DETECTING GENDER INEQUALITY IN ELEMENTARY EDUCATION

An Observational Case Proposal Submitted
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Abstract

Primary education is a ubiquitous and an indispensable social service offered in our society. From an early age gender bias has been detected in female students who are more likely to experience a division between their quantitative comprehension abilities and those of their male counterparts in elementary math. The most prevalent reason for this divide seems to be a sense of insignificance resultant from underrepresentation in classroom participation portions of lessons, which lowers the perceived value of and individual confidence in their abilities. This paper studies previous research on this topic and then undertakes an observational study to see if this practice is still occurring.

Detecting Gender Inequality in Elementary Education

Introduction

In an average public elementary class, students are instructed through multiple subject specialties. One of the specialties mandated by Common Core State Standards is mathematics. Early in a child's instruction, a marked divide can be observed in the mathematical confidence and ability of male and female students, stemming from a teacher's unconscious gender biases. There are several possible causes of this schism, but the most prevalent originates with the feeling of insignificance resultant underrepresentation in the classroom: girls are called on less than boys, instilling in these girls the stigma that they are less able to participate and that their input is less valued than that of their male counterparts. Student performance studies have shown that, "girls fall behind boys in science and mathematics; [and] girls participate less than boys in class or, as it is said, are silent in the classroom; [leaving] girls suffering a major decline in self-esteem at adolescence while adolescent boys gain in self-esteem" (Kleinfield, 2001).

This leads to the conclusion that girls falling behind in mathematics and science can be linked to the lack of attention they receive during question and answer time. Other research conducted on this subject provides further proof of underrepresentation and gender bias in the classroom, leading to low ability and self-esteem in girls compared to boys.

Literature Review

Early Stages of Development

Primary education is a ubiquitous and an indispensable social service offered in our society. In the early stages of childhood development, "stereotypes begin to emerge

during grades 1-2" (Cvencek, Greenwald, & Meltzoff, 2011). McKee (1992) explained that early childhood development and education play a crucial role in "challenging and changing gender role expectations that undermine the self-confidence and achievement of girls" (p. 4). Additionally, researchers "[suggest] that the math-gender stereotype develops early in development and differentially influences boys' versus girls' self-identification with math, prior to ages where differences in math achievement [start to] emerge" (Cvencek et al., 2011).

Teacher Influence

For students in a classroom, Frawley (2005) stated that a "teacher's biases, intentional or otherwise, can send clear and harmful messages that are very influential as children form beliefs in their own abilities" (p. 221). Classroom education "can act as an equalizer for people from many different geographic areas, races, genders, classes, etc." (Gugliotta, 2010). However, this equalization can be negated through bias; Eccles (2007) criticized teachers for not giving male and female students equal and "ample opportunity to participate in classroom activates. Based on these stereotypes, teachers may unintentionally create classroom climates that favor males" (p. 200). Eccles investigated teacher-student interaction patterns in science and math classes, reporting that, "select[ed] boys in each math class received particular attention to the exclusion of all other students" (p. 206). Amelink (2009) also revealed through research that, "teachers may call on females less often, mak[ing] less eye contact with females during instruction, and give more praise to male students for schoolwork based on the belief that female students are less interested in math subject matter" (p. 14). Recently, "gender gaps [have been

revealed] especially in terms of fewer girls participat[ing] [in the classroom]" (APEC, 2010).

According to the *American Association of University Women* (AAUW), several occurrences of gender gaps happen in the classroom (McKee, 1992). First and foremost, "girls receive significantly less attention from classroom teachers than do boys" (p. 2). This confirms what Devine (1989) earlier elaborated on, stating "that stereotypes [in gender] gaps can be separated into two underlying processes—one automatic, unconscious, and implicit, and the other controlled, conscious, and explicit" (p. 7).

Classroom

A study referenced in the AAUW Report Executive Summary revealed that during lessons, boys called out answers an astonishing "eight more times than girls. When [the] boys called out, teachers listened. But when [the] girls called out, they were told to 'raise your hand if you want to speak'" (McKee, 1992, p. 2). The EQUATE Project (2008) revealed that "teachers tended to wait at least three times as long for male students to answer—3 to 5 seconds—as for female students—0 to 9 seconds" (para. 2). Another study conducted within the confines of a fifth grade classroom found that male students were shown preferential treatment when presenting a project; "[when] groups demonstrated their machines, they were asked to call on other students to name the machines. Boys were called on 31 times, and girls were called on 13 times" (Matthews, Binkley, Crisp, & Kimberly, 1998). Furthermore, Amelink (2009) gives another example of how females experience exclusion in the classroom through research that states that there is evidence for "calling on females less often for answers during math instruction…" (p. 12). In 1995, 1999, 2003, and 2007, trends were detected in the

International Mathematics and Science Study (TIMSS) conducted by the International Association for the Evaluation of Education Achievement (IEA) between fourth and eighth grade students (Amelink, 2009). Performance wise, Amelink's study showed that "overall math performance has increased among both U.S. males and females' in fourth and eighth grade… However, among U.S. fourth-graders, males outperformed females in each of the four years of administration" (p. 7). The outperformance was quite specific to mathematics and science. Amelink also stated that all males outperformed females in "number[s], geometry, and data and chance" (p. 8).

