Behaviors of Teachers and Their Students in Schools With and Without an Achievement Gap: An Observational Study

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Abstract

This research shares findings from a year-long observational study to determine if there were significant differences in the identified behaviors of teachers and students in fourth and seventh grade classrooms in schools with an achievement gap versus those with no achievement gap. Specific research questions addressed types of instructional grouping patterns, instructional strategies employed, number and types of questions asked by teachers, and specific interactions observed during instructional and management episodes. The researchers found that instances of teacher normative control, student rebellion, and student off-task behavior were more prevalent in learning environments *with an achievement gap.* Perhaps, more importantly, the research revealed that teachers across all classrooms relied predominantly on the use of low level questioning in whole group, teacher-directed settings.

Although achievement gaps have existed in schools for decades, these learning gaps have become a hot topic of discussion in a variety of settings; therefore, it is important that all stakeholders use a common definition. As noted by Harris and Herrington (2006), concerns regarding educational disadvantages of minority students were first identified near the end of WWII. These concerns led to historical changes in American public education. A major action

was the Supreme Court's Brown vs. Board of Education decision of 1954 which focused on ending racial segregation in American public schools. Decades later, the Reagan administration's National Commission on Excellence in Education published its seminal work, A Nation at Risk: The Imperative for Educational Reform (Gardner, Larsen, Baker, & Campbell, 1983). This document focused on making U.S. schools accountable for equalization of educational resources and content for all students and also offered recommendations related to standards, time, teaching, and fiscal support. More recently, the No Child Left Behind Act (NCLB) of 2002 was enacted under the Bush administration and established *adequate yearly progress* (AYP) requirements designed to expose achievement gaps while encouraging schools to increase efforts to close these gaps over time.

For the purpose of this study, *achievement gap* has been defined as a significant difference in performance on standardized tests when comparing students of different gender, race, socioeconomic status (SES), and disability. The intent of this investigation was to determine if the learning environments in fourth grade and seventh grade classrooms where achievement gaps existed were significantly different than the learning environments of similar classrooms in schools with no achievement gaps. Specifically, the researchers wanted to discover if differences existed in the way teachers created learning environments as related to instructional patterns, instructional strategies, number and type (cognitive level) of questions, and number and type of interactions between teachers and students. The importance of these variables in the development of quality learning environments can be seen through an examination of the literature (Hamre et al., 2013; Harris & Harrington, 2006; Stronge, Ward, Tucker, & Hindman, 2007).

The Achievement Gap

A review of the literature identified a number of factors associated with the achievement gap. Factors such as student home environments, educational systems, student behaviors, and teacher behaviors have all been shown in the literature to impact the size and duration of achievement gaps. However, as Anderson, Medrich, and Fowler (2007) have reported, trying to isolate and accurately measure the factors that cause achievement gaps is a difficult endeavor. As previously noted, AYP requirements were put in place to address achievement gaps and motivate educators to put their efforts into closing these gaps; however, achieving AYP is not the same thing as closing achievement gaps. Schools closing the achievement gap are not necessarily making AYP, and schools making AYP are not necessarily closing the achievement gap (Anderson, Medrich, & Fowler, 2007).

Outside Factors

Some researchers, such as Lee and Bowen (2006), found that home environments and parenting techniques can either positively or negatively impact the achievement gap. Viadero and Johnston (2000) reported that all students, regardless of their SES, tend to perform less well when attending schools where at least 25% of the student body lives in poverty, as compared to students attending schools in more affluent communities. Gorey (2009) completed a meta-analysis of factors related to school reform and student achievement and discovered that between 25% to 50% of the black-white achievement gap can be attributed to parental, home, and community factors. This finding supported the work of Bowen (2006) who found that lower achievement test scores were made more often by non-white students living in poverty with less educated parents. Interestingly, Benner and Mistry (2007) reported that educator perceptions may be a factor impacting the findings such as those of Gorey (2009) and Bowen (2006) because

several studies have reported that students from low SES families are perceived as less capable compared to more advantaged students (Auwarter & Aruguete, 2008; Jussim, 1991; 1986; Hamilton, Sherman, & Rulvolo, 1990). Similarly, researchers have found that when asked about causes for the achievement gaps, teachers frequently state that two major contributing causes are parenting techniques and level of parental education (Phillips, Brooks-Gunn, Duncan, Klebanov, & Crane, 1998). Additionally, Uhlenberg and Brown (2002) surveyed African American and Caucasian teachers and found that all participants, regardless of race, tended to support the belief that family income and parenting techniques were important contributing factors to the achievement gap.

