AN EXAMINATION OF RACIAL COMPOSITION IN CULTURALLY RELEVANT MATH STUDY GROUPS ON MATH LEARNING OUTCOMES

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This paper proposes to use communalism, an asset-driven strategy effective with Black learners, with racially mixed study groups. This study found that students who studied in racially mixed groups performed better when told that individuals would receive a reward for scoring the highest in their group. Also, the White students' perceptions of how much they mattered differed based on the racial composition of the study groups where those studying with only White students felt they mattered more than those who studied with White and Black participants. Implications of the importance to have culturally relevant and responsive resources for racially diverse classrooms are discussed.

Keywords: Elementary School Education; Equity and Diversity; Instructional Activities and Practices; Affect, Emotion, Beliefs and Attitudes

Purpose

Currently, there have been no longstanding viable solutions to the problem of the achievement gap between Black students and their White counterparts. As revealed by the Nation's Report card (NAEP, 2015), though both group's scores have increased in the past 30 years, the White-Black learning gap has persisted with no significant gains made by Black students to close it. Black students' learning gap is a more severe problem when compared at the global level, where students in the United States are falling behind the scores of students from other developed nations (Boykin & Noguera, 2011). Students in countries such as Singapore, South Korea, Japan, Belgium, The Netherlands, Hungary, and Russia are all out-performing students in the United States in both fourth and eighth grade mathematics. To close this international achievement gap, culturally relevant and responsive resources targeting the performance of Black (and Brown) students both nationally and internationally must be implemented (Blanco-Álvarez & Luisa Oliveras 2016), as the number of K-12 students of color are projected to increase consistently in the coming years (NCES, 2011). Mathematics achievement, in particular, is imperative--as it has been noted as the "new" civil rights movement (Paige & Witty, 2009)--where students' achievement is linked to opportunities in the global political economy (Blanco-Álvarez & Luisa Oliveras 2016).

This study hypothesizes to increase scores in students of colors' mathematics performance by utilizing cultural assets that students possess stemming from norms and values in their home and surrounding communities (Hurley, Allen, & Boykin, 2009). Based on work that flows from "communalism" (Boykin & Noguera, 2011), the authors sought to explore the effects of an afro-cultural learning context in a racially mixed classroom setting. Specifically, the goals in this study were to examine A) the effects of racial composition of study groups and B) learning context/communalism on A)math performance, B)group processes/behaviors, and C)students' perceptions of how much they matter in their study groups. Implications from findings are to add more depth to the literature on the importance of group learning contexts, such as communalism, as a culturally responsive paradigm geared to empower nondominant youth's learning ecologies.

Theoretical Framework and Relevant Literature

In order to increase the performance of Black students, Boykin and Noguera (2011) posited that it was important to utilize students' assets in educational reform strategies. Asset-focused factors deal with the contextual conditions in which teaching, learning, and engagement are manifested (Boykin & Noguera, 2011). They are called assets because they involve learning exchanges that

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build on what students bring to the classroom. Within the asset-focused factors are strategies that strive to align the values, interests, and learning priorities of both teachers and students (Boykin& Noguera, 2011). The authors describe meaningful learning and cultural resources as two major strategies that can create this alignment. However, for the purposes of this study, the researchers paid specific attention to cultural resources. The use of cultural resources, like culturally relevant pedagogy, understands that schooling does not take place in a vacuum, and students' cultural orientations can be valuable resources in the classroom. Out of these resources, one of the most successfully implemented cultural resources has been communalism (Boykin, 1986).

Boykin (1986) defines communalism as "a commitment to social connectedness which includes an awareness that social bonds and responsibilities transcend individual privileges" (p. 61). Similarly to collectivism (Triandis, 1995), communalism is an ethnographic paradigm that stands in contrast to that of individualism or—for this study—interpersonal competition. Where interpersonal competition focuses on individuals placing an emphasis on their own performance and accountability, communalism places individual performance as a responsibility of the group where all members are held accountable for the group's success (Boykin, 1986; Johnson et al., 1981). A number of empirical studies have found that Black students' performance has increased when they were placed into communal group learning contexts across a number of learning tasks. This was shown in with performance measures such as: text recall, multiplication performance, math-estimation, vocabulary, geography, and learning transfer (Dill & Boykin, 2000; Hurley, Allen, & Boykin, 2009; Hurley, Boykin, & Allen, 2005).

