one hand. Byron thinks he can’t. Bruce picks up 20. Bryon points out that he left 6 on the floor. (Alternatively the last line could be replaced with ‘How many marbles were left on the floor?’ to become a recognizable word problem.)

My hope is by writing word problems students understand from experience the transition from the written word to the physical world, making solving the mathematical component of the problem a more natural progress. In Lesson Seven, students continue translating scenes, now written as all actions and no dialogue, into paragraph form word problems. Lessons Eight and Nine focus on allowing students then time to stage and perform their scenes.

Process

Originally I planned to base the specifics of the unit on the requests and scheduling needs of my host teacher, who I will refer to as Elizabeth Soler. When I spoke with Mrs. Soler, who would be teaching the lessons in her class, she requested it deal specifically with multiplication and division. Around the same time, I stumbled upon an article about a third grade class and
their struggles with word problems. In “Learning to Share Equally”, Drew Polly and Laura Rubie worked with a class on word problems and were disappointed when the students were unable to transfer the knowledge of completing a word problem mathematically to writing an original word problem. I knew the students in the participating school are often English language learners and struggle with making connections between basic mathematics facts and how they relate to word problems. At that point I realized these lessons needed to tackle word problems and the importance of scaffolding the lessons because many of the students were English language learners and had little to no experience with theatre.

Theatre directly addresses spoken word and storytelling. It is a natural fit for students to act out word problems and many classroom teachers activate these problems in such a way. In the past few years, I have observed an emergence of teaching key words and phrases, like ‘total of,’ ‘added to,’ and ‘less than,’ to students to help them understand what function to use in any word problem. One of the major flaws in this teaching strategy is that, commonly, the standardized tests are filled with word problems designed to use those key words in contexts that truly test if the student understands the problem or only skimming for these key phrases. Once students understand the thought process of writing a word problem, they will be able to transfer that knowledge into understanding the entire problem and have a higher chance of solving it correctly.

I then approached a playwriting teacher, Jef Holbrook, for advice. He was gracious enough to walk me through his process of teaching playwriting to young people and explained the benefits of using the format ADDDAD, a format he created to use specifically with young playwrights. He explained by giving the writers a structure to work with, they are able to focus
on being creative instead of splitting their concentration between structure and creativity. Also six line scenes are short and therefore students are able to write them quickly, giving them a sense of accomplishment.

ADDDAD provides an excellent stepping stone for the 'arc' of the unit: a personal goal to focus on connecting and building upon each lesson. I have struggled with creating units with strong arcs and wanted to use this opportunity to push myself as an educator. Creating an arc was one of the factors in my decision to spend the first two lessons focusing only on writing ADDDAD scenes, allowing students the opportunity to master one skill before adding additional levels of challenge.

As I created the unit, I obviously kept the grade level I was writing for in mind. I used the Florida Department of Education’s Next Generation Sunshine State Standards for Mathematics to make clear grade-appropriate connections to the curriculum. However, the school system I worked with had not selected the new mathematics text to be used the following year. Florida was transitioning to a new set of mathematics standards and a text would need to be selected based on new standards. As I wrote the lessons, I could not use examples the students would encounter in their books. This became a frustration as I created the lessons, because I had no true frame of reference for what this grade level student had been exposed to or would be working towards. I structured the lessons to be very flexible to accommodate various levels of word problems by focusing on the students’ work and allowing places for Mrs. Soler to use examples from the text.
Discoveries

Along the way I felt extremely concerned that I was not incorporating enough mathematics into the lessons. As I connected the lessons to the Next Generation Sunshine State Standards it became clear that the Dramath Unit addressed more writing benchmarks than mathematics. All of the lessons connected directly to Language Arts Standards and made more connections with Language Arts and Theatre Standards than Mathematics Standards. Knowing teachers are under high pressure to teach quickly and efficiently, I worried this nontraditional route would cause uneasiness because it did not connect to the Mathematics Standards even though it addressed word problems.

As I reflected on the unit as a whole, I came to understand mathematics as more than simply comprehending mathematic facts. These students struggle to connect their day to day lives with mathematics. I remember classmates in my early education, rebels I thought at the time, pressing our teachers to explain why we were learning these facts. I also remember the insufficient answers we received. This unit gives students a chance to discover daily moments when mathematics enters their lives while exercising their writing skills. They will not need to learn often misleading key words in word problems to help them choose the correct mathematical operation to yield the correct answer because they will understand how to construct and visualize story problems. This particular struggle led me to discover the equal importance of words and numbers in mathematics, an idea I found echoed later in my research.

These realizations also led me to question how to categorize this lesson as I share it with teachers. Being closely aligned with the Language Arts standards it perhaps belongs in a Language Arts class. However, the ultimate goal is using familiar language, dialogue in scenes,
to aid understanding of language less familiar, word problems, used in a mathematics class. To teach mathematics, we must use language and if a student does not understand the language, referring to the language of mathematics, the obstacles to learning are much greater. It seems to categorize a cross-curricular unit, the teacher must decide if the categorization is based on the methods or the projected outcomes. The *Dramath* Unit uses language arts and theatre to give students a deeper understanding of the language used in mathematical word problems.
POST PROJECT

Post Project Interview And Journals

Fourth grade teacher, Elizabeth Soler, integrated the *Dramath* Unit into her class throughout the Fall semester of 2010. She received the lesson plans and support materials electronically in August of 2010 and a package containing magnetic cards used within the unit. Mrs. Soler documented the process through journal style emailed updates for the first half of the unit and responded to the second half of the lessons in an interview conducted on December 16, 2010. The lessons were ultimately used as an enrichment activity in her class’ writing block. Her class consists of twenty students, thirteen girls and seven boys. Seventeen students are ESOL: four Haitian Creole and thirteen Hispanic (three students are in their second year of learning English). Also included were two students with Attention Deficit Hyperactive Disorder, three with an Exceptional Student Education Exceptionality, one classified as Severe Learning Disability (Autism, Speech and Language Impaired), one as Severe Learning Disability (Speech and Language Impaired) and one as Speech and Language Impaired.

Mrs. Soler taught both Lessons One and Two in one day. She reported both lessons going extremely well:

The students immediately recognized the ADDDAD pattern and really worked on improving the ‘action’ (most treated as dialogue). Most students made the distinguish of action and dialogue and identified the colons as dialogue. They completed the worksheets and we even had time to switch and grade as a group. No one missed more than 3. (Email)
Later in the day the class revisited these ideas in Lesson Two. Because the white board in her classroom is not magnetic, Mrs. Soler chose to skip the relay activity. They began writing a scene together and discussing each student’s ideas and how they might work or not work in the scene. Rules of unity of time (time cannot be manipulated), using two characters and one location were introduced in this lesson:

Once the students realized the ease of writing the scene, they really got into it.

Very few students are clueless and the main struggle comes from differentiating writing dialogue vs. action. They want to write as if writing an essay and use terms like ‘said’ rather than to just write what was said. (Email)

On the third day, Mrs. Soler started by wrapping up the individual writing from Lesson Two. She then moved to the plan for Lesson Three:

Good Ol' Lesson 3! I sort of switched it around as we first reviewed (bridging in the incorporation of math) and then completed the ADDDAD Puzzle Examples. (what a hoot as to the random numbers they would come up with when trying to complete the missing information in the scenes) They were then able to act out the scenes. With the remaining time we went over one example of the Relay and as a group we came up with the first Action. ‘AJ and BJ screamed when bird poop landed on their head’... you can only imagine the lines they came up with. I then had the groups act out their scene and they immediately realized the mistakes they made. (Writing action as dialogue, not making sense with the previous lines, pressure of writing on the spur of the moment) It made it easier for the groups to have the first action completed as I know some of the students are not as swift as
others when it comes to writing. Maybe later in the lesson I can give less
information as you suggested like the characters or location and let the groups go
from there. The two groups who did not compete in the Relay are going to start
tomorrow and they will have the challenge of incorporating the math. (Email)

The students initially struggled with incorporating the mathematics and filling in the puzzle worksheet. Mrs. Soler led the class in creating answers for the first puzzle and allowed the students to work on their own for the other two puzzles. About half of the class finished the assignment without any assistance. The other half “knew what was expected, but couldn’t successfully write it out. Like, if they wrote something I was like ‘Okay, well let’s go back and check it to see if it makes sense.’ This is the kind of stuff that made them think. It really got them going (Interview).” By talking Mrs. Soler through the scene or acting it out for her, students were able to identify where and why their logic worked or fell short.

After Lesson Three was completed, Mrs. Soler encountered scheduling difficulties due to increased pressures in preparation for testing and other school obligations. She was unable to come back to the lessons for another three weeks. The remainder of the unit (Lessons Four through Nine) was finished in the week of classes before Winter Break. Because the time restraints became such a challenge, Mrs. Soler did not write individual reflections for each of the final four lessons but verbally reflected in our interview.

Overall, the remainder of the lessons went well according to Mrs. Soler, who reported she did not spend as much time allowing sharing of work through acting the scenes. Instead she used it as an incentive for diligently working students.
Lesson Four brought our first communication hiccup. Mrs. Soler expressed confusion due to a lack of explanation of how to present the lesson. Through email correspondence I was able to break down the lesson into greater detail about how I envisioned the lesson being taught and clarified I was not seeking brilliant acting in these lessons. The acting was being used as a tool to help students make the connections between the written word and the physical manifestation of their writing and to allow students an opportunity to speak out loud in front of the class in a low pressure situation.