Learning Environments

As is true with the current study, a number of researchers have collected and analyzed observational data to better understand how teachers and their students interact, both instructionally and behaviorally, in learning environments to promote academic achievement. Legewie and DiPrete (2012) reported that gender and socioeconomic status interact to explain why some males have more difficulty functioning in learning environments. These authors suggested that as the number of males from low SES families increased in a classroom, the greater the variance between male and female performance. These authors suggested that this appeared to be due to the fact that low SES males often view classroom expectations for behavior as un-masculine; therefore, low SES males tend to misbehave more frequently and are more frequently off task. Additionally, several researchers have studied the dynamics of the classroom environment and have determined that the amount of unwanted student behavior impacts the achievement gap (Dee, 2005; Gregory, Skiba, & Noguera, 2010). For example, classroom climates have been shown to affect student behavior in ways that can negatively

impact student time-on-task behavior which often results in negative academic achievement (Dee, 2005, 2007; Downer, Rimm-Kaufman, & Pianta, 2007; Greenwood, Horton, & Utley, 2002; Gregory, Skiba, & Noguera, 2010; Reyes, Bracket, Rivers, White, & Salovey, 2012). Specifically, Downer, Rimm-Kaufman, and Pianta (2007) found that many children in at-risk groups demonstrated higher rates of off-task behavior when teachers employed either large group instruction emphasizing rote memorization or assigned individual work. These findings echo those of Harris and Harrington (2006) who reported that instruction for at-risk students should be conducted in small groups and should focus on analysis and inference, not rote memorization. Moreover, Jones, Yonezawa, Mehan, and McClure (April, 2008) noted, to improve schools in a way that consistently leads to increasing achievement for all students, one must first focus on changing educators' beliefs, values, and attitudes related to how best to enrich the learning environment.

The current study was conducted to determine if there were significant differences in the identified behaviors of teachers and students in fourth and seventh grade classrooms in schools with an achievement gap versus those with no achievement gap. This research will add to the existing literature by identifying differences within the learning environments of specific classrooms existing in schools categorized as having an achievement gap compared to those having no achievement gap based on NCLB testing results. The following research questions guided the study.

1) Do teachers in schools with an achievement gap and teachers in schools with no achievement gap differ in any of the following ways:

    a. the types of instructional grouping patterns they employ with their students,
    b. the instructional strategies they use with their students,

c. the number and types of questions they ask their students,

d. how they interact with students during instruction, and

e. how they interact with students while managing behavior?

2) Do students in schools with an achievement gap and students in schools with no achievement gap differ in any of the following ways:

a. how they interact with their teachers during instruction,

b. how they interact with their teachers in response to teacher management behaviors, and

c. the amount of time-off-task behavior they exhibit?

Method

Participants

The sample was composed of 31 fourth and seventh grade teachers and their students from four elementary and four middle level public schools in a large school district located in the southeastern United States. Two of the elementary and two of the middle level schools were categorized as having an achievement gap, while the remaining two elementary and remaining two middle level schools were categorized as having no achievement gap. The schools were selected by school district personnel based on the noticeable difference in achievement between students in different subgroups. These differences in achievement were based on the results of state-mandated testing.

District personnel requested that fourth grade elementary teachers and seventh grade English/language arts and math teachers participate in the study because students in their classrooms were required to take end of year state-mandated tests. All fourth grade teachers (15 total) in each of the four elementary schools were selected to be observed during literacy

instruction. In each of the four middle schools, two English/language arts and two math teachers were observed. These 16 teachers comprised the total population of seventh grade English/language arts and math teachers in each middle school (Table 1).

