Journal of Urban Mathematics Education
July 2016, Vol. 9, No. 1, pp. 19–47

Using a Conference Workshop Setting to Engage Mathematics Teachers in Culturally Relevant Pedagogy

Stephanie Timmons-Brown
University of Maryland, College Park

Catharine Warner
University of Maryland, College Park

In this article, the authors explore using a conference workshop setting to engage mathematics teachers, who serve largely underserved student populations, in culturally relevant pedagogy (CRP). The conference workshop encouraged the exchange of information among teachers of similar grade levels and classroom contexts. The authors' analysis of the findings highlight improvements in teachers' perceptions of their CRP knowledge as well as beneficial features of the conference workshop. These features include the creation of networks among mathematics teachers and team leaders, new post-conference mathematics lessons to implement in the classroom, and encouragement for the expansion of relationships and engagement in the classroom. While some teachers found their new knowledge of CRP served to validate current practices, others found that the conference workshop provided a language with which to integrate successful practices into the mathematics classroom.

KEYWORDS: culturally relevant pedagogy, mathematics education, mathematics teacher professional development

Culturally relevant pedagogy (CRP) has the potential to empower students' learning and to generate high levels of success among racially and ethnically diverse student populations (Ladson-Billings, 1994, 1995a, 1995b, 1997). The use of CRP has been connected to increased student engagement (Boutte, Kelly-Jackson, & Johnson, 2010) and has been widely considered as a promising approach to improve student learning for various cultural groups within mathematics as well as other disciplines (Dallavis, 2013; Darrow, 2013; Delpit, 2006; Enyedy & Mukhopadhyay, 2007; Griner & Stewart, 2012; Hill, 2009; Howard, 2003; Leonard, 2008; Malloy & Malloy, 1998; Tate, 1995). The National Council of Teachers of Mathematics has highlighted several components of a culturally relevant ap-

STEPHANIE TIMMONS-BROWN is a research associate and the executive director of the Maryland Institute for Minority Achievement and Urban Education in the College of Education, 4716 Pontiac St., Suite1102, College Park, MD 20740; email: stbrown@umd.edu. Her research interests include college and career readiness for underrepresented minorities, experiential learning through STEM, and school contextual factors.

CATHARINE WARNER is an affiliate of the Maryland Institute for Minority Achievement and Urban Education, 4716 Pontiac St. Suite 1102 College Park, MD 20740; email: cwarner3@umd.edu. Her interests include teacher and leader effectiveness, educational equity, school contextual factors, and educational policy and analysis. She is also a senior study director at Insight Policy Research.

proach as central goals to achieve equity in mathematics teaching and learning, particularly the goal to explore the importance of immediacy and relevancy of mathematics to students' lives (Gutstein et al., 2005; Waddell, 2010).

Although CRP has been applied to mathematics and science (Boutte et al., 2010; Martin, 2010; Tate, 1995), we still lack systematic approaches to distilling knowledge of CRP among mathematics teachers. There is relatively little literature linking CRP efforts in mathematics to specific professional development approaches (Bartell, 2011; Leonard, Brooks, Barnes-Johnson, & Berry, 2010; Morrison, Robbins, & Rose, 2008). While some research provides lesson plans and specific practices for implementation in the classroom (e.g., Gutstein & Peterson, 2006; Irvine & Armento, 2001; Strutchens, Johnson, & Tate, 2000), there is little research on broad methods to encourage CRP among teachers of underserved student populations in particular (Matthews, Jones, & Parker, 2013).

In this article, we use pre- and post-conference survey results from a conference intended to foster knowledge of CRP as well as in-depth interviews to understand how mathematics teachers benefited (or not) from professional development about CRP and its potential to raise student engagement in mathematics. In particular, we consider how mathematics teachers translated greater awareness of CRP into practice one year later. The conference, hosted by the Maryland Institute for Minority Achievement and Urban Education (the Institute), represents an effort to provide mathematics teachers with professional development through a conference workshop setting, creating collaboration among teachers of students of similar ages and within similar school contexts. The goal of this article is to illustrate how a 2-day workshop experience highlighting CRP in mathematics yielded improvements to teachers' perceptions of their effectiveness, classroom practices, and teachers' relationships with students. While workshops offer an efficient means to share information to large groups and to establish networking opportunities, once teachers return to their individual school contexts, the implementation of change can pose challenges. Despite steps to provide teachers with partners and teams with which to implement results, there are often barriers to the translation of workshop experiences to new classroom practices.

One of the challenges when investigating teachers' professional development experiences lies in linking professional development efforts to student outcomes (Loucks-Horsley & Matsumoto, 1999). Ladson-Billings (2006) notes that preparing teachers in CRP requires a compilation of curriculum requirements, teaching practices, social justice, and the ability to deconstruct knowledge. Most importantly, Ladson-Billings explains that you cannot tell anyone how to "do" CRP. It is dependent on the individual students and the home, school, and community contexts. Teachers who attended the 2-day, professional development conference reported here participated in workshops that guided and instructed teachers to consider the social and family context of their students and how individual student experiences

may influence how they teach. In this article, we identify several benefits of the workshop format for improving CRP among a diverse group of teachers. Using quantitative analyses of teachers' self-reports and qualitative analyses of in-depth interviews, we document several ways in which teachers translate workshop experiences to classroom practices.

Culturally Relevant Pedagogy: Mathematics, Implementation, and Professional Development

The literature on CRP represents a wide range of practices and theoretical applications, making the implementation of specific culturally relevant practices difficult given the potentially vague understandings of the term. Here, CRP refers to the theory put forth by Ladson-Billings (1994; see also 1995a, 1995b, 1997) to describe a pedagogy that "empowers students intellectually, socially, emotionally, and politically" (p. 18) by using culture and rapport to exchange knowledge. Ladson-Billings (1995a) highlights three broad components to CRP: (a) setting high expectations of academic success, (b) developing cultural competence with greater understandings of students' (and teachers') identities, and (c) creating awareness of inequality and social justice issues. CRP uses the community, knowledge, and experiences of the students to inform the teacher's lessons and methodology, in addition to reflecting on inequalities and power relations in society. This approach emphasizes students' own knowledge and encourages them to be active participants in shaping the daily material taught during classroom lessons (Gay, 2000).

CRP and Mathematics

Much of the research on the use of CRP in the mathematics classroom stresses the importance of relationships and cultural awareness (Dance, Wingfield, & Davidson, 2000; Ladson-Billings, 1997; Leonard et al., 2010). Relationships with students are a central component of teachers' abilities to empower students intellectually and to implement curricular that reaches students in the classroom setting (Morrison et al., 2008). In using a culturally relevant approach to mathematics teaching and learning, teachers intentionally embed the mathematics content in socially meaningful contexts that matter to students (Herzig, 2005).

