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Purpose

The Interdisciplinary Journal of Teaching and Learning (IJTI) - formerly the E-Journal of Teaching and Learning in Diverse Settings, is a scholarly, triple-blind, peer reviewed, open access electronic refereed journal that is published three times each year by the College of Education at Southern University - Baton Rouge. Publication occurs in the Spring, Summer, and Fall.

The IJTL is designed to provide opportunities for divergent ideas, views, and opinions on various topics and issues from professionals in diverse disciplines and professional arenas. It strives to be highly interdisciplinary in content that is likely to be of interest to teachers, principals, other school administrators, policymakers, graduate and undergraduate students, researchers, and academicians.

Manuscripts that focus on special education, general education (including subject content areas), bilingual education, cultural and linguistic diversity, innovative methods in teaching, assessment, exemplary programs, technology (assistive and instructional), educational leadership and reform, public policy, current issues and practices, and research relevant to education are encouraged.

Manuscripts submitted to the IJTL should be interesting, thorough, innovative, informative, well-documented, and have practical value that embraces and contributes to effective teaching and learning.

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The Interdisciplinary Journal of Teaching and Learning (IJTL) welcomes submissions that contributes to effective teaching and learning. It provides a forum for the dissemination of articles focused on a wide variety of topics and content subject areas.

The IJTL is comprised of four departments -- Feature Articles, Educational Tweets, Online Resources, and the Event Zone.

Feature Articles provide scholarly articles on important topics, theoretical perspectives, current issues, practices, strategies, and research related to teaching and learning in PK-12 and higher education settings. All manuscripts submitted to this department undergo a triple-blind peer review.

Manuscripts for feature articles may be submitted by faculty, graduate students (whose work is co-authored by faculty), school administrators, policymakers, researchers, classroom teachers, and other practicing educators on current and compelling educational topics, issues, practices, and concerns at all levels (PK-12 and higher education) from a wide range of disciplines.

Manuscripts that focus on special education, general education, bilingual education, cultural and linguistic diversity, innovative methods in teaching, assessment, exemplary programs, technology (assistive and instructional), educational leadership and reform, public policy, current practices and issues, and research relevant to education are encouraged. The manuscripts should

be interesting, informative, well documented, appeal to the IJTL diverse audience, and have practical value that embrace and contribute to effective teaching and learning.

Additionally, the manuscripts should be original, well written, and offer new knowledge or a new and insightful synthesis of existing knowledge that has significance or importance to education. They should also have a solid theoretical base and offer an appropriate blend of teaching and practice. The conclusion, summary, final thoughts, or implications should be supported by the evidence presented.

The complete review process for manuscripts submitted to this department may take up to three months. The author guidelines provide additional information on what you should know about the submission process.

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Submission Deadlines		
Spring 2015 (March/April)	**Summer 2015 (July/August)**	**Fall 2015 (October/November)**
Manuscript Deadline November 15, 2014	Manuscript Deadline February 15, 2015	Manuscript Deadline May 15, 2015

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The Interdisciplinary Journal of Teaching and Learning (IJTL) is a scholarly, triple-blind, peer reviewed, open access electronic refereed journal that welcomes manuscripts from scholars, academicians, teachers, researchers, graduate students (whose work is co-authored by faculty), administrators, practitioners, and policymakers on a variety of topics and content areas as well as educational issues, evidence-based practices, and topics of educational significance.

Manuscripts submitted must be an original contribution that has not been previously published (in whole or substantial part), or is being concurrently considered for publication by another publisher. A cover letter stating these conditions should accompany the submission.

Manuscripts must be submitted electronically using word processing software. Acceptable formats include Microsoft Word (doc /docx) and Rich Text format (rtf).

Manuscripts should be formatted for printing on standard 8 x 11 inch paper with 1-inch margins, double spaced (including quotations and references), and prepared in Times New Roman 12-point font size. Titles, headings, and subheadings should be in upper and lower case fonts.

Manuscripts should not exceed 25 pages in length, including the title page, abstract, references, and tables or figures.

A separate cover sheet should provide the author's full name, organization or institutional affiliation, mailing address, phone number, and e-mail address; and the corresponding author should be identified. The author's name should not appear on any other pages of the manuscript. It is the responsibility of the corresponding author to notify the corresponding editor of the IJTL of changes in address, organization, or institutional affiliation occurring during the review process.

An abstract (100 - 150 words) should be included that summarizes the content of the manuscript. Five or six key words should be placed below the abstract.

Tables and figures should be placed in a separate file, and need not be double-spaced. Tables should only be used when appropriate and should include only essential data. Figures should be camera ready. Indicate the location for tables and figures in the text in boldface, enclosed in brackets, on a separate line.

The author is responsible for the accuracy and completeness of all references. References should be double-spaced and follow the specifications of the 6th edition of the *Publication Manual of the American Psychological Association*. The author is also responsible for obtaining permission to use copyrighted material, if required.

Photos or artwork must be camera ready. The acceptable electronic format is jpeg of at least 300 dpi. Authors should never assume that material downloaded or extracted from the Internet may be used without obtaining permission. It is the responsibility of the author to obtain permission, which should accompany the manuscript submission.

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Review Process

Manuscripts submitted to the IJTL undergo a triple-blind peer review. All identifying information about the author is removed to ensure that the author's identity is not revealed.

Manuscripts received will be screened by the journal editors for conformity to the editorial guidelines, appropriateness of topic, and appropriateness for the journal readership. Manuscripts will also be assessed for content, relevance, accuracy, and usefulness to those in educational settings and stakeholders with an interest in educational policies and issues.

Appropriate manuscripts will be sent to peer reviewers. Poorly written or incorrectly formatted manuscripts will not be sent out for peer review.

All manuscripts received by the IJTL are assigned an identification number that is used to track the manuscript during the review process.

Within two weeks of receipt of the manuscript, an e-mail acknowledging receipt of the manuscript with notification of the assigned identification number will be sent to the author. The author may contact the journal corresponding editor at any time during the review process to obtain information about the status of their manuscript. Include in the subject line "Request for Manuscript Status Update (Manuscript #___)."

The manuscript review process is generally completed within three months. This process may be slightly longer during major academic breaks or holidays.

Peer reviewers make one of the following decisions concerning a manuscript: (a) accept for publication (b) accept for publication and request minor revisions, (c) consider for publication after major revisions with the stipulation for a second peer review, (d) reject with resubmission invited, or (e) reject and decline the opportunity to publish.

Authors of manuscripts that have been accepted for publication will be notified by e-mail through the corresponding author. In some instances, authors may be asked to make revisions and provide a final copy of the manuscript before it is forwarded for publication.

Manuscripts accepted for publication may be susceptible to further editing to improve the quality and readability of the manuscript without materially changing the meaning of the text. Before publication, the corresponding author will receive an edited copy of the manuscript to approve its content and answer any questions that may arise from the editing process.

The IJTL is always looking for peer reviewers to serve on its Board of Reviewers. If you are interested in being considered as a peer reviewer, click on the link Peer Reviewer to obtain an application. Please return the application by e-mail (coeijtl@subr.edu) or fax (225-771-5810).

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Preservice Teachers' Perceptions About Teaching Mathematics Through Music

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This study examined preservice teachers' perceptions about teaching elementary level mathematics lessons integrated with music. It also sought to determine how preservice teachers would strategize the integration of music activities when introducing elementary level mathematics lessons. The participants, 53 undergraduate preservice teachers at a large public university in a southern metropolitan area, were provided a series of six 40-minute interactive music-math integrated activities. Results of qualitative data analyses revealed that the majority of preservice teachers provided positive feedback about music-integrated pedagogy for teaching mathematics because it allowed them opportunities to escape from the limitations of traditional mathematics instruction.

Keywords: music-mathematics interdisciplinary curriculum, interdisciplinary mathematics instruction, preservice teachers' perceptions, pedagogical content knowledge.

Mathematics is a subject content area that can be easily integrated with other subject content areas. However, one of the drawbacks to this notion is that students think school disciplines are independent to each other and that school education is irrelevant to real life (Cumming, 1994). An instructional strategy that can be used to change students' outlook on education is the integrated curriculum, which is an approach that offers students the opportunity to understand and apply school subjects through multiple approaches (Fiske, 1999).

Interdisciplinary instruction enhances students' holistic thinking skills by developing knowledge through interdisciplinary connections (Hargreaves, Earl, Moore, & Manning, 2002); facilitating their creativity through the opportunities to fulfill situated, socially-constructed, and culturally intervening experiences (Marshall, 2005); and providing learning experiences that can intellectually and emotionally motivate their understanding of academic concepts from multiple perspectives, as well as transfer of learning (Chrysostomou, 2004). Teachers can also benefit from integrated instruction. Such instruction can provide teachers with opportunities to address important issues that may be difficult to investigate in individual subjects and it can lead to a broader view of the curriculum thereby reducing redundancy of content (Carrier, Wiebe, Gray, & Teachout, 2011).

Moreover, interdisciplinary education can provide students with a learning environment that enables them to have a better social relationship with their everyday experiences. It can also engage them in a reflection and inquiry process (Parsons, 2004) to help them better understand the core subjects with rich connections among school subjects and out-of-school experiences (Hargreaves, et al., 2002.

Reports of improvement in students' achievement through the integrated curriculum has led many organizations, including the National Arts Education Association [NAEA] (1994), the American Association for the Advancement of Science [AAAS], (1998), the National Research Council [NRC], 1996), and the National Council of Teachers of Mathematics [NCTM] (2000) to adopt national standards and constructivist teaching approaches. In fact, the NCTM explicitly acknowledges that students are required to have opportunities to identify and apply knowledge associated with other school subjects and real life experiences.

Unlike many curriculum integration designs that link two or more school subjects together (e.g., mathematics-science), the arts integrated curriculum, with its unique function of transferring student learning from the arts to non-arts content, has the potential to be integrated with all school subjects (Catterall, 2005). Several studies have found that the arts can provide students and teachers learning experiences that can motivate understanding (Chrysostomou, 2004; Mansilla, 2005), engage learners through self-reflection and active inquiry (Parsons, 2004), and provide an enjoyable and collaborative learning environment (Fiske, 1999).

Music, an essential category of the arts, has been developed with different curriculum elements and instructional strategies to supplement other school subjects, especially mathematics (Cornett, 2007; Robertson & Lesser, 2013). The natural similarities between music and mathematics (such as patterns, structures, and symbols) offer rich overlapping knowledge areas for mathematics educators to develop K-16 mathematics lessons integrated with various music concepts such as music composition and musical instrument designs (Fauvel, Flood, & Wilson, 2006; Loy, 2006).

By designing appropriate music integrated mathematics lessons, students can understand, analyze, and interpret mathematics through different routes (An, Capraro, & Tillman, 2013; An, Kulm, & Ma, 2008; Brown; 2013). For example, elementary school teachers have utilized advanced digital manufacturing technologies, including 3D-printers, to involve students in music instrument design and fabrication activities based on mathematical concepts such as measurement and geometry (Tillman, 2013). However, existing research on teaching mathematics through music is usually focused on the superficial relationship between mathematics and music (Rogers, 2004).

Although more connections need to be explored, such as the connections between music and mathematics during the composition of rhythm with repeating beats per minute patterns and internal rhythmic structures with underlying mathematical foundations (An, Ma, & Capraro, 2011), more research needs to be done on how teachers develop their abilities to teach mathematics concepts through contextualized music activities. The purpose of the study was to examine preservice teachers' perceptions about teaching elementary level mathematics topics integrated with music and to determine how they would strategize integrating music activities in lessons to address elementary mathematics topics.

Conceptual Framework

The conceptual framework for this study was based on a synthesis of three areas of music-mathematics connections – the cognitive structures and levels of the students, the emotional and attitudinal impact of mathematics on student behavior, and the pedagogical methods of teachers. Researchers (e.g., Rauscher, Shaw, & Ky, 1993; Rideout & Laubach, 1996) synthesized these themes for using music as a context for mathematics education by focusing on the impact of music activities (such as the Mozart Effect) on students' abilities in performing mathematics tasks.

The Cognitive Structures and Levels of the Students

In 1993, Rauscher and his colleagues published a groundbreaking study about the "Mozart Effect" entitled *Music and Spatial Task Performance*. In this study, they reported that the group of participants who listened to Mozart's music demonstrated significantly higher IQ scores than participants in the other two groups who listened to either relaxing music or silence. However, this advantage only lasted about 10 to 15 minutes after the treatment. Although many researchers have replicated the "Mozart Effect" with participants of various ages and backgrounds and have found positive impacts on various mathematical tasks (e.g., Rauscher et al., 1995; Rideout & Laubach, 1996; Nantais & Schellenberg, 1999; Wilson & Brown, 1997), it is theorized that a possible explanation for these findings is that music stimulates neuron activity in certain areas of the brain that is also responsible for mathematical related reasoning.

Regarding educational implications for the Mozart Effect, Shaw (2004) pointed out that there are two kinds of mathematics reasoning – spatial-temporal reasoning and language-analytic reasoning. Spatial-temporal reasoning involves the mental rotation of objects in space and time, searching sequences and patterns, and thinking in advance to reason through a problem. Language-analytic reasoning expects students to receive the necessary information with the goal of answering questions. The traditional approach to education focuses more on language-analytic reasoning within a lecture-type environment where information and solutions are of a quantitative nature, which may neglect the mental visualization process in the conceptual understanding of mathematics.

Emotional and Attitudinal Impact of Mathematics on Student Behavior

An important facet of student learning involves emotion. Emotion is essential to students' learning because positive emotions tend to lead to higher levels of motivation that facilitate learning. Miller and Mitchell (1994) suggest that teachers create a highly motivating environment for learning, free from tension and other possible causes of embarrassment or humiliation. Music, with its aesthetical features, can provide students with a highly motivating environment with less prejudice and violence, and it can help them become better risk takers and communicators (Langer, 1997). Simply stated, by creating a highly motivating learning environment where students can be engaged to participate in mathematics tasks with less anxiety, music can be used as a sugarcoating for learning explicit concepts in mathematics (An et al., 2011).

Mathematics anxiety is also a facet of behavior that commonly exists among teachers and students of all grade levels (Zettle & Raines, 2002). It has been reported that preservice teachers have higher levels of mathematics anxiety and more negative mathematics attitudes than their peers in other majors (Bursal & Paznokas, 2006). Not only do preservice teachers report feeling nervous and uncomfortable when involved in mathematical-related tasks, they also tend to transmit these negative dispositions toward their prospective students when they are in field-based learning environments (Furner & Berman, 2005).

Pedagogical Methods of Teachers

Traditional mathematics curricula and instructional methods that promote one way to demonstrate mathematics, thereby neglecting conceptual understanding, are considered the key factors that cause mathematics anxiety among students (Furner & Berman, 2005). Offering preservice teachers multiple opportunities to build their pedagogical content knowledge and experience with innovative teaching strategies (e.g., using problem-solving activities, simulations, discoveries, contextualized challenges, and games) have been postured as effective solutions to reshaping their teaching beliefs and attitudes, which may in turn positively influence their students (Bursal & Paznokas, 2006).

Since most elementary preservice teachers lack sufficient classroom teaching experiences, one of the most important areas they need to strengthen in their pedagogical content knowledge is mastering strategies on how to explain mathematics concepts to young children (van Driel, Verloop, & de Vos, 1998). Teaching mathematics with connections (or integrated with other subjects such as music) provides a different way to present and apply mathematics knowledge. To effectively deliver intellectual communications, as well as reduce the redundant content across different disciplines, preservice teachers, especially elementary teachers, should be able to design and implement lessons in interdisciplinary ways (Catterall, 2005).

Developing integrated instructional abilities are often difficult because synthesizing processes are required during lesson preparation and higher order cognitive procedures are required to combine different pieces of subject knowledge into one part (Stein, Connell, & Gardner, 2008). Thus, implementing an integrated curriculum or lesson is impractical for most teachers because they lack the strategies, resources, and supports to prepare lessons that foster connections among subjects (Czerniak, Weber, Sandmann, & Ahern, 1999; Pang & Good, 2000). Because of curriculum design limitations at the elementary grade levels (e.g., lack of instructional time, weak curriculum organization, ambiguity of content focus) most teacher education programs fail to offer courses that prepare preservice teachers to develop integrated teaching methods (Zhou & Kim 2010).

Method

The current study was characterized by a sequence of classroom activities aimed at understanding preservice teachers' perceptions about the integration of music with mathematics instruction and their development of pedagogical content knowledge related to teaching mathematics integrated with music. The two research questions addressed were:

1. What are elementary preservice teachers' perceptions of the relative merits of music-mathematics integrated approaches to the teaching and learning of elementary mathematics?
2. How do elementary preservice teachers plan to integrate music activities addressing elementary mathematics topics for their future mathematics teaching practice?

Participants

The participants were 53 undergraduate preservice teachers (47 females; 6 males) pursuing an elementary education degree. Most (N=49) were Hispanic and ranged in age from 22 to 43 years. Thirty-five (35) were enrolled in the K-4 generalist certificate program and 18 were enrolled in the K-4 bilingual generalist certificate program. All participants were either in their third or fourth year of study, and were split between two mathematics methods courses during a regular academic semester.

Consent for participation in the study was obtained by the graduate teaching assistant and conducted in a manner that ensured that preservice teachers understood their rights, the purpose of the study, and did not feel coerced into signing the consent form. The graduate teaching assistant also safeguarded the anonymity of the participants so that the instructor would not know which preservice teachers were participating in the study.

Setting

The research took place at a large public university in a southern bilingual metropolitan area. Approximately 23,000 students attend this university. The student body is 77% Hispanic and 54% female. At the time of this study, slightly more than 250 preservice teachers were enrolled in the K-4 generalist certificate program and approximately 150 were enrolled in the K-4 bilingual generalist certificate program.

Intervention

The intervention consisted of a series of six 40-minute interactive music-mathematics integrated activities, which were introduced to preservice teachers over a six-weeks period within a regular academic semester. Table 1 shows a list of the music activities integrated into the mathematics content areas.