Table 1 *Number of teachers by classification in elementary and middle level classrooms*

	Elementary Teachers (15)	Middle Level Teachers (16)	
		Language Arts	Mathematics
African-America Females	1	0	0
Caucasian Females	10	7	7
African-American Males	0	0	
Caucasian Males	4	1	1

The researchers observed 656 students in these 31 fourth and seventh grade classrooms. The students in each of the classrooms were coded according to gender, race/ethnicity, special education status, and socioeconomic status as defined in Public Law No. 107-110, § 115, Stat. 1425 (NCLB, 2002). Table 2 shows the total number of students in each subgroup and the percentage of total females or males that subgroup represents at each level.

Table 2: *Number of students by subgroup in elementary and middle level classrooms*

Student Total	Definition	Elementary Females (155)	Elementary Males (166)	Middle Level Females (167)	Middle Level Males (168)
Subgroup 1	Non-white, low SES, disability	1 (0.6%)	8 (5%)	5 (3%)	14 (8%)
Subgroup 2	Non-white, low SES, no disability	50 (32%)	46 (28%)	62 (37%)	44 (26%)
Subgroup 3	Non-white, not low SES, disability	9 (6%)	0 (0%)	0 (0%)	2 (1%)
Subgroup 4	Non-white, not low SES, no disability	16 (10%)	18 (11%)	8 (5%)	6 (4%)
Subgroup 5	White, low SES, disability	3 (2%)	12 (7%)	5 (3%)	7 (4%)
Subgroup 6	White, low SES, no disability	46 (30%)	33 (20%)	50 (30%)	53 (32%)
Subgroup 7	White, not low SES, disability	1 (0.6%)	1 (0.6%)	7 (4%)	6 (4%)
Subgroup 8	White, not low SES, no disability	29 (19%)	48 (29%)	30 (18%)	36 (21%)

Procedures and Operational Definitions

The researchers used observational methods to collect data on the identified teacher and student behaviors. Each classroom was observed four times for a period of 30 minutes per visit, equaling a total of 120 minutes. During each visit, students were identified by codes known only to the researcher. Teachers were informed the morning of each visit so that students would have the appropriate identifier when researchers arrived. The observers were unaware of which schools were categorized as having an achievement gap and which schools were categorized as having no achievement gap. Data from the observations were entered into SPSS as quantitative data for analysis. One-way ANOVAs were employed in an attempt to identify differences between groups of students previously identified in Table 2. The data were analyzed to provide a description of what occurred during the classroom observation. In particular, the researchers analyzed the frequency of teacher and student interactions and the percentage of time students spent off-task.

The researchers operationally defined specific teacher and student interactions which have been shown to have an impact on classroom climate (Schlechty, 1976). A coding system was developed to record these interactions, and training was developed and implemented to assure validity and reliability. Teacher behavior was classified as being either instruction- or management-focused. The major teacher instructional behavior, *teacher task interaction,* was defined as the teacher providing instruction to the students (e.g., asking and answering questions or giving information). Teacher behavior management interactions were classified in one of the following four categories: *teacher normative control*, when the teacher asked students to change their behavior; *teacher remunerative control,* when the teacher manipulated a reward system to control student behavior; *teacher coercion,* when the teacher threatened or actually used physical

force and/or took away property or freedom; and *teacher retreatism,* when the teacher failed to react when student rebellion occurred. Student behavioral interactions included: *student task behavior*, the asking and answering of content related questions and discussing content; *student conformity*, student compliance with a teacher's behavioral management interaction; and *student rebellion*, when a student overtly failed to comply with stated rules for behavioral conduct.

In addition, using the aforementioned operational definitions, the researchers recorded the instructional grouping pattern, type of instructional strategy, and both the frequency and cognitive level of teacher questions. Instructional grouping patterns were coded as whole group, small group, or individual. The types of instruction were coded as direct instruction or indirect instruction. *Direct instruction* included lecture, drill, modeling, brainstorming, and teacher-led instruction. *Indirect instruction* included learning centers, cooperative learning, inquiry, and laboratory (Hunt, Wiseman, & Touzel, 2009). Using Gallagher and Aschner's (1963) classic model as a guide, the researchers combined cognitive memory and convergent questions into one category labeled as *low level questions*. These low level questions typically have only one possible correct answer. Divergent and evaluative questions were combined into a second category labeled as *high level questions,* which typically can have more than one possible correct answer.