To establish a sense of "everyday life" in the mathematics classroom, teachers must have a strong sense of the cultural components of students' cognitive approaches to learning (Albert, 2000; Brenner, 1998; Matthews et al., 2013; Nasir, 2002; Waddell, 2010). For example, everyday relationships to mathematics may be better understood through exposure to students' out-of-school experiences (González, Andrade, Civil, & Moll, 2001; Nasir, 2002). Teachers must make a careful appraisal of a single student's performance, school setting, and household responsibil-

ities, moving teachers out of the mathematics classroom into home and community (Bartell, 2011).

These relationships with students also extend to students' senses of community in the classroom. Teachers must intervene in classroom exchanges among students to ensure peer support for student learning (Dance et al., 2000; Morrison et al., 2008). In a description of culturally relevant teaching practices in middle school mathematics classrooms, Waddell (2014) distinguishes between the learning environment, classroom climate, and classroom community. Through each of these components, respectively, teachers establish high standards, create a safe environment for students, and consider supportive relationships between students and community members. Waddell claims that it is only within these various types of relationships that CRP occurs.

Finally, a successful CRP approach also must incorporate social justice pedagogy, which requires strong relationships with students (Leonard et al., 2010; Morrison et al., 2008). For example, Leonard and colleagues (2010) note the intersection of CRP and a social justice approach in mathematics occurred as a teacher realized that a students' classroom behavior stemmed from personal changes. In *Rethinking Mathematics: Teaching Social Justice by the Numbers* (Gutstein & Peterson, 2006) several educators highlight relevant social justice issues such as racial profiling (Peterson, 2006) and environmental justice (Tate, 2006) and demonstrate how they are used to teach various mathematics topics.

CRP and Implementation

Despite the potential success of CRP there are challenges to putting culturally relevant theories into practice (Boutte et al., 2010; Milner, 2011; Young, 2010). Some researchers argue that culturally relevant techniques must be developed over time, through experience, and within individual teachers (see, e.g., Milner, 2011). Others have shown case studies of new teachers in urban settings adopting a culturally relevant approach by generating dialogue among teachers, students, and classmates; establishing personal relationships; and developing a sense of community in the classroom (see, e.g., Price-Dennis & Souto-Manning, 2011). Together, the dialogue, relationships, and sense of community created in the classroom allow teachers the space to address issues of injustice as well as improve the contexts in which students learn classroom material (Price-Dennis & Souto-Manning, 2011). Nonetheless, teachers often find incorporating all three components of CRP—setting high expectations, developing cultural competence, and creating social justice awareness—challenging (Young, 2010). As a result, approaches to implementing CRP too often appear "limited and simplistic" (Sleeter, 2012, p. 568). Generally speaking, there are several concerns about the successful implementation of CRP in classrooms.

First, the time available in the classroom for planning and implementation is a potential problem. Teachers have limited time to reflect, develop, and integrate CRP into their curricular and teaching strategies, particularly with the introduction of "common core" requirements and changing expectations across schools and states. Additionally, teachers are challenged to find time to collaborate and consult with their colleagues about what is working well in their respective classrooms. But research on the success of professional development initiatives indicates that allowing planning time for teachers improves the level of classroom implementation (Penuel, Fishman, Yamaguchi, & Gallagher, 2007). Moreover, there is concern among educators about how to incorporate CRP tactics in the classroom. Teachers may have access to suggested practices but remain unsure about how to implement these suggestions (Waddell, 2014). Practices may also require additional teaching time, while teachers stretch to meet existing mathematics learning objectives within expected timeframes (Young, 2010).

Second, some teachers may be less willing to include issues of injustice and inequality, a critical component of CRP, into seemingly "objective" subject matter like mathematics (Sleeter, 2012; Young, 2010). But research on social justice mathematics suggests that such an approach offers students—in particularly, students of color—the opportunity to form positive mathematics identities, and can produce mathematics knowledge that is powerful in everyday life (see, e.g., Gutstein, 2003, 2006). Without the social justice component, teachers may engage with students in simplistic ways, teaching about "culture" rather than using culture to elevate learning objectives, or reduce CRP to "steps to follow" rather than a broad approach to understanding social justice issues (Sleeter, 2012, p. 569). Many social justice issues can be addressed through a mathematical perspective, but there is a standing concern that, absent a true social justice approach, teachers will use cultural deprivation or deficit approaches to understanding how children of color succeed in the classroom (Schmeichel, 2012).

The third challenge arises in teachers' efforts to establish relationships with students in the classroom. This aspect of teaching can be equally challenging as creating active learning strategies and implementing new classroom practices. At the foundation of a culturally relevant approach, teachers must connect lesson plans to students' daily lives in their communities, families, and leisure activities, and be willing to learn from students' experiences outside the classroom (Boutte et al., 2010). A caution, however, is that teachers might develop an overemphasis on understanding students' home cultures only superficially rather than understanding institutional issues of power, privilege, and inequality in the school setting and society at large (Young, 2010). This overemphasis can result in an essentializing of student behaviors substituting for the development of supportive and caring relationships.

The workshops hosted by the Institute during the 2-day CRP conference were intended to address some of these challenges and to support teachers' ability to integrate CRP into mathematics classrooms. As noted by Morrison and colleagues (2008), however, a culturally relevant approach is often counter to the organizational structural of schools, significantly limiting teachers' ability to implement longstanding change. Analyses of the findings discussed here address the specific types of practices implemented in the classroom and the benefits teachers' received from the workshop approach to professional development.

CRP and Professional Development

Traditional paths to teaching focus on pedagogical content knowledge, generally gained through university education, internships, and work experience (Baumert, Kunter, Blum, Brunner, & Voss, 2009). The research on professional development is broad and emphasizes multiple kinds of knowledge: content, student learning, teaching methods, and how to help individual students gain knowledge in the classroom (Loucks-Horsley & Matsumoto, 1999). A focus on teaching methods rather than content is only one way to improve teacher knowledge, but it has met with success in the past. Baumert and colleagues (2009) found that, while content knowledge is required for teachers to impart knowledge to students, pedagogical training has a larger effect on student progress, making additional training efforts such as the conference workshop discussed here important for improved educational outcomes.