In Lesson Five, the video could not be used because of technology limitations of this classroom.

Lessons Six and Seven were difficult for the students to complete. Not able to devote the time needed, Mrs. Soler indicated these lessons were understood conceptually but the students struggled with making the transition on paper. “I would say for the struggling writers, it was too hard. They couldn’t get it done in the time allotted but they at least had the idea (Interview).” Mrs. Soler indicated specific grammar challenges in understanding when it was appropriate to use a colon or quotation marks to indicate spoken words. Students also struggled to include more detail when transferring a written scene into a paragraph. Mrs. Soler noted the students were comfortable writing a paragraph and scenes from scratch but connecting the two forms without an example stumped them. Stepping outside the written unit (and my intentions), Mrs. Soler reviewed a chart of key words and phrases used in story problems. Key words are taught with story problem strategies to help students understand what operation is needed to find the correct answer despite controversy over the effectiveness of this approach. Mrs. Soler expressed she helped build stronger connections to mathematics once those ideas were reintroduced in
class. Mrs. Soler felt they suddenly connected with how to make the transition but still needed more time to fully develop those skills.

Lessons Eight and Nine were completed the days following our interview, and Mrs. Soler plans to continue working with this project for the entire 2010-2011 school year. She shared the class written scene created that day as the first part of Lesson Eight:

[Sam is packing 400 shirts and pants into her luggage.]

Rachel: Hey, I heard you were going on a trip.

Sam: Sure am. I need to figure how much luggage I need for my clothes.

Rachel: Where are you going and how many shirts and pants can fit into one luggage bag?

[Sam counts and packs the clothes into her luggage.]

Sam: I can fit 5 shirts and pants which totals to 10 items of clothing in one luggage.

Rachel: If you divide 400 by 10, that equals to 40 bags of luggage.

Sam: Great, my trip to the moon will be great.

In our conversation following the completion of the lessons, Mrs. Soler made the following observations about the lessons and her class overall.

Throughout the process, Mrs. Soler was delighted by many unexpected successes. After unity of time was introduced to the class, Mrs. Soler began to notice the class began correcting her mistakes when she used incorrect tense while writing on the board. The students would tell Mrs. Soler she was not following the rule of unity of time and gave her the correct tense of the word to use. When the class began working on writing narratives, Mrs. Soler found being able to
refer to ADDDAD scenes and what they discovered in writing scenes allowed the class to quickly understand how to write in a narrative form. Writing is an important subject area within Florida fourth grade classrooms and students will be tested in several writing styles, including narrative. Student understanding of writing narrative has been difficult in the past so the connection was welcomed in Mrs. Soler’s class. She also noted that students were more willing to share their work than before and “it helped them with their fluency (Interview).” As the students became more comfortable with performing their scenes, they transitioned from reading the scripted actions into doing the actions and some students began coaching and encouraging the whole class to make this transition. Many students used scenes they wrote in class for a class book exhibiting their best work that was bound and distributed to each student. Mrs. Soler was pleasantly surprised that the class enjoyed and looked forward to continuing work in the unit.

Mrs. Soler touched on the difficulties she saw in the lessons. Her class struggles with writing, and she felt the lessons would be more effective if they were spread out evenly over a longer period and if more time could be allotted to each lesson. Group work allowed struggling writers to fall behind because they were able to make one tiny suggestion and not participate beyond. Mrs. Soler combated that by stopping the groups before they could finish a scene and had each group member finish the scene individually. The class easily incorporated simple mathematics into scenes. As Mrs. Soler pushed the class to include more complicated mathematics, she found it became much more difficult to successfully complete. Mrs. Soler expressed that by incorporating the mathematical component earlier in the unit it would allow more time for the students to process this new information before increasing the difficulty of the mathematics.
Reflection On Working With A Partner

Having worked with Mrs. Soler on a previous project, I entered this partnership comfortable with our preexisting communication. We both rely heavily on email because our schedules are constantly changing. Mrs. Soler was comfortable enough with me to be open about any issues or concerns she had throughout the process. This was a great comfort to me as we started the project. We discussed that she would need to work the unit into class in October. I sent an email to check in and let her know I was excited about her starting the unit. Several days later, I got a response informing me she had many unforeseen scheduling issues come up and she would need to wait another few weeks until she could begin. The unit was not started until mid-November. At this point, Mrs. Soler was not responding to emails every day and I began to worry if the project would be completed. I wanted to become more aggressive in my communication about the timeline but did not want to risk losing Mrs. Soler as a partner. I made an effort to keep my communication positive and encouraging to promote a positive relationship. In the end, Mrs. Soler completed as much of the unit as time allowed.

I faced an internal struggle in having to release the project to another person, knowing she would ultimately make minor changes to the existing lessons. I discussed with Mrs. Soler in advance that I wanted her to make adjustments based on her class because I wrote the lessons before her class was assigned for the year. I had no control over the timeline. Later I realized Mrs. Soler had little control over her day-to-day curriculum and went to great lengths to make time for the lessons. While grateful for the efforts of Mrs. Soler, I was left without true results from the written lesson plans. Although one focus was addressed successfully during the project
of creating a user-friendly unit for classroom teachers, this focus limited my understanding of the effectiveness of the unit because I was limited to Mrs. Soler’s interpretations, reflections and observations.

In our end-of-semester interview, Mrs. Soler continually referred to the unit as “great enrichment” and “true enrichment.” I knew this was a positive statement referring to the quality of the unit, but the word ‘enrichment’ rubbed me the wrong way. I realized I never considered the unit to be outside regular curriculum, and as with the arts in schools, the word ‘enrichment’ signals it is an expendable part of the curriculum. Arts-Across-the-Curriculum serves two functions in the classroom, but because it has a dual focus of art and core content, it is easily put aside for lessons completely focused on the core subject. I believe we perpetuate the issue of being pushed aside when we continue to use language that supports this idea. Full of good intentions and compliments for the project, Mrs. Soler brought to light an issue of how the education system refers to alternative ways to teach subject matter.

Unit Alterations

Based on Mrs. Soler’s recommendations and experience using the unit, I made a few alterations to the lessons. This first change is minor in nature. On the ‘ADDDAD Puzzle’ worksheet, I indicated the number by writing out the word and then providing the digit in parentheses. The students are in the process of learning how to write out numbers so the repetition did not further their understanding of these concepts. I originally included both because I was uncertain how familiar the students would be with writing out the words. However, this is not an issue for fourth grade students so I removed the numeric indications.
I integrated mathematical components earlier into the unit because her class quickly understood the pattern in scene writing and how to manipulate the ADDDAD structure effectively. The addition of an activity in which students use pre-written word problems, either by the teacher or pulled from the current mathematics text, as the basis for an ADDDAD scene will begin introducing how students can use the same information to write in two formats. Also, this addition clearly introduces the mathematical component early in the unit and gives something clear to write about, taking away some of the pressure of creating a new story as many times as the original lessons allotted. Hopefully, this will ease some of the pressure for students who struggle with writing in the beginning and give them something to refer back to when they begin writing their own word problems based on scenes and as the difficulty increases.

Mrs. Soler was concerned because her class had a difficult time turning a scene into a paragraph. Initially, I thought the lesson introducing these ideas should be altered to more clearly show students the linear transition from scene to paragraph. Upon reviewing the original lesson, I discovered my intention in writing that lesson did not need to be altered, but I needed to be clearer in my instruction and intentions. I expanded the section to include more discussion questions and removed a statement about an example of differences in scenes and paragraphs that mislead Mrs. Soler. The hurried manner in which the last third of the unit was covered did not allow Mrs. Soler or her students to explore this unique writing exercise fully. Having little insight to the effectiveness of the section, I left it alone.

My personal focus on creating an arc continued as I revisited the lessons. From the beginning, the connections between writing formats and word problems are made clearer in the
revised unit, laying a stronger base from which to build. The feedback given by Mrs. Soler helped me shape and build a stronger arc for the unit.

Further Research

As this project continues in the future there are many areas I want to build upon based on my experiences in this initial phase. The major areas are data collection, partners and students.

At the beginning of the project, I rejected including a pre- and post-test because I knew most of the students would have little or no experience writing scenes or word problems. I felt tests would be skewed in favor of the unit regardless of the unit’s quality. Students would undoubtedly score higher on the post-test because they would be exposed to the material throughout the unit. As I neared the end of this phase, I discovered some clarity of how to effectively write a test for this unit to measure the growth of student understanding of solving traditional word problems. Initially, I envisioned the pre- and post-test focused on writing scenes because so many of the lessons are using scenes, but now I believe the testing should be based on word problems to measure growth specifically related to the mathematical outcomes. The test will include solving word problems including the thought process the student went through to come to their answer and a section for student-written word problems and scenes. The data collected in this form will give a non-subjective reading of the student progress that will allow me to move forward.

Expanding the number of teacher-partners will give many different perspectives and ideas. The more feedback available from various sources, the more the unit will have an opportunity to evolve in a productive, practical way. I would like to see teachers in other
locations adopt this unit for their classes. I believe this unit can be scaled up or down for different grade levels and would love to work with teachers in other grade levels to adapt the unit for many classrooms. I would also like the unit to be used in a class with less of a time restraint to see the differences in student understanding. Research in a classroom setting is difficult and having a wider base of participants strengthens the validity of the data.