Two observers gathered data during each visit using an observation form created by the researchers. During each 30-minute observation, one observer recorded all teacher and student data related to female students while the other observer recorded all teacher and student data related to male students to ensure accuracy of the observations. Each observer collected data on both males and females throughout the study by randomly assigning gender prior to each observation. Each interaction was recorded by noting the number of the student subgroup the

teacher addressed or student task observed. For example, if a teacher directed a question to a white, low SES, male with no disability, a 6 was recorded as a teacher task by the researcher assigned to observe male interactions. If a non-white, not low SES, female with a disability asked a question, a 3 was recorded as a student task by the researcher assigned to observe female student interactions.

Prior to beginning each observation, the researchers recorded the total number of students by subgroup for their gender. These data were used when observers scanned the classroom at the end of each 10 minute segment to note the number of students who were off-task for each subgroup and gender. Time-off-task was recorded as the number of students by subgroup and gender who were off task over the total number of students by subgroup and gender in the classroom when the scan was completed.

Data were collected by college faculty who were trained during a half-day workshop in which they reviewed and discussed operational definitions and recorded observations of a classroom videotape to determine a baseline inter-rater reliability score. Moreover, prior to actual data collection, the observation instrument was used by all researchers in classrooms in a school not selected for this study to obtain additional inter-rater reliability data. Inter-rater reliability was calculated by dividing the total number of behaviors recorded in agreement by that number plus those recorded in disagreement, then multiplying by 100. Training continued until data collectors demonstrated inter-rater reliability at or above 90 percent.

Results

Grouping Patterns and Instructional Strategies

The results from a series of one-way ANOVAs indicated that there were no significant differences between the instructional strategies or grouping patterns employed at either the elementary or middle level at any of the schools. This was due to the fact that teachers overwhelmingly employed direct instruction in the context of whole group settings.

Teacher Questioning

As shown in Table 3, Subgroup 4 females and Subgroup 4 males (non-white, not low SES, no disability) in middle level schools with no achievement gap were asked significantly more low level questions than their peers at schools with an achievement gap. It is important to note the total number of high level questions asked across all student subgroups ranged from zero to seven, with zero being the most commonly observed number. Therefore, the prevalence of high level questions was so low that statistical analyses could not provide any meaningful information. There were no other significant differences found in either elementary or middle level classrooms regarding teacher questioning.

Table 3: *Significant differences in low level teacher questions*

Student Subgroup	df	F	η^2	p
Middle School Student Subgroup 4 Females	62	8.52**	0.12	.005
Middle School Student Subgroup 4 Males	62	5.77*	0.02	.019

*Significant at p<.05

**Significant at p<.01

Teacher Task Interactions with Students

Table 4 shows the five subgroups of elementary students where there was a significant difference in the teacher task interactions with students at schools with an achievement gap and those with no achievement gap. In these five groups, students in schools with an achievement gap had significantly more teacher task interactions than their peers in schools with no achievement gap. There were no significant differences in teacher task interactions directed toward any of the subgroups of students at the middle school level.

Table 4: *Significant differences in positive teacher task interactions*

Student Subgroup	df	F	η^2	p
Elementary Student Subgroup 2 Males	58	5.54*	0.087	.022
Elementary Student Subgroup 4 Females	58	8.03**	0.12	.006
Elementary Student Subgroup 6 Females	58	4.20*	0.07	.045
Elementary Student Subgroup 8 Females	58	6.13*	0.10	.016
Elementary Student Subgroup 8 Males	58	8.92**	0.13	.004

*Significant at p<.05

**Significant at p<.01

Teacher Normative Interactions

Table 5 shows the significant differences found with teacher normative control interactions at both the elementary and middle level in schools with an achievement gap. In the elementary schools, Subgroup 6 (white, low SES, no disability) females experienced

significantly more teacher normative control interactions, whereas Subgroup 2 females (non-White, low SES, no disability) experienced more teacher normative control interactions in middle level schools.