Several aspects of professional development activities have positive effects on teachers' self-reported increases in knowledge and skills. Effective practices include long-term professional development programs, immersing participants in active learning efforts, providing curriculum strategies, creating collaborative networks, focusing on improvements to student inquiry, and using university-based partners for professional development (Garet, Porter, Desimone, Birman, & Yoon, 2001; Loucks-Horsley & Matsumoto, 1999; Penuel et al., 2007). One professional development effort involving CRP among middle school science teachers occurred over a period of 15 months and provided content training, curriculum instruction, regular classroom observations, and, most importantly, networking opportunities with fellow teachers and outside observers to discuss problems and solutions to incorporate components of CRP (Johnson & Marx, 2009). As a result of the professional development, teachers reported closer relationships with students and colleagues as well as the implementation of new, successful teaching practices (Johnson & Marx, 2009). While such long-term initiatives are not easily established, some components of such successful endeavors may be used in a lower-cost setting that targets a large number of participants.

Workshops are a setting commonly used to share such knowledge with teachers outside the classroom, and while they can be effective in generating ideas for

change, they may not provide teachers with the necessary resources to implement those changes in the classroom (Garet et al., 2001; Loucks-Horsley & Matsumoto, 1999). Incorporating successful features of workshops, such as individual components used by Johnson and Marx (2009), however, may provide one avenue to professional development within existing structural constraints. Using a national sample of mathematics and science teachers, Garet and colleagues (2001) found that facilitating networking, grouping participants by grade level, using active learning strategies, and including multiple teachers from the same school led to greater gains in knowledge and changes in classroom practice. By including these networking opportunities and generating collaboration within schools, educators have a better chance of implementing change if they have someone with whom to collaborate once they return to their home school.

CRP is one theory that may be well applied in a workshop setting to give educators additional resources with which to create gains in student learning. Teachers used as exemplars for culturally relevant approaches in the classroom are often part of the community in which they teach (Ladson-Billings, 1995b). Participation in the community provides necessary knowledge (a type of training) to employ CRP practices. Participation in a broader community that supports CRP reflects teachers' beliefs in establishing student–teacher relationships; strengthening connections with students and their communities; and conceptualizing multiple forms of knowledge (Ladson-Billings, 1995b). Waddell (2014) focuses on culturally ambitious teaching practices in mathematics accomplished through a community of teachers receiving weekly coaching; such practices were created with the intention they would be "starting points" for community conversations on classroom practices throughout the school year (p. 15).

Problem Statement and Research Questions

The extensive research on professional development for educators provides a number of best practices for improving student outcomes. However, we know little about the extent to which these practices prove effective for the multiple components necessary for CRP. Additionally, extensive professional development efforts can require significant time and resources less often available to teachers of underserved populations. As a result, it becomes important to prioritize components of professional development that have evidence-based findings to support teachers' knowledge development. Workshop settings are a positive means of introducing teachers to CRP practices for mathematics classrooms because they offer opportunities for teacher communities to form, allowing teachers to grow supportive networks as they implement CRP practices. The resources and networks teachers develop through CRP workshops contribute to a greater chance of CRP implementation, and, eventually, teachers' development of improved relationships with stu-

dents through implemented practices. Given the significant emphasis on forming relationships with students in a culturally relevant approach, this facet of professional development must be emphasized (Brenner, 1998; Matthews et al., 2013; Nasir, 2002).

Complicating the implementation of CRP following a conference workshop are the many challenges and components to achieve a mathematics curriculum that fully reflects CRP, not the least of which is an extended period of time to establish relationships and improve practices. Therefore, much of the function of a workshop setting on CRP must be to introduce educators to the concept, instruct them on key practices, and provide them with resources to continue to develop their pedagogy. Here, we focus our analyses on two key research questions:

1. Can a 2-day conference workshop setting improve teachers' perceptions of their CRP knowledge specific to mathematics?
2. What benefits do teachers perceive as a result of a conference workshop setting focused on CRP in mathematics classrooms?

Methods

The 2012 conference "Helping Mathematics Teachers Become Culturally Relevant Educators: New Tools for a New Generation" was designed for those who teach mathematics in the elementary grades and for mathematics teachers in middle and high school. This conference drew on successes from an earlier conference in 2010 that indicated teachers welcomed information and techniques that would help them address the cultural knowledge of their students. At the conclusion of the 2010 conference, conference attendees submitted post-conference comments that suggested teachers faced daunting barriers to implementation. Some teachers wished that other teachers from their home school had attended so that they could share ideas. In response, the 2012 conference assessed here incorporated workshops that invited teachers to attend as school teams and provided tools and instruction for classroom use.

In addition, there were three plenary speakers and three workshop facilitators invited to the 2012 conference. The plenary speakers were requested to provide attendees with two perspectives from which to gain a better understanding of CRP from both a theoretical and a mathematics practice perspective. Dr. Jacqueline Irvine (Emory University) and Dr. Geneva Gay (University of Washington), notable researchers in the field, provided an overview of the state of research and current thinking of CRP. Dr. Lawrence Clark (University of Maryland, College Park), an experienced mathematics classroom teacher and researcher in mathematics education, provided the more classroom-specific content. Over the 2-day conference,

each teacher participated in at least six hours of workshop activities with their designated workshop facilitator.

Analyses presented here are based on a closed-ended survey and follow-up interviews with conference attendees 1 year after the conference workshop. The research process, therefore, is a sequential explanatory mixed methods model, first collecting the quantitative data and then collecting qualitative data to better answer research questions not adequately addressed through quantitative data (Creswell, 2007). To evaluate respondents' perceived gains in CRP knowledge over the 2-day conference workshop, pre- and post-conference surveys were administered to attendees. The pre-conference survey was distributed and collected prior to the first workshop. Attendees were asked to complete the post-conference survey after the last workshop, during lunch. Sample questions from the survey are included in Appendix A. A total of 81 individuals attended the conference; 76 respondents (93.8% response rate) completed the pre-conference survey, while 48 respondents (59.3% response rate) completed the post-conference survey. Analyses used paired t-tests to measure significance (at $p < .05$) pre- and post-change, resulting in a sample size of 48. The paired t-test approach takes into account the shared error in respondent characteristics of the before and after survey sample, increasing the standard error in analyses to allow more conservative estimates of change.