Similarly, I am curious to see the results when used in other classrooms because each classroom is different. Mrs. Soler found that her ESOL students benefited from scene writing and presenting because their conversational English improved drastically. However, based on the sample from Mrs. Soler’s class, there is little information pointing to the success of native English speaking students. As the number of students participating in the unit grows, I hope to determine how the lessons can be adapted to meet the needs of classes beyond grade level appropriateness and what benefits teachers see in their classes as a result of the unit.
CONCLUSION

“The time has come to show all teachers - ordinary day-in and day-out classroom teachers - how they can use drama at times to achieve something that cannot be attained as effectively in any other way.” - Dorothy Heathcote

Inspired by Dorothy Heathcote’s passion and my unique view of mathematics as a theatre artist and educator, I embarked on a journey to bring together three of my loves: mathematics, theatre and the classroom. The split focus of the project ultimately led to less-focused findings, but it created a rich experience for myself as an educator.

The first focus is championed by Heathcote’s statement. It became important that I create a unit that would be able to be readily used in a classroom with a teacher with little-to-no theatre training. Teachers cannot implement lessons if the lessons are not accessible and will not implement Arts-Across-the-Curriculum if they feel they are not qualified to teach using the arts. I cannot be in every classroom, but my writing has that ability. I want to empower teachers who are searching for innovations for their classrooms to enhance the education of their students. These teachers deserve to know they are capable of this type of instruction and, with time, may even develop their own. As a practitioner, I asked myself to take a step back and allow my work to become someone else’s creation and experience in the classroom. As I wrote the lessons, I strived to make the language accessible for teachers with no arts education training, or experience, while making sure the lessons did not talk down to the reader. My relationship with Mrs. Soler, prior to the start of this project proved to be an advantage for our communication, because she was comfortable speaking honestly with me when she encountered any confusion in the lessons. Based on our communication throughout the project, I feel Mrs. Soler was confident
as she taught the majority of the lessons, and her feedback allowed me to further clarify the intention and plan in each lesson.

The second focus centered on student learning. I decided early in the project not to include a pre- and post-test. At the time, I felt it was an inadequate measure of achievement because the data would be skewed. Logically, I concluded that if the students had little or no experience in writing word problems or scenes, then after the unit they would improve because they now had exposure to those ideas. Mrs. Soler had already hinted time might be tight, and I felt like I would rather have precious classroom time be used for instruction instead of testing. Another factor was my desire for the unit to be presented and used in the classroom as if it were not part of an outside project. I felt using a pre- and post-test would give students a clear indication that the lessons were not part of ‘normal’ class. In the clarity of hindsight, numerical data would have been a strong addition to the project. A new vision of the structure and type of questions used in the pre- and post-test alleviate my previous concerns and will be implemented as this project continues. Based on the information gathered from student work and Mrs. Soler, the effects of the unit on the students’ understanding of mathematical word problems is impossible to declare. Without further research, I remain convinced these concepts have the potential to help students link their imagination, reading, writing and mathematics in a way that benefits their education and understanding.

Based on Mrs. Soler’s interactions and observations of the class, the students benefited from the unit in many unexpected ways. Grasping onto the concept of unity of time, students learning English as a Second Language understood verb tense almost immediately. The class seemed to naturally understand narrative writing, and Mrs. Soler accredited it to having the
experience of creating and telling story through ADDDAD (Action/Dialogue/Dialogue/Dialogue/Action/Dialogue) scene structure. They also naturally became comfortable enough with the differences in action and dialogue that they began performing the scenes instead of merely reading them. Mrs. Soler noted increased understanding and use of conversational English with her English language learners. As I created the unit, I encountered the struggle of how much time would be spent on Mathematics standards versus Language Arts standards but did not shift the hypothetical learning trajectory. Using theatre in the classroom is often linked with a raised level of confidence in students. I believe this showed true in Mrs. Soler’s class as her students became productively vocal in their education. The students were given an opportunity to experience connecting written word to vocal word as they performed the scenes. On a simplistic level, students practiced conversation and reading aloud, teaching them social norms in a low-stakes situation. The importance of confidence in and understanding of social interactions cannot be understated because they help students justify and explain answers or opinions in mathematics and life.

As with many arts across the curriculum, the multiple content areas covered are both exciting and problematic. School days are broken into times for different subject areas. When teaching a unit covering mostly Language Arts standards, but focused on deeper understanding of the language used in mathematics, is it used in the time allotted for writing or mathematics? Do teachers restructure their entire day and routine for Arts-Across-the-Curriculum units? Are they able to restructure their time in this way? As I continue this project, how do I market these ideas to teachers? The cross-curricular nature of the unit makes it difficult to define and points back to many problems found in implementing this type of unit in a traditional classroom. I find
the inflexibility of Mrs. Soler’s schedule due to school demands impractical and unfair to teachers working hard to find the best ways to teach. The system begins robbing teachers of their creativity within the classroom by rigidly standardizing instruction instead of creating an atmosphere where teachers are championed for implementing different teaching strategies, if they so choose.

The small statement made by Mrs. Soler that “[the students] certainly enjoyed it” gives hope. I believe we led these students to the proverbial water and saw them jump in and play. The project gave life to a struggling group of students in traditionally intimidating subjects and opened the channels of true enrichment and education.
APPENDIX A: ORIGINAL DRAMATH UNIT
DRAMATH
Word Problems

GRADE LEVEL: 4th
CURRICULUM AREAS: Writing

OBJECTIVES:
- Students will understand and identify vocabulary words “action” and “dialogue.”
- Students will identify a pattern/template for writing scenes.

SUNSHINE STATE STANDARDS:
- L.A.4.1.6.1: The student will use new vocabulary that is introduced and taught directly.
- L.A.4.1.7.1: The student will relate new vocabulary to familiar words.

MATERIALS NEEDED: Twelve cards labeled with ‘D’ and six with ‘A’ with magnets on the back

PROCEDURES:
Intro: Ask students to share what they think the word “dialogue” means. If the students don’t know, lead them to the answer and write on the board different ways to show dialogue (quotes and colons in play-scripts). Next, instruct the students to “have a three-second dialogue” with the student sitting next to them. Count to three and signal the class to stop. Repeat for “action” and list action words on the board. Call out actions for the students to do. (Examples may include stand, walk, sit, wiggle.) (5-7 minutes)

ADDDAD Discovery: Write three ADDDDAD scenes on the board. Ask two volunteers from the class to come act out each scene. After each scene has been read/acted, ask the class if each line is an action or dialogue. If they are having trouble identifying the parts, use the acted scene to reference, even going so far as having the volunteers act the scene line by line. Use the letter cards to label each line - ‘A’ indicates action and ‘D’ indicates dialogue. Once all the examples are finished, ask the class if they can connect all the examples/see a pattern. Lead the class to see each scene follow the same pattern and slide the cards from a vertical position to horizontal. Allow the students to figure out the letters spell ‘add’ and ‘dad’ - giving a name to the formula. (25-30 minutes)

Individual Work: Hand out ADDDDAD Worksheet. (Remainder of class or homework)

EVALUATION: The game will serve as a quick idea as to how students understand the concepts, but the worksheet will show how well each student understands the ideas.
Lesson One
ADDDAD Scene Examples

Scene One
___ Laura dribbles a basketball.
___ Ron: Hey Laura, can I play with you?
___ Laura: No.
___ Ron: What? Lame!
___ Ron walks away.
___ Laura: Just kidding! Come back!

Scene Two
___ Gene sorts money into piles.
___ Paul: Let’s go buy a Coke.
___ Gene: I need to finish counting this first.
___ Paul: Okay.
___ Gene counts money, Paul drums on the table with his hands.
___ Gene: Done! Let’s go!

Scene Three
___ Leah and Katy are doing jumping jacks.
___ Leah: How many more sets are we doing, I’m going to pass out.
___ Katy: Just one more I hope.
___ Leah: I can’t do anymore. I quit.
___ Leah stops and lays down.
___ Katy: If you’re done, then I’m done.
Name: ______________________________  Original

Date: ______________________________

Name that Line

Directions: Label each line ‘A’ for action and ‘D’ for dialogue in the blank provided.

___ Suzie plants three seeds.
___ Joey: I want to play basketball today.
___ Fred: Will you pass me the peas?
___ Jazymine: Oh wow!
___ Katie falls.
___ Jeff walks his dog, Fluffy.
___ Maria: It’s really hot outside today.
___ Scott buys four candy bars.
___ Shannon paints her toenails bright red.
___ Luke brushes his teeth.
___ Sally gives Rose a high-five.
___ Lynn: I need two more blocks to finish building the wall.
___ Ryan: No way!
___ Paul: We’re having my favorite dinner tonight.
___ Katrina paints the wall purple.
___ Katrine: Purple is my favorite color.
___ Jennifer fishes in the river.
___ Peter jumps out of the way as Katie falls.

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DRAMATH
Word Problems

GRADE LEVEL: 4th
CURRICULUM AREAS: Writing, Theatre

OBJECTIVES:
- Students will write an ADDDAD scene as a class.
- Students will be able to explain what an ADDDAD scene is and write one individually.

SUNSHINE STATE STANDARDS:
- LA.4.2.1.2: The student will identify and explain the elements of plot structure, including exposition, setting, character development, problem/resolution, and theme in a variety of fiction.
- LA.4.4.1.1: The student will write narratives based on real or imagined ideas, events, or observations that include characters, setting, plot, sensory details, a logical sequence of events, and a context to enable the reader to imagine the world of the event or experience.
- TH.B.1.2: The student improvises, writes, and refines scripts based on heritage, imagination, literature, history, and personal experiences.