TABLE 1
Intervention Activities for Teaching Mathematics Through Music

	Mathematics Content Area(s)	Music Activity
Week 1	Numbers and Operations	Music Playing Activities
Week 2	Data Analysis, Algebra	Music Composition Activities
Week 3	Geometry	Musical Instrument Designing Activities
Week 4	Probability	Music Composition Activities
Week 5	Measurement	Musical Instrument Designing Activities
Week 6	Numbers and Operations, Algebra	Music Composition Activities

Procedure

The intervention activities were implemented in two mathematics methods courses during regular class meetings over the course of six-weeks. In each of the courses, one music-mathematics integrated activity was introduced each week (see Figure 1) that focused on one or more major mathematics content areas corresponding with that week's topic. After each activity, preservice teachers were introduced to demonstrations and research studies about how and why integrating mathematics with music might improve students' mathematics learning. Although participants had different schedules for presenting their lessons, the researchers took diligence in trying to ensure that both class sessions received equivalent activities during the intervention. Following the intervention activities, the researchers introduced two discussion forums. The first forum was introduced in week seven; the second forum, week eight. It should be noted that the same instructor taught both sections of the course, and though the participants were roughly equivalent demographically, they were not chosen based on any distinguishing factors.

Data Collection

Data collection occurred during one academic semester over a period of three weeks. After the first six weeks of demonstrations involving integrated music-mathematics activities, preservice teachers participated in an online interactive discussion by writing a reflective essay and making comments on each other's essays. Two discussion forums were created that asked students about: (1) their experiences in participating in the music-mathematics integrated activities and (2) their plans to design and implement a mathematics lesson with music activities in their future classroom.

In weeks seven and eight, preservice teachers were asked to write a disposition essay with multiple paragraphs for each topic of the discussion forum. In week nine, preservice teachers were asked to provide meaningful comments with one or more paragraphs about their classmates' essays for both discussion forum topics. The first discussion forum topic yielded a total of 148 writing pieces (53 disposition essays; 95 follow-up comments; 109 writing pieces). The second discussion forum topic yielded 53 disposition essays and 56 follow-up comments. Although data were collected during the semester, they were not reviewed until after final grades were calculated. Figure 1 outlines the data sources and data collection timelines.

Figure 1. *Intervention and Data Collection Timelines*

Week 1 – Week 6	Week 7	Week 8	Week 9
Demonstration of Music-Mathematics Integrated Activities	Discussion 1	Discussion 2	Comments

Data Analysis

For data analysis, a grounded theory approach (Corbin & Strauss, 2008) was used which posits "systematic, yet flexible guidelines for collecting and analyzing qualitative data to construct

theories grounded in the data themselves" (Charmaz, 2006, p. 2). The coding process was comprised of two main steps. The first step involved open and selective coding, which focused on creating categories and their properties. The second step involved theoretical coding, which connected the substantive codes together into a complete hypothesis and theory.

The constant comparative method was used to code the data. First, the writings were compared instance to instance to generate categories. Then, new instances were compared to the categories, which resulted in the formation of new categories from the comparisons. This process allowed for an initial and broad list of categories to be created from the first reading of the data. In the second phase, the data were grouped based on a series of questions such as "What category does this instance indicate? What is actually happening in the data?" (Glaser, 1978, p. 57). This allowed us to collapse the categories and establish themes that were immersed in the data. After the initial themes were established, a randomly selected subset of the data was reviewed and coded based on these themes to determine if the data were saturated or if additional categories needed to be created. Once the coding of subsets was completed, the remaining data were coded using categories previously developed.

Results

This study addressed two primary research questions. The first question examined elementary preservice teachers' perceptions of the relative merits of music-mathematics integrated approaches to teaching and learning elementary mathematics. The second question attempted to determine how elementary preservice teachers planned to integrate music activities into elementary mathematics topics for their future mathematics teaching practice?

Interactive Music-Mathematics Activities

Of the six interactive music-mathematics activities (see Table 1), the two activities experienced most by preservice teachers were "music composition" and "musical instrument design". In these activities, preservice teachers learned how to use graphic notation (e.g., music color cards) and a variety of musical instruments (e.g., handbells, drums, keyboards) as manipulatives to teach mathematics as well as to represent music through statistical methods (see Figures 2-4). During these activities, preservice teachers were given musical pieces to help them understand how to use mathematical methods to analyze the pieces based on music theories, and they were given opportunities to experiment, practice, and apply various mathematics concepts and skills through the series of music-mathematics integrated lessons. For example, during the mathematics lesson that incorporated a music composition activity, music composition color cards were provided to the preservice teachers as a creative music composition tool. Preservice teachers used the color patterns, number patterns, and letter patterns written on the cards to compose the music, which was played by using hand bells; and they were asked to solve a number of mathematics word problems based on their musical works.

Figure 2. *Handbells, Graphical Notation, and Staff Notation of "Twinkle Twinkle Little Star"*

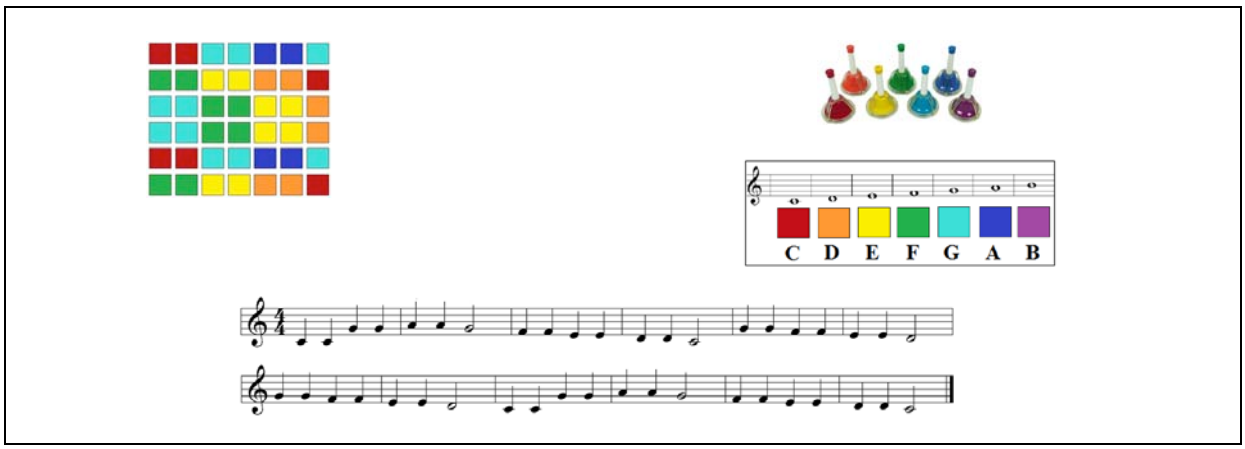


Figure 3. *Sample of Mathematics Problems Based on "Twinkle Twinkle Little Star"*

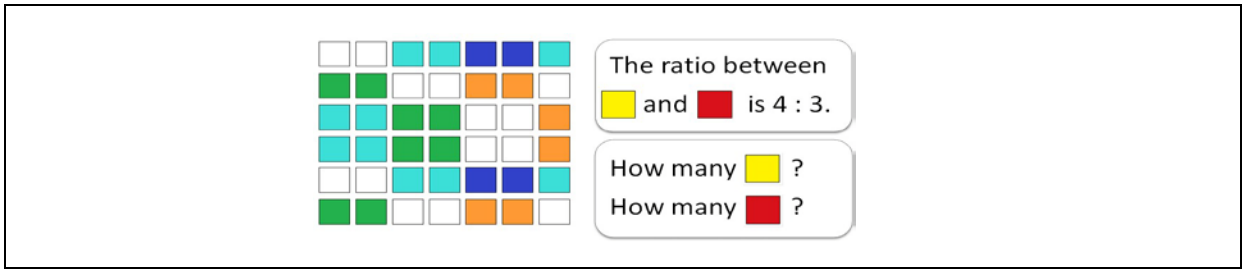
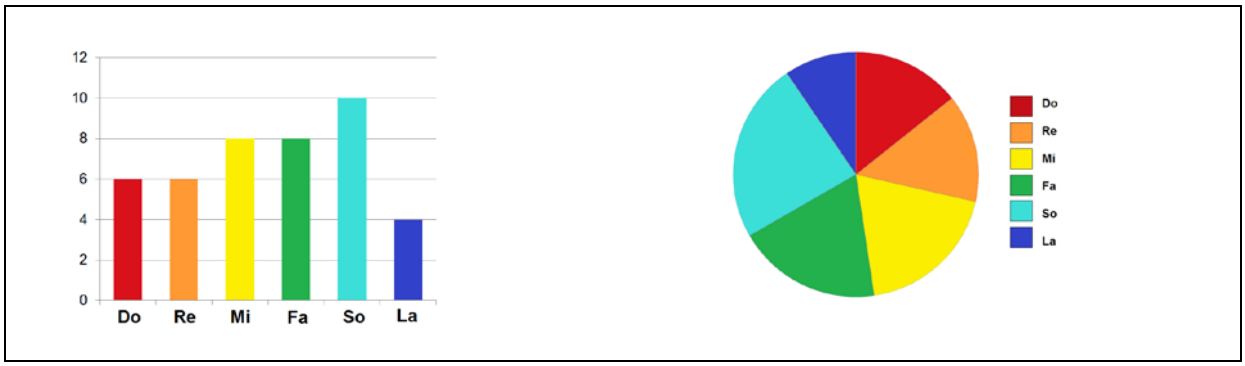


Figure 4. *Statistical Graphs Based on "Twinkle Twinkle Little Star"*



Further, the results indicated that preservice teachers expressed a variety of ideas about their perceptions of teaching mathematics integrated with music and teaching strategies for music-mathematics integration.

Research Question 1: *What are elementary preservice teachers' perceptions of the relative merits of music-mathematics integrated approaches to teaching and learning elementary mathematics?*

An analysis of preservice teachers' reflective essays from the first discussion forum (the topic, which was extricated from Research Question 1) revealed that preservice teachers' perceptions about the music-mathematics integrated approach to teaching mathematics yielded four main themes — fixing common mathematics education problems (33.78%), improving student academic achievement (43.92%), engaging math education with enjoyable experiences (94.59%), and developing creativity in mathematics and learning (30.41%) — and 21 subthemes. These themes and subthemes were generated from preservice teachers' writings on the discussion forum, which emerged from 53 disposition essays and 95 follow-up comments (see Table 3).

TABLE 3

Themes Derived from Preservice Teachers' Perceptions Toward the Teaching and Learning of Mathematics Through Integrated Music-Mathematics Instruction

General Themes	Subthemes	Response Count (n=148*)	Response Rate
1. Fixing Common Mathematics Education Problems	• Ease teaching process • Reducing anxiety • Accommodating different learning styles • Appropriate challenge • Alternative understanding and evaluation • Remove language barrier	14 15 9 7 3 2	50 (33.78%)
2. Improving Student Academic Achievement	• Facilitate learning and development • Connecting and recalling information • Improve understanding • Broad content coverage	15 22 22 7	65 (43.92%)
3. Engaging Mathematics Education with Enjoy-able Experiences	• Foster engagement • Entertaining and fun • Motivation and interest	28 75 37	140 (94.59%)
4. Developing Creativity in Math Teaching and Learning	• Innovative pedagogy • Multiple approaches • Dynamic learning process	30 8 7	45 (30.41%)

***** Note: Responses computed based on participants' total writing pieces.

Fixing Common Education Problems

The first theme, fixing common mathematics education problems, emerged from preservice teachers' views of the integrated music-mathematics approach as being an effective method to

engage students to focus on mathematics learning and participate in mathematics explorations. Collectively, teachers listed the enjoyable and exciting experiences solving musically contextualized mathematics problems, representing and reasoning through mathematics in diverse ways with musical connections, and cooperating with classmates to create and analyze mathematics through music as activity components that have the potential to motivate students to attempt more challenging mathematics tasks. Preservice Teacher A remarked that mathematics-music interdisciplinary teaching and learning experiences were engaging through the dynamic and interactive nature of the activities, and described how this pedagogical approach can help students experience mathematics learning with excitement.

> Math it is a subject which the majority of the students think it is so difficult to learn. By using dynamic activities the students will be more focused and excited to participate and learn. Children love the sound of music, the beat, the rhythm is what catches their attention at the very first listen. Honestly I am impressed in how different kind of activities and content areas can we adjust using music-mathematics to teach them. In the class I was so excited to participate and be part of the lesson, I can imagine how more excited the young kids will be

Improving Student Academic Achievement

The second theme, improving student academic achievement, emerged from preservice teachers' comments about how teaching mathematics integrated with music activities can improve students' achievement in mathematics. Various statements were provided to explain how this improvement could occur. For example, it would: (a) stimulate the brain as well as cognitive development, (b) help students to retain and recall information more effectively by making more connections, and (c) allow teachers to introduce different mathematics contents in relation to music. Preservice Teacher B remarked:

> Music is the key to the soul. Music is used for celebration, expression, connections to others, and simple enjoyment. So why wouldn't music be good for education? I think that integrating music into learning is pure genius! Through the use of rhythm, the brain makes connections that otherwise would not be made. One method to help improve students' mathematical performance is to change the approach and to integrate mathematics with other academic subjects; music gives students a practical approach to learning and using math. It is important to prepare activities which can attract the students' attention, in that way the students will be able to remember what they are learning.

Engaging Mathematics Education With Enjoyable Experiences

The third theme, engaging mathematics education with enjoyable experiences, materialized from Preservice teachers' shared instances about how music can help teachers solve or alleviate current issues in mathematics education, including mathematics anxiety, difficultly in reaching all students, language-culture barriers, and lack of techniques to provide alternative ways to represent and assess mathematics concepts. In general, preservice teachers reported that using music as a context to develop mathematics lessons benefits both teachers and their students.

Specifically, they noted that teaching mathematics through music is a way to present math concepts that make sense to students and it can provide more flexibility in presenting mathematics tasks that accommodate students with different learning styles and academic levels. Additionally, music-mathematics instruction can foster a more positive attitude and less anxiety among students, as well as facilitate communication with their peers through the universal language of music without language-culture barriers. Preservice Teacher C described his perspective of the value of music for reducing students' anxiety in learning mathematics in the following manner:

> Learning how music can be integrated into math throughout this semester was interesting as well as fun. We as future educators have to create a classroom that has low anxiety and stress levels. Students often get frustrated when trying to understand math and with music-math activities I think students will not only enjoy it but it will help them comprehend the material better. Music can help to keep the levels of tension and stress to a minimum as well as have the power to keep students engaged. Using music activities in my future lessons can help by making the day more alive and interesting as well as the lesson.

Developing Creativity in Mathematics Teaching and Learning

The final theme, developing creativity in mathematics teaching and learning, emerged from preservice teachers perceptions of music being a meaningful context to combine with mathematics. Preservice teachers perceived this approach as having benefits not only for teachers (by providing them with new ways to demonstrate mathematics concepts) but also for students in helping them understand and apply mathematics in non-routine ways through active exploration processes and problem-based learning experiences. For example, Preservice Teacher D noted that many teachers refuse to teach mathematics in conjunction with the other school subjects because they believe they do not know enough about the educational connections among the different subject areas. Nonetheless, this participant stated that the music-mathematics integrated lessons was an innovative way to show teachers a new approach to teach contextualized mathematics and possibly learn with their students at the same time:

> Fear keeps many teachers from trying to teach mathematics through music. Teachers often think they don't know enough about the relationships between these subjects. The relationship is not that mysterious and help does exist. Moreover, showing students how an adult goes about learning a new subject may well be one of the most important lessons a teacher can pass along. Admitting to students that we don't know something can be a daunting task for teachers, but the lessons learned from this experience can stay with students for a lifetime. This semester, we have seen many different strategies that are being used in classrooms. Since students have different ways to learn this is also helpful for those who struggle in learning the traditional way.

Research Question 2: *How do elementary preservice teachers plan to integrate music activities addressing elementary mathematics topics for their future mathematics teaching practice?*

An analysis of preservice teachers' reflective essays from the second discussion forum (the topic, which was extricated from Research Question 2), revealed 18 specific mathematics lesson topics and five mathematics content areas in which they proposed to integrate music activities (see Table 4). Numbers and Operations (75.22%) was the most prevalent content area followed by algebra (55.96%), geometry (37.61%), probability and data analysis (32.11%), and measurement (15.60%).

TABLE 4

Preservice Teachers' Plans for Integrating Mathematics Content Activities in Future Mathematics Teaching Practices

Mathematics Areas	Mathematics Content/Lesson Topics	(n=109*)	
		Response Count	Response Rate
1. Numbers and Operations	Counting	14	82 (75.22%)
	Number Relationships	5	
	Concept of Fraction	20	
	Real Number (Negative Number)	3	
	Whole Number Computation	26	
	Basic Facts	8	
	Fraction Computation	6	
2. Algebra	Algebraic Patterns	46	61 (55.96%)
	Algebraic Expression	4	
	Ratio/Proportion	7	
	Representation of function	4	
3. Geometry	Shapes and Prosperities	22	41 (37.61%)
	Geometric Transformation	19	
4. Probability and Data Analysis	Concept of Chances	8	35 (32.11%)
	Independent Events	4	
	Statistical graph	21	
	Statistical Relationship	2	
5. Measurement	Time	11	17 (15.60%)
	Length	4	
	Area	2	

* Note: Response computed based on participants' total writing pieces.