Table 1
Characteristics of all Conference Attendees Compared to Pre- and Post-Conference Survey Respondents

Race/Ethnicity	**All Attendees (n = 76) Percentage**	**All Attendees SD**	**Paired Sample (n = 48) Percentage**	**Paired Sample SD**
White	65.3	0.48	64.6	0.48
Black	27.8	0.45	29.2	0.46
Am. Indian/ Nat. Hawaiian	2.8	0.17	2.1	0.14
Asian	4.2	0.20	4.2	0.20
Gender				
Male	18.1	0.39	12.5	0.33
Female	81.9	0.39	87.5	0.33
Grade Taught				
Elementary	40.3	0.49	43.8	0.50
Middle	44.4	0.50	37.5	0.49
High	13.9	0.35	16.7	0.38
Middle /High	1.4	0.12	2.1	0.14

Note: SD = Standard Deviation

Table 1 provides characteristics—race, gender, and grade taught—of the conference attendees. On most demographic characteristics, individuals that responded

to both surveys (at the start and completion of the conference) are similar to the rest of the conference attendees, including those that did not respond. Two exceptions are in respondent self-reported gender identity and the grade that the individual teaches. Slightly more women are included in the results included here compared to those at the conference (88% compared to 82%) and more respondents to both surveys taught elementary school compared to total conference attendees (44% compared to 40%).

In an effort to gain a more detailed account of how attendees implemented culturally relevant practices in the classroom, eleven interviews with conference attendees and their school principals were conducted. Schools with multiple educators as attendees were targeted for the follow-up interviews. We also solicited respondents for the interviews using grade level and geographic location as guidelines, targeting teacher attendees from both elementary and middle schools as well as teachers from each of the three surrounding states represented by conference attendance. The proximity of surrounding states allowed for in-person interviews.

The second author approached 16 teachers and instructional coaches at 11 elementary and middle schools to participate in the research. In-depth (in person and phone) interviews were conducted with five elementary school teachers and three middle school teachers at six schools. After speaking with the educators, the second author also contacted principals at those six schools to gather more information on school-wide priorities and policies regarding CRP. Three principals at these corresponding schools agreed to interviews. Interviews were 15 minutes to 1 hour in length, with the principal interviews considerably shorter than the teacher interviews. Table 2 provides summary information on teachers' characteristics, detailing the educator's role as a teacher or instructional coach, and primary classroom grade level. The schools at which the educators are employed vary considerably in their demographics. Conference organizers solicited participation from schools with a substantial proportion of students of color, although in some cases principals also requested that their teachers have an opportunity to participate in the conference workshops. The racial and ethnic composition and free and reduced-price lunch percentages reported for the 2011–12 school year are also included in Table 2.

In-depth interviews addressed what respondents remembered about the conference workshop 1 year later, how they had used conference workshop information, and some of the attendees' potential paths to classroom implementation. The timing for the interviews is important, as 1 year had passed before assessing how (and whether) participants used (or not) the conference workshop information. Experience from a past conference on CRP conducted by the first author indicated that teachers were best able to implement new teaching techniques when they attended the conference in teams. As a result, the Institute solicited team attendance from schools for the 2012 conference. The interviews used the same basic interview guide, developed by the first author (available on request). All quotes have been

edited for false starts, repeated words, and extraneous phrases (e.g., well, um, like, you know, kind of, I mean, whereas). Ellipses note when some sentences or phrases have been cut to clarify the statement without changing the original meaning.

Table 2
Qualitative Interview Sample Characteristics

Pseudonym	Grade Level	% Free or Reduced-Price Meals	% School Racial Composition	Title
Cathy Jackson	Elementary	83%	63% Black 21% White	Teacher
Diedre Noon Jennifer Pence	Elementary	10%	6% Black 77% White	Teacher Teacher
Rosa Daniels	Elementary	75%	88% Black	Math Coach
Tanya Nash	Elementary	84%	98% Black	Math Coach
Beth Idler Russell Gates	Middle	65%	53% Black 38% White	Math Coach Teacher
Kendra Burns	Middle	52%	25% Black 62% White	Math Coach

Findings

Survey Findings

Survey findings were analyzed using paired t-tests of pre- and post-conference evaluations. Results from the evaluation show that participants increased their basic knowledge of key terms and concepts as they pertain to CRP. Given the large range of terminology that surrounds a culturally relevant approach, participants were asked to rate their familiarity with key terms at the start of the conference workshop and again at the close. Attendees consistently rated their perceived knowledge of the many concepts by which CRP may be known as improved. These results are indicated in Table 3. As an example, familiarity with the term "CRP" in the first row increased by a full standard deviation by the end of the conference workshop. This translates to a pre-conference survey average rating of being familiar with the term "to a small extent" to a post-conference survey average rating of being familiar with the term "to a moderate extent."

The aim of the conference workshop, however, was to improve both their perceived knowledge and anticipated CRP practice in the classroom. A second set of questions tested the use of culturally relevant teaching practices in the 2011–12 school year prior to the conference (pre-test) and intended usage for the remainder of the 2011–12 school year following the conference (post-test). While many practices were used quite frequently prior to attending the conference workshop, there are several areas in which participants show likelihood of increased use of practices

consistent with CRP, as shown in Table 4. Specifically, participants noted a statistically significant increase in their intended use of the following practices: planning lessons toward a variety of abilities, making sure all students understood content before moving on, allowing students to share artifacts from their own cultures, using real-world examples, implementing strategies to ensure that teachers' attention is equitably distributed, and reflecting on their own (teachers') cultural biases.

Table 3

Self-Reported Change in Familiarity with Culturally Relevant Terminology

	Pre-Test		**Post-Test**		
	Mean	*SD*	*Mean*		*SD*
"Culturally Relevant Pedagogy" (CRP)	2.42	0.89	3.29	*	0.65
"Culturally Relevant Teaching"	2.64	0.87	3.52	*	0.58
"Culturally Responsive Teaching"	2.44	0.87	3.44	*	0.58
"Culturally Sensitive Teaching"	2.54	0.83	3.44	*	0.68

Note: Scores represent mean of the range where 1 = no extent, 2 = small extent, 3 = moderate extent, and 4 = large extent; only pairs are in the sample for score analyses (N = 48); * $p < .05$; SD = Standard Deviation

Table 4

Respondents' Self-Reported Current and Anticipated Use of CRP Practices

	Pre-Test (Current Use)		**Post-Test (Anticipated Use)**		
	Mean	*SD*	*Mean*		*SD*
a. Plan lessons toward a variety of abilities and needs	4.26	1.08	4.67	*	0.52
b. Visit student families outside of schools	1.60	1.09	1.84		0.78
c. Make sure all students understood the content before moving on	4.14	0.99	4.47	*	0.50
d. Allow students to share cultural artifacts	2.70	1.36	3.85	*	1.00
e. Use real-world examples	4.65	0.61	4.86	*	0.35
f. Use strategies to ensure attention is equitably distributed	4.48	1.09	4.81	*	0.40
g. Engage with students about their problems	4.67	0.61	4.60		0.49
h. Explain concepts in different ways	4.81	0.55	4.84		0.37
i. Reflect upon own cultural heritage and biases	3.58	1.26	4.26	*	0.83