MATERIALS NEEDED: ADDDAD magnetic cards from Day One (three sets in envelopes)

PROCEDURES:
ADDDAD Scramble: Split the class into three teams; each team will receive an envelope with a set of ADDDAD magnetic cards. Each team will line up, with the first person in line holding the folder. When the teacher (or student who doesn’t want to play) says “GO,” the line leader draws a card from the folder, runs to the board, places the card on the board (in a designated section), runs to the back of his/her line. The next person in line then grabs a card out of the folder, and the process repeats. The goal is to place the cards in order to spell out ‘ADDDAD’ lined vertically. First team to finish wins.

ADDDAD Writing: Tell the class they are going to write ADDDAD scenes as a group today. The rules to ADDDAD scenes are: there can only be two characters, one location, and unity of time. (Unity of time means the scene must be in real time.) You may want to write these rules on the board as a reference for the students. Ask for two volunteers to act the scenes as they are written. The two students will choose the names of the characters they are going to play. Next ask the class to offer suggestions for a location. The teacher picks one of the suggestions and asks the class to come up with an action that tells where the location is. (i.e., John and Jenn are at the park eating a twinkie.) The volunteers will act the action. Lead the class through writing the scene line by line. Have the volunteers say the dialogue as the teacher writes it on the board using the cards placed in the warm-up game. Once the scene is finished, have the volunteers act the whole scene. Repeat this activity two more times. (You can choose to get new volunteers each round or keep the same ones.)

Bryson 1 of 2
DRAMATH

Word Problems

Individual Writing: Challenge the class to write their own ADDDAD scene and turn it in as they leave class (or, if time is running short, this can be homework)

EVALUATION: The individual writing is in place to show students’ understanding. Also, the group work will allow the teacher to gauge overall understanding.
DRAMATH
Word Problems

GRADE LEVEL: 4th
CURRICULUM AREAS: Writing, Mathematics, Theatre

OBJECTIVES:
- Students will become more proficient writing ADDDAD scenes individually and as a group.
- Students will begin writing about mathematics by describing action.

SUNSHINE STATE STANDARDS:
- L.A.4.4.1.1: The student will write narratives based on real or imagined ideas, events, or observations that include characters, setting, plot, sensory details, a logical sequence of events, and a context to enable the reader to imagine the world of the event or experience; and
- TH.B.1.2: The student improvises, writes, and refines scripts based on heritage, imagination, literature, history, and personal experiences.

MATERIALS NEEDED: Examples of ADDDAD mathematics puzzle, Puzzle Worksheet, ADDDAD magnetic cards

PROCEDURES:

ADDDAD Relay Writing: Place the ADDDAD cards on the board spaced with room for writing. Split the class into 3 groups (or more if needed) and have them line up across the room from the white board. Each group gets one white board marker that will be handed off during the relay. The goal of the game is for each team to write an ADDDAD scene. When each team member runs to the board, they write the next line of the scene. The scene is written line by line. Before each race, give the class an element that must appear in the scene. (For example, one of the characters in this scene must be a dog. There must be a baseball in this scene.) Play a few rounds before moving on.

ADDDAD Scene Puzzle: Structured the same as group writing in the previous lesson with a layer added. One or more of the lines in the scene must involve mathematics. Discuss with the class practical application of mathematics - counting money, cooking, knowing how to share parts equally, etc. Write the first example on the board, and have two volunteers act it. Work your way through the examples and have the class fill in the puzzle (you’re writing in the suggestion you like best on the board).

Puzzle Worksheet: (End of class or for homework) Hand out worksheet

EVALUATION: Puzzle Worksheet

TEACHING NOTES:
Students who will benefit from a challenge may write different answers to the puzzles during class, create their own puzzle, create their own formula for a scene and write scenes using that formula (i.e., instead of using ADDDAD, they could create and use ADADAD).
ADDDAD Puzzle Examples

A Charlie takes one of four slices of pizza from the box.
D Herb: Hey Charlie, could you grab me a piece of pizza while you’re up.
D Charlie: Sure!
D Herb: Do we have enough pizza for me to have another slice?
A Charlie puts Herb’s slice on a plate.
D Charlie: Yeah, we have two slices left.

A Beatrice counts the stickers on her paper.
D Katie: You have four more stickers than me.
D Beatrice: Mom said we had to split them.
D Katie: Fine.
A
D Beatrice: Thanks!

A
D David: Let’s go to the movies.
N Chris: I only have five dollars
D
A The boys count their money.
D Chris: Looks like we can go. What do you want to see?

A Ty stacks a box with 6 vases on a table with other boxes.
D Enoch: Can you put price tags on those vases?
D Ty:
D Enoch: If we sell them all, we should make 24 dollars. Right?
A
D Ty:
ADDDAD Puzzle

Directions: Fill in the lines in each ADDDAD scene. Each scene must show a way to use mathematics in daily life.

**Scene 1**
A Jonathan pours fifteen (15) cups of water into a bowl.
D Mike: We need to make sure each of the five (5) cats gets at least two (2) cups of water.
D Jonathan: Umm...okay. I’m not going to measure out two (2) cups for each cat; it’s already poured.
D Mike: ________________________________

A ________________________________

D ________________________________

**Scene 2**
A ________________________________

D Mary: I wonder if that tree would fit in our house.
D Donald: I don’t know, our ceiling is twelve (12) feet tall.
D Mary: ________________________________

A ________________________________

D Donald: Sorry, it’s too big to fit in the house.

**Scene 3**
A ________________________________

D Gina: Thanks for sharing your bag of candy.
D Kate: You’re welcome. I wanted to count the candy before I gave it out, but I forgot.
D Gina: We can figure it out – you gave candy to ten (10) people including yourself and each person got three (3) pieces of candy.
A ________________________________

D ________________________________
DRAMATH
Word Problems

GRADE LEVEL: 4th
CURRICULUM AREAS: Writing, Theatre

OBJECTIVES:
- Students will practice writing ADDDAD scenes.
- Students will perform and read in front of the class.

SUNSHINE STATE STANDARDS:
- TH.A.1.2: The student acts by developing, communicating, and sustaining characters in improvisation and formal or informal productions.
- TH.B.1.2: The student improvises, writes, and refines scripts based on heritage, imagination, literature, history, and personal experiences.
- LA.4.5.2.5: The student will make formal and informal oral presentations for a variety of purposes, audiences, and occasions, demonstrating appropriate language choices, body language, eye contact, gestures, and appropriate use of available technologies.

MATERIALS NEEDED: Scene for each pair, scene specifics to cut up for hat, hat/bowl/envelope

PROCEDURES:
Individual Writing: Each student will write an individual ADDDAD scene with one key piece of information provided by the teacher. If you choose to use the first written scene as a “Do Now” activity, write the instructions on the board as class begins. The information can be drawn from a hat as students enter the class to introduce the element of chance/fun to it. After writing two of these, ask for volunteers to share their scenes. The scenes will be read by the playwright.

Acting: Split the class into pairs; each pair will receive a scene to stage and act. Explain that they only will have a few minutes to rehearse and will need to work quietly and quickly. The scenes will be a mix of good student work and pre-written scenes. Give them about 5 minutes to rehearse, have the class sit back down and begin the sharing. To make this go quickly, write numbers on top of each script. They will perform them in order (1,2,3...). If these are not finished, the remainder will perform at the beginning of the next class.

EVALUATION: Written work will be collected along with homework.
ADDDAD Scenes

*The characters in these scenes do not have names beyond ‘A’ and ‘B’ and can be played by boys or girls. (Students can give their character a name.)*

A  A dances to the music playing on her iPod.
D  B: Can I listen too?
D  A: Only if you promise not to make fun of me for dancing anymore.
D  B: Fine.
A  A hands B the headphones. B slowly starts to dance.
D  A: And he/she said I was a bad dancer?

A  A is packing clothes into a bag.
D  B: Hey, I heard you were going on a trip.
D  A: Sure am.
D  B: Where are you going?
A  B looks into A’s bag.
D  A: The moon.

A  A and B play a game of thumb war.
D  A: Ha! I won again!
D  B: I’m bored.
D  A: You’re only saying that because you keep losing. Let’s arm wrestle!
A  A and B arm wrestle. B easily wins.
D  B: That was boring too.
ADDDAD Scenes

A    A brushes his/her teeth. B knocks on the door.
D    A: Hold on, I’m brushing my teeth.
D    B: I gotta go! Now!
D    A: Sorry, I got in here first. You have to wait your turn.
A    B stands at the door doing a little dance of discomfort. A waits, enjoying
    B’s pain, and slowly opens the door.
D    B: Ahhhh! Move!

A    A mixes brownie batter in a bowl.
D    B: Can I have some batter?
D    A: No, that’s gross.
D    B: But it tastes good.
A    A turns around to wash hands. B sticks his/her hand in the bowl and talks
    as he/she leaves the kitchen.
D    B: Okay, call me when they’re ready.