Numbers and Operations

Preservice teachers identified numbers and operations as the most frequently cited mathematics area in which they would integrate music. Among the specific lesson topics mentioned were counting, number relationships, the concept of fractions, real numbers, whole number computation, and basic facts and fraction computation. Music composition and playing activities were described as the main musical elements that would be incorporated into the lessons. For example, Preservice Teacher E proposed a mathematics lesson with the learning objective of understanding the concepts of counting, addition, and subtraction:

> I think addition, subtraction, and perhaps multiplication and division could be taught using music. I would use a maximum of ten bells to be rung by individual students to make up a problem then solved by other students as a game. Have certain numbers being represented by the different color bells. I would integrate music into a math lesson by having 10 students lined up at a time with different colored bells. Each bell represents a number for example blue is one, green is two, and so on. I would say word problems to them such as "5 minus two is"…and the correct responding colored bell must ring his or her bell. If a wrong bell is rung, someone else from the class must replace their spot to attempt the activity.

This preservice teacher continued by describing how she would develop a lesson about number operations not only for students in lower grades to practice counting, addition and subtraction, but also for students in higher grade levels to learn the concept of fractions, practice fraction computations, and pose their own problems:

> A math lesson that I would do integrating music would be adding by using the music notes. For younger students I would have them counts or subtract the notes on a music sheet. For older students, I would use music to teach them fractions. I would go more on depth and instead of just counting or subtracting notes I would tell them about the value of each note. For example, adding a quarter note and a half note. So we would use this kind of examples to learn about fractions. I would also have the students play the songs that they are using to answer those questions, or I would simply play it to them. I would also have the students come up with their own problems using what they learned.

Algebra

Algebra was the second most frequently cited area identified by preservice teachers as an area in which they would teach music-mathematics integrated activities. Among the content lesson topics identified by preservice teachers for incorporating the music-mathematics strategy were algebraic patterns, algebraic expression, and ratio and proportion as well as representations of functions. The key musical elements cited for infusing these activities were music composition and playing activities. Preservice Teacher C plans to ask students to create their own music by using patterns, which will be embedded into the beat, rhythm, melody, and tempo of students' music. Preservice Teacher C remarked:

> The type of lesson that I will integrate music into would be patterns. Patterns are a unifying theme of mathematics. Students will be able to investigate the patterns that they find in numbers, shapes and expressions as they make mathematical discoveries as well as create a variety of patterns that will help them represent mathematics in the real world. Numbers and shapes certainly offer many opportunities, but so do music, language and physical activity. Students will create a beat, rhythm, melody and a tempo as they see the pattern they are creating the music for, just like we did in class. Students will also create their own patterns by using color-music cards to compose music and play their music by using handbells.

Ratio and proportion and other algebraic concepts were also expressed by preservice teachers in their strategies for teaching a music-mathematics integrated lessons to students that introduces part-part ratios and part-whole ratios. These mathematical topics are relevant to music in several ways, one of which is that ratios are key to understanding why different notes have different tones. Likewise, the concept of ratio between different notes can be developed into algebraic questions and formulas (see Figure 2). Preservice Teacher E described this approach as follows:

> Ratio proportion is one of the mathematical concepts that can be taught based on using the graphic musical notations to compose and play music. I will prepare musical composition cards for my students to compose and play music, and then I will ask them to find the ratio of different musical notes (cards with different colors) in the music that they composed by themselves. For example, what is ratio between the music note of Mi (yellow card) and Fa (Green card) in the song? What is ratio between the music note of Re (orange card) and all the music notes in the song?

Geometry

Preservice teachers also generated a series of geometry and measurement lessons that can be taught with music activities. Some lessons were based on: (a) making geometric transformations such as reflection and rotation within the music composition processes, (b) musical instrument designs such as using geometrical figures to construct a guitar and taking geometrical measurements of musical instruments, and (c) using songs to help students remember geometrical shapes. As an example, Preservice Teacher F proposed a lesson using songs and singing activities to teach geometric figures:

> If I am going to design a math lesson that integrates with music activities, I would focus on shapes for the lower grades. I would incorporate songs that would help my students memorize the shapes. For example, like singing the Hockey Pokey song to remember the shapes. I would cut out the shapes for every child in the class then we would start singing the song and when they hear a certain shape they need to find the shape in their pile and hold it up, like if we sing "Put your Circle in, put your circle out put your circle in and you shake it all about..." they have to hold the circle up.

Other preservice teachers like Preservice Teacher B, developed lessons using musical instruments to teach shapes. The narrative below describes how Preservice Teacher B integrated

guitar designing with triangles by using electronic guitar images and music videos with students exploring triangles by constructing their own guitar outlines:

> I will let my students practice measuring angles and create the body of an electric guitar out of triangles. First, I will provide some examples about electric guitars from Google Image, and also play some video clips from Youtube.com of musicians playing electric guitars. Then I will ask students to design their own guitar by drawing triangles and make geomantic transformations about their triangles. Students will then explore the property of triangles including angles and sides.

Measurement

Measurement, the third most frequently cited category, is a concept that involves understanding and representing length, size, capacity, time, and weight. These concepts can be found in musical instrument designing and music playing processes. Preservice Teacher G introduced a strategy of teaching measurement which included the following: (a) music instruments being used as a measurement task whereby students are directed to investigate the length and size among different instruments by using different measurement units and (b) music pieces being used as measurement tasks and time as a measurement concept represented by integrating it with length:

> Students could create their own musical instruments and take measurements of their materials used as they go. I will teach students what units are better for measuring several different instruments, for example, inches, meters, cm, km, depending on the size of the instrument. Students can measure the length of the instruments and compare them to other instruments. They can also measure the length of the note in a music piece to see how far they can measure, for example, whole note=1inch, and half note=1/2 inch and so forth. They can measure the strand of the music.

Probability and Data Analysis

The fourth category, probably and data analysis, preservice teachers proposed a variety of activities for teaching probability and data analysis through music composition and playing. For example, Preservice Teacher C proposed a musical experiment for checking out independent events through a music composition process—e.g., after students play the music they compose, they will analyze the frequency of each musical note they used to construct a bar graph. Specifically, this preservice teacher said:

> For probability, students can create a song with the handbells using the corresponding colored squares and collect data from the squares (How many blue, purple, etc.) Then they can put the squares in a bag and mix them up, and try to find the probability that a particular number will be played and this would correlate with data analysis. For data analysis, students will be introduced to different string instruments and will be asked to create a bar graph according to the number of strings in more than one instrument. For example, the guitar has 6 strings so the graph would go up to 6. The violin has 4 or so, the graph would go up to 4.

Discussion

The results of this study provide insight into elementary preservice teachers' views about the intricacy of music-mathematics strategies for teaching mathematics. The majority of preservice teachers provided positive reflections about music-mathematics integrated pedagogy for teaching mathematics and how it allowed them to extend beyond the limitations of traditional mathematics instruction to present and apply mathematics knowledge in a more contextualized approach where students have opportunities to understand mathematics concepts in enjoyable and meaningful ways. They also proposed a variety of ways to teach mathematics with integrated music activities.

For the music-mathematics integrated instructional strategies, a total of 20 specified math lesson topics covering the five major mathematics content areas listed in the NCTM standards (NCTM, 2000) — numbers and operations, algebra, geometry, measurement, and data analysis and probability — were identified by preservice teachers. These prospective instructional strategies provided additional examples of how music activities can be developed as a way to address mathematics lessons. This finding is consistent with previous studies showing that there are multiple ways that teachers can design mathematics lessons with different topics integrated with music (An et al., 2013; Robertson & Lesser, 2013). Further, the study revealed that connections between music and mathematics could be developed as an integral part of mathematics lessons. It also showed that this connection could be used to introduce a mathematics concept at the beginning of lessons, apply mathematical knowledge in the middle of a lesson, or practice mathematical skills at the end of a lesson.

Benefits of the Music-Mathematics Instructional Approach

Overall, preservice teachers' perceptions about teaching mathematics through music are consistent with existing research on arts based interdisciplinary instruction in K-12 settings and teacher education programs. This research has shown that music-mathematics integrated instruction can reduce students' mathematics anxiety (An et al., 2008; An et al., 2011; Colwell, 2008); accommodate different learning styles and allow alternative ways of thinking (Brown, 2013; Colwell, 2008); improve students' engagement and motivation in mathematics learning (Brown, 2013; Mansilla, 2005); and develop creativity in STEM teaching and learning (Carrier et al., 2011; Marshall, 2005).

The first theme, which emerged from preservice teachers' written essays about music-mathematics integrated instruction, was *fixing common mathematics education problems.* This finding was consistent with previous studies which found that music-mathematics integrated instruction can reduce common mathematics education problems, such as mathematics anxiety (An et al., 2008; An et al., 2011; Colwell, 2008). In the current study, preservice teachers envisioned that an integrated music-mathematics curriculum provided the tools to solve common mathematics education issues. They also perceived that such a curriculum could potentially fix common mathematics education problems such as math anxiety, language barriers among students, lack of challenge for high achieving students, lack of strategies to accommodate students with diverse needs, and lack of alternative ways to provide assessment. Explanations for the positive perceptions of this integrated approach may be associated with preservice

teachers' experiences, the majority of whom indicated that this approach allowed them to escape the limitations of traditional mathematics instruction that consisted mostly of presenting and applying mathematics knowledge that is disconnected from other topics. They also viewed this approach as more contextualized which allowed students opportunities to understand mathematics concepts in enjoyable, meaningful, and relevant ways.

The second theme that emerged was *improving student academic achievement*. This finding was consistent with previous studies, which have found that a music-integrated curriculum can enhance student thinking and subsequent learning performance. For example, Brown (2013) and Colwell (2008) found that an integrated curriculum, especially one that uses music as a pedagogical theme, could accommodate different learning styles and allow alternative ways of thinking. In this study, preservice teachers viewed music-mathematics (which involves listening to music, playing music, and music composition), as a medium for facilitating students' mathematics brain development and helping students memorize abstract mathematical concepts by associating mathematics facts with their favorite songs. By using music as a tool that students can use to associate with different pieces of knowledge, they have more innovative ways to retain and recall information, which may help them develop problem solving strategies by connecting different mathematics content together and using alternative ways to internalize mathematics concepts.

The third theme, *engaging mathematics education with enjoyable experiences*, was consistent with existing studies (e.g., Robertson & Lesser, 2013) which have found that a music integrated teaching method can have powerful positive effects on student-teacher engagement. In a carefully designed learning environment built on music activities, An and colleagues (2011) found that preservice teachers were aesthetically engaged. Throughout the intervention, it was reported that preservice teachers' engagement might be improved as a result of: (a) their original interests in music and curiosity of finding the mathematical patterns behind music; (b) the enjoyable experiences of composing music, playing music and designing musical instruments based on meaningful mathematics arrangement; and (c) the creative investigation of mathematics pedagogical components based on their authentic musical works. Preservice teachers were convinced that the learning environment created, based on music activities, can be used as effective mathematics teaching strategies to engage elementary students to participate more with mathematical tasks.

The fourth theme, *developing creativity in math teaching and learning*, which emerged from preservice teachers' discussion forum, centered around music-mathematics integrated instruction as a medium for developing creativity in math teaching, and learning that could provide a positive math classroom environment for students. This finding was consistent with previous literature (Carrier et al., 2011; Marshall, 2005) which suggested that offering students' learning experiences based on interdisciplinary tasks would promote creativity in both teaching and learning processes for teachers and students. In the current study, preservice teachers indicated that a music-mathematics integrated lessons would allow teachers to implement more innovative teaching methods by providing students with opportunities to think outside of the box. These strategies offer various non-drill forms of activities that have the potential to help students view mathematics from different perspectives. As a result, when students are solving mathematics problems, they have more ideas and approaches in mind for how to solve the problem.

Preservice teachers also reported that music could be explored as a framework for developing mathematics lessons by making connections within and outside of the mathematics curriculum. The interdisciplinary teaching scenarios in the music-mathematics lessons can prompt students to use meaningful strategies through wider and more flexible processes to learn mathematics.

Music-Mathematics Teaching Strategies

Preservice teachers posed a variety of music-mathematics teaching strategies for the major mathematics content/lesson areas. This finding was consistent with previous studies (An et al., 2011; An et al., 2013) which have reported that when teachers have opportunities to experience exemplary mathematics lessons based on meaningful music activities, they will be enabled to explore more connections between the two subjects and design innovative mathematics lessons based on inventive musical elements. In the intervention, multiple examples of music and mathematics integrated activities were introduced to preservice teachers in music composition/playing activities and musical instrument designing activities.

From these experiences, preservice teachers were not only convinced that there are connections between music and mathematics, but also that these links can be further explored and developed as meaningful parts of mathematics lessons. Topics in music that range from basic (i.e., rhythm, intervals, and intervals) to advanced (i.e., melody, music form, and instrumentation) can be integrated into mathematics from elementary to college courses (Harkleroad, 2006). The current study suggests that preservice teachers' pedagogical content knowledge (especially knowledge of preparing mathematics lessons with meaningful connections within and outside of mathematics content) provides them with more opportunities to understand how to identify and apply educational resources to design and implement mathematics lessons in different ways.

Of the mathematics lessons proposed by preservice teachers, the two primary music activities integrated into their lessons were music composition and playing activities. Perhaps the main reason for this finding can be attributed to preservice teachers learning how to develop effective mathematics lessons from the examples provided to them during the intervention. To some extent, the intervention activity enlarged preservice teachers' pedagogical and curriculum knowledge about teaching mathematics integrated with music. Unlike common teaching methods that teachers use to teach mathematics through music by letting students count beats, rhythms or sing a song with mathematics content as lyrics (Rogers, 2004), most of the preservice teachers in this study explored the music-mathematics connections in a more profound way by developing lessons based on complex music activities such as music composition and musical instrument development.

Conclusion

The current study had several limitations, among which are the sample size, which limits its generalizability; an ethnically homogenous sample with perceptions that may not reflect the perceptions of other minority preservice teachers; and the diversity in preservice teachers' interests or abilities in music and their general attitudes toward mathematics education, all of which could have been better assessed at the beginning of the course.

The findings suggest several things. First, the need for additional studies that investigate preservice teachers perceptions and attitudes of contextualized mathematics and its impact on their mathematics content knowledge. Second, the need for studies on how preservice teachers learn about music-mathematics integrated teaching strategies and the implementation of these strategies in the classroom. Thirdly, the need for knowledge on how to best integrate technology into the music-mathematics curriculum, which is a n atural next step in this area that could strongly impact both teacher and student outcomes.

The findings also invite further research with pre-post assessment and control groups on the effects of using music-mathematics integrated lessons as interventions and preservice teachers' self-efficacy beliefs towards teaching mathematics. A lso, additional research needs to be done on constitutional research and its impact on music-mathematics integrated curriculum and instruction on teachers' pedagogical content knowledge and their students' mathematics dispositions and achievement at various grade levels.

One of the most important goals of teacher education programs is to develop preservice teachers' comprehensive abilities and positive perceptions toward teaching and learning mathematics. However, many preservice teachers have limited opportunities to learning innovative methods for teaching mathematics. As such, mathematics teacher educators and curriculum developers need to provide a variety of workshops and other professional development opportunities to introduce preservice teachers to more effective and innovative teaching strategies. Mathematics methods courses have the potential to positively shift teachers' attitudes and beliefs towards mathematics through observing effective lessons, meaningful activities, and authentic experiences involving the development, implementation, and evaluation of mathematics lessons in innovative ways (Gresham, 2007; Knoblauch & Hoy, 2008).

By designing appropriate music activities integrated across mathematics lessons, teachers can offer more approaches for students to comprehend, investigate, and apply mathematics (An et al., 2013). With the aim of facilitating preservice teachers' understanding of effective ways of teach mathematics lessons to elementary students, teacher educators should make extra effort to improve preservice teachers' awareness and abilities for teaching mathematics contextualized with the activities that children may be engaged, such as music (Robertson & Larry, 2013).

The music-mathematics integrated teaching strategy, with its unique feature of creating a h igh motivational learning environment (An et al., 2011), is an effective teaching strategy that allows preservice teachers to effectively and creatively meet the needs of students. Findings from this study indicate that preservice teachers benefit from the opportunities to experience and learn different ways of teaching mathematics lessons. Teaching mathematics with connections to other disciplines, such as music, can improve students' understanding of mathematics concepts and their dispositions about mathematics (van de Walle, 2010). Consequently, we recommend that mathematics teachers take advantage of the rich connections between music and mathematics to develop a variety of activities to teach mathematics in an enjoyable and productive way.

AUTHOR NOTES

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Exploring Team-Based Learning at a State University

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A small group of faculty at Salem State University representing the disciplines of Chemistry, Finance, Geography, Political Science, and Social Work implemented a Team-Based Learning (TBL) model in their courses to explore its efficacy for increasing student engagement. Surveys were used to collect pre- and post-data from students to determine the extent of change in their perceptions of TBL. The data showed that TBL not only heightened students' self-awareness of their learning capabilities but also revealed that students had an affinity for TBL, often preferring TBL courses over traditionally structured courses.

Keywords: team-based learning, teaching strategies, student engagement, multi-disciplinary research

Increasing student engagement and learning has become an increasingly important focus of faculty at colleges and universities. One instructional strategy that can be used to motivate, encourage, and engage students in the learning process is team-based learning (TBL). TBL is a form of small group collaborative learning, which can also be extended to larger class settings. The concept of TBL was developed, refined, and popularized by Larry K. Michaelsen. Michaelsen (2004) used this instructional strategy as a way to not only contend with large classes but also to promote learning and foster a more actively engaged classroom. TBL emphasizes that students' initial contact with course content should occur prior to class thereby providing a larger amount of class time to apply and evaluate concepts.

Since its development in the late 1980s, TBL has been used extensively by educators who have observed improved performance of their students in areas such as attendance and engagement, as well as learning gains in course content understanding, application, and critical thinking (Michealsen, Knight, & Fink, 2004). After implementing TBL in an evidence-based medicine course, Hunt, Haidett, Coverdale, and Richards (2003) reported that student attendance increased from 50%-60% to 82%-95%. In another study, Kelly et al. (2005) used trained observers to measure student engagement in traditional lecture, problem-based learning, and TBL classrooms. Lecture classrooms showed slight peer engagement (9%) and problem-based learning classrooms showed relatively little engagement with the instructor (11%); whereas, TBL classrooms showed a balance between peer engagement (51%), engagement with the instructor (21%), and time for reflection and writing (28%).