Note: Scores represent the mean of the scale of use of the practice where 1 = never, 2 = quarterly /annually, 3 = monthly, 4 = weekly, and 5 = daily; only pairs with non-missing scores are included (N = 46); * $p < .05$; SD = Standard Deviation

Moreover, reviewing teachers' anticipated change in practice could inform our understanding of how their actions align with other notable pedagogical theory. For example, items "a" and "e" in Table 4 have gained particular attention in the

teacher practice literature as teaching activities that influence classroom engagement—differentiated instruction (item "a") and funds of knowledge (item "e"). As teacher attendees indicated that they anticipate employing more lesson plans that address a range of student abilities and ultimately more engaged learners and possibly increased academic achievement. For item "e"—use of real-world examples—the survey results increased from 4.65 to 4.86, which represents a statistically significant change and provides important implications for teacher practice. According to Civil (2002) teachers' use of real-world examples positively influences students' interest in the lessons presented and their ability to comprehend and retain the information.

For the most part, the anticipated increase in use of key practices was relatively small, with less than a standard deviation for all the practices. However, for five of the six practices, teachers left the conference workshop with the intention of engaging students in these approaches on a weekly basis, as opposed to a monthly or quarterly basis, engaging students more frequently than prior to attending the conference workshop.

In response to the first research question—whether a conference workshop setting improves knowledge of CRP—the survey data indicates that educators left the conference with an improved perceived understanding of CRP and intentions to use related practices more frequently. Given the limitations of the results collected at the conference site through pre- and post-conference surveys, we followed up with participants one year after the conference workshop to assess the extent to which CRP had been integrated into their classrooms. These follow-up interviews indicate that participants found particular aspects of the conference workshop beneficial in changing classroom practices, with some limitations on the extent to which changes were successful when fully integrated, as outlined in the next section.

Interview Findings

The second research question addresses the particular components of professional development efforts that serve to change classroom practices, translating knowledge to practice. There are three key benefits that accrued to conference workshop participants: networking with others, sharing teaching practices, and developing teacher–student and student–student relationships. Within each of these, there are additional benefits. For example, networking provided participants not only with new colleagues but also a new language for sharing culturally relevant teaching practices that they did not previously possess.

Networking with others. Educators sought an opportunity to share experiences in the classroom, and the CRP conference workshop provided the setting to interact with teachers in similar grade levels. For example, Rosa Daniels, a mathematics specialist in a Title I elementary school, noted that the chance to share information with such a large number of colleagues was one of the conference highlights:

> What I remember most was the participants … I remember speaking with them and listening to how they were trying to transform the way they do mathematics in their school system. And what impacted me was them talking about no more procedural math being done until the fourth grade. So K–3 they were trying to do more exploration and more conceptual types of mathematics versus doing procedural type of mathematics. And they explained some of the things that they were doing in that county and how they were changing those things. … The discourse in the session was more powerful than anything else.

Networking opportunities provide language for positive efforts underway at individual schools and offer educators pedagogical support for current or imagined projects. Tanya Nash, a Title I mathematics specialist at an elementary school, also felt that networking was one of the most useful components of the workshop. She noted:

> It's not often that we get a chance to have professional dialogue. Coming together and sharing. The fact that we were from different cultures, different backgrounds to share experiences. I thought that was a great form and a great way to come together. That's what I really remember most. The networking.

Additionally, by allowing educators the opportunity to discuss practices that build relationships and provide a sense of understanding of students' home and school environments, educators are given a language to highlight successful practices. Educators referred to the break-out grade level sessions as "fantastic" and noted the many ideas that "flowed" through the session. Kendra Burns, a mathematics coach in a middle school, noted that the conference reinforced existing practices by providing a vocabulary for describing her efforts:

> I was doing a lot of it before; it was just never called "culturally relevant teaching"… But since the conference, I'm just more aware of it, and … so that when I come up with something, and I feel it's pretty darn good, I'm looking around to see, what else is out there that might touch base with a student that maybe has a different background.

In many ways, networking provided additional validation and support for teachers that often felt uncertain about how their classroom technique would be perceived by colleagues. Additionally, by providing educators with new ways to understand their existing practices, participants were able to expand upon successful efforts using a culturally relevant approach.

The networking available at the conference also validated some educators' more creative efforts to capture children's attention and build relationships. According to Rosa Daniels (an elementary instructional mathematics coach at a Title I school):

> It comforted me to know that I wasn't some wacky, crazy teacher out here trying to just do all these things … it really was something that was needed for our children to relate to, and then tying in economics with doing some addition and subtraction … I've always done stuff like that; it just helped me to understand that it was important, and it was needed.

For many, networking at the CRP conference workshop offered teachers a label for practices they may already employ. Teachers that attended were more likely to work with underserved student populations. Such teachers often found themselves seeking to establish relationships with students, to present the subject matter in an accessible manner, and to provide a fun atmosphere for learning combined with high expectations for students. However, it was not as often that these practices were given a name and status as "best practices" approaches to engaging with students. The language of the conference workshop offered teachers a way to communicate about their efforts in a professional setting, with the support and acknowledgement of experts.

Sharing teaching practices. Similar to the networking opportunities, the workshop format modeled several best practices in culturally relevant teaching that could be implemented in the classroom. As participants came together, they were able to share practices that had worked well in their own classrooms. After the conference workshop, Jennifer Pence describes her elementary classroom as "a busy, busy place." The classroom practices covered several areas of mathematics learning. We offer three examples of teachers we interviewed to demonstrate how they engaged in CRP for mathematics.

In the first example, mathematics teachers used a culturally relevant approach to foster student-to-student communication in the classroom. For example, Russell Gates, a middle school mathematics teacher, noted:

> I also remember one of the guys in the group made a real impression on you, because he used the respectful talk: "I respectfully disagree." That was a great conversation that came up in our session … having the kids learn how to talk to each other, to work cooperatively in groups and having that level of respect. It doesn't always work, but I did implement it since that conference, day one. These kids are already shut down enough. The last thing we need is to shut them down even more by saying, "Your answer is wacky," which [other students] want to do.

The practice of having students respectfully disagree with peers was successful in Russell's classroom and easily implemented. In this way, students had an opportunity to learn from each other, but were required to do so from a place of respect.