Table 5: *Significant differences in teacher normative control interactions*

Student Subgroup	df	F	η^2	p
Elementary Student Subgroup 6 Females	58	4.20*	0.07	.045
Middle Level Subgroup 2 Females	62	6.25*	0.092	.015

*Significant at p<.05

Teacher Retreating

Table 6 shows the significant differences found in teacher retreating behaviors. There were significantly more teacher retreating behaviors with Subgroup 8 males (white, not low SES, no disability), as well as all non-low SES males in middle schools with no achievement gap, than with their peers in schools with an achievement gap.

Table 6: *Significant differences in teacher retreating*

Student Subgroup	df	F	η^2	p
Middle school Subgroup 8 Males	62	4.50*	0.06	.045
Middle school all not low SES Males	62	5.08*	0.08	.028

*Significant at p<.05

Student Interactions with Teachers

Table 7 shows that in schools with an achievement gap, Subgroup 4 females (non-white, not low SES, no disability) at both the elementary and middle level, Subgroup 8 (white, not low SES, no disability) females in middle level schools, and Subgroup 8 males in elementary schools interacted with their teachers significantly more than their peers at schools with no achievement gap. However, in middle schools with no achievement gap, Subgroup 4 females and Subgroup 4 males as well as Subgroup 7 (white, not low SES, disability) females interacted with their teachers significantly more than their peers at schools with an achievement gap. All statistically significant findings related to student interactions with teachers occurred with not low SES students regardless of the existence or non-existence of an achievement gap.

Table 7: *Significant differences in student interactions with teachers*

	df	F	η^2	p
Elementary Student Subgroup 4 Females+	58	5.9*	0.08	.028
Elementary Student Subgroup 8 Females+	58	4.52*	0.07	.038
Elementary Student Subgroup 8 Males+	58	4.60*	0.07	.037
Middle School Student Subgroup 4 Females^	62	11.27**	0.15	.001
Middle School Student Subgroup 4 Males^	62	7.11*	0.10	.010
Middle School Student Subgroup 7 Females^	62	5.00*	0.08	.013
Middle School Student Subgroup 8 Females+	62	5.28*	0.08	.025

*Significant at p<.05

**Significant at p<.01

+significant differences schools with *an achievement gap*
^significant differences schools with *no achievement gap*

Student Rebellion

Table 8 shows the significant differences found in student rebellion at the middle school level. There were significantly more student rebellion behaviors with the following student subgroups at schools with an achievement gap: all non-white females, all non-white males, and all low SES males. There were no significant differences found at the elementary level.

Table 8: *Significant differences in student rebellion*

Student Subgroup	df	F	η^2	p
Middle school all non-white females	62	4.83*	0.07	.032
Middle school all non-white males	62	4.70*	0.07	.034
Middle school all low SES males	62	8.50**	0.12	.005

*Significant at p<.05

**Significant at p<.01

Off-task Behavior

Table 9 shows the significant differences found in student off-task behavior between two subgroups of elementary students and one subgroup of middle school students. At the elementary level, all Subgroup 4 students (non-white, not low SES, no disability), both females and males, in schools with an achievement gap had more off-task behaviors than their peers in schools with no achievement gap schools. In comparison, at the middle level, Subgroup 6 males (white, low SES, no disability) were significantly off task more frequently in schools with no achievement gap.

Table 9: *Significant differences in student off-task behavior*

Student Subgroup	df	F	η^2	p
Elementary Student Subgroup 4 Females+	58	9.30**	0.14	.003
Elementary Student Subgroup 4 Males+	58	4.71*	0.08	.034
Middle School Student Subgroup 6 Males ^	62	7.15*	0.10	.010

*Significant at p<.05

**Significant at p<.01

+significant differences schools with *an achievement gap*
^significant differences schools with *no achievement gap*

Discussion and Implications

The intent of this study was to determine if the identified behaviors of teachers and students of selected fourth and seventh grade classrooms in schools with an achievement gap were significantly different than the identified behaviors of teachers and students of similar classrooms in schools with no achievement gap. An analysis of the data led the researchers to agree with the position taken by Anderson, Medrich, and Fowler (2007) that it is difficult to isolate factors that contribute to the achievement gap. However, the researchers were able to isolate some factors that helped us better understand how teachers and students interacted with one another in learning environments with and without an achievement gap.