Other TBL studies have shown significant learning achievement. Letassy et al. (2008) implemented TBL in an endocrine system module and observed improvement in student grades and no failing scores on unit tests, compared to the previous semester. When Levine et al. (2004) employed TBL in a third year psychiatry clinical clerkship, they found that students performed better on their standard exams for that area. In a larger study, Koles, Stolfi, Borges, Nelson, and Parmelee (2010) analyzed individual item scores for a class over two academic years, which showed two notable results. First, students performed better on topics that employed TBL than on topics not covered using this approach. Secondly, this effect was magnified for the weakest students. Not surprisingly, however, is that TBL studies have also shown improved outcomes when compared to small group learning. Thomas and Bowen (2011) divided students in an ambulatory medicine clerkship into two cohorts. Each cohort used TBL for half of the units and small team learning for the other half. They found that students performed better on four of the five topics that used TBL.

While the TBL literature report increases in student learning, student perceptions of TBL have been mixed. Hunt et al. (2003) found that students in an evidence-based medicine course reported increased learning and motivation to prepare for class, but expressed a preference for lecture and individual learning. A two-year study by Parmelee, DeStephen, and Borges (2009) found that medical students had a positive experience with TBL, but had mixed feelings about whether TBL improved their learning or grades. And, Thomas and Bowen (2011) found that medical students expressed impatience with the class time used for the readiness testing process.

Recently there has been some evidence of successful implementation of TBL with undergraduate students in fields as diverse as biology (Charmichael, 2009; McInerney & Fink, 2003), economics (Espey, 2012), history (Restad, 2012), literature (Roberson & Reimers, 2012), psychology (Coleman, 2012; Haberyan, 2007; Kubitz & Lightner, 2012), sociology (Hunter & Robinson, 2012), and theatre (Chamberlain, 2012). Unfortunately, the majority of evidence supporting the use of TBL is still focused on medical and pharmaceutical courses with students who are generally capable and motivated. And, it could be argued that these results might not be representative of most college students.

Background

Team-Based Learning (TBL) incorporates four practical elements—strategic formation of teams, readiness assurance, application activities, and peer evaluation (Cestone, Levine, & Lane, 2008; Michaelsen, et al., 2004). These elements, when combined, represent the six best practices of evidence-based teaching, which include cooperative learning, feedback, reciprocal teaching, whole-class interaction, required concept-driven decisions, and visual presentations (Hye-Jung & Cheolil, 2012).

Moreover, TBL provides opportunities for individual and team accountability through readiness assessment tests (RATs) (Michaelsen & Sweet, 2011; Sweet & Pelton-Sweet, 2008) and it promotes a type of social interaction that increases peer accountability, assessment, and evaluation. TBL also links student accountability to a decrease in social loafing, a concern for most instructors when they structure group activities. Student responsibility to each other is also fostered by each student's assessment of his or her team members' performance. This assessment

is a complicated process, as there are numerous criteria that students are often asked to consider. When students recognize that their contribution (or lack thereof) is important to the team's evaluation, it tends to spur active student engagement. While students often are initially reticent to assess and evaluate their team members, TBL research has shown that these roadblocks can be overcome when instructors deliberate with students on the process of peer evaluation and work with students to customize the peer evaluation process so that it is meaningful for them (Cestone, et al., 2008; Hye-Jung & Cheolil, 2012; Watson, BarNir, & Pavur, 2010).

Implementing TBL requires planning and preparation to design each unit within a course around an explicitly stated goal. Though similar to traditionally structured and content driven classes, TBL differs in that courses incorporating this instructional technique require that the goals are behaviorally measureable and that the content is primarily provided through readings which are assigned prior to the beginning of each module. In TBL classes, students take the RAT individually and then in teams. After the RAT is completed, time is spent reviewing the material that was not understood by students, a method, which allows for more efficient use of time. In so doing, little to no time is consumed discussing what students understand; instead, the majority of class time is spent processing the material (Cestone, et al., 2008). Teams work together to apply the concepts and ideas covered in the readings and RATs; and because the majority of class time is spent working on higher level analysis and application of the course material, students in TBL classes develop social and reasoning skills along with knowledge acquisition (Sweet & Michaelsen, 2011; Sibley & Parmelee, 2008).

Method

Study Context

A group of faculty at Salem State University (SSU) joined a faculty learning community. The purpose of this learning community was to acquire knowledge about TBL and study how TBL was being used in other university settings. The learning community met every other week for one academic year, during which time they read and discussed the work of Michaelsen et al. (2004), and numerous empirical and non-empirically based peer-reviewed journal articles on TBL. As a result, the group decided to explore the efficacy of TBL with their students. The students with whom TBL was to be used often did not demonstrate the level of commitment or motivation as the graduate students in medical or pharmaceutical courses with whom the model had been studied. This study began during the 2011 Spring Semester, with data collection ending during the 2013 Spring Semester.

SSU is a public teaching university in Salem, Massachusetts with the primary focus on teaching and learning. SSU offers a variety of liberal arts and professional programs. In 2012, there were a total of 7,143 students enrolled at SSU, with the largest enrollment of majors in business (16.8%), nursing (9.81%), and psychology (7.52%). Of this number, the vast majority (5,777; 80.9%) were undergraduate degree seekers (Salem State Factbook, 2012). While there are substantially more female than males enrolled in the undergraduate programs (61% vs. 39%, respectively), the student ethnic and racial make-up (73% White; 10% Hispanic/Latino; 7% African American/Black; 3% Asian; and 7% Unknown) is generally representative of the state's level of diversity.

The student graduation rates for SSU are similar to other state teaching universities. The four-year graduation rate for cohort years 2002-2008 averaged approximately 18.5%; the graduation rate in five years was approximately 38%; and six years, approximately 43% (Salem State Factbook, 2012). While many of the students enrolled at SSU graduate, the numbers that graduate seem to suggest that there are barriers to graduating in the traditional four-year period. Faculty report that the majority of students work full time. There are a considerable number of nontraditional students attending the university including Veterans, first generation college attendees, and returning adult students who have family obligations.

Although the faculty implementing this study was unable to find evidence of the efficacy of TBL with students similar to those at SSU, it was important for them to examine the effectiveness of the TBL approach with this student population. The purpose of this study was to explore ways in which a select group of SSU students engaged with each other in classes where TBL was strategically used to enhance learning, and to explore their experiences and perceptions of this pedagogical approach.

Participants

The participants in this study differed from the student population at large, particularly in the TBL courses. During the 2010-2013 academic years, 271 to 255 students participated in this study. The participants, mostly female, were undergraduate students in eight courses from four different disciplines (Chemistry, Finance, Geography, and Political Science) and graduate students from the School of Social Work. Additional information about the study participants is discussed under demographic characteristics.

Materials and Procedures

The courses from each of the disciplines utilized the main elements of TBL discussed in the research (i.e., students were placed in permanent teams, instructors provided frequent and prompt feedback, and individual and team RATs were given), with some pedagogical variations. Students in many of the courses had control of the percentage of an assignments' worth within a range set by the instructor. While application exercises were completed in teams, some courses featured mid-term and final exams that were not team oriented.

Data were collected throughout the three academic years. At the beginning of the semester, students completed a pre-survey that registered their expectations about TBL as explained to them. At the end of the semester, students completed a post-survey that measured their experiences with TBL.

The pre-survey asked students about their thoughts on assertions made in the TBL literature, such as many students are often reticent to work in teams (Michaelson, 2004). Using a five-point Likert scale (1= strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree), students were asked about potential concerns. Specifically, students were asked whether they looked forward to working in a team, would feel obligated to complete project tasks, and/or worried that other team members would not pull their weight and do their fair share of work. Students were also asked how they would function in a group, with questions ranging

from whether they thought they would perform adequately in a team to whether they would contribute significantly to upcoming team projects, and whether they thought they would be heard, appreciated, and valued. Additionally, students were asked whether they had previous experience with TBL and if they had any other general concerns.

Because the literature reports that TBL enables students to engage in critical thinking, foster positive team relations, and promote self-understanding (Cestone et al., 2008; Michaelsen, 2004), the pre-survey also asked students to rank their skill level in areas associated with traditional learning outcomes. Using a five-point Likert scale (1 = lowest and 5 = highest), students rated their performance in the following areas: (a) writing, including grammar and building an argument; (b) listening to others and comprehending what is being said; (c) stating personal views and opinions and making sure that they are understood; (d) facilitating a team dialogue, responding to others, and reaching an agreement; and (e) public speaking, including presentation skills. Demographic questions such as class standing (e.g., freshman, sophomore), major, age, and gender were also asked.

At the end of each semester, students were asked to complete a post-survey. This survey was designed to capture students' experiences with the TBL model. The first section of the post-survey asked students to report on their experiences with TBL; then, using the same five-point Likert scale as on the pre-survey, students were asked about their experiences in the TBL course. The post-survey also asked students to rank the same personal skills they had ranked on the pre-survey using the same five-point Likert scale.

Additionally, the post-survey asked students to report on the structure of the TBL course and whether they believed that the major claims of the TBL model were met. A five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree) was also used for this section of questions. Statements that the students were asked to respond to included: (a) whether the course suffered from a lack of organization; (b) if the TBL course made them feel more compelled to attend class; (c) if the TBL model was compatible with their learning style; and (d) how likely they were to recommend this class. Students were also asked whether, if given the choice to take the same course, they would prefer to take a traditional lecture-based approach or one that employed TBL. For this question, students had the option to indicate whether it depended on the course topic or if they had no opinion.

To explore the TBL assertions of increased levels of energy, improved quality of learning, and better student relationships and cohesiveness (Michaelsen et al., 2004), students were asked to evaluate whether the TBL course was livelier than other classes, whether their interactions with the instructor were better and more frequent, and whether they would keep the friendships they made during the course. The same demographic information asked on the pre-survey was also requested.

Data Collection and Analysis

Data collection began Spring 2010 and ended Fall 2013. Pre- and post- surveys were used to collect the data, which was analyzed using descriptive and inferential statistics. All data collected was aggregated prior to the data analysis.

Results

Demographic Characteristics

Two Hundred seventy-one students participated in the pre-survey and 255 students participated in the post survey. The majority (60.9%) had not previously participated in a TBL course; almost one-third (29.7%) had previously participated in a TBL course; and 9.4% were unsure if they had been involved a TBL course. Table 1 presents aggregated data on course demographics of the study participants. Most were female and most were political science, chemistry, and social work majors. Although participants were not asked about their ethnicity, they were asked their age. Approximately 62% were between the traditional college ages of 18 and 21 years, which is reflective of the university's service to nontraditional-aged students.

TABLE 1

Team-Based Learning Course Demographics

Category	Number (N)	Percent (%)
Gender		
Male	79	47
Female	89	53
Total	**168**	**100%**
Age		
18-19	56	32
20-21	53	30
22-23	28	16
23-25	10	6
25-30	16	9
> 30	13	7
Total	**176**	**100%**
Most Represented Majors		
Accounting	57	23
Biology	44	18
Chemistry/Physics	22	9
Political Science	23	9
Social Work	15	6
Criminal Justice	9	4
Business Administration	10	4
All Other Majors	10	4
Undeclared	56	23
Total	**246**	**100%**

Note: Aggregated data for the 2010-2013 academic years. Differences in "N" totals result from some questions not being answered by the respondents.

TBL data on class ranking and course levels by academic year are presented in Table 2. These data reveal that students were fairly evenly divided among class rankings (i.e., freshman, sophomore, junior, senior), with slightly more being juniors. While the majority of responses obtained in the study were from students enrolled in 100 level courses (41.6% pre-survey; 37.6% post-survey), the second largest group of responses was obtained from students enrolled in 400 level courses (22% pre-survey; 23.6% post-survey). The remaining responses were fairly evenly divided among students enrolled in 200 level (19.2% pre-survey; 20.7% post-survey) and 300 level courses (17.2% pre-survey; 18.2% post-survey). Although graduate courses were included in the study, no graduate students were identified in the data, as the surveys did not include an area for students to indicate if they were enrolled in a graduate level course when the study began. This lacuna accounted for some of the differences between the number of students who completed the pre and post-surveys. During the 2010-2011 academic year, only undergraduate students participated in the study. During the 2011-2012 and 2012-2013 academic years both graduate and undergraduate students participated in the study.

TABLE 2

Survey Results by Academic Year, Class Ranking, and Course Level

	Pre-Survey		**Post-Survey**	
Academic Year	N	%	N	%
2010-2011	25	9.20	34	13.30
2011-2012	56	20.80	61	62.80
2012-2013	190	70.00	160	72.88
Total	271	100.00	255	100.00
Class Ranking				
Freshman	53	22.18	53	23.45
Sophomore	53	22.18	44	19.47
Junior	75	31.38	78	34.51
Senior	58	24.27	51	22.57
Total	239	100.00	226	100.00
Course Level				
100	104	41.60	91	37.60
200	48	19.20	50	20.66
300	43	17.20	44	18.18
400	55	22.00	57	23.55
Total	250	100.00	242	100.00

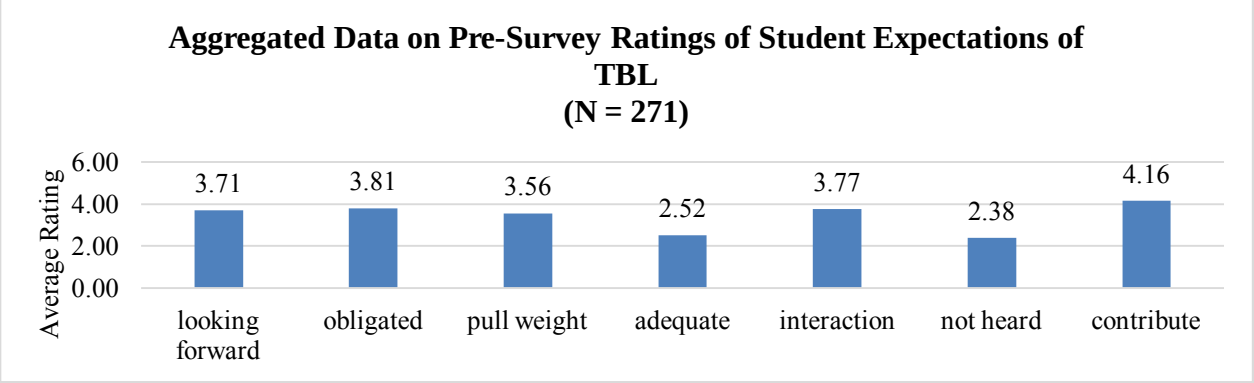
Note: Data on class ranking and course level are aggregated for the 2010-2013 academic years. Differences in "N" totals result from some questions not being answered by respondents.

Student Expectations of TBL

When asked, on the pre-survey, about their expectations and concerns about the TBL course, students responded quite positively (see Table 3). The average responses were neutral or above for the following statements: (1) I am looking forward to working with assigned team-members;

(2) I will feel more obligated to complete the project tasks because I will be working with a team and will have to report to others; (3) I am concerned that other team members will not pull their weight and do their fair share of the work; (4) I am concerned about whether I will be able to perform adequately in a team setting; (5) I am looking forward to interacting with students from my assigned team even though I may or may not know them well; (6) I am concerned that I may not be heard, appreciated or valued by the other team members; and (7) I believe that I will contribute significantly to upcoming team projects.

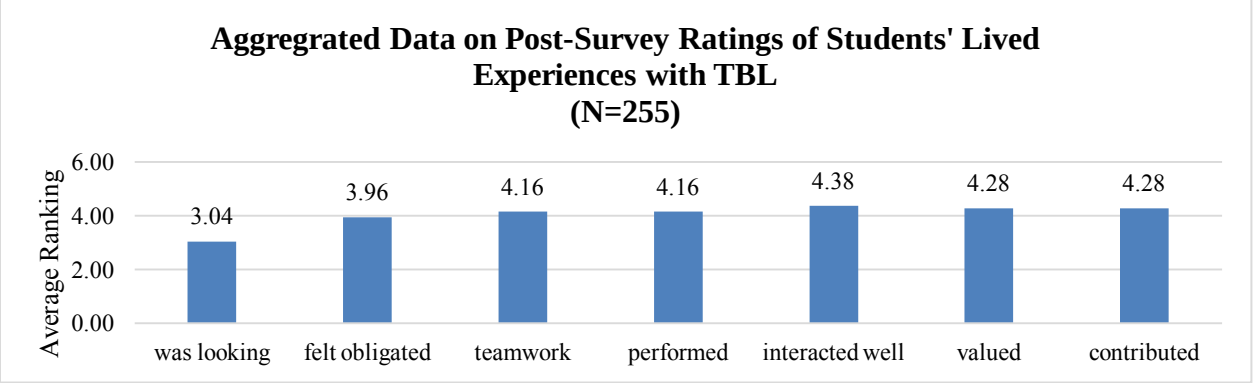
TABLE 3



1 = Strongly Disagree 2 = Disagree 3 = Neither Agree or Disagree 4 = Agree 5 = Strongly Agree

When asked, on the post-survey, about their expectations and concerns about the TBL course (see Table 4), on average students reported feeling mostly positive about their experiences (3.0), except for their recollection of how they anticipated working with their teammates in which they reported feeling neutral. Moreover, most students agreed with the following statements: (1) I felt more obligated to complete the project tasks because I was working with a t eam and had to report to others; (2) Other team members pulled their weight and did their fair share of the work; (3) I performed adequately in a team setting (4) My team interacted well - even though we may or may not have known each other well at the beginning; (5) I was heard, appreciated or valued by the other team members; and (6) I contributed significantly to team projects.