In a second example, several teachers noted that an immediate (and relatively simple) improvement to classroom practices was the use of real-world examples for students. Kendra Burns, a middle school mathematics coach, gave one example—

> It's just being more aware of pulling in different aspects of those real-world problems. So instead of having a problem that would predominantly be something that a white Caucasian person would encounter, it's more broad in general. And just being specific, for instance, we've done a lesson with music and math, and the title of the lesson was literally "Can Music Kill You?" It was talking about the heart rate, and it was based on a lesson that was designed through a website, it's called Mathalicious. Basically, we changed the music so that it kind of hit all different cultures, not just classical music or something of that sort. We've just incorporated more into what was not maybe a meaty math problem, but to make it relevant to the students.

Seven of the eight teachers interviewed provided examples of real-world applications they have used in mathematics. Suggestions ranged from examples using sports percentages and shopping, to the use of manipulatives and mathematics applications that related to recent reading assignments.

Finally, in a third example, three respondents commented on their success with employing active learning practices in the classroom, which they learned at the conference workshop. These respondents were primarily teachers of elementary-age children, who perhaps had the most to benefit from providing students with a way to be actively involved in their mathematics lessons. Cathy Jackson, a second year general elementary teacher, described why after the conference workshop mathematics became the more successful lesson time in her classroom—

> Math is so much more hands-on, and manipulative, and drawing and creating models and seeing what other people are doing and creating. The students just seem more like they're into it with math, whereas reading—I hate to say this—I love reading and I'm a reading person, and I'm an avid reader and have been so those little readings just more sit and focus on what you're doing, not a lot of opportunity to move and bounce around the room. With math, you have them working more collaboratively to achieve something.

Similarly, Rosa Daniels provided a specific example of how mathematics lessons could become more movement oriented in the classroom. She provided an example for a general elementary teacher at her school that would get students moving, but also communicate mathematics curriculum. She explained:

> So we're running as fast as we can in place, and [we sing this song called] "5,280," understanding that every time we hit our feet to the floor that means it's a foot. So it's, "5,280 5,280" and I'll say, "What does that mean?" [And, the students say,] "Five-thousand-two-hundred-eighty feet in a mile." So she [the teacher] allows me to help her with things like that. And she's actually come up with her own things to help engage them in that way too. So I think I inspired her by coming to the conference to do more things like that with the kids.

The workshop approach not only provided educators with active instruction from an expert in the field but also with several opportunities to network with col-

leagues to learn of new practices that could be applied in classrooms. The approach to networking at the conference workshop sorted teachers according to grade level offered teachers several advantages: new peer networks and colleagues, a language for labeling successful teaching practices, validation of successful teaching practices, clear examples of new practices to employ in the classroom, and a broad network to share other teachers' best practices.

Developing teacher–student and student–student relationships. In following up with educators one year after the conference workshop, they often focused on their efforts to establish relationships in the classroom. These relationships included educators' desire to reach students on a personal level as well as their interest in facilitating the classroom relationships among students to promote cooperative learning. Several participants highlighted these ideas when discussing how they employed knowledge from the conference workshop in the classroom. For example, one teaching team at an elementary school changed their classroom furniture from individual desks to small groups at tables in an effort to promote cooperative learning following the workshop. According to Diedre Noon, "We've gotten rid of the traditional desk and have tables where [students] are encouraged to be much more collaborative and share their thinking, and to really foster that sense of community and culture and care."

Teachers also noted that the preparation in CRP inspired them to be cognizant of the issues outside of school that may influence students' learning. For example, an elementary teaching team that attended the conference workshop suggested that they are better able to consider each child as an individual person, rather than an individual learner. According to Diedre Noon, an elementary teacher—

> I think [the conference] just helped us to … look at each child as an individual. I mean we already do that when we differentiate, but we were looking at *them* rather than just on achievement, really, what the whole package was. What is that child all about and how can we plan lessons and how can we talk to them and how can we respond to them in ways that show that we understand all of that and we're respectful of it.

A culturally relevant approach requires that teachers develop relationships with children over time, and learning outcomes improve as teachers gain better knowledge of how to teach an individual child. Diedre found that the conference workshop encouraged her to think beyond achievement and focus on understanding the whole child.

This focus on the individual child also extends to the acknowledgement of a child's home life as well as how they appear in the school setting. Russell Gates, a middle school mathematics teacher, described how important it is to consider why students may perform a certain way at school:

> The whole conference, the whole purpose was to try to understand where kids from different cultures, different levels of poverty are coming from, and how to accommodate. I think that's what I got the most out of it. It's just not, "You didn't turn in your homework? Okay, 'D.'" [Instead] you say, "Maybe we can talk to this student and figure out is there something that we can do." … Their home lives are so different than what we're probably used to. So, maybe they didn't have time at home. You know, their parents aren't home and they're babysitting all afternoon, or they go to bed late, whatever the case may be. That's what I got the most out of, just not judging, assuming right away. They didn't turn in their homework. They don't seem as happy today. Did something happen to keep them from doing the homework assignment? … Learning more about them, establishing that relationship, and it goes miles.

Classroom implementation of approaches to culturally relevant teaching may initially be limited to one aspect of CRP, such as emphasizing cultural differences in the classroom as Sleeter (2012) cautioned. Our findings echoed this issue, as teachers focused on the family background of students as explanation for academic problems and sought to build relationships with those students. Additionally, teachers might make assumptions that there are issues at home or that students are "going to bed late," but not highlight personal relationships with students that would make clear this knowledge was entirely correct. Overall, there was less emphasis on setting high expectations for academic success for students and providing sources of support within the school or of exposing oppressive power relations in the school or in the curricular content.

In addition to creating teacher–student relationships, teachers sought to improve the relationships among students in the classroom to encourage cooperative learning. For example, Diedre Noon also noted: "In terms of grouping, [the speaker] especially talked a lot about cooperative groups and just using that to benefit you … So when I'm planning lessons … I'm thinking about how I'm going to put those kids together so that I'm drawing out on all of their strengths." Diedre's quote is important, because Ladson-Billings (2006) notes that cooperative learning is not always an answer to social justice in the classroom. Teachers must do careful thinking about the setting and be able to recognize when group activities will not generate learning outcomes. In other examples, participants noted how they guided more conversations in the classroom to foster religious and cultural awareness. In some cases, teachers highlighted each student's contribution to class discussion as a way to develop a collaborative environment and identify ideas for future lessons.

It is clear that relationship building may not come easily in the classroom, especially for teachers and students. CRP may address some of those issues, but in other cases the teachers who need professional development may not seek it. According to Rosa Daniels (an elementary mathematics specialist at a Title I school) establishing a rapport with the student can be one of the most challenging parts of teachers' jobs:

> The teachers work so hard here to try to build these relationships with the students, and it's such a disconnect. And I believe that they could use a whole session here, a series. So what I've been trying to do is to model for the teachers how to communicate with the students, how to teach them through doing lessons, showing them how to talk with the students. So my approach from what I got from your experience there is that I've been trying to live it as an example for the teachers, rather than trying to tell them this is what you should do or this is how you should handle it.