When students perform better academically after studying in a group, whether communally or cooperatively, there must be some underlying group processes at work that cause students to work well together where they would not have done as well working alone. To understand these processes, Hurley, Allen, and Boykin (2009) examined group processes as a means to see the differences between communalism and other group-based learning contexts. Indeed, the researchers found that there were significant differences in students' ratings for learning context. Students in the communal condition were rated higher in group behaviors (e.g. accountability for actions, {a lack of} task hindering behaviors) than did those in a competitive group condition. Moreover, a marginally significant difference was found for the interaction between condition and ethnicity. In this case, Black and White students achieved their highest ratings for positive group behaviors when they were in different learning contexts, Black students in the communal condition and White students in a more individual oriented learning context condition (Hurley, Allen, and Boykin, 2009). Furthermore, both groups of students performed best in the conditions that yielded their highest group ratings. Though not significant, the findings cannot go unnoticed.

In addition to understanding the link between communalism and group processing, the present authors sought to examine students' perceptions of whether they matter during their group work. The mattering literature had its start in the mental health field first examined by Rosenberg and McCullough (1981), who defined mattering as the "direct reciprocal of significance" (1981). The scholars further described mattering as a "motive: the feeling that others depend on us, are interested in us, are concerned with our fate, or experience us as an ego-extension exercises a powerful influence on our actions." Wicker (2004) further describes mattering as how one perceives himself as being important to another person, or group of people. Simply put, mattering asks the question: How important do I feel I am to you (Wicker, 2004)? Mattering has been divided into three components: attention, importance/appreciation, and dependence (Elliot, Kao, & Grant, 2004).

In its 30 years of research, perceived sense of mattering has been tied to important psychological outcomes such as self-esteem, relatedness to others, sense of purpose, meaningfulness in life, and job satisfaction in higher education (Gibson and Myers, 2006; Rosenberg and McCullough, 1981). For example, in a study on students attending The Citadel, a military college in the southeastern United States, researchers found that perceived mattering was positively related to a measure of Total

Wellness, particularly as it relates to the Social Self subfactor where the underlying constructs were 'love' and 'friendship' (Gibson and Myers, 2006). In a particularly disturbing study, Elliot, Colangelo and Gelles (2005) found that mattering was a significant predictor of adolescent suicide ideation; where the further participant responses for mattering went below the mean, the further the instances of suicide ideation increased. As the researchers looked more deeply into the data, they found mediating properties of other variables such as depression, self-esteem, and religiosity. Researchers found a model where depression and self-esteem mediated the effects of mattering on suicide ideation being that the addition of depression and self-esteem completely erased the established relationship between mattering and suicide ideation (Elliot, Colangelo, and Gelles, 2005). To confirm the literature that says mattering is an issue across one's life span, Dixon (2007) explored the relationship of mattering and important wellness variables for older adults; here the author found that mattering to others was a significant predictor in participants' overall wellness (positively related to purpose in life and overall wellness and negatively related to depression).

To understand why students perform differently in different learning contexts, the purpose of this study was to examine how afro-centric learning contexts, specifically utilizing communalistic cooperative learning settings, relates to group processes/behaviors and student mattering. Moreover, although numerous studies have empirically proven communalism's utility in improving African American students' achievement in performance tasks, further research is needed to examine its utility with racially mixed student demographics where African American learners are present. Thus, this study sought to answer: what are the effects of racial composition of study groups (All Black students or all White students in the same group) and mixed racial groups (Black and White students in the same group), and communalism as a learning context on the math performance, group processes, and perceptions of mattering for 5th grade Black and White students? The study also sought to understand what, if any, were the relationships between academic performance, group processes, and perceptions of mattering.

Methodology

The research reported here stems from a math intervention project that sought to investigate the math performance, perceived group processes, and perceived mattering for students as a function of learning context and the racial composition of their study groups. Data from this study was collected from a math performance task and survey measures in the southeastern United States. The sample consisted of 110 Black and White 5th grade students. These students were sampled from three racially integrated elementary schools. Each school was a part of a large school district in a large metropolitan area.