A    A runs to B holding an egg.
D    B: What is that?
D    A: I think an egg, but it’s really heavy.
D    B: Let’s see if we can figure out what kind of egg before we hatch a snake in
    our house.
A    B looks through a book.
D    B: It’s not in here. I think that thing is either a rock or you just discovered
    a new kind of animal.
ADDDAD Scenes

A  A sneaks up on B.
D  A: Boo!
D  B: Ahhhh.
D  A: Got you!
A  A runs away laughing.
D  B: I hate babysitting.
Scene Specifics

Location: Beach
Character: Old Woman
Relationship between characters: Brother and sister
Line of dialogue: Are you actually going to do that?
Time of day: Morning
Location: Forest
Character: 5 year old boy
Relationship between characters: Parent and child
Line of dialogue: Hurry up, we’re going to be late.
Time of day: Lunch
Location: Restaurant
Character: Excited dog
Relationship between characters: Best friends
Line of dialogue: You are crazy.
Time of day: Nap time
Location: School
Character: Teacher
Relationship between characters: Brother and sister
Line of dialogue: Is he gone yet?
Time of day: Middle of night
Location: Grocery Store
Character: Sleepy cat
Relationship between characters: Grandparent and grandchild
Scene Specifics

Line of dialogue: Are we there yet?
Time of day: Bedtime
Location: Living room
Character: Hat
Relationship between characters: Live on the same shelf
Line of dialogue: I wish I could do that too.
Time of day: Breakfast
DRAMATH  
Word Problems  

GRADE LEVEL: 4th  
CURRICULUM AREAS: Writing, Theatre  

OBJECTIVES:  
- Students will understand and demonstrate writing a scene with no dialogue.  

SUNSHINE STATE STANDARDS:  
LA.4.1.7.3: The student will determine explicit ideas and information in grade-level text, including but not limited to main idea, relevant supporting details, implied message, inferences, chronological order of events, summarizing, and paraphrasing;  
LA.4.3.3.2: The student will revise by creating clarity by deleting extraneous or repetitious information and organizing and connecting related ideas (e.g., order of importance, chronological order, compare/contrast, repetition of words for emphasis);  
LA.4.3.5.3: The student will share the writing with the intended audience.  
LA.4.4.1.2: The student will write a variety of expressive forms (e.g., short story, poetry, skit, song lyrics) that employ figurative language (e.g., simile, metaphor, onomatopoeia, personification), rhythm, dialogue, characterization, plot, and/or appropriate format.  
TH.D.1.2: The student analyzes, criticizes, and constructs meaning from formal and informal theatre, film, television, and electronic media.  
TH.B.1.2: The student improvises, writes, and refines scripts based on heritage, imagination, literature, history, and personal experiences.  

MATERIALS NEEDED: computer, projector (ideally), WALL-E script  

TECHNOLOGY CONNECTION:  
WALL-E YouTube video: http://www.youtube.com/watch?v=FvA78Z-W9UE&NR=1  

PROCEDURES:  
Lead in Discussion: Ask the class if it is possible to write a scene to be performed without dialogue. (You can lead them by using ADDDAD scenes - “If we took out the dialogue, would we know what was going on?”) Can the class come up with some examples of television shows or movies. (Silent movies, Three Stooges, WALL-E are possible examples)  

Action Scenes: Using ADDDAD as a reference, ask the class what the formula for an Action Scene would be - AAAAAA. Referring back to the examples given could be beneficial if they are struggling with understanding how to tell a story through action. Show the video and allow students to just watch. Ask for a volunteer to describe the story that was told and how they knew. Project and read through the section of the script as an example of writing action. Watch the scene again.
DRAMATH
Word Problems

Action Scene Challenge: Allow the students to begin writing scenes individually and share if they want. If time allows, have some of the scenes acted for the class. If all students have not written a scene by the end of class, have them write one as homework.

EVALUATION: Collect written scenes
DRAMATH

Word Problems

GRADE LEVEL: 4th
CURRICULUM AREAS: Writing

OBJECTIVES:
- Students will understand and demonstrate how to transfer information into different writing formats.

SUNSHINE STATE STANDARDS:
LA.4.1.7.1: The student will identify the purpose of text features (e.g., format, graphics, sequence, diagrams, illustrations, charts, maps).
LA.4.1.7.3: The student will determine explicit ideas and information in grade-level text, including but not limited to main idea, relevant supporting details, implied message, inferences, chronological order of events, summarizing, and paraphrasing.
LA.4.2.1.2: The student will identify and explain the elements of plot structure, including exposition, setting, character development, problem/resolution, and theme in a variety of fiction.

PROCEDURES:
Group Activity: Write an action scene on the board as a class. Then explain as a group you will be writing the same information in a different format - a paragraph. Discuss how the different formats are useful for readers. (A paragraph is normally more detailed, while scenes are formatted to focus on the character’s actions and spoken lines.) Lead the class in changing the scene they have written into a paragraph, perhaps strongly guiding the first line or two but then allowing for more student input. Write the paragraph on the board next to the action scene. Discuss what was tricky or easy about making the transition. How does each format show what order actions happen in? Which makes more sense when you read it? Why? As a class use the paragraph to write the scene again. Engage the class in discussion about the process. Repeat with a second scene allowing students to provide most of the answers.

Six Line Paragraph: Give the students their action scene(s) from the day before. They will write a paragraph based on the information from the scene on the bottom of the page. This is handed in at the end of class.

Challenge: If students finish early, have them swap papers and write the other person’s paragraph as a scene.
EVALUATION: The action scene and paragraph are both turned into the teacher.
DRAMATH
Word Problems

GRADE LEVEL: 4th
CURRICULUM AREAS: Writing, Mathematics, Theatre

OBJECTIVES:
- Students will practice writing word problems based on given information.

SUNSHINE STATE STANDARDS:
MA.4.A.1.1: Use and describe various models for multiplication in problem-solving situations, and demonstrate recall of basic multiplication and related division facts with ease.
LA.4.2.2.2: The student will use information from the text to answer questions related to explicitly stated main ideas or relevant details
LA.4.3.3.2: The student will revise by creating clarity by deleting extraneous or repetitious information and organizing and connecting related ideas (e.g., order of importance, chronological order, compare/contrast, repetition of words for emphasis)
LA.4.3.5.3: The student will share the writing with the intended audience.
TH.A.1.2: The student acts by developing, communicating, and sustaining characters in improvisation and formal or informal productions.

MATERIALS NEEDED: Word Problem Creation Worksheet (cut so each group gets one problem at a time)

PROCEDURES:
Word Problem Creation: Students are given an action scene prewritten that has a mathematical component. They will write that scene as a paragraph. (This should resemble a word problem - but not called that yet.) Once that is completed successfully (teachers will need to be circulating helping and reading what the students have written), students will decide what part of the paragraph involves mathematics (typically an exchange between people). Students will be split into groups based on their handout to work together (4 students all have the same scene and that forms the group). Each group should share their paragraphs and talk about what was different in each one. Some students may want to revise their paragraphs to include more details or correct components. While solving the mathematical component, encourage students to act the actions to give them ideas of how to solve it. When the group finishes successfully, have them write on their paper in journal form how they figured out the answer. If groups finish quickly, give them another scene to work on.

EVALUATION: Collect papers from each group.
Scene Transformation

A Jada collects four (4) white rocks from the ground.
A Al collects four (4) grey rocks from the hill.
A Jade and Al put their rocks into piles of two (2).
A Jade and Al gives the piles to some friends.
Ask: How many friends do they give piles to?

A Katy sits tapping her feet.
A Topher and Tommy walk into the kitchen.
A All smell food cooking and smile.
A All begin setting the table with dishes and napkins.
A Katy opens the oven, takes the lasagna out and places it on the table.
A Topher cuts the lasagna into equal pieces for everyone at the table.
Ask: If each person eats two pieces, how many pieces did Topher cut?

A Brenda sweeps the floor, waiting for party guests to arrive.
A Brenda puts up the broom.
A Brenda opens a bag of candy.
A Brenda pours the bag of candy into a bowl.
A The guests knock on the door.
A Brenda opens the door.
A The guests enter and grab three (3) pieces of candy each.
A Brenda goes to get more candy because it is all gone.
Ask: How many pieces of candy were originally in the bowl?

A Byron picks up an ax and measures one (1) foot from the bottom of a fallen tree.
A Byron lifts the ax and chops into the wood until it breaks off.
A Byron does this forty-nine (49) times.
A Byron stacks all fifty (50) pieces in a wheelbarrow.
A Byron takes the wood inside.
A Byron puts the pieces of wood in bundles of four (4).
Ask: If Byron uses one bundle of wood each day, does he have enough for the month of December?
A  Calen puts seven (7) lollipops on the chair.
A  Calen walks to his bedroom.
A  Leah walks into the living room and sees the lollipops.
A  Leah puts three (3) lollipops in her pocket.
A  Calen walks into the living room and puts five (5) more lollipops on the chair.
A  Calen gives Leah one (1) lollipop from the pile.
A  Leah smiles.
**Ask:** How many lollipops do they each have?
DRAMATH

Word Problems

GRADE LEVEL: 4th
CURRICULUM AREAS: Theatre

OBJECTIVES:
- Students will stage and perform a variety of scenes.

SUNSHINE STATE STANDARDS:
TH.A.1.2: The student acts by developing, communicating, and sustaining characters in improvisation and formal or informal productions.
TH.B.1.2: The student improvises, writes, and refines scripts based on heritage, imagination, literature, history, and personal experiences.

MATERIALS NEEDED: Active word problems (I would like to pull these from the text used in the classroom), word problem worksheet (I would like to pull these from text used in classroom as well. They will turn one of the word problems into a scene - either an action scene (AAAAAA) or ADDDAD.)

PROCEDURES:
Acting: The class will be broken into groups of two and given word problems or scenes to act. (These scenes are a mixture of good student work and prewritten provided scenes. Some groups will have traditional word problems to act and may find it necessary to add some dialogue of their own.) The class is given 5-10 minutes to work on the scene and then present. (If you find the numbered scene/paper system worked well, continue to use that system.)