In the end, student relationships are a core component of a CRP, although they are not easily achieved. Ladson-Billings (2006) explains that before teachers can learn and implement CRP, they must understand the ideology of the curriculum and the individual needs of their students. When an educator embraces the core components of CRP and also assumes a lifelong interest in how their students are in 5 or 10 years and how education has shaped them, then they are "doing" culturally relevant teaching (Ladson-Billings, 2006).

Discussion

Despite the literature on the implementation of CRP in mathematics classrooms, there is less attention to professional development efforts geared toward large groups of teachers. Given the challenges associated with the implementation of CRP, especially the numerous definitions of cultural relevancy and the structural constraints teachers face at individual schools, mathematics teachers would benefit from additional professional development efforts in CRP. In response to these issues, the Institute established a conference workshop setting for mathematics teachers at schools serving largely underserved student populations to improve their knowledge of CRP and to create networks with which to build their classroom practices. Here, we have highlighted three benefits to CRP professional development that embraces a workshop setting approach. In addition to these benefits, we have also noted areas in which teachers' application of professional development curriculum was lacking. These instances provide opportunities to refocus professional development efforts in CRP in mathematics classrooms to address such challenges.

In the first benefit, the 2-day conference workshop setting improved teachers' confidence in their perceived understanding of knowledge of culturally relevant approaches to teaching and of grade-specific practices they might implement in their classrooms. In particular, teachers reported a better familiarity with key terms following the conference workshop as well as plans to increase the frequency with which they engaged in particular active learning strategies in the classroom as a result of attendance. It is important to note that the quantitative survey sample is a small sample, with significant sample loss between pre- and post-surveys. Bias as a result of attrition and nonresponse is more likely related to geography than school or teacher characteristics. Furthermore, given that teachers were not observed or

evaluated on their understanding of CRP or on the presence of particular classroom practices, results only indicate attendees' perceived growth and confidence with key concepts and pedagogies.

At the close of the conference workshop, quantitative results indicated that teachers intended to implement at least six practices related to CRP on a more frequent basis, usually weekly instead of monthly. These practices included planning lessons geared to a variety of abilities, allowing students to share their culture in the classroom, using real-world examples, and reflecting on their own (teachers') cultural heritage. With changes at less than 1 standard deviation, the increased use of CRP in the classroom is not dramatic. Nonetheless, any additional incorporation of these practices and other culturally relevant pedagogies are likely to facilitate relationships with students, especially in terms of teachers recognizing their place of privilege, power dynamics in the classroom, issues of social justice, and making the classroom content more specific to the daily contexts of students (Herzig, 2005; Price-Dennis & Souto-Manning, 2011).

We can draw on existing research for two of the practices teachers discussed using in the classroom to highlight instances where these improvements may yield additional results and align with notable pedagogical theories. The practice of teachers increasingly planning lessons for a variety of abilities aligns with the promotion of CRP in mathematics classrooms. Differentiation may be described as a group of common theories and practices acknowledging student differences in background knowledge, readiness, language, and learning style, and interests, inciting teachers to respond to individual student needs (Tomlinson & Kalbfleisch, 1998). Teachers anticipated use of real-life examples aligns with another aspect of CRP in that using examples from the students' social context helps them connect to the academic concept. The concept *funds of knowledge* (cf., González, Moll, & Amanti, 2005) highlights this practice; learning modules building on students' local knowledge validate students' experiences and backgrounds. Teachers' use of real-world examples positively impacts students' interest in the lessons presented and their ability to comprehend and retain the information (Civil, 2002). Therefore, for the limited time in which teachers participated in the conference workshop and the practices they were able to learn over the course of 2 days, these improvements are relatively noteworthy and beneficial to students. Quantitative findings show that the conference workshop fostered greater awareness of CRP in mathematics and prompted such actions as those discussed, but teachers also needed additional concrete strategies and lesson time for implementation.

As a result of the positive, but limited, quantitative results, we conducted in-depth interviews with a convenience sampling of conference participants to better understand how CRP professional development through a workshop setting informed mathematics practices. Through these interviews, we found that teachers' experiences supported the quantitative findings indicating improvements in under-

standing of CRP, growth in professional relationships around CRP, and new classroom applications. Here, we note that the qualitative interview sample was selected from a group of educators already interested in improving their skills in reference to CRP. Furthermore, those educators that made time for the additional follow-up interview were more likely to have been pleased with their experience at the conference workshop. Some survey respondents noted that one particular session was not useful for them, but we could not identify any of those attendees for interviews, as survey responses were anonymous. Therefore, the educators participating in the interviews are more likely to look back favorably on their experience at the conference.

In the second key benefit of using a conference workshop setting approach to increasing mathematics teachers' confidence in CRP, our analysis indicates that the workshop setting fostered mathematics teachers' networks and enhanced their ability to communicate with others about their teaching efforts. Several mathematics teachers interviewed lacked the language to articulate the emphasis they already placed on building relationships with students and sharing ideas. Attending the conference workshop allowed these teachers an opportunity to further their interests, acquire new classroom practices, and generate a language to discuss their successes with other teachers at their home school. Teachers who attended shared findings and best practices with other teachers at their school.

Teachers noted several practices during interviews that improved the exchange of mathematics knowledge in the classroom and facilitated the development of new classroom relationships, among both teachers and students. Teachers focused on developing collaborative relationships among students and the use of real-world examples in mathematics lessons. Teachers of elementary-aged students in particular, found that using active learning strategies during mathematics topics encourage student engagement and created a "busy" classroom. Overall, the study participants are more likely to be educators associated with schools with fewer resources, larger proportion of students of color, and more socioeconomic inequality. The potential lack of resources at the school may make implementation of new practices more difficult, although several participants also noted that Title I funding often helped them to access key resources for the classroom, such as manipulatives. While best practices in professional development indicate that efforts lasting over one year that take place in the classroom or school setting are key to improving teacher knowledge, such interventions are not always economically feasible. Given the limited finances available to improve culturally relevant teaching practices in mathematics, the conference workshop achieved a number of positive results among participants.