For this design, all procedures were conducted in a simulated classroom setting excluding any students who were not Black or White. Prior to the manipulation of the independent variables, participants took a pretest to assess their skill level in mathematics-estimation. Their scores were used as a covariate to control for individual/condition variation and prior knowledge before the learning phase of this study. To orient them to mathematics estimation, the researcher took the students through an example problem on the first two pages of the math estimation study packet. The students were required to follow along and answer any questions that the example problem asked. The orientation portion of the study took approximately 5 minutes. After the orientation, the researcher read the instructions for the math estimation study packet to the participants and then read the prompt for the group's respective learning context.

Prior to the administration of this study, students were randomly assigned to group learning contexts that were either the communal condition or the interpersonal competition condition. For both the communal and interpersonal competition learning contexts, students were placed in groups of four, sat together in a cluster of desks, and given one math estimation study packet. Students in the communal condition were encouraged to work together, share, and do well for the good of the

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group. Students in the interpersonal condition were told that the student who performs the best on the quiz would win a prize, and that they should each worry only about themselves as they studied. The students then began the 20-minute mathematics estimation study session. Students were also randomly assigned to either participate in a racially homogeneous group or a racially mixed/heterogeneous group. The homogeneous racial groups had students of all one race working together in the two learning context conditions. Students' study groups were either all Black or all White. In the heterogeneous racial groups, there were two Black students and two White students participating in the study session together. Students then completed the opposite form of the math estimation performance measure individually to ensure individual performance was being measured.

Students completed two surveys, the Process Loss Questionnaire (PLQ; 20 items on a 1-4 4-point likert scale; alpha reliability coefficient was .75, 13 items were used for analysis) to assess group processes, and the Perceived Mattering Questionnaire (PMQ; modified version included 15 items on a 1-5 likert scale; the three components of the mattering index reached the proper level of internal consistency with reliabilities of .78, .82, and .72 for attention, importance, and dependence, respectively). The PLQ (Hurley, Allen, & Boykin, 2009) is a measure that is built to understand children's specific group-work related behaviors. The scale pays attention to behaviors that are "presumed to be manifestations of the participants' perception of their accountability, and of the level of task hindering group dynamics that occurred in their study groups." The PMQ is a modified version of Elliot, Kao, and Grant's (2004) Mattering Index. It contains three components of the mattering construct (attention, importance, and dependence), and where the original mattering index only asks questions about students mattering as a general state, the items in the PMQ were modified to reflect the participants' sense of mattering in the group context during their study session. To ensure the students understood the questions in the surveys, the first author read each question, and explained each questionnaire's answer choices.

Results

The study sought to examine the effects of three variables (learning context as a cultural resource, racial composition of the study group, and race) on the math performance, group processes, and mattering of 110 fifth grade children. The data were analyzed by conducting a 2 (Learning Context) X 2 (Racial Composition of the Study Group) X 2 (Race) Analysis of Covariance on the dependent variable, math performance, using pretest performance as a covariate. Secondly, the group processes and mattering variables were entered into a 2 (Learning Context) X 2 (Racial Composition of the Study Group) X 2 (Race) Multivariate Analysis of Variance. Lastly, the dependent variables were entered into a correlation analysis to test the relationships between them.

For the first set of analyses, there was a two-way interaction between learning context and racial composition on performance ($F(1, 101) = 5.285$, $p < .05$). Based on pair-wise comparisons as a post hoc analysis, students who studied in the interpersonal competition performed significantly better than their communal studying counterparts (11.69 and 8.75, respectively). No other combinations of the variables' effects on math performance were statistically significant. Figure 1 below displays the means for performance in highlighting the aforementioned two-way interaction.