Homework: Word problem worksheet - let the class know they will be using the homework in class the next day and will not be able to participate fully if they don’t bring it finished to class.

EVALUATION:
Teacher observation (Are the groups with paragraphs struggling to create their scenes more than groups with traditionally structured scenes? Do they understand how the mathematical component should be acted out in the scene?)

TEACHING NOTES:
Due to the short amount of time for rehearsal, encourage students to use classroom materials and use their imagination for props.
DRAMATH
Word Problems

GRADE LEVEL: 4th
CURRICULUM AREAS: Writing, Theatre, Mathematics

OBJECTIVES:
- Students will write scenes based on mathematical word problems.
- Students will stage and perform in a scene.

SUNSHINE STATE STANDARDS:
MA.4.A.1.1: Use and describe various models for multiplication in problem-solving situations, and demonstrate recall of basic multiplication and related division facts with ease.
TH.D.1.2: The student analyzes, criticizes, and constructs meaning from formal and informal theatre, film, television, and electronic media.
TH.A.1.2: The student acts by developing, communicating, and sustaining characters in improvisation and formal or informal productions.
LA.4.2.2.2: The student will use information from the text to answer questions related to explicitly stated main ideas or relevant details
LA.4.3.5.3: The student will share the writing with the intended audience.
LA.4.5.2.5: The student will make formal and informal oral presentations for a variety of purposes, audiences, and occasions, demonstrating appropriate language choices, body language, eye contact, gestures, and appropriate use of available technologies.

PROCEDURES:
Quick Rehearsal: Students are grouped in teams of three. Each student will direct his/her scene using the other two people in their group as actors. Each director will have 5-10 minutes to direct their scene. After each student has directed their scene, the scenes will be performed for the class. As the scenes are performed, the class will write down the mathematics problem in the scene and solve it based on what they see in the performance. (Performances will most likely span two classes.)

EVALUATION: All written work will be collected.

TEACHING NOTES:
Due to the short amount of time for rehearsal, encourage students to use classroom materials and use their imagination for props.
APPENDIX B: REVISED DRAMATH UNIT
DRAMATH
Word Problems

GRADE LEVEL: 4th
CURRICULUM AREAS: Writing

OBJECTIVES:
- Students will understand and identify vocabulary words “action” and “dialogue.”
- Students will identify a pattern/template for writing scenes.

SUNSHINE STATE STANDARDS:
- L.A.4.1.6.1: The student will use new vocabulary that is introduced and taught directly.
- L.A.4.1.7.1: The student will relate new vocabulary to familiar words.

MATERIALS NEEDED: Twelve cards labeled with ‘D’ and six with ‘A’ with magnets on the back

PROCEDURES:

Intro: Ask students to share what they think the word “dialogue” means. If the students don’t know, lead them to the answer and write on the board different ways to show dialogue (quotes and colons in play-scripts). Next, instruct the students to “have a three-second dialogue” with the student sitting next to them. Count to three and signal the class to stop. Repeat for “action” and list action words on the board. Call out actions for the students to do. (Examples may include stand, walk, sit, wiggle.) (5-7 minutes)

ADDDAD Discovery: Write three ADDDAD scenes on the board. Ask two volunteers from the class to come act out each scene. After each scene has been read/acted, ask the class if each line is an action or dialogue. If they are having trouble identifying the parts, use the acted scene to reference, even going so far as having the volunteers act the scene line by line. Use the letter cards to label each line - ‘A’ indicates action and ‘D’ indicates dialogue. Once all the examples are finished, ask the class if they can connect all the examples/see a pattern. Lead the class to see each scene follow the same pattern and slide the cards from a vertical position to horizontal. Allow the students to figure out the letters spell ‘add’ and ‘dad’ - giving a name to the formula. (25-30 minutes)

Individual Work: Hand out ADDDAD Worksheet. (Remainder of class or homework)

EVALUATION: The game will serve as a quick idea as to how students understand the concepts, but the worksheet will show how well each student understands the ideas.
Name that Line

Directions: Label each line ‘A’ for action and ‘D’ for dialogue in the blank provided.

___ Suzie plants three seeds.
___ Joey: I want to play basketball today.
___ Fred: Will you pass me the peas?
___ Jazymine: Oh wow!
___ Katie falls.
___ Jeff walks his dog, Fluffy.
___ Maria: It’s really hot outside today.
___ Scott buys four candy bars.
___ Shannon paints her toenails bright red.
___ Luke brushes his teeth.
___ Sally gives Rose a high-five.
___ Lynn: I need two more blocks to finish building the wall.
___ Ryan: No way!
___ Paul: We’re having my favorite dinner tonight.
___ Katrina paints the wall purple.
___ Katrine: Purple is my favorite color.
___ Jennifer fishes in the river.
___ Peter jumps out of the way as Katie falls.
DRAMATH

Word Problems

GRADE LEVEL: 4th
CURRICULUM AREAS: Writing, Theatre

OBJECTIVES:
- Students will write an ADDDAD scene as a class.
- Students will be able to explain what an ADDDAD scene is and write one individually.

SUNSHINE STATE STANDARDS:
- LA.4.2.1.2: The student will identify and explain the elements of plot structure, including exposition, setting, character development, problem/resolution, and theme in a variety of fiction.
- LA.4.4.1.1: The student will write narratives based on real or imagined ideas, events, or observations that include characters, setting, plot, sensory details, a logical sequence of events, and a context to enable the reader to imagine the world of the event or experience.
- TH.B.1.2: The student improvises, writes, and refines scripts based on heritage, imagination, literature, history, and personal experiences.

MATERIALS NEEDED: ADDDAD magnetic cards from Day One (three sets in envelopes)

PROCEDURES:

ADDDAD Scramble: Split the class into three teams; each team will receive an envelope with a set of ADDDAD magnetic cards. Each team will line up, with the first person in line holding the folder. When the teacher (or student who doesn’t want to play) says “GO,” the line leader draws a card from the folder, runs to the board, places the card on the board (in a designated section), runs to the back of his/her line. The next person in line then grabs a card out of the folder, and the process repeats. The goal is to place the cards in order to spell out ‘ADDDAD’ lined vertically. First team to finish wins.

ADDDAD Writing: Tell the class they are going to write ADDDAD scenes as a group today. The rules to ADDDAD scenes are: there can only be two characters, one location, and unity of time. (Unity of time means the scene must be in real time.) You may want to write these rules on the board as a reference for the students. Ask for two volunteers to act the scenes as they are written. The two students will choose the names of the characters they are going to play. Next ask the class to offer suggestions for a location. The teacher picks one of the suggestions and asks the class to come up with an action that tells where the location is. (i.e., John and Jenn are at the park eating a twinkie.) The volunteers will act the action. Lead the class through writing the scene line by line. Have the volunteers say the dialogue as the teacher writes it on the board using the cards placed in the warm-up game. Once the scene is finished, have the volunteers act the whole scene. Repeat this activity two more times. (You can choose to get new volunteers each round or keep the same ones.)
DRAMATH

Word Problems

Individual Writing: Challenge the class to write their own ADDDAD scene and turn it in as they leave class (or, if time is running short, this can be homework)

EVALUATION: The individual writing is in place to show students’ understanding. Also, the group work will allow the teacher to gauge overall understanding.
DRAMATH
Word Problems

GRADE LEVEL: 4th
CURRICULUM AREAS: Writing, Mathematics, Theatre

OBJECTIVES:
- Students will become more proficient writing ADDAD scenes individually and as a group.
- Students will begin writing about mathematics by describing action based on story problems from their text.
- Students will perform and read in front of the class.

SUNSHINE STATE STANDARDS:
- L.A.4.4.1.1: The student will write narratives based on real or imagined ideas, events, or observations that include characters, setting, plot, sensory details, a logical sequence of events, and a context to enable the reader to imagine the world of the event or experience; and
- TH.B.1.2: The student improvises, writes, and refines scripts based on heritage, imagination, literature, history, and personal experiences.

MATERIALS NEEDED: ADDAD magnetic cards, examples of word problems from text

PROCEDURES:
ADDAD Relay Writing: Place the ADDAD cards on the board spaced with room for writing. Split the class into 3 groups (or more if needed) and have them line up across the room from the white board. Each group gets one white board marker that will be handed off during the relay. The goal of the game is for each team to write an ADDAD scene. When each team member runs to the board, they write the next line of the scene. The scene is written line by line. Before each race, give the class an element that must appear in the scene. (For example, one of the characters in this scene must be a dog. There must be a baseball in this scene.) Play a few rounds before moving on.

ADDAD Writing with Word Problems: Read word problem aloud and have students follow along in book. Lead the class in writing the word problem as if it were a ADDAD scene paying attention at the unity of time to make sure the story stays linear and vital information from the original paragraph format of the word problem is used in the scene. It may be helpful to have two volunteers act out the paragraph, if they use dialogue in their improvisational scene that will be a good starting place for the scene. Acting the examples out reinforces the differences in actions and dialogue, while showing how the dialogue can support the story of the word problem even though it is a different format. Lead the class through two or three problems as a group. Have students begin working in small groups or individually writing scenes based on other word problems.

Acting: Split the class into pairs; each pair will receive a scene to stage and act. Explain that they only will have a few minutes to rehearse and will need to work quietly and quickly.
DRAMATH

Word Problems

The scenes will be a mix of good student work and pre-written scenes. Give them about 5 minutes to rehearse, have the class sit back down and begin the sharing. To make this go quickly, write numbers on top of each script. They will perform them in order (1,2,3...). If these are not finished, the remainder will perform at the beginning of the next class.