Finally, results show that after attending the 2-day conference workshop, teachers returned with renewed energy for fostering classroom relationships. These efforts occurred in a number of ways, from helping students to communicate with

each other in small group settings, changing the physical structure of the classroom, and encouraging other teachers to develop a greater rapport with students. Given the emphasis on developing deep relationships with students in order to pursue a culturally relevant approach in the classroom (Herzig, 2005; Ladson-Billings, 1997; Leonard et al., 2010), teachers' renewed interest in classroom relationships following the conference workshop is a positive result. Research in mathematics diversity and success urges that a sense of belonging fosters student achievement (Herzig, 2005), and as teachers in this study focused on making the classroom content more relevant for students they also succeeded in improving relationships and cultural awareness in the classroom. However, findings also indicate that developing relationships with students can be a time-consuming and complicated process, not always done successfully. Unfortunately, teachers also indicated that in an effort to understand students' lives, they might also oversimplify students' experiences and generalize knowledge of one student's home life to apply to another. In CRP, teachers must not use their perceptions of student background to substitute for setting high expectations for academic success or to justify current institutional policies that may not benefit all students in the classroom.

The conference workshop setting provided teachers with important and helpful information to move forward with changes to classroom practices and integrating all students more clearly into how key skills are developed. As noted by Sleeter (2012), teachers are rarely able to embrace all tenets of a culturally relevant paradigm in a short period of time, such as 1 year. Success with CRP is one that comes slowly, over a period of time, as teachers develop relationships with students, become a part of the school community, and develop their knowledge of what social justice issues can inform their teaching practice (Ladson-Billings, 2006; Milner, 2011). The teachers in this study displayed an active interest in these tenets and the perceived ability to expand their knowledge of CRP. Based on the affective responses from interviewed teachers and the changes they made in their mathematics classrooms, there is progress towards Ladson-Billing's (1994) goal of "empowering students intellectually, socially, emotionally and politically" (p. 18). By attending the conference workshop, teachers learned strategies that increased student engagement and mutual respect among students in their classrooms—first steps toward increased mathematical empowerment and student collaborative learning as social empowerment.

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APPENDIX A

Sample Questions from Pre- and Post-Conference Surveys

Pre-Conference Survey Questions

1. Please indicate your race/ethnicity. You may check more than one.
   - € White
   - € American Indian or Native Alaskan
   - € Native Hawaiian or Other Pacific Islander
   - € Black or African American
   - € Asian
   - € Hispanic or Latino

2. Please indicate your gender.
   - € Male
   - € Female

3. Please check the appropriate boxes to indicate what grade(s) you teach.
   - € Elementary
   - € Middle
   - € High School
   - € Combination

4. What subject(s) do you teach? _____

5. To what extent are you familiar with the following terms and concepts:

	Large Extent	**Moderate Extent**	**Small Extent**	**No Extent**
a. I am familiar with the term "Culturally Relevant Pedagogy"	○	○	○	○
b. I am familiar with the term "Culturally Relevant Teaching"	○	○	○	○
c. I am familiar with the term "Culturally Responsive Teaching"	○	○	○	○
d. I am familiar with the term "Culturally Sensitive Teaching"	○	○	○	○

6. During the current school year (2011-12), how often did you do the following?

	Daily	**Weekly**	**Monthly**	**Quarterly/ Annually**	**Never**
a. Plan lessons geared toward a variety of student abilities and social needs.	○	○	○	○	○
b. Visit student families outside of schools	○	○	○	○	○
c. Make sure all students understood the content before moving on with the lesson plan	○	○	○	○	○
d. Allow students to share cultural artifacts from home culture	○	○	○	○	○
e. Use real world examples	○	○	○	○	○
f. Use systematic strategies to ensure attention is equitably distributed to all students	○	○	○	○	○
g. Engage with students about their problems or experiences not related to school	○	○	○	○	○
h. Explain concepts in different ways to ensure all students understood the material	○	○	○	○	○
i. Reflect upon your own cultural heritage and possible biases	○	○	○	○	○

7. The actions above are elements of a culturally relevant teaching (CRT). Collectively, how would you describe the extent to which you have attempted to apply these concepts in your classroom during the current school year?

	Always	**Often**	**Occasionally**	**Rarely**	**Never**
a. I have attempted to use CRT ideas in my classroom in all subjects	○	○	○	○	○
b. I have attempted CRT for most mathematics lessons	○	○	○	○	○
c. I have attempted to develop a multicultural curriculum in my classroom	○	○	○	○	○

Post-Conference Survey

1. To what extent are you familiar with the following terms and concepts:

	Large Extent	**Moderate Extent**	**Small Extent**	**No Extent**
a. I am familiar with the term "Culturally Relevant Pedagogy"	○	○	○	○
b. I am familiar with the term "Culturally Relevant Teaching"	○	○	○	○
c. I am familiar with the term "Culturally Responsive Teaching"	○	○	○	○
d. I am familiar with the term "Culturally Sensitive Teaching"	○	○	○	○

2. Would you be interested in another conference on a related topic hosted by (the same university)? If so, would you suggest any topics? _____

3. Given the information gained from the conference, how often do you plan to use the following activities in the remainder of the school year (2011–12)?

	Daily	**Weekly**	**Monthly**	**Quarterly/ Annually**	**Never**
a. Plan lessons geared toward a variety of student abilities and social needs.	○	○	○	○	○
b. Visit student families outside of schools	○	○	○	○	○
c. Make sure all students understood the content before moving on with the lesson plan	○	○	○	○	○
d. Allow students to share cultural artifacts from home culture	○	○	○	○	○
e. Use real world examples	○	○	○	○	○
f. Use systematic strategies to ensure attention is equitably distributed to all students	○	○	○	○	○
g. Engage with students about their problems or experiences not related to school	○	○	○	○	○
h. Explain concepts in different ways to ensure all students understood the material	○	○	○	○	○
i. Reflect upon your own cultural heritage and possible biases	○	○	○	○	○

7. The actions in item #6 are elements of a culturally relevant teaching (CRT). Collectively, how would you describe the extent to which you plan to apply these concepts in your classroom for the remainder of this school year (2011–12)?

	Always	**Often**	**Occa-sionally**	**Rarely**	**Never**
a. I plan to use CRT ideas in my classroom in all subjects	○	○	○	○	○
b. I plan to use CRT for most math-ematics lessons	○	○	○	○	○
c. I have plans to use CRT for all my mathematics lessons.	○	○	○	○	○

8. To what extent has your knowledge of teaching changed by attending this conference?

	Large Extent	**Moderate Extent**	**Small Extent**	**No Extent**
a. My knowledge of teaching from a multicultural perspective has been enhanced	○	○	○	○
b. My knowledge of teaching by incor-porating students' cultural has been extended	○	○	○	○