TABLE 4



1 = Strongly Disagree 2 = Disagree 3 = Neither Agree or Disagree 4 = Agree 5 = Strongly Agree

Prior to and after the TBL course, students were asked to rate their skill level in five areas—writing, listening, stating their own views, communicating, public speaking, and facilitating a team. Using a five-point Likert scale, where 1 is the lowest and 5 is the highest rating for skills ranked, the post-survey average was higher than the pre-survey average thereby indicating that students perceived an increase in their skill level. The average rating for each pre- post survey question was compared. For all but one question pair, the differences between the pre- and post survey averages were significant **(**see Table 5**).**

TABLE 5

Aggregated Data on Student Ratings of Skill Level

Skill	Pre-Survey (N=271)	Post-Survey (N=255)	Significance Level
1. Writing, including grammar and building an argument	4.22	4.59	.37*
2. Listening to others and comprehending what is being said	4.88	5.00	.12
3. Stating your own views and opinions and making sure your are understood	4.63	4.89	.27
4. Conversing and communicating and acknowledging others' views	4.79	5.01	.22*
5. Public speaking/presenting to an audience	3.65	4.14	.49*
6. Facilitating a group dialogue, responding to others, and reaching an agreement	4.40	4.72	.32*

*Indicates a significance difference

Students were also asked to consider how the TBL course differed from traditional courses they had taken. For the most part, students indicated that they were pleased with the structure of the TBL course. Using a five-point Likert scale, with 1 being strongly disagree and 5 being strongly agree (average rating, 1.76) students did not agree that the TBL courses were disorganized, which was a concern of instructors using the model because this model was quite different from other pedagogical models being used within their respective departments. On average, the students reported feeling satisfied with the amount of information learned during the TBL course (4.19); they felt they would likely recommend the course to others (4.41); and believed that the TBL classroom had a livelier atmosphere than other courses taken (4.26).

When asked if they had positive feelings about whether TBL was compatible with their learning style, the students' average rating was slightly lower (3.86). When asked whether they were more compelled to attend class, the average rating was 3.91. When asked whether their interactions with the instructor was better and more frequent, the average rating was 3.95. Interestingly, when students were asked if they would maintain the friendships developed in the TBL course, the average rating was 3.73.

Students were also asked to compare the TBL course with traditional courses. A majority (144, 58.3%) preferred the TBL course as opposed to traditional courses (18, 7.3%). Seventy-one (28.7%) stated it would depend on the course topic to determine which pedagogy they would prefer; 5.7% (n = 14) had no opinion.

Discussion

From the findings presented in this study, the following observations can be made. First, the claims put forth in the TBL literature such as students' feeling obligated to contribute to their team, concerns that team members would not participate, and being heard and their views appreciated (Michaelsen et al., 2004), generally matched students' expectations as well as their experience with the course.

At the beginning of each semester, SSU students were receptive to the benefits of the TBL model. On the pre-survey, students indicated that on average they agreed they were looking forward to working in groups (3.71); would feel obligated to complete tasks because they would work in teams (3.81); looked forward to interacting with their teammates (3.77); and, believed they would contribute significantly to upcoming team projects (4.16). Echoing their willingness to work with other classmates, the students generally disagreed that they would not be able to work adequately in a team setting (2.52) or that they would not be heard, appreciated or valued by their team members (2.38). As in the observations made in the TBL literature (Coleman, 2012; Espey, 2012; Haberyan, 2007), the students initially expressed a small but noticeable concern that other team members would not be able to pull their weight or do their fair share of the work (3.56).

On the post-surveys, students further reinforced their positive perceptions of the TBL model. First, TBL promoted student engagement in that students strongly felt they interacted well with their team (4.38). This finding is consistent with other findings in the literature relating to the specific ways that TBL organizes group activities to collectively enhance learning (Levine, et al., 2004; Michaelsen, et al., 2004). Students' claims of making significant contributions to the class (4.28) provide further evidence that TBL is more likely to promote student discussion and analysis of the material than other pedagogical methods. Specifically, students indicated that they felt more obligated to complete tasks because they were accountable to their team (3.96) and that they felt an additional desire to attend TBL classes (3.91). These findings support conclusions found in the TBL literature that structure encourages student engagement and participation (Michaelsen, 2004).

Students also reported positive experiences with TBL. The team structures inherit in TBL promoted students' voice, making their views appreciated and valued (4.28). Compared to other classes, students found TBL courses to be livelier (4.26). These findings, in conjunction with students' responses regarding teamwork and increased learning, indicate that the extra class energy did not detract from their in-class experience. Students' positive report of instructor feedback (3.95) highlights the additional amount of quality contact between students and teachers.

Perhaps the most important finding is that students reported that the TBL courses contributed to the advancement of their learning skills. While it could be expected that listening and comprehension skills would have been promoted as a result of TBL, each of the other skill areas also increased, thus suggesting that the TBL courses played a role in students' positive self-perception of their learning. Notably, the two areas where students initially reported the least amount of confidence (writing, 4.22; public speaking, 3.65); resulted in the highest increase in confidence (+.37 and +.49). These results suggest that the larger group projects, where individuals are often accountable for their own written analysis, provide students ample opportunity to develop their written work. Because students must explain their ideas to their teammates, as well as, articulate them publicly, it is not surprising that students believed they significantly improved in this area. Therefore, it seems logical to speculate that the group nature of the TBL quizzes, discussions, and projects may have contributed to the +.32 increase in students' ability to facilitate group dialogue, respond to others, and reach agreement. It may also account for the +.27 increase in students' ability to express their viewpoints and the +.22 increase in students' capacity to converse with others and acknowledge their views.

The post-survey also highlighted the appeal of TBL for students. Although TBL is structured differently from instructional approaches in traditional courses, students did not feel that the TBL courses were disorganized (1.76). Thus, when instructors make clear course expectations and requirements, students quickly learn the TBL format. As noted in the results, by a nearly 8:1 margin (58.3% to 7.3%), students in TBL courses greatly preferred this pedagogy to teaching methods used in traditional courses. The fact that few students favored traditional courses underscores that TBL is pedagogy students find appealing. Lastly, because the study included courses from five different disciplines ranging from introductory to graduate level courses, it provides additional evidence that TBL can be implemented in a myriad of college settings and course disciplines.

Limitations

As with self-assessment surveys such as the one used in this study, it is impossible to quantify the extent to which the effects of social desirability played into students' responses. While the anonymous nature of the surveys may have limited some bias, it was not possible to completely remove its effects. Because the surveys were specifically designed and crafted for use in this study, they were not tested for their parametric characteristics. Also, cognitive skills were not measured. In addition, the sampling strategy was one of convenience, rather than a randomization or comparison group, thus resulting in an inability to generalize the findings. Another limitation was the variation in the types of students participating the study and student classification levels. While it was the researchers intent to explore how well TBL worked for university students, in general, particularly in disciplines not found or infrequently cited in the literature, it is possible that variations in the types of participants in this study (e.g., classification by class ranking/course level, age, gender) confounded the findings.

Conclusion

Although TBL was initially popularized in classes that taught highly motivated medical and pharmaceutical students, the results of this study seems to suggest that TBL also works with

students who may not be as highly motivated. Student reports of increased engagement and higher likelihood of analysis and discussion within teams suggest that TBL may increase students' metacognition (Rahman, Jumani, Satti, & Malik, 2010; Schraw & Dennision, 1994; Tobias & Everson, 2002). It also suggests that TBL may help students think about what and how they are learning. Therefore, it is reasonable to expect that the development of these learning skills will result in greater learning.

Additionally, students' self-report of an increase in their ability to participate in team discussion and analysis suggest an increase in their perceived self-efficacy. According to Bandura (1993), perceived self-efficacy has an important influence on student academic growth. As such, individuals with higher perceived self-efficacy are more likely to engage in challenging goals and they are less likely to shy away from difficult experiences, including those within an educational setting.

Both metacognition and perceived self-efficacy are qualities that increase a student's probability for academic success, and this study seems to indicate that students attending classes where TBL was implemented experienced an increase in both characteristics. This is important because it suggests that TBL also for students attending teaching universities, such as SSU, as well as students who may not have the educational background or expectations of the students with whom TBL has been most explored. Finally, this study suggests that using TBL with students attending teaching universities may increase their success and set the stage for continued academic achievement in the future.

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Culture Clash: Interactions Between Afrocultural and Mainstream Cultural Styles in Classrooms Serving African American Students

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This study examined the relation between classroom cultural and achievement-related characteristics and their influence on social outcomes in a sample of 74 fifth grade African American youth (41 girls; 33 boys) ages 10-13 years. Trained observers rated classrooms according to Boykin's (Boykin, Tyler, & Miller, 2005) definition of mainstream (competition, individualism, bureaucracy) and Afrocultural (verve, communalism, affect, movement, orality) cultural styles. Classrooms in low-income schools and with more African American students had lower levels of Afrocultural styles. Significant interactions between mainstream and Afrocultural variables suggested that youth in classrooms with high levels of both tend to perform better in reading and mathematics than those in other groups. Afrocultural, but not mainstream, classroom cultural characteristics were positively related to teacher reports of social skills and negatively related to problem behaviors. Implications for instructional practice are discussed.

Keywords: African American students, culturally responsive instructional practices, cultural discontinuity, Urban Education, Afrocultural styles

In recent decades, attention has been drawn to the role of culture in cognition and cognitive development (cf. Boykin & Ellison, 1995; Gallimore & Goldenberg, 2001; Okagaki, 2001). Culture is defined as the values, traditions, and beliefs that influence the behavior of social groups (Parsons, 2003). Culture shapes students' learning and problem-solving in several ways—through culture-specific knowledge and skills, values that mold motivation and beliefs, organization of information (i.e., cognitive architecture), and use of contextual cues to guide behavior (Serpell & Boykin, 1994). Culture and cognition are entwined because learning, thinking, and problem solving are socially situated and mediated by culture (Gordon & Armour-Thomas, 1991; Vygotsky, 1978).

Although a great deal of research has contrasted the cultural characteristics of American classrooms with those of other countries, particularly East Asian countries, less research has examined the impact that variation in the home cultures of American students has on achievement outcomes (Tyler et al., 2008). A growing body of empirical literature suggests that the cultural styles found in many African American homes are at odds with the culture of typical American classrooms (e.g., Boykin, 1983; Pai, Alder, & Shadiow, 2006). Therefore, it is not surprising that a cultural discontinuity exists between home and school that has implications for the school experiences and performance of African American children (Boykin & Bailey, 2000).

African American homes tend to be characterized by high levels of movement, multiple and simultaneous sources of sensory stimulation (e.g., music, conversation), and a communalistic orientation that values group over individual effort (Bailey & Boykin, 2001; Boykin, 1983; Boykin, Tyler, & Miller, 2005; Tyler, Boykin, Boelter, & Dillihunt, 2005; Tyler, Boykin, Miller, & Hurley, 2006). American classrooms, on the other hand, tend to focus on limited movement, individualism, bureaucracy, and competition (Boykin & Bailey, 2000; Boykin, Tyler, Watkins-Lewis, & Kizzie, 2006; Pai et al., 2006; Parsons, 2003). Recent studies have shown that African American youth perform significantly better in school when they are able to learn in a style that reflects their home culture rather than in the style associated with traditional classrooms (Boykin & Bailey, 2000). Further, studies have shown that when elementary students perceive discontinuity between home and school cultures, they have lower motivation and poorer academic outcomes (Arunkumar, Midgely, & Urdan, 1999; Warzon & Ginsburg-Block, 2008).

Although the body of research on cultural discontinuity in African American youth is growing, several issues still remain. First, most of the extant research was conducted with low-income African American samples (Tyler et al., 2006). Second, previous research has focused on learning and other cognitive outcomes and has not included academic and behavioral outcomes to the same degree (Wong & Rowley, 2001). The same cultural processes that inform learning and cognition probably also shape behavioral norms. Third, previous research tends to pit mainstream characteristics against Afrocultural characteristics without considering that most classrooms probably reflect a mix of the two (Boykin et al., 2006).

African American Children and Cultural Discontinuity

Okagaki's (2001) Triarchic model of minority achievement suggests that youth adapt more easily to the schooling process when classrooms reflect students' cultural norms. Although some children find similarity between the cultural characteristics of their homes and those they find at school, other children are faced with discontinuity—large differences between the cultural characteristics of home and school (Okagaki, 2001).

Boykin (1983) discussed the cultural discontinuity that exists for many African American youth. He notes that African American homes tend to reflect Afrocultural styles, a melding of African and American cultural values and behaviors. American schools, on the other hand, tend to reflect mainstream values such as individualism and self-control (Boykin et al., 2006).

Empirical research underscores the value of learning for African American students within a context that is consistent with Afrocultural ethos. In a study of cultural values in the contexts of low-income African American fourth graders, Tyler et al. (2006) found that students had the greatest preference for learning and working styles that were communal and vervistic—both at

home and at school. While most students favor cooperative learning opportunities over individualistic experiences (Johnson, 2006), a number of studies showed that African American students prefer working in groups more than do students of other ethnic groups (Dunn et al., 2005).

It is not surprising that African American youth learn better in the contexts that they prefer – those embracing Afrocultural styles. One study found that allowing African American students to move during story readings and a subsequent recall task yielded better scores than when movement was restricted (Boykin & Cunningham, 2001). In addition, African American students performed better on mathematics and reading items when learning in a communal context (i.e., seated together, sharing materials) than when assigned to individual learning or peer tutoring (Dill & Boykin, 2000; Hurley, Boykin, & Allen, 2005). Highlighting the cultural underpinnings of these results are studies that suggest that although communalistic and cooperative learning contexts benefit both African American and European American students, African American students benefit to a greater degree than European Americans (Boykin & Bailey, 2000; Serpell, Boykin, Madhere, & Nasim, 2006). Furthermore, high levels of movement have been shown to have a positive effect on the cognitive performance of African American students, but a negative effect on European American students (Allen & Boykin, 1991; Boykin & Bailey, 2000).

Compared to studies on Afrocultural values and behaviors, less research has examined the influence of mainstream styles on student achievement. The research available has yielded mixed findings. Tyler et al. (2006) found that teachers rated hypothetical children adopting mainstream styles more positively than they rated students portrayed with an Afrocultural ethos. Additionally, Lam, Yim, Law, and Cheung (2004) found that students performed better in classrooms with high versus low levels of competition. Nevertheless in the same study, students in the competitive classroom had more negative self-evaluations, which could have long-term effects on motivation (Lam et al., 2004). Other work has also shown lower self-efficacy and motivation in classrooms that emphasize performance goals, competition, and individualism (Chan & Lam, 2008; Ryan & Patrick, 2001). Moreover, mainstream practices may be especially problematic for African American youth (Boykin & Cunningham, 2001; Dill & Boykin, 2000; Hurley, Boykin, & Allen, 2005) since American classrooms tend to demonstrate mainstream styles. Yet, it is unclear how beneficial these styles are for achievement and adjustment, particularly for African American students.

Also, much of the literature using Boykin's (1986) Afrocultural framework has been conducted with schools serving low-income children. This literature suggests that such schools tend to be high in mainstream cultural styles and low in Afrocultural styles (Boykin et al., 2005). Research has not made clear how similar these classrooms are to those serving more middle-class or racially integrated classrooms. However, evidence suggests that schools serving high numbers of low-income African American and Latino students tend to be more focused on issues of accountability, and thus, more structured and less creative (Madaus & Clarke, 2001). We suspect that greater focus on testing and accountability would increase emphasis on individualism and decrease opportunities for movement, communalism, and affective engagement.

Study Context

The current study examined the relation between classroom culture (i.e., mainstream versus Afrocultural) and achievement-related characteristics and their influence on social outcomes in

an ethnically diverse sample of African American youth. Trained research assistants rated each classroom in terms of mainstream (bureaucracy, individualism, and competition) and Afrocultural (verve, affect, orality, and communalism) cultural styles. These observational ratings were related to children's achievement test scores and assessments of social skills made by parents and teachers. The following research questions were posed to deepen our understanding of the relation between classroom culture and achievement-related characteristics and their influence on social outcomes:

1. *What is the relation between cultural values and school composition? Are mainstream and Afrocultural values correlated with each other? Are the racial and socioeconomic composition of the school related to classroom culture?* It was hypothesized that the tendency for classrooms to have mainstream cultural characteristics would be unrelated to school racial or socioeconomic characteristics. However, classrooms with more African American youth and children from families of low socioeconomic status would be in classrooms with less Afrocultural characteristics. In addition, we expected that mainstream and Afrocultural values would be slightly related to each other.

2. *Does classroom culture, both Afrocultural and mainstream, predict achievement and behavioral outcomes?* For this question, we expected that Afrocultural characteristics would be positively related to achievement and behavioral outcomes of African American students, but that mainstream classroom characteristics would be negatively related to those outcomes.

3. *Do Afrocultural and mainstream classroom culture interact to predict achievement and behavioral outcomes?* Although we examined the interaction of mainstream and Afrocultural classroom styles, we did not have specific hypotheses about these outcomes. In this analysis we considered the possibility that mainstream behaviors may be less detrimental in the context of high levels of verve (e.g., emphasizing competition may be less problematic in the context of other communalistic activity).

Purpose of Study

The purpose of this study was to determine how classrooms reflected mainstream or Afrocultural values in an economically diverse sample of African American fifth-graders and whether classroom characteristics were correlated with racial and socioeconomic composition. The study also sought to determine whether classroom culture was associated with achievement and behavioral outcomes for African American students.

Additionally, the study attempted to fill the gaps in the literature examining classroom cultural characteristics and their relation to achievement and behavioral outcomes in economically diverse African American youth by focusing on five of nine dimensions of Boykin's (1986) Afrocultural ethos that are believed to be most relevant to classroom practice – (1) *movement*: an emphasis on the interconnectedness of movement, dance, rhythm, and percussiveness; (2) *verve*: an ability to focus with high levels of sensory stimulation; (3) *affect*: an emphasis on emotion and the ability to be emotionally expressive; (4) *communalism*: a commitment to social connectedness, including an awareness that social bonds transcend the individual; and (5)

orality: emphasizing oral and aural modes of communication. In contrast, the three dimensions of Boykin's mainstream ethos were also examined and include: (1) "*Individualism:* emphasizing individual accomplishments and autonomous work; (2) *Competition:* a focus on showing the best performance in a domain; and (3) *Bureaucracy:* an emphasis on rules, form and procedure" (Boykin & Ellison, 1995, pp. 99-100).