EVALUATION: Written work will be collected along with homework.
ADDDAD Puzzle Examples

A Charlie takes one of four slices of pizza from the box.
D Herb: Hey Charlie, could you grab me a piece of pizza while you’re up.
D Charlie: Sure!
D Herb: Do we have enough pizza for me to have another slice?
A Charlie puts Herb’s slice on a plate.
D Charlie: Yeah, we have two slices left.

A Beatrice counts the stickers on her paper.
D Katie: You have four more stickers than me.
D Beatrice: Mom said we had to split them.
D Katie: Fine.
A
D Beatrice: Thanks!

A
D David: Let’s go to the movies.
B Chris: I only have five dollars
D
A The boys count their money.
D Chris: Looks like we can go. What do you want to see?

A Ty stacks a box with 6 vases on a table with other boxes.
D Enoch: Can you put price tags on those vases?
D Ty:
D Enoch: If we sell them all, we should make 24 dollars. Right?
A
D Ty:
ADDDAD Puzzle

Directions: Fill in the lines in each ADDDAD scene. Each scene must show a way to use mathematics in daily life.

**Scene 1**
A Jonathan pours fifteen cups of water into a bowl.
D Mike: We need to make sure each of the five cats gets at least two cups of water.
D Jonathan: Umm...okay. I’m not going to measure out two cups for each cat; it’s already poured.
D Mike: ____________________________

A ____________________________

D ____________________________

**Scene 2**
A ____________________________

D Mary: I wonder if that tree would fit in our house.
D Donald: I don’t know, our ceiling is twelve feet tall.
D Mary: ____________________________

A ____________________________

D Donald: Sorry, it’s too big to fit in the house.

**Scene 3**
A ____________________________

D Gina: Thanks for sharing your bag of candy.
D Kate: You’re welcome. I wanted to count the candy before I gave it out, but I forgot.
D Gina: We can figure it out - you gave candy to ten people including yourself and each person got three pieces of candy.
A ____________________________

D ____________________________
DRAMATH
Word Problems

GRADE LEVEL: 4th
CURRICULUM AREAS: Writing, Theatre

OBJECTIVES:
- Students will practice writing a variety of ADDDAD scenes.

SUNSHINE STATE STANDARDS:
- TH.A.1.2: The student acts by developing, communicating, and sustaining characters in improvisation and formal or informal productions.
- TH.B.1.2: The student improvises, writes, and refines scripts based on heritage, imagination, literature, history, and personal experiences.
- LA.4.5.2.5: The student will make formal and informal oral presentations for a variety of purposes, audiences, and occasions, demonstrating appropriate language choices, body language, eye contact, gestures, and appropriate use of available technologies.

MATERIALS NEEDED: Scene for each pair, scene specifics to cut up for hat, hat/bowl/envelope, Examples of ADDDAD mathematics puzzle, Puzzle Worksheet,

PROCEDURES:
Individual Writing: Each student will write an individual ADDDAD scene with one key piece of information provided by the teacher. (There is a list of “Scene Specifics” included, these can be cut into strips and each student may choose one out of a hat. These give parameters for their scenes.) If you choose to use the first written scene as a “Do Now” activity, write the instructions on the board as class begins. The information can be drawn from a hat as students enter the class to introduce the element of chance/fun to it. After writing two of these, ask for volunteers to share their scenes. The scenes will be read by the playwright.

ADDDAD Scene Puzzle: Structured the same as group writing in the previous lesson with a layer added. One or more of the lines in the scene must involve mathematics. Discuss with the class practical application of mathematics - counting money, cooking, knowing how to share parts equally, etc.. Write the first example on the board, and have two volunteers act it. Work your way through the examples and have the class fill in the puzzle (you’re writing in the suggestion you like best on the board).

Puzzle Worksheet: (End of class or for homework) Hand out worksheet

EVALUATION: Puzzle Worksheet

TEACHING NOTES:
DRAMATH

Word Problems Lesson 4 of 9

Students who will benefit from a challenge may write different answers to the puzzles during class, create their own puzzle, create their own formula for a scene and write scenes using that formula (i.e., instead of using ADDDAD, they could create and use ADADAD).
ADDDAD Scenes

*The characters in these scenes do not have names beyond ‘A’ and ‘B’ and can be played by boys or girls. (Students can give their character a name.)*

A  A dances to the music playing on her iPod.
D  B: Can I listen too?
D  A: Only if you promise not to make fun of me for dancing anymore.
D  B: Fine.
A  A hands B the headphones. B slowly starts to dance.
D  A: And he/she said I was a bad dancer?

A  A is packing clothes into a bag.
D  B: Hey, I heard you were going on a trip.
D  A: Sure am.
D  B: Where are you going?
A  B looks into A’s bag.
D  A: The moon.

A  A and B play a game of thumb war.
D  A: Ha! I won again!
D  B: I’m bored.
D  A: You’re only saying that because you keep losing. Let’s arm wrestle!
A  A and B arm wrestle. B easily wins.
D  B: That was boring too.
ADDDAD Scenes

A: A brushes his/her teeth. B knocks on the door.
D: A: Hold on, I'm brushing my teeth.
D: B: I gotta go! Now!
D: A: Sorry, I got in here first. You have to wait your turn.
A: B stands at the door doing a little dance of discomfort. A waits, enjoying B's pain, and slowly opens the door.
D: B: Ahhhh! Move!

A: A mixes brownie batter in a bowl.
D: B: Can I have some batter?
D: A: No, that's gross.
D: B: But it tastes good.
A: A turns around to wash hands. B sticks his/her hand in the bowl and talks as he/she leaves the kitchen.
D: B: Okay, call me when they're ready.

A: A runs to B holding an egg.
D: B: What is that?
D: A: I think an egg, but it's really heavy.
D: B: Let's see if we can figure out what kind of egg before we hatch a snake in our house.
A: B looks through a book.
D: B: It's not in here. I think that thing is either a rock or you just discovered a new kind of animal.
ADDDAD Scenes

A  A sneaks up on B.
D  A: Boo!
D  B: Ahhhh.
D  A: Got you!
A  A runs away laughing.
D  B: I hate babysitting.
Scene Specifics

Location: Beach
Character: Old Woman
Relationship between characters: Brother and sister
Line of dialogue: Are you actually going to do that?
Time of day: Morning
Location: Forest
Character: 5 year old boy
Relationship between characters: Parent and child
Line of dialogue: Hurry up, we're going to be late.
Time of day: Lunch
Location: Restaurant
Character: Excited dog
Relationship between characters: Best friends
Line of dialogue: You are crazy.
Time of day: Nap time
Location: School
Character: Teacher
Relationship between characters: Brother and sister
Line of dialogue: Is he gone yet?
Time of day: Middle of night
Location: Grocery Store
Character: Sleepy cat
Relationship between characters: Grandparent and grandchild
Scene Specifics

Line of dialogue: Are we there yet?
Time of day: Bedtime
Location: Living room
Character: Hat
Relationship between characters: Live on the same shelf
Line of dialogue: I wish I could do that too.
Time of day: Breakfast
DRAMATH
Word Problems

GRADE LEVEL: 4th
CURRICULUM AREAS: Writing, Theatre

OBJECTIVES:
- Students will understand and demonstrate writing a scene with no dialogue.

SUNSHINE STATE STANDARDS:
LA.4.1.7.3: The student will determine explicit ideas and information in grade-level text, including but not limited to main idea, relevant supporting details, implied message, inferences, chronological order of events, summarizing, and paraphrasing;
LA.4.3.3.2: The student will revise by creating clarity by deleting extraneous or repetitious information and organizing and connecting related ideas (e.g., order of importance, chronological order, compare/contrast, repetition of words for emphasis);
LA.4.3.5.3: The student will share the writing with the intended audience.
LA.4.4.1.2: The student will write a variety of expressive forms (e.g., short story, poetry, skit, song lyrics) that employ figurative language (e.g., simile, metaphor, onomatopoeia, personification), rhythm, dialogue, characterization, plot, and/or appropriate format.
TH.D.1.2: The student analyzes, criticizes, and constructs meaning from formal and informal theatre, film, television, and electronic media.
TH.B.1.2: The student improvises, writes, and refines scripts based on heritage, imagination, literature, history, and personal experiences.

MATERIALS NEEDED: computer, projector (ideally), WALL-E script

TECHNOLOGY CONNECTION:
WALL-E YouTube video: http://www.youtube.com/watch?v=FvA78Z-W9UE&NR=1

PROCEDURES:
Lead in Discussion: Ask the class if it is possible to write a scene to be performed without dialogue. (You can lead them by using ADDDAD scenes - “If we took out the dialogue, would we know what was going on?”) Can the class come up with some examples of television shows or movies. (Silent movies, Three Stooges, WALL-E are possible examples)

Action Scenes: Using ADDDAD as a reference, ask the class what the formula for an Action Scene would be - AAAAAA. Referring back to the examples given could be beneficial if they are struggling with understanding how to tell a story through action. Show the video and allow students to just watch. Ask for a volunteer to describe the story that was told and how they knew. Project and read through the section of the script as an example of writing action. Watch the scene again.

Bryson 1 of 2
DRAMATH
Word Problems

Action Scene Challenge: Allow the students to begin writing scenes individually and share if they want. If time allows, have some of the scenes acted for the class. If all students have not written a scene by the end of class, have them write one as homework.