The researchers believe that one of the most important findings of this study was that there were no significant differences in the learning environments of fourth and seventh grade classrooms in schools with an achievement gap and schools with no achievement gap related to the use of instructional strategies, instructional grouping patterns, or the level of teacher

questions asked. Overwhelmingly, teachers used direct instructional strategies along with low level questioning in the context of whole group settings in all classrooms at both the elementary and middle school levels. High level questions were so rarely asked that statistical analysis could provide no meaningful information. Obviously, the fact that there was an achievement gap in some schools and not in others seemed to have little impact on how teachers grouped students for instruction, the instructional method they employed, or levels of questions asked. Teachers in all schools, both with an achievement gap and with no achievement gap, offered the exact same style of instruction. These findings raise concerns when compared to studies related to effective instruction for at-risk students. For example, Harris and Harrington (2006) found that instruction for high risk students is most effective when delivered in small groups using higher level questioning strategies that encourage higher levels of thinking, not memorization of facts. Additionally, Downer, Rimm-Kaufman, & Pianta (2007) found that students at risk function better when teachers avoid both large group instruction and the use of low level questions that lead to rote memorization. The findings discussed above are both powerful and alarming since they describe how educators related to the learning needs of their students.

The overreliance on whole group instruction and low level questioning may have impacted the instructional interactions that took place between the teachers and their students. Teachers in elementary classrooms in schools with an achievement gap were attempting to interact with students categorized as low SES (Table 4); however, those students were not responding to their teachers (Table 7). In fact, students who interacted significantly more with those teachers were all categorized as non-low SES. These teachers were interacting with their students using predominantly low level questions in large group settings. However, as noted in the literature review, teachers who ask more open-ended questions and employ small group

instruction are more likely to generate meaningful student responses (Downer, Rimm-Kaufmann, & Pianta, 2007; Harris & Harrington, 2006).

Finally, significant differences related to the teachers' management of student behavior in the learning environment deserves attention. The data revealed that instances of teacher normative control, student rebellion, and student off-task behavior were more prevalent in learning environments with an achievement gap (Tables 5, 8, 9). When teachers ask students to behave (normative control) but students behave either inappropriately (rebellion) or are not academically engaged (off-task), there is less time for instruction. This loss of instructional time impacts the quality of the learning environment for *every* student in the classroom because teachers and students are being distracted from learning experiences.

Jones, Yonezawa, Mehan, and McClure (April, 2008) concluded that if schools are going to improve, educators must create the best possible learning environments for all students. Teachers who work with students at risk must be able to create learning environments that keep students actively involved and on-task. Literally, all instruction in this study occurred in teacher-directed, whole group settings with predominantly low level questions. Rather than bolster student performance, and thereby narrow the achievement gap, such strategies are likely to maintain the status quo. Thus, the researchers believe that the teachers' failure to provide small group instruction and ask high level questions when working with at-risk students had a consistent negative impact on the quality of the learning environment.

High priority must be placed on using techniques and grouping strategies that promote student engagement while maintaining on-task behavior. The implications for both public school teachers and administrators as well as university teacher educators seem clear: in-service and pre-service teachers need training that prepares them to differentiate instruction to meet the

needs of these students. The teachers in this study attempted to engage low SES students in whole group settings through the use of low level questions; however, these students did not respond to their teachers. Educators working with students in high risk categories must provide small group instruction characterized by questions that require critical thinking and analysis as opposed to one correct answer. Research shows that high risk students engaged in small group instruction are much more likely to stay on task. Moreover, when small group instruction is implemented, teachers are better able to monitor student behavior and more effectively keep students on task. The proposition that all children should be taught alike in whole class settings runs counter to what research has shown to be best practice in narrowing and eventually eliminating the achievement gap. Not only must educators be prepared to implement appropriate instruction, they must also be able and willing to advocate for best practice in meeting the needs of all students.

Further observational studies must be conducted to determine if research-based instructional strategies are being used to create learning environments that provide all students the opportunity to achieve. Specifically, observational research in classrooms where teachers implement a wide variety of effective instructional strategies as compared to those who do not should be conducted to determine if there are significant differences in the resulting achievement of their students.

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