Method

Participants and Setting

Seventy-four African American fifth grade students (41 girls; 33 boys) ages 10-13 years (*M*=11.4 years) participated in this study. These students were attending one of 40 elementary schools (52 classrooms) located within and around a small city in the southeast. The students were initially recruited when they were infants and part of a longitudinal study of health and development. The parents of these children were lower middle class with an average of 13 years of education (ranging from 3 to 19 years). The majority (68%) had greater than a high school education, including some college. About half of the sample was considered poor according to federal poverty standards. A higher percentage of the schools in the sample had students that were African American while a lower percentage of the schools had a majority European American student body. Few students of other ethnicities were enrolled.

Instruments

1. *Cultural Themes in the Classroom Checklist* (Boykin, Tyler, & Miller, 2005) was used to assess 'classroom culture'. This observation checklist assesses the extent to which five Afrocultural (i.e., verve, orality, affect, communalism, and movement) and three mainstream cultural patterns (i.e., individualism, competition, bureaucracy) are present in the classroom. A trained observer visited each classroom for 2-3 hours to observe the child's affect and engagement, the developmental appropriateness of the classroom and the classroom cultural characteristics. At the end of the observation period, the observer recorded levels of cultural characteristics based on strict definitions of each using a scale from 1 (*not at all characteristic*) to 5 (*very characteristic*). Reliability was calculated by having a second observer in about 10% (n=8) of the classrooms. Kappas calculated from those observations suggested good reliability (.82 - .88). Two composite scores were created by computing the average score of the five Afrocultural (Cronbach's alpha = .70) and three mainstream (Cronbach's alpha = .68) items. Cultural themes tended to be positively correlated within subscales, and negatively correlated between the two (see Table 1).

2. *Woodcock-Johnson Tests of Achievement (WJ-R) Broad Reading and Broad Math Cluster* (Woodcock & Johnson, 1989) was used to assess mathematics and reading ability. The Broad Reading cluster includes Letter-Word Identification, which assesses the ability to identify isolated letters and words, and Passage Comprehension, where children read a passage silently and identify a key word that is missing in the context of the passage. The Broad Math cluster includes Calculations, a combination of basic (addition, subtraction, multiplication, and division) and advanced (geometric,

trigonometric, and calculus) mathematical skills. The Broad Math cluster also includes Applied Problems, which assesses skills in analyzing and solving verbal math problems.

3. *Social Skills Rating System* (SSRS), Grades K-6 (Gresham & Elliot, 1990) was used annually by teachers and parents to assess social skills. This instrument (questionnaire) requires teachers and parents to assess whether a child has displayed certain social skills in the past month (*never*, *occasionally*, or *frequently*). A social skills standard score and percentile ranking (based on norming sample) are computed. The percentile scores were used in this investigation. In addition, the Grades K-6 version includes a Problem Behaviors Scale, which measures negative behaviors such as aggression displayed in the past month. This measure is widely used, with adequate internal consistency and construct validity for African American children in other studies (Huston et al., 2001) and in our sample for both social competence (a = .93) and behavior problems (a = .91). Teacher and parent scores are examined separately, though they were moderately positively correlated.

Procedure

The children were originally recruited between 6 and 12 months, when they were in a childcare center and part of a study of children's health and development. Assessments of classroom culture were made when the children advanced to fifth grade. The 52 classrooms of participating children were observed and assessments of cognitive and social skill outcomes were obtained for each child individually during the summer upon completion of fifth grade by an African American research assistant.

Results

Preliminary Analyses

The mean scores on the Afrocultural and mainstream composite variables (see Table 1) revealed that the classrooms under study were, on average, more Afrocultural in nature, with scores just under the scale midpoint of 3 (M = 2.76, SD = .52). Mainstream scores were slightly lower in comparison (M = 2.13, SD = .62). There was significant variability in both scores, as evidenced by large standard deviations and significant ranges. Examination of individual components of each subscale showed that the high levels of Afrocultural characteristics were driven by high levels of orality, affect, and movement. Individualism was the highest rated mainstream orientation, with levels similar to orality, affect, and movement. Relatively low levels of verve, competition, and bureaucracy were observed.

TABLE 1
Correlations Among Afrocultural and Mainstream Classroom Culture Variables

	Verve	Orality	Affect	Communalism	Movement	Individualism	Competition	Bureaucracy
Verve	1.00							
Orality	0.30*	1.00						
Affect	0.03	0.61**	1.00					
Communalism	0.16	0.52**	0.48**	1.00				
Movement	0.35**	0.38**	0.29*	0.41**	1.00			
Individualism	-0.02	-0.05	-0.31*	-0.36*	-0.10	1.00		
Competition	0.05	-0.17	-0.15	-0.17	0.05	0.27*	1.00	
Bureaucracy	-0.03	-0.25*	-0.33**	-0.30*	-0.11	0.39**	0.56**	1.00
Mean	2.88	3.38	3.00	3.13	3.25	2.88	1.13	1.88
SD	1.36	0.92	0.76	1.36	1.39	1.13	0.35	0.84
Range	1-4	2-4	2-4	2-5	1-5	1-4	1-2	1-3

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

Moreover, correlations among cultural theme ratings showed that most Afrocultural themes were moderately positively correlated with each other (verve was not significantly related to affect or communalism) and either unrelated or negatively related to mainstream ratings. Mainstream themes were moderately, positively associated with each other. In addition, schools with greater numbers of poor students (i.e., those receiving free or reduced priced lunch) and those with more African American students had lower levels of Afrocultural behaviors in the classroom. The percentage of White students was positively correlated with Afrocultural behaviors and mainstream behaviors were unrelated to school demographic characteristics (see Table 2).

TABLE 2
Correlations Between Classroom Culture and Demographic Variables

	Free/Reduced Lunch	% Black	% White	Poverty Status	Parent Education
Verve	-0.27*	-0.38**	0.37**	-0.32**	-0.18
Orality	-0.18	-0.13	0.15	-0.14	-0.10
Affect	-0.07	-0.07	-0.05	-0.06	0.07
Communalism	-0.19*	-0.22	0.22	-0.22	-0.01
Movement	-0.31*	-0.30*	0.29*	-0.26*	0.04
Individualism	-0.12	-0.08	0.07	-0.07	0.05
Competition	-0.02	0.05	-0.05	-0.06	-0.03
Bureaucracy Orientation	-0.08	-0.06	0.05	-0.11	0.13
Afrocultural Composite	-0.31*	-0.30*	0.31*	-0.31*	-0.09
Mainstream Composite	-0.09	-0.04	0.03	-0.10	0.07

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

Classroom Cultural Themes and Student Outcomes

Ordinary Least Squares Multiple Regressions (see Table 3) were used to evaluate the study hypotheses. Independent variables were composite scores for Afrocultural and mainstream classroom themes as well as a product score of the two. In addition, parent education level, child sex, school socioeconomic status (percentage of students receiving free or reduced lunch), and school racial composition (percentage of school population that was African American) were entered simultaneously as covariates. Dependent variables were the Woodcock-Johnson broad reading cluster, Woodcock-Johnson broad mathematics cluster, social skills, and behavior problems.

TABLE 3

Ordinary Least Squares Multiple Regressions

	Woodcock-Johnson (Reading)	**Woodcock-Johnson** (Math)	**Problem Behaviors** (Teacher Report)	**Social Skills** (Teacher Report)	**Problem Behaviors** (Parent Report)	**Social Skills** (Parent Report)
Parent Education	2.67 (.70)**	1.18 (.69)	-2.68 (2.11)	2.30 (1.79)	-4.348 (1.95)*	6.39 (2.00)**
Child Sex	-1.55 (2.51)	0.99 (2.65)	-7.52 (8.41)	15.55 (7.30)	-2.47 (7.75)	6.37 (7.95)
Poor School	-0.13 (.09)	-0.15 (.10)	-0.55 (.66)	-0.15 (.56)	-0.38 (.60)	-0.29 (.62)
% Black	0.00 (.10)	0.07 (.10)	0.18 (.33)	-0.03 (.29)	0.25 (.29)	-0.16 (.30)
Afrocultural	4.99 (2.66)	3.32 (2.85)	-28.38 (9.85)**	19.04 (.03)*	-5.39 (8.53)	7.39 (8.75)
Mainstream	1.32 (2.18)	2.56 (2.30)	-2.34 (6.88)	0.28 (6.00)	6.67 (6.53)	-2.29 (6.70)
Afrocultural*Mainstream	11.87 (3.96)**	8.97 (4.22)*	-24.21 (15.56)	15.92 (13.23)	-23.11 (12.45)	18/19 (12.77)

Note: *p<.05; **p<.01
B(se) for each variable is listed

Overall, the results of this study showed that a b alance of Afrocultural and mainstream classroom cultural styles is associated with better reading and math scores. More specifically, the interaction of Afrocultural and mainstream orientations was a significant predictor of reading scores (b = 11.87, $p < .001$) and mathematics scores (b = 8.97, $p < .05$). We used the method suggested by Aiken and West (1991) to evaluate the interactions. Figures 1 and 2 show a plot of the interactions.

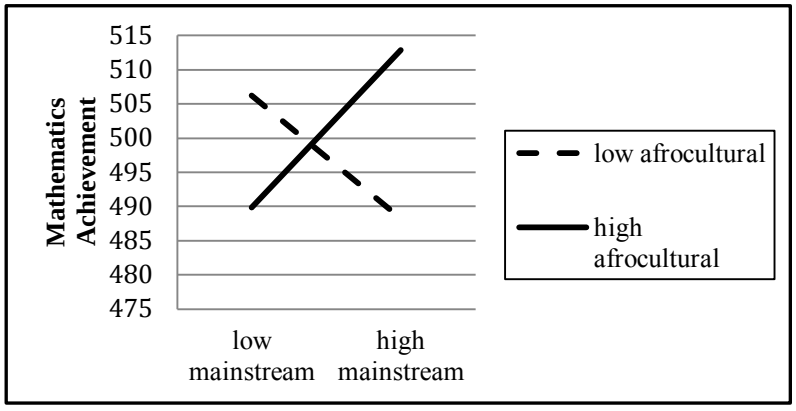

Figure 1. Interaction Between Mainstream and Afrocultural Orientations on Mathematics Achievement Scores.

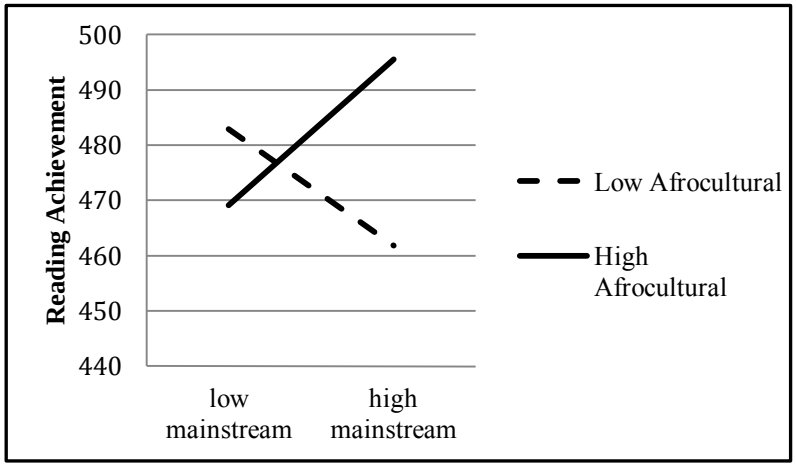

Figure 2. Interaction Between Mainstream and Afrocultural Orientations on Reading Achievement Scores.

In both cases the plots show that students in classrooms high in both mainstream and Afrocultural characteristics tended to have the best reading and mathematics scores. Students in high mainstream classrooms with low scores on Afrocultural characteristics and those in classrooms low in both styles tended to fare least well.

For behavioral outcomes, the results were somewhat different. Classroom cultural styles were unrelated to parent reports of social skills and behavior problems. Afrocultural classroom culture, however, was positively related to teacher-reported social skills (b = 19.04, $p < .05$) and

negatively associated with teacher-reported behavior problems (b = -28.38, p < .05). Mainstream styles and the interaction of the two styles were unrelated to behavioral outcomes. Moreover, parent reports of problem behaviors and social skills were unrelated to Afrocultural classroom culture or mainstream classroom culture.

Discussion

The purpose of this study was to determine how classrooms reflected mainstream or Afrocultural values in an economically diverse sample of African American fifth-graders and whether classroom characteristics were correlated with racial and socioeconomic composition. The study also examined whether classroom culture was associated with achievement and behavioral outcomes for African American students. To this end, classroom culture scores were compared to scores on reading and math assessments, as well as teacher and parent ratings of behavior and social skills.

In general, the classrooms in this study were more Afrocultural than mainstream. Though there was substantial variation, this differs from other studies (i.e., Boykin, Tyler, Watkins-Lewis, & Kizzie, 2006), which suggest that typical classrooms reflect more mainstream than Afrocultural styles. These findings may be due to the socioeconomic diversity of our sample. Also, these results highlight the relevance of socioeconomic classroom composition and suggest that classrooms with more middle-income students may be higher in Afrocultural styles than those that serve primarily low-income students.

The first research question, which was related to variability in cultural styles found in classrooms serving our sample of African American children, revealed considerable variability. Nearly all of the classroom cultural ratings ranged from 1 to 4 with standard deviations about three-quarters of a point. In addition, mean levels of each subscale were quite different within the major categories of Afrocultural and mainstream styles. Moderate levels of orality, affect, communalism, and movement; and low levels of verve characterized the Afrocultural scale. High levels of individualism were coupled with low levels of competition and bureaucracy on the mainstream scale. These results mirror, to some degree, the results of Tyler, Boykin, Miller, and Hurley (2006). They found that teachers of low-income African American youth preferred communalistic student behaviors over those involving verve. Unlike the current study, however, Tyler and colleagues also found that teachers highly endorsed competition among their students.

The second research question examined the relationship between school demographics and classroom cultural styles. We predicted that Afrocultural, but not mainstream, styles would be associated with the racial and economic composition of the schools. Indeed, mainstream styles were unrelated to school demographics, but Afrocultural styles were more likely to be exhibited in classrooms with lower percentages of low-income and African American students. These are the children that the literature suggests would prefer Afrocultural styles the most, yet these styles are less present in their classrooms.

The third research question investigated the relation between Afrocultural and mainstream classroom cultural styles, and academic and behavioral outcomes. The findings revealed partial support for the hypothesis that Afrocultural styles would be positively associated with

achievement and social skills, but negatively associated with behavior problems; and that mainstream styles would show the inverse. Interactions between cultural styles were significant for both reading and mathematics outcomes. Classrooms high in both Afrocultural and mainstream values had children with higher reading and math achievement scores. However, classrooms high in mainstream values without corresponding high Afrocultural values, or classrooms low in both tended to have lower scores. Mainstream styles were not related to social skills or behavior problems, but Afrocultural styles were positively related to teacher-reported social skills and negatively related to teacher-reported behavior problems. In other words, high mainstream values were associated with more negative outcomes, but only when accompanied by a low emphasis on Afrocultural values. When both were emphasized, achievement was actually higher. As expected, Afrocultural styles were negatively related to teacher reports of behavior problems. It is interesting, though not totally unexpected, that these same styles were unrelated to parent-reported social skills. Other research confirms modest concordance between parent and teacher ratings on the SSRS, suggesting that there may be variation in behavior across contexts (Ruffalo & Elliot, 1999) and that classroom processes may not transfer to behavior outside of school.

The achievement results highlight the unique contribution of this study to the research literature. The findings indicate the importance of a balance/interaction, implying that both are needed for African American youth to be academically successful. One interpretation of the results is that by engaging in both types of cultural styles, the youth in this study were able to build a bicultural competence (LaFromboise, Coleman, & Gerton, 1993) that would allow them to successfully navigate between worlds, regardless of their preferences. This study only assessed academic success and behavior, but future research may consider other outcomes such as well-being and school belonging.

A second possibility is that teachers using both styles may be serving as cultural brokers (Serpell & Boykin, 1994) who are preparing children to navigate between mainstream and Afrocultural spheres. By incorporating both styles into the classroom, teachers allow children to learn the skills they need, while at the same time, not alienate them from the values they are exposed to at home. Also, rather than denigrating the culture of African American students, the teachers may be consciously drawing on the students' culture to help them learn.

The results for behavioral outcomes were somewhat different in that only Afrocultural styles were significant predictors. As the classroom culture affords great expression of affect, movement, and communalism, students were found to have better social skills and fewer behavior problems. This fits with broad theories of home-school discontinuity, which suggest that when the classroom cultural style is more in sync with the home cultural style, children have better developmental outcomes (e.g., Boykin, 1986; Okagaki, 2001). If one assumes that the homes from which these children come are higher in Afrocultural styles, an implication is that some of the behavior problems of African American youth may be the result of the lack of opportunity to work collectively or an expectation to learn in a passive manner. Teachers of African American children may assume that the best way to deal with the behavior problems of young African American students is to further restrict their behavior; in essence, to help them learn to behave properly by increasing bureaucracy (forcing them to raise their hands be moving) and decreasing movement. These results suggest that the opposite is true. Allowing African

American students to express an Afrocultural ethos may improve behavior. I n addition, increasing Afrocultural classroom styles might have an indirect effect on African American student achievement and engagement, given their relationship to behavior problems and social skills (Jagers, 1996; Jagers, Smith, Mock, & Dill, 1997).