EVALUATION: Collect written scenes
DRAMATH
Word Problems

GRADE LEVEL: 4th
CURRICULUM AREAS: Writing

OBJECTIVES:
- Students will understand and demonstrate how to transfer information into different writing formats.

SUNSHINE STATE STANDARDS:
LA.4.1.7.1: The student will identify the purpose of text features (e.g., format, graphics, sequence, diagrams, illustrations, charts, maps).
LA.4.1.7.3: The student will determine explicit ideas and information in grade-level text, including but not limited to main idea, relevant supporting details, implied message, inferences, chronological order of events, summarizing, and paraphrasing.
LA.4.2.1.2: The student will identify and explain the elements of plot structure, including exposition, setting, character development, problem/resolution, and theme in a variety of fiction.

PROCEDURES:
Group Activity: Write an action scene on the board as a class. Then explain as a group you will be writing the same information in a different format - a paragraph. Discuss how the different formats are useful for readers. What does a paragraph look like? How do you write a paragraph? What does a scene look like? What kinds of information about the story do you get from the different formats? Lead the class in changing the scene they have written into a paragraph, perhaps strongly guiding the first line or two but then allowing for more student input. Write the paragraph on the board next to the action scene. Discuss what was tricky or easy about making the transition. How does each format show what order actions happen in? Is there a pattern to the transition? (Guide them to see each line can be transferred to a paragraph in the same order as it appears in the scene, still keeping in line with unity of time.) Which makes more sense when you read it? Why? As a class use the paragraph to write the scene again. Engage the class in discussion about the process. Repeat with a second scene allowing students to provide most of the answers.

Six Line Paragraph: Give the students their action scene(s) from the day before. They will write a paragraph based on the information from the scene on the bottom of the page. This is handed in at the end of class.

Challenge: If students finish early, have them swap papers and write the other person’s paragraph as a scene.
EVALUATION: The action scene and paragraph are both turned into the teacher.
DRAMATH
Word Problems
Lesson 7 of 9

GRADE LEVEL: 4th
CURRICULUM AREAS: Writing, Mathematics, Theatre

OBJECTIVES:
- Students will practice writing word problems based on given information.

SUNSHINE STATE STANDARDS:
MA.4.A.1.1: Use and describe various models for multiplication in problem-solving situations, and demonstrate recall of basic multiplication and related division facts with ease.
LA.4.2.2.2: The student will use information from the text to answer questions related to explicitly stated main ideas or relevant details.
LA.4.3.2.2: The student will revise by creating clarity by deleting extraneous or repetitious information and organizing and connecting related ideas (e.g., order of importance, chronological order, compare/contrast, repetition of words for emphasis).
LA.4.3.5.3: The student will share the writing with the intended audience.
TH.A.1.2: The student acts by developing, communicating, and sustaining characters in improvisation and formal or informal productions.

MATERIALS NEEDED: Word Problem Creation Worksheet (cut so each group gets one problem at a time)

PROCEDURES:
Word Problem Creation: Students are given an action scene prewritten that has a mathematical component. They will write that scene as a paragraph. (This should resemble a word problem - but not called that yet.) Once that is completed successfully (teachers will need to be circulating helping and reading what the students have written), students will decide what part of the paragraph involves mathematics (typically an exchange between people). Students will be split into groups based on their handout to work together (4 students all have the same scene and that forms the group). Each group should share their paragraphs and talk about what was different in each one. Some students may want to revise their paragraphs to include more details or correct components. While solving the mathematical component, encourage students to act the actions to give them ideas of how to solve it. When the group finishes successfully, have them write on their paper in journal form how they figured out the answer. If groups finish quickly, give them another scene to work on.

EVALUATION: Collect papers from each group.
Scene Transformation

A Jada collects four white rocks from the ground.
A Al collects four grey rocks from the hill.
A Jade and Al put their rocks into piles of two.
A Jade and Al gives the piles to some friends.
A Ask: How many friends do they give piles to?

A Katy sits tapping her feet.
A Topher and Tommy walk into the kitchen.
A All smell food cooking and smile.
A All begin setting the table with dishes and napkins.
A Katy opens the oven, takes the lasagna out and places it on the table.
A Topher cuts the lasagna into equal pieces for everyone at the table.
A Ask: If each person eats two pieces, how many pieces did Topher cut?

A Brenda sweeps the floor, waiting for party guests to arrive.
A Brenda puts up the broom.
A Brenda opens a bag of candy.
A Brenda pours the bag of candy into a bowl.
A The guests knock on the door.
A Brenda opens the door.
A The guests enter and grab three pieces of candy each.
A Brenda goes to get more candy because it is all gone.
A Ask: How many pieces of candy were originally in the bowl?

A Byron picks up an ax and measures one foot from the bottom of a fallen tree.
A Byron lifts the ax and chops into the wood until it breaks off.
A Byron does this forty-nine times.
A Byron stacks all fifty pieces in a wheelbarrow.
A Byron takes the wood inside.
A Byron puts the pieces of wood in bundles of four.
A Ask: If Byron uses one bundle of wood each day, does he have enough for the month of December?
A Calen puts seven lollipops on the chair.
A Calen walks to his bedroom.
A Leah walks into the living room and sees the lollipops.
A Leah puts three lollipops in her pocket.
A Calen walks into the living room and puts five more lollipops on the chair.
A Calen gives Leah one lollipop from the pile.
A Leah smiles.
**Ask:** How many lollipops do they each have?
DRAMATH
Word Problems

GRADE LEVEL: 4th
CURRICULUM AREAS: Theatre

OBJECTIVES:
- Students will stage and perform a variety of scenes.

SUNSHINE STATE STANDARDS:
TH.A.1.2: The student acts by developing, communicating, and sustaining characters in improvisation and formal or informal productions.
TH.B.1.2: The student improvises, writes, and refines scripts based on heritage, imagination, literature, history, and personal experiences.

MATERIALS NEEDED: Active word problems (I would like to pull these from the text used in the classroom), word problem worksheet (I would like to pull these from text used in classroom as well. They will turn one of the word problems into a scene - either an action scene (AAAAAA) or ADDDAD.)

PROCEDURES:
Acting: The class will be broken into groups of two and given word problems or scenes to act. (These scenes are a mixture of good student work and prewritten provided scenes. Some groups will have traditional word problems to act and may find it necessary to add some dialogue of their own.) The class is given 5-10 minutes to work on the scene and then present. (If you find the numbered scene/paper system worked well, continue to use that system.)

Homework: Word problem worksheet - let the class know they will be using the homework in class the next day and will not be able to participate fully if they don’t bring it finished to class.

EVALUATION:
Teacher observation (Are the groups with paragraphs struggling to create their scenes more than groups with traditionally structured scenes? Do they understand how the mathematical component should be acted out in the scene?)

TEACHING NOTES:
Due to the short amount of time for rehearsal, encourage students to use classroom materials and use their imagination for props.
DRAMATH
Word Problems

GRADE LEVEL: 4th
CURRICULUM AREAS: Writing, Theatre, Mathematics

OBJECTIVES:
- Students will write scenes based on mathematical word problems.
- Students will stage and perform in a scene.

SUNSHINE STATE STANDARDS:
MA.4.A.1.1: Use and describe various models for multiplication in problem-solving situations, and demonstrate recall of basic multiplication and related division facts with ease.
TH.D.1.2: The student analyzes, criticizes, and constructs meaning from formal and informal theatre, film, television, and electronic media.
TH.A.1.2: The student acts by developing, communicating, and sustaining characters in improvisation and formal or informal productions.
LA.4.2.2.2: The student will use information from the text to answer questions related to explicitly stated main ideas or relevant details
LA.4.3.5.3: The student will share the writing with the intended audience.
LA.4.5.2: The student will make formal and informal oral presentations for a variety of purposes, audiences, and occasions, demonstrating appropriate language choices, body language, eye contact, gestures, and appropriate use of available technologies.

PROCEDURES:
Quick Rehearsal: Students are grouped in teams of three. Each student will direct his/her scene using the other two people in their group as actors. Each director will have 5-10 minutes to direct their scene. After each student has directed their scene, the scenes will be performed for the class. As the scenes are performed, the class will write down the mathematics problem in the scene and solve it based on what they see in the performance. (Performances will most likely span two classes.)

EVALUATION: All written work will be collected.

TEACHING NOTES:
Due to the short amount of time for rehearsal, encourage students to use classroom materials and use their imagination for props.
NOT HUMAN RESEARCH DETERMINATION

From: UCF Institutional Review Board #1  
FWA0000351, IRB00001138

To: Lucy Bryson, Department of Theatre

Date: April 6, 2010

Dear Researcher:

Thank you for sending the description of your proposed research – creating a unit of lesson plans teaching how to write mathematics word problems through playwriting – to the IRB office. After reviewing this information and discussing your plans on the phone, the IRB determined that the following proposed activity is not human research as defined by DHHS regulations at 45 CFR 46 or FDA regulations at 21 CFR 50/56:

Type of Review: Not Human Research Determination

Project Title: Theatre Master's Thesis
Investigator: Lucy Bryson
Research ID: N/A

University of Central Florida IRB review and approval is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are to be made and there are questions about whether these activities are research involving human subjects, please contact the IRB office to discuss the proposed changes.

On behalf of the IRB Chair, Joseph Bielitzki, DVM, this letter is signed by:

Joanne Muratori  
IRB Coordinator

cc: Earl Weaver
LIST OF REFERENCES