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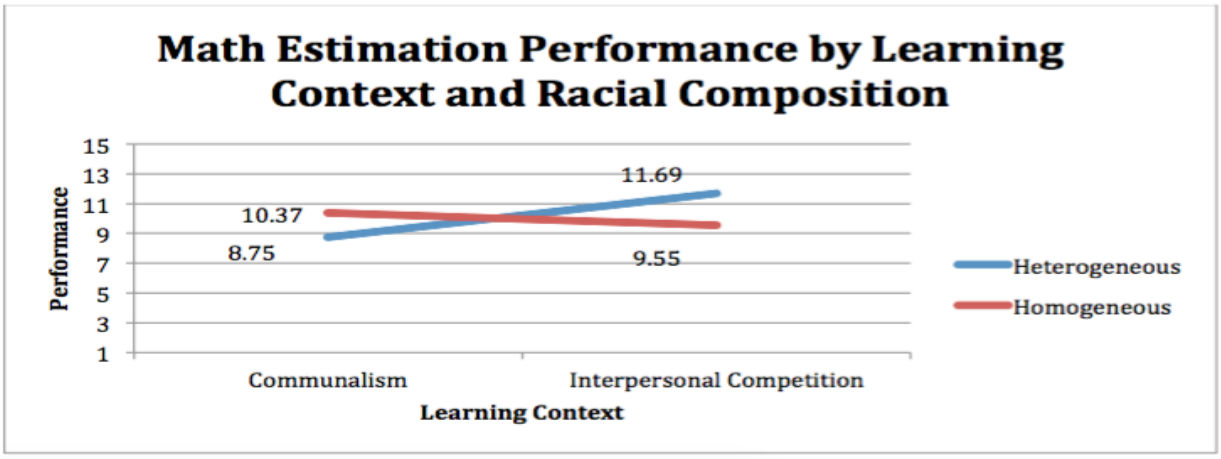

Figure 1: Math performance by learning context and racial composition.

For the next set of analyses, there was a significant two-way interaction between race and racial composition on participants' perceived mattering ($F(1, 101) = 6.529$, $p < .05$). In this interaction, post hoc analyses indicated that participants who studied in the homogeneous groups felt they mattered more (3.55) than those who studied in the heterogeneous groups (2.94). However, no other differences between the combinations of race and racial composition were statistically significant. Figure 2 displays the means for the two-way interaction.

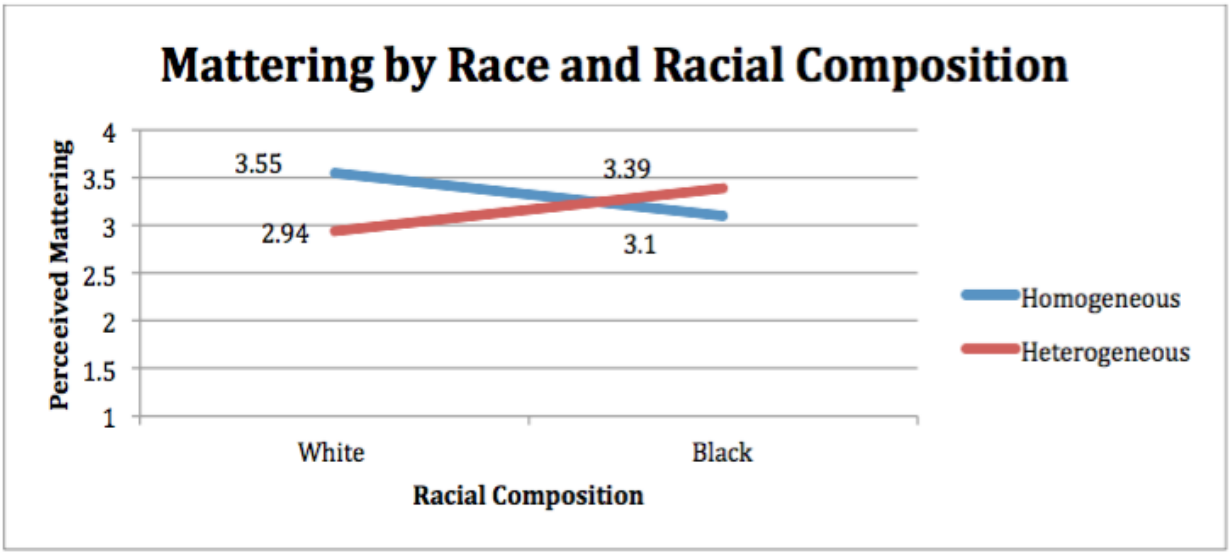

Figure 2: Mattering by race and racial composition.

Lastly, the researcher ran a correlation analysis for the dependent variables including the three subscales for the mattering survey. This analysis found that there was a negative relationship between the attention component of mattering and group process ($r = -.248$, $p < .01$) suggesting that as students perceived themselves to hold other's attention more and be noticed more by their group members, they exhibited less process loss behaviors. The table below highlights the correlation coefficients for all of the variables of interest.