This research, however, was not without limitations. First, the study only used achievement test scores as a measure of academic achievement, where some research has shown grades and daily classroom performance to be important and complementary in triangulating actual student achievement (Duckworth & Seligman, 2006). Still, achievement test scores may be preferable over grades because of the potential for teacher bias. Teachers who create the classroom culture also assign grades and would likely be biased in favor of children who have similar behavior styles. Second, the sample was small and non-random. The sample size precluded more sophisticated analyses, such as analyses where gender or family socio-economic status could have been considered as moderators of these relationships. The small sample size also underscores the strength of the interactions between cultural styles in predicting achievement scores, as interactions require significantly more power to detect than main effects.

In summary, this study supports previous research that Afrocultural styles are advantageous for African American children (Okagaki, 2001). At the same time, the study contradicts previous research, in that our findings indicate that reducing the discontinuity between home and school is important for children's success, but mainly in a context that also requires children to adjust mainstream values and behaviors as well. Teachers who present students with aspects of both orientations may be giving their students the best of both worlds.

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Perspectives on Culturally and Linguistically Responsive RtI Pedagogics Through a Cultural and Linguistic Lens

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Response to intervention (RtI) originates from national legislation and critical research of evidence-based practices for low performing students and students at-risk of failing or receiving special education services. RtI proactively facilitates culturally and linguistically responsive pedagogy for culturally and linguistically diverse (CLD) students. With evidence-based practices, RtI when infused with culturally responsive pedagogy, has the potential to decrease the over-representation of CLD students in special education. This article examines RtI through a cultural and linguistic lens, addresses implementation challenges for CLD students, and emphasizes the importance of a culturally and linguistically responsive RtI approach that connects students' cultural knowledge, experiences, and learning styles to the academic and performance skills they need to learn and know.

Keywords: response to intervention (RtI), culturally and linguistically diverse students, IQ-achievement discrepancy model

Response to intervention (RtI) is built on the tenets of national legislation and critical research involving evidence-based practices. It was designed to target low performing students, students at-risk of failing, and students needing special education services because of academic and behavioral challenges (Klingner & Edwards, 2006; NASDSE, 2005; Orosco, 2010). Introduced by the Individuals with Disabilities Education Improvement Act (IDEIA, 2004), RtI offers promise for addressing the disproportionate representation of culturally and linguistically diverse (CLD) students in special education (Proctor, Graves, & Esch, 2012; Shealey, McHatton, & Wilson, 2011). Prior to RtI, federal legislation supported the IQ-achievement discrepancy model, or the "wait to fail approach." This model placed CLD students at a higher risk for misidentification and inappropriate placement in special education (Fuchs, Mock, Morgan, & Young, 2003; Haager, 2007; White, Polly, & Audette, 2012).

Problems with the IQ-achievement discrepancy model is evident when considering the academic struggles of English Language Learners (ELLs), especially in situations where reading remediation is delayed until a threshold of reading failure is reached before being considered for

special education (Brown & Doolittle, 2008). This approach to intervention was problematic and resulted in a disproportionate number of CLD students being identified for special education services (White et al., 2012). When using the IQ-achievement discrepancy model, CLD students who demonstrate minimal lags in reading generally do not receive interventions until the delays were significant. Because of the procedural latent responsiveness to intervention posed by this model, researchers examining its effectiveness (e.g., Haager, 2007; Proctor et al., 2012) determined that the IQ-achievement discrepancy model was pedagogically inappropriate for meeting the immediate instructional needs of CLD, low achieving, and at risk students. It was also identified as a major contributor to the misclassification and disproportionate representation of CLD students in special education (Artiles & Trent, 1997; Tomlinson & Kalbfleisch, 1998; Vaughn, Bos, & Schumm, 2000).

When teachers lack an understanding of CLD students' prior knowledge, heritage, customs, language, learning preferences, interests, etc. (Tomlinson & Kalbfleisch, 1998; Vaughn et al., 2000), it can affect their ability to provide effective instruction (Villegas & Lucas, 2002). Standardized IQ measures used to assess students' abilities also have inherent cultural and linguistic biases that contribute to the overrepresentation of CLD students in special education (Batsche et al., 2006). According to Proctor et al. (2012), biased IQ measures have contributed to the misdiagnosis of many CLD students, especially in the category of specific learning disability (SLD), emotional disturbance (ED), and intellectual disability (ID). Among the other factors that can affect teachers' pedagogical effectiveness is the environment in which teachers work (e.g., a wide range of instructional needs to accommodate student learning differences; limited or no time for co-planning, if working collaboratively; lack of resources; and not enough time available for assessment, monitoring, and tracking progress).

RtI is the most promising approach for not only addressing the learning and behavioral challenges of CLD students but also the overrepresentation of these students in special education. This article examines RtI through a cultural and linguistic lens by addressing implementation challenges for CLD students and emphasizing the importance of a culturally and linguistically responsive RtI approach that connects students' cultural knowledge, experiences, and learning styles to the academic and performance skills they need to learn and know.

RtI Through a Cultural and Linguistic Lens

RtI is a multi-tiered approach to early intervention. It is designed to prevent underachievement and support students before they experience significant failure. This framework shows promise in accomplishing two significant goals related to CLD students (Garcia & Ortiz, 2006). First, it offers CLD students an opportunity to improve English literacy skills via evidence-based practices (Morris & Cortez, 2008). Secondly, it provides a systematic approach for addressing the disproportionate representation of CLD learners eligible for special education services (Proctor et al., 2012; Shealey et al., 2011).

While there is widespread variation in how states implement RtI, Fuchs, Fuchs, and Stecker (2010) assert that most stakeholders assume there is a general consensus about RtI, which in reality, is not the case. Rather, they propose that there are two loosely configured camps—the Individuals with Disabilities Education (IDEA) Act group and the No Child Left Behind (NCLB)

Act group. From their exploratory view of RtI, Fuchs et al. describe their perceptions of how each group thinks. Accordingly, they assert that the NCLB group places a strong emphasis on learning curriculum standards and believe that curriculum assessments reflect mastered skills rather than evidence for special education eligibility. They also posed that this group foresees reading problems as gaps in need of remediation as opposed to genuine learning problems.

Alternatively, the vision of RtI from the perspective of the IDEA group is that the IDEA group is a proponent of the standard treatment protocol intervention approach (Fuchs et al., 2010). While this intervention approach necessitates a decision-making team, its distinguishing feature is a strong reliance on providing evidence-based practices to students demonstrating predictable reading problems (Batsche et al., 2006). Also, this approach is time-sensitive in that it specifies the duration and frequency of the intervention. In addition, emphasis is placed on level of specificity and structure that facilitates decision-making regarding intervention intensity and exploration of eligibility determination for tier advancement or non-advancement based on student progress. While the IDEA and NCLB groups share some commonalities (e.g., both support the intent of RtI and its tiered approach to intervention; both advocate for the early identification of low achieving and at-risk students), they have different visions regarding the nature and purpose of RtI (Fuchs et al., 2010).

RtI plays a critical role in the identification of students with disabilities who need special education services and supports. While some RtI models include four tiers, the most familiar graphic representation of RtI is the three-tiered triangle model. Within this model, each tier represents a level of intensity for instructional intervention. Depending on the student's responsiveness, the intensity of the instruction may increase at each successive tier (Batsche et al., 2006). Tier 1 represents the lowest level of intervention; Tiers 2 and 3 represent more intensive levels of intervention. Approximately 80% of the students receive intervention at Tier 1, approximately 15% at Tier 2, and approximately 5% benefit from the most intensive interventions provided at Tier 3 (Pullen, Tuckwiller, Konold, Maynard, & Coyne, 2010). In the RtI framework, the interventions used across the tiers are evidence-based and supported by research (Center for Response to Intervention, 2014).

According to the Center on Response to Intervention (2014), RtI provides a means by which "schools identify students at risk for poor learning outcomes, monitor student progress, provide evidence-based interventions and adjust the intensity and nature of those interventions depending on a student's responsiveness, and identify students with learning disabilities or other disabilities" (p. 7). This center is designed to assist educators, policymakers, administrators, and researchers in meeting RtI challenges; encourage stakeholders, at all levels, to give special attention to fidelity of implementation; and place emphasis on cultural and linguistic responsiveness and the recognition of student strengths.

Implementing instructional practices has inherent challenges (Gerber, 2003), which increases as efforts are made to implement culturally and linguistically appropriate RtI pedagogy in classrooms with fidelity (Gargiulo, 2014). What researchers cite as most problematic (Artiles, 2002; Gee, 2001) is the lack of evidence-based practices that are contextually valid for CLD students. For example, some researchers fail to include language dominance and proficiency as variables or they insufficiently describe participants' demographic characteristics thus rendering

the study findings questionable with tenuous external validity (Artiles, Trent, & Kuan, 1997; Donovan & Cross, 2002; Simmerman & Swanson, 2001). When instructional practices are touted as effective, it is critical to understand for what student population the prescribed interventions are intended (Klinger & Edwards, 2006). Although obtaining materials and resources that match the customs and traditions of CLD students can be challenging, understanding their diverse backgrounds can also be challenging. Regardless, teachers should interpret the life experiences of CLD students as instructional assets rather than deficits for remediation, and they should use this information to develop culturally responsive pedagogy (Garcia & Ortiz, 2006; Nichols, Rupley, Webb-Johnson, & Tlusty, 2000; Shealey & Callins, 2007). Because of the critical need for teachers to understand CLD students' educational needs, cultural norms, and social behaviors that impact learning, the subsequent sections of this article examines the RtI three-tiered framework for CLD students from a cultural and linguistic lens.

Tier 1 Instructional Intervention and CLD Students

Tier 1 is the core curriculum, which is applicable to all students. Schools make every effort to ensure that the curriculum chosen is appropriate. While it may not be effective for all students, it is characterized by evidence-based practices as demonstrated by experimental and quasi-experimental studies that reveal academic gains for a majority of the students. While a more comprehensive view of what constitutes evidence-based practices is needed (Klinger & Edwards, 2006), the complex nuances that involve culture and language must be considered, especially when looking at the cultural representation of subjects participating in the validation process.

Instructional fidelity is a critical factor for all tiers. Failure to maintain a high degree of fidelity makes it difficult to determine the cause of learning difficulties experienced by CLD students (Brown & Doolittle, 2008; Hernández Finch, 2012; Proctor et al., 2012). Reading difficulties, for example, may be the result of a poorly implemented curriculum or lack of culturally relevant materials, as opposed to a reading deficit or disability. If the core instructional programs lack fidelity in its implementation, the purposefulness of Tier 1, as well as the subsequent tiers, are compromised. The goal of RtI is to have fewer students in need of more intensive interventions, which occurs at Tier 2 and Tier 3 (Vaughn & Fuchs, 2003).

Universal screening in the core content areas (e.g., reading, math) is the first step in the RtI model for identifying students with learning difficulties at risk for failure. These screenings, which consist of brief assessments, is an essential component of the instructional process that provides teachers with opportunities to determine which CLD students are struggling to learn and are performing at or below grade level (Jenkins, Schiller, Blackorby, Thayer, & Tilly, 2013). For early intervention initiatives, curriculum-based measures (CBMs) such as teacher-made assessments are particularly effective with CLD students. These measures use a criterion to screen student performance of school-related academic tasks (Rhodes, Ochoa, & Ortiz, 2005) and they provide reliable assessment measures of basic skills in reading and math (e.g., words per minute (wpm), fluency, comprehension, percent correct) (Blue & Alexander, 2009).

Teachers can use the screening outcomes of CLD students to formulate tier level judgments based on performance (Batsche et al., 2006). The totality of these measures not only presents a holistic view of a student's learning difficulties but also encourage collaborative opportunities

with teachers and other professionals. These collaborative opportunities can facilitate teachers use of interventions that are tempered with cultural and linguistic vitality (Klingner & Edwards, 2006; Orosco, 2010; Vaughn & Ortiz, 2012). They can also help teachers understand the cultural and linguistic needs of CLD students, including linguistic proficiency, language dominance, second language acquisition development, and cultural life experiences (Rinaldi & Samson, 2008; Vaughn & Ortiz, 2012).

When teachers use culturally and linguistically responsive RtI pedagogical methodologies, many CLD students benefit from small group and individualized differentiated instruction, which subsequently reduces the number of referrals for special education (Brown & Doolittle, 2008). At Tier 1, when culturally and linguistically responsive RtI pedagogy is implemented, it helps develop the reading skills of CLD students because instruction is differentiated by academic needs (Proctor et al., 2012) that take into consideration students' cultural and linguistic differences. Differentiated instruction provides opportunity for linguistic accommodations, content re-teaching, and smaller, flexible student groupings (Brown & Doolittle, 2008), all of which facilitate reading development.

The socio-cultural aspects of CLD students are also important. Among the socio-cultural attributes that teachers should consider are, for example, language use or preference, social affiliations (e.g., friends and relationships), daily life experiences (e.g., foods, responsibilities, and chores), culture (e.g., traditions, identity, and values), and communication style (Aceves & Orosco, 2014; Rhodes, Ochoa, & Ortiz, 2005). Teachers' awareness of socio-cultural influences not only helps them scaffold instruction to a more appropriate academic level (Orosco, 2010), it also helps them form more positive teacher-student relations (NCCRESt, 2005). More importantly, by having knowledge of students' socio-cultural influences, it can assist in the development and implementation of a more balanced culturally and linguistically responsive RtI pedagogical methodology that can help prevent CLD students from being misdiagnosed for special education services (Proctor et al., 2012).

For students from CLD backgrounds, such as ELLs, interventions at Tier 1 should focus on structured English and native language instruction for improving literacy and oral language skills. In a longitudinal study by Tong, Lara-Alecio, Irby, and Mathes (2011), the reading and oral language skills of 70 English and Spanish kindergarten students in treatment bilingual classrooms were compared with 70 k indergarten students in controlled bilingual classrooms through first grade. Instruction for the treatment group was conducted via two languages, using only one language during certain periods of instruction. By contrast, the control group received minimum state and district required ESL instruction. Results indicated that students in the treatment group acquired increased levels of oral dual language acquisition and reading. Findings from this study corroborate previous research by Tong, Lara-Alecio, Irby, Mathes, and Kwok (2008), which revealed that the same two-year intervention accelerated English academic oral proficiency among a l arger sample of participants from a s imilar age group. The interventions used in both studies promoted students' learning by incorporating structured and direct instruction, ESL strategies, and context-embedded vocabulary learning.

Tier 2 Instructional Intervention and CLD Students

Tier 2 instructional interventions are implemented when a student fails to demonstrate academic gains via differentiated instruction at Tier 1. Tier 2 offers students more intensive supplemental supports (Batsche et al., 2006; Hernández Finch, 2012; Vaughn & Ortiz, 2012) in the core content areas to avert further screenings and/or observations and progress monitoring that would delay implementation of more intensive interventions for students who are low achieving or at-risk of failure. Instruction at Tier 2 is provided in a smaller student-teacher ratio. Although this tier could be implemented by a general education teacher, it is best implemented by a specialized interventionist (e.g., Title I teacher, reading specialist, special education teacher, speech and language specialist) with more knowledge and experience in remediating academic deficits (Brown & Doolittle, 2008; Jenkins et al., 2013). A recent study by Jenkins et al. (2013) corroborates the use of more specialized interventionists at higher tier levels. In this study, which involved 62 elementary schools from across 7 states, it was reported that 77% of the schools surveyed used a reading specialist to implement more intensive reading strategies at Tier 2, with 63% using reading specialists at Tier 3.

Tier 2 is perceived as the gatekeeper for possible special education referrals (Klingner & Edwards, 2006). The goals of Tier 2 are to critically analyze and determine why students fail to make the expected progress in reading, and to avoid making special education referrals. At Tier 2, schools have the option of using a problem-solving approach, a standard treatment protocol approach, or a hybrid approach (i.e., a combination of the two).

Schools have used the problem-solving approach for over 20 years. This approach relies on an instructional team to identify interventions for individual students (USDE, 2007) and it is ideal for conducting functional assessments to determine students' academic strengths and weaknesses, which help drive instruction. Salient characteristics of the problem solving approach involve: (1) identification of the problem and determination of causation, (2) development of an action plan to address the problem, (3) implementation of the plan (i.e., the intervention), and (4) evaluation of the effectiveness of the plan.

The problem-solving approach captures the essence of RtI in that it is inclusive of all of the elements of Tiers 1, 2, and 3. Briefly stated, all students receive instruction using empirically validated techniques and academic progress is monitored (Tier 1). When a student's academic growth does not meet desired benchmarks, a school-based team intervenes to ensure that the student receive more intensive, individually tailored and small group instruction using evidenced-based interventions. These interventions are based on individual student needs and performance data, and are flexible enough to meet their academic challenges (Tier 2). Students who continue to underachieve (i.e., make inadequate process) and are at-risk of school failure, state and district policies are used to determine the options for students. This may involve the student receiving more intensive instruction using validated techniques (as determined by the school-based team) that is individualized or special education services, if a comprehensive evaluation determines the student has a disability (Tier 3) (USDE, 2007). With the problem-solving approach, decision-making is more fluid as teachers collect data, plan, adjust, monitor and evaluate student progress (Fuchs et al., 2010).

On the other hand, the standard treatment protocol approach is strongly supported by research. This approach consistently uses one intervention selected by the school-based team to address the multiple needs of students. With the standard treatment protocol, the individual delivering the intervention makes instructional decisions following a standard protocol. When students demonstrate similar academic challenges, they are presented with one, standard, research-based intervention, which is a major disadvantage for addressing skill deficits for struggling learners. Lastly, the prescribed intervention is delivered in a predetermined format that may address more than one skill set. When a single intervention is implemented in this manner, there is greater control for fidelity of implementation and monitoring (USDE, 2007) yet, it may not be effective for all students needing more intensive instruction.

Lastly, the hybrid approach, which is a mixed methodology, is comprised of the problem-solving and standard treatment protocol approach. Batsche et al. (2006) assert that the hybrid approach to intervention is most advisable for Tier 2. It works best because students' benefit from an academic plan customized to their unique needs, thus ensuring that appropriate and valid research-based interventions are selected (Searle, 2010).

In the case of CLD students, monitoring students' reading progress using a hybrid approach tempered with knowledge of students' cultural and linguistic differences can help teachers develop a culturally and linguistically responsive pedagogical methodology that engenders effective teaching. While validated approaches for native English speakers may seem appropriate for this population, there are instances in which adapted or differentiated instructional practices have proven more effective for some CLD students (McCardle, Mele-McCarthy, & Leos, 2005).

Tier 3 Intervention and CLD Students

If a student continues to demonstrate below level expectation and a lack of adequate progress in response to the evidence-based interventions and differentiated instruction provided at Tiers 1 and 2, the student is then referred to Tier 3. At Tier 3, close progress monitoring continues and individual diagnostic assessments are administered to determine the specific skill patterns which need remediation (Hernández Finch, 2012). Remediation at Tier 3 occurs in very small groups and/or individually tailored; and the evidence-based practices implemented are more intensive than in the previous tiers. It is generally recommended that interventions at Tier 3 include 50 minutes/day of intensive instruction in addition to the 90 minutes of reading core instruction, with a student-teacher ratio not greater than 3:1 (Henley et al., 2008). While the most distinguishing feature of Tier 3 is the plausibility of processing a special education referral, Tier 3 services may or may not yield identification for special education.

For CLD students receiving intervention at Tier 3, it is important to ensure that the student's cultural and linguistic influences are examined before special education referral. A mismatch between teachers and CLD students in areas such as language, immigration status, economic status, and prior life experiences can lead to a referral. Poor academic responses of CLD students to life circumstances, which are often misinterpreted for learning disabilities (Moreno & Gaytán, 2013), can also lead to referral. Interestingly, the flowchart developed by Garcia and Ortiz (1988) more than twenty-five years ago still encapsulates questions that are intended to minimize teacher misinterpretations of CLD students who are struggling academically, and help them with

the decision-making process. Such questions include: Is the student experiencing academic difficulties? Are the curricula and instructional materials known to be effective for language minority students? Has the problem been validated? And, Is there evidence of systematic efforts to identify the source of difficulty and take corrective action? Answers to questions such as these can guide teachers in a self-assessment of their knowledge of students' cultural and linguistic proficiency, preferred teaching and learning styles, motivational influences, and so forth, as compared to the needs of CLD students. Similar questions have also emerged for ELLs, which focus on documenting observable behaviors across various learning contexts, identifying unique student characteristics, and considering previously attempted interventions (Hamayan, Marler, Sánchez-López, & Damico, 2013).

Thus, not considering the cultural and linguistic attributes of CLD students carries serious implications. For example, students may become disenfranchised with school and disengaged from the learning process, which can exacerbate their at-risk status and potential misidentification for special education (Moreno & Gaytán, 2013) with dismal outcomes. Research by Artiles, Kozleski, Trent, Osher, and Ortiz (2010) and Cartledge and Dukes (2009) have indicated that CLD and African American students in special education experience poor achievement, high levels of drop out, low participation in post-high school opportunities, and restrictive educational placements.

Challenges of RtI Implementation for CLD Students

A major challenge in the implementation of RtI is teacher preparation and training (Hoover, Baca, Wexler-Love, & Saenz, 2008; Kratochwill, Volpiansky, Clements, & Ball, 2007; Wiener & Soodak, 2008). A recent survey of 242 members of the Council of Administrators of Special Education revealed that 95% of the respondents believed lack of adequate preparation was a primary cause for experiencing difficulties in RtI implementation (Wiener & Soodak, 2008). Thus, if teachers are ill prepared to educate CLD students, implementation of a cultural and linguistically responsive RtI tiered approach becomes a more difficult process (Orosco & Klingner, 2010). Schools with poorly designed RtI program that lack cultural and linguistic responsiveness and sufficient use of evidence or scientifically-based interventions increase the likelihood that CLD students will be misdiagnosed or inappropriately referred for special education services (Batsche et al., 2006; Vaughn & Ortiz, 2012).

Additionally, if teacher preparation programs fail to include curriculum content on educating CLD students, the quality of culturally and linguistically responsive pedagogy becomes questionable (Trent, Kea, & Oh, 2008), thus making RtI implementation more challenging (Orosco & Klingner, 2010). Having a curriculum that incorporates culturally and linguistically responsive pedagogy is vital to the success of CLD students within schools implementing RtI (Orosco & Klingner, 2010).

Dimensions of Culturally and Linguistically Responsive Pedagogy

Culturally and linguistically responsive pedagogy, according to Richards, Brown, and Forde (2006), is a form of instruction that supports the achievement of all students. It is learner-

centered and ensures that students' strengths are identified, nurtured, and used to increase student achievement.

Cultivating teacher buy-in to the concept of RtI poses a challenge in implementing RtI (Wiener & Soodak, 2008), particularly when it involves students with cultural and linguistic differences. RtI, is contingent on various interrelated factors such as having a clearly defined description of its purpose and teacher roles and responsibilities (Fuchs & Bergeron, 2013). Teacher expectations and the impact of these expectations on student achievement must also be clearly communicated (Khalifa, 2011).

The literature on RtI (e.g., Fuchs & Bergeron, 2013) has shown that teachers receiving professional development and training on RtI will more likely buy-in to this pedagogical approach; however, the degree to which they buy-in depends on the resources and materials available to support effective implementation and the extent of their involvement in the implementation, decision-making, and the planning process. Also important to buy-in, as noted by Fuchs and Bergeron, is the degree to which teachers have opportunities to discuss issues involving implementation, their philosophical differences, and the extent to which they believe RtI will produce positive results.

The quality of a RtI pedagogy is generally reflected in three primary dimensions—institutional, personal, and instructional—each of which are in continuous interaction with each other. Not only do these dimensions impact teaching, they also impact the student learning process and the effectiveness of the culturally and linguistically responsive pedagogy (Richards et al., 2006) employed in the RtI process.

Institutional Dimension. The first dimension, institutional, is a reflection of school administrators, school policies, and the value-system held by the school. This dimension addresses how the entire school organization relates to diversity (Richards, et al., 2006) and how these entities address the use of physical space and classroom arrangement that encourage cooperative work, which is shown to benefit CLD students (Calderón, Slavin, & Sánchez, 2011). It also addresses community involvement. The institutional dimension places emphasis on having effective teachers assigned to students with the greatest instructional needs, parent collaboration, and school policies that invite parents to be partners in education (Richards, et al., 2006). Failure to address the institutional dimension makes implementation of a culturally and linguistically responsive RtI pedagogy more challenging (Richards et al., 2006) and less effective.

Personal Dimension. The second dimension, which could challenge the quality of culturally and linguistically responsive RtI pedagogy, is personal. The personal dimension encapsulates the thoughts and emotions teachers experience as they become more culturally responsive (Richards et al., 2006). Personal reflection, examination, and reconciliation of biases are critical to the success of culturally and linguistically responsive RtI pedagogy (Villegas & Lucas, 2002). The significance of the personal dimension is most apparent when biases lead to a mismatch of value systems between teachers of European descent and CLD students (Gay, 2010). Teachers of European descent often have limited interactions, experiences, and knowledge of the customs and practices of CLD students (Gay, 2010). Similarly, CLD students may have limited

knowledge of the norms and practices of teachers of European descent. Such a mismatch in the classroom can result in a lack of understanding, which hinders the instructional quality of the teacher-student relationship. According to Harris-Murri, King, and Rostenberg (2006), when a class is characterized by a mismatch of value systems, the conduct of CLD students is often misinterpreted as inappropriate behavior. These misinterpretations frequently result in the removal of CLD students from the instructional setting to, for example, an alternative school or out-of-school suspension, thus causing them to miss vital instruction and fall further behind with their academics.

Instructional Dimension. The final dimension, instructional, is critical to the successful implementation of a culturally and linguistically responsive RtI pedagogy. In this dimension, instructional materials, activities, and resources must match the cultural practices, norms, and language of the students (Richards et al., 2006). When the tools of instruction are incompatible with the experiences of CLD students, a serious disconnect and counterproductive relationship is likely to exist among teachers and students (Irvine, 1992; Irvine, 2010), which often manifests with CLD students either underachieving or dropping out of school (Richards et al., 2006). Conversely, schools that integrate culturally and linguistically responsive RtI pedagogy into their curriculum demonstrate a value towards the identity of CLD students and their respective communities.

Thus, it can be theorized that schools exhibiting the institutional, personal, and instructional dimensions are pedagogically prepared to focus on the needs of CLD students. Further, it can be presumed that schools that demonstrate some, but not all of these characteristics, are ill prepared to meet the needs of CLD students within an RtI framework.

The "Why" of Culturally and Linguistically Responsive RtI Pedagogics

Effective teachers provide quality instruction that infuses students' culture in all aspects of the teaching-learning process. They understand that culture is not a static set of characteristics within students but rather a complex phenomenon that is learned, acquired through interaction, shared with others, and constantly changing (Klingner & Edwards, 2006; Ovando, Combs, & Collier, 2006).

Similarly, language displays the same characteristics as culture, in that cultural and linguistic components interrelate to create observable patterns (Ovando et al., 2006). Effective teachers are attuned to such observable patterns and they integrate these cultural and linguistic components into differentiated lessons to better connect with CLD students (Gutierrez & Rogoff, 2003; Santamaria, 2009). Code-switching, the practice of mixing or moving back and forth between languages, is an example of a communicative strategy that teachers can use to scaffold English content to non-English speaking students in an effort to help them better understand concepts (Fennema-Bloom, 2010). Teachers who understand the importance and relevance of code-switching are better prepared to maximize the skills of CLD students (Orosco & Klingner, 2010).

Moreover, to ensure implementation of an effective culturally and linguistically responsive RtI pedagogy, school districts must provide on-going professional development, training, (Fuchs & Bergeron, 2013), support, and feedback (Batsche et al., 2006). In the initial stages of

implementation, teachers need to be fully trained in the basic components of RtI (e.g., processes for screening, progress monitoring) and knowledgeable of their assigned roles, responsibilities, and data collection requirements. They should also know how progress-monitoring results will be interpreted in light of cultural and linguistic factors (Vaughn & Ortiz, 2012). Teachers knowledgeable of oral language development; early literacy; and students' home language, contextual considerations, and cultural backgrounds are more incisive and perceptive of how to interpret data. Their understanding of the differing linguistic and cultural factors can lead to improved decision-making regarding intervention selection, intensity, and tier level determination (Vaughn & Ortiz, 2012).

To increase the probability of teachers implementing a culturally and linguistically responsive RtI pedagogical approach, researchers (e.g., Gay, 2010; Villegas & Lucas, 2002) suggest that they provide multiple activities to help students become more attuned to their personal biases and how these biases may impact instruction. Such activities may include thinking or writing activities that prompt introspective thought about motivations underlying actions and behaviors. Teachers should also be encouraged to consider specific interactions with CLD students and how they might respond. In addition, teachers should consider analyzing personal and family histories and reflect on how these influences contribute to their current understanding of CLD students. Analyzing personal events provides a venue for dispelling potential and current misconceptions of individuals from other races and ethnicities.

One strategy that can be used to enhance teachers' capacity for implementing culturally and linguistically responsive pedagogy within an RtI configuration is acknowledging the importance of cultural and linguistic differences and commonalities among CLD students (Richards et al., 2006). Engaging students in lessons that allow them to share cultural norms, practices, and languages can serve to both validate and affirm students' identities (Richards et al., 2006), which is vital to helping teachers build classroom unity. Lessons focusing on multiculturalism are also important. Such lessons can minimize misconceptions about certain behaviors exhibited by CLD students (e.g., the way Latin American children show respect to adults, which involves looking down when spoken to). By communicating with CLD students and their families, and visiting their neighborhoods, teachers can better conceptualize students' instructional needs (Richards et al., 2006). Such involvement can help build critical teacher-student bonds that can lead to a deeper understanding of the student, increased student motivation, and increased teaching effectiveness that incorporates and relate real-life experiences to reading instruction (Gay, 2002; NCCRESt, 2005; Patrikakou, 2008; Villegas & Lucas, 2002).

A culturally and linguistically responsive RtI pedagogy also requires parental involvement. Engaged parents increase the likelihood that schools will be more diligent in the logistics underlying RtI and carrying out appropriate implementation. When parents experience opportunities to play a key role in the decision-making process, school-parent partnerships are cultivated and parents are more likely to buy-in to school policies and initiatives (Davis, 2000; Haines, McCart, & Turnbull, 2013). Teacher participation in the decision-making process is also critical to RtI buy-in and subsequent success. A 3-year longitudinal study by Turnbull (2002) involving 25 elementary schools and 5 middle schools across three school districts, sought to understand factors that impacted teacher buy-in in relation to quality of the chosen model, teachers' likelihood to improve their teaching, degree of personal motivation, and understanding

of how student learning would increase. The predictor variables were: (a) school level support (e.g., school infrastructure); (b) developer support (e.g., mentoring or coaching); (c) administrator buy-in; (c) training, resources; (d) control over the school initiative's impact in their classrooms; and (e) budget considerations. Nearly all factors, except budget considerations, were significant in creating teacher buy-in. The results of Turnbull's study have several pedagogical implications for RtI and CLD students in relation to school initiatives. First, teachers are more likely to support a school reform initiative when they are involved in decision-making and when their questions and concerns about implementation are addressed. Secondly, teachers are empowered and inclined to believe the school reform initiative will be successful if administrators believes in and support its success. Third, when teachers receive training, have access to needed resources, and maintain some decision-making power over classroom decisions, they are more likely to be effective teachers. Finally, administrators need to allow time for pre-planning and planning to occur before a school-wide initiative is launched.

Final Thoughts

Successful implementation of a culturally and linguistically responsive response to RtI requires teachers to have knowledge of and be sensitive to the cultural and linguistic needs of CLD students. It also requires teachers to have knowledge of evidenced-based practices, students' cultural norms, and the communities in which students live. Teacher proficiency in delivering a culturally and linguistically responsive response to RtI not only helps CLD students succeed academically but also helps them cultivate positive relationships with teachers. Partnering with parents is essential to student success in that parents can help reinforce student learning and the lessons taught at school. Also critical to the success of a culturally and linguistically responsive response to RtI is teacher and administrator buy-in, teacher participation in the decision-making process, and teacher training and ongoing participation in professional development activities.

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Educational Tweets

William E. Moore

Limitations of Longitudinal and Cross Sectional Standardized Tests

According to the Organisation for Economic Co-operation and Development, the United States ranks 27th in mathematics, 17th in reading, and 20th in science[1]. This underachievement is driving a call for change within the American educational system. The proposed changes generally fall into one of two categories: overhauls to state and national curricula and targeting ineffectual teachers for dismissal or retraining. Student-based standardized testing is the primary tool used to measure such changes. However, these tests are intended to gauge student performance within a narrow context and cannot, in and of themselves, assess teacher performance.

Standardized testing generally appears in one of two forms—longitudinal and cross-sectional. Longitudinal testing measures a student's performance over multiple years or tests, while cross-sectional testing measures a student's performance in relation to his or her peers.

Assessing teacher performance with longitudinal testing of students discourages teachers from addressing the needs of advanced students since any nontraditional instruction may negatively impact student scores. Under the longitudinal system educators must choose for example, covering a variety of enrichment topics and protecting their job reputations as educators. One must also consider that teachers in areas rich with high mobility students may find their job performance based on their students' prior education. Alternatively, high mobility students may not be considered when evaluating any teacher and would fall through the cracks when using longitudinal assessment.

Cross-sectional testing is unreliable for teachers of at-risk populations, even when tests are controlled for poverty and mobility rates. In addition to daily distractions within the lives of at- risk students, teachers must now worry about their career when volatility at home interferes with testing. Penalizing teachers for students' home lives creates a system where at-risk schools are deemed career killers, and the students who are most in need of qualified educators will be faced with yet another hurdle in recruiting those teachers.

Quality measures of teacher or student performance are not created through anti- or pro-union legislation. Quality measures require a knowledge of education and statistics, study, and time. Standardized testing is a tool for assessing student knowledge within the narrow confines of the material the test covers. In its current form, it cannot validly assess teacher performance.

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[1] http://www.oecd.org/pisa/keyfindings/pisa-2012-results.htm

The Event Zone

Martha Jallim Hall ◆ *Michael J. Maiorano*

National Train-the-Trainer Institute Conference
Co-Teaching That Works
December 2 - 5, 2014
Boston, Massachusetts

American Political Science Teaching and Learning Conference
Innovations and Expectations for Teaching in the Digital Era
January 16 - 18, 2015
Washington, DC

FETC Annual Conference
January 20 - 23, 2015
Orlando, Florida

32nd Academic Chairpersons Conference
February 4 - 6, 2015
Austin, Texas

National Reading Recovery & K - 6 Literacy Conference
February 7 - 10, 2015
Columbus, Ohio

NABE Annual Conference
Achieving Global Competence: Biliteracy for All
March 4 - 7, 2015
Las Vegas, Nevada

70th Annual ASCD Conference and Exhibit Show
Challenging Convention: Leading Disruptive Innovations
March 21 - 23, 2015
Houston, Texas

NASPA Annual Conference
Navigating with Courage
March 21- 25, 2015
New Orleans, Louisiana

26th International Conference on College Teaching and Learning
Ignite, Inspire and Engage: Powerful Ideas for Today's Educators
March 30 - April 2, 2015
Ponte Vedra Beach, Florida

Council for Exceptional Children Convention and Expo
April 8 - 11, 2015
San Diego, California

NCTM Annual Meeting & Exposition
Effective Teaching to Ensure Mathematical Success for All
April 15 - 18, 2015
Boston, Massachusetts

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Feel Well, Teach Well: Ways to Gain and Sustain Wellness In and Out of the Classroom

Revisiting the Differentiated Classroom: Looking Back and Ahead