	1	2	3	4	5	6	7
1. PRE	1						
2. POST	.365**	1					
3. GRP	.037	.168*	1				
4. MATT	.222*	.143	-.103	1			
5. ATTN	.168	.124	-.248**	.890**	1		
6. IMP	.196**	.140	.076	.841**	.620**	1	
7. INT	.242*	.110	-.078	.841**	.620**	.713**	1

Note: PRE = Pretest; POST = Post test; GRP = Group Processes; MATT = Mattering; ATTN = Attention; IMP = Importance; and INT = Interdependence. ** = Correlation is significant at the .01 level. * = Correlation is significant at the .05 level.

Figure 3: Correlation analyses of dependent variables.

Discussion and Implications

To date there has been no work exclusively examining the studying of Black and White students *together* in a communal learning context. The added layer of racially heterogeneous study groups to the communalism research led to this experiment having an exploratory nature. Finding that students studying in the heterogeneous groups with an incentive for their individual performance performed better than those who studied communally was a very interesting outcome to add to the communalism research. The pattern of findings is not an indictment of the previous communalism literature (Boykin, 1986). The findings could be attributed to the possibility that working communally in a heterogeneous group presented African American students with difficulty in code-switching, or a sense of culture shock that disrupted their abilities to work well together (Baugh and Graen, 1997; Stahl et al., 2010). On the other hand, this was only apparent for the communal groups and not the interpersonal competition groups. The students-theoretically—had to work together in this condition. However, they did not have the same impetus for cooperating with one another. The students only were required to focus on their own wellbeing when it came to the performance on the math estimation task. This competitive reward structure could also be more typical of their traditional group work, and could have led the interpersonal competition condition to be more comfortable for them.

This study also found that students' perceived sense of mattering was lower when they studied in racially heterogeneous study groups than those who studied in the homogeneous study groups. From this set of analyses, it seems that White students experienced some pro White bias regarding when they felt they mattered most based on whether they studied with students of their same race or with Black students. Contrarily, Black students experienced no differences based on racial group composition. One explanation from previous literature could potentially shed light on this pattern of findings. First, some of the mattering research examines people's feelings of marginalization and how they relate to perceptions of mattering. In this sense, experiences of marginalization have led students to feel that they matter less. Interestingly enough, in the mattering research, the marginalization-mattering connection has been made for participants of color including Black, Latino, and Middle-Eastern students attending school in the United States (Huerta & Fishman, 2014). However, in this study, perhaps the students felt some sense of marginalization as they worked in the heterogeneous groups that led to a lower perception of their own mattering. The possibility exists that students have been more comfortable working exclusively with their own race whereas Black

students are not affected by a change in racial composition as feelings of marginalization occur both in and outside of the classroom setting in racially mixed contexts. Also, even though the groups had the same number of Black and White students, White students possibly felt some feelings of exclusion, what some students of color feel on a daily basis.

Lastly, there was a relationship between group processes and the attention component of the mattering construct. This relationship indicated that as one felt that they were noticed more by their group members they exhibited less process loss behaviors characterized by a lack of accountability of one's own actions but a proliferation of task hindering dynamics. This result may be due to a link in how one perceives his or herself and how he or she then interacts with the group as they study. One possibility is that as students perceive themselves to be "invisible" in a setting, they may seek out behaviors that led to lack of positive group processes. Attempts to be noticed may work, but they may ultimately sacrifice the wellbeing of the group's interactions as they work together on the given task. Accounting for this outcome requires further research.

Conclusion

This research has opened the door to the complexities of communal research when one attempts to use a sample perhaps more closely aligned to the average make up of the classroom across the nation. Placing both Black students and White students together in a communal learning context when studying mathematics estimation did not benefit both races significantly. However, with the current trends of the student population for this country, it is important to change the focus from what has historically worked for and in favor of White students and utilize what has been effective for African American and other students of color. Doing so can solidify achievement solutions for generations to come. There is promise in how the students behaved while they were in their study groups regardless of the condition. Researchers expected some arguing and scrambling for materials displayed by the students, especially in the interpersonal competition condition. However, this occurred minimally, and most participants either shared the materials completely of used some form of taking turns during the study phase of this experiment. Therefore, with more time, performance could follow the example of how the participants acted towards one another, especially in a communal setting. Lastly, the examination of mattering as a variable in the classroom setting shed light on how students in diverse classrooms' perceptions can change based on different learning contexts. Future research should plan to understand how students' sense of mattering operates to potentially help or hinder their wellbeing and/or academic performance in the school environment.

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