Self-Confidence Develops (or Fails to)

Frawley's (2005) studies have shown that teachers' perceptions of the strengths, weaknesses and abilities of different genders have a direct impact on representation and other forms of classroom interaction (p. 223). This was later confirmed by Steffans, Jelenec, and Noack (2010) who wrote that, "math-ability self-concepts and math performance could be related to implicit math-gender stereotypes" (p. 947). This low ability in math and science at this young age, whether it is real or perceived (or both) leaves girls less likely to excel in these areas later in their education. Wade (2013) reveals that part of the problem stems from internalized preconceptions of one's self, "girls' insecurity regarding their own math ability isn't just because they internalize cultural norms, their elementary school teachers, who are over 90% female, sometimes do [as well], and they teach [this way]" (para. 13). In 2005, Frawley encourages the gender bias-free community saying that "the classroom and school culture should encourage girls to be achievers, take chances, and be leaders" (p. 225). In my observational study I will look to see if this community has been created.

Research Question

As defined in the previous section, research has shown that there is a distinct difference in treatment in the classroom when it comes to boys and girls. Call and response time is specifically cited as a metric for determining gender bias in the classroom. Several studies reveal that boys are called on more often than girls, especially in math and science lessons. Because these studies span decades of research and have recently called for more gender equality in the classroom, I will seek to determine if this is happening in the modern elementary school. I am left with the question of confirmation; is it true in our culture and time era, that boys are represented more than girls during a teacher-led call and response time? I will seek to determine whether or not the self-worth of students has been affected at this stage in their education by initiating call and response sessions during a 3 day-long math unit to see how many girls raise their hands compared to the number of boys. Gender bias in this classroom has not yet been the subject of any study and so measuring the proportion of girls to boys who raise their hands in response will indicate whether gender bias is present. As indicated in the literature review, this could therefore affect the abilities and self-worth in relation to mathematics of the girls in this classroom.

Defining Key Terms

A challenge to the collection of unadulterated data depends on how gender equality and inequality are defined. Gender equality is a commonly used but largely undefined term. Its definition can vary depending on the context and circumstances in which it is being used. While examining the use of the phrase 'gender equality' as it

relates to the education system in the classroom, there is practical framework that needs to be evaluated.

Defining the concept of gender equality in education will assist educators to better craft, work, and evaluate their education process (Hodges, 1995). The definition used in this study will inform the results as well. Hodges (1995) has devised one of the most complete definitions of the term gender equality, stating that it allows "males and females [to] have equal opportunities to realize their full human rights and contribute to and benefit from economic, social, cultural, and political development. Parity and equity are the building blocks of equality in education".

Gender inequality relates to the understanding that there is a dynamic process that occurs between men and women where differences are constituted throughout their individualized lives. Purely defined, gender inequality is "the disparity in status, power and prestige between people who identify as women and men" (Ferro, 2012).

Personal Background and Bias

I have never directly felt discriminated against because of my gender, nor have I felt that gender equality was something that affected my self-worth or ability while during my years in primary, secondary and higher education. However, since studying at Northwest University in the Masters in Teaching program, I have been made aware that anything teachers do or say can be incredibly influential in the development of a child's skills, knowledge and self-worth. Ever since this realization, I have been in contact with Kate Wallace (2012) who is an author, blogger, and co-founder of the Junia Project that "advocates for gender equality in the home, church, and world-at-large" (para. 1). Wallace was the first to challenge me in this topic when she stated that; "because little

girls are being called on less in class, they therefore develop a [psychological] complex later in life leading them to believe that they are worthless, and worth less than men" (para. 10). I decided to conduct this descriptive study with the third grade class that I was student teaching in, however, during the lesson I was careful to remember to teach and call on students no differently than I normally would.

Methodology

Participants

The study was composed of a pre-selected group of five boys and five girls, so that there were equal opportunities for both genders to raise their hands and be called upon. I only sampled one classroom of students for this study. The experiment required no prior knowledge of math or of gender inequality from either the students or myself; it purely had to do with questions posed which required students to raise their hands in response. Who was eventually called on was irrelevant, but the number of boys versus girls who raised their hands in response to a question, and the recording of these instances was measurable.

Instruments and Recording

A Canon 7d camera that had recording capabilities was used to capture the data on film. When I reviewed the film, I used tally markings on two different excel graphs (Appendix A and Appendix B) to record the information being studied.

Procedure

The descriptive study I preformed was conducted over a three-day math unit lasting approximately twenty minutes each day. The group that was taped had been preselected; 5 female and 5 male students all had a signed consent form from a guardian

allowing them to be photographed or taped by me. There was no deception involved in the recording of the students. I explained to all 10 students that they were being filmed for a project I had to do for a class. At the beginning of each lesson, I reminded students that they were to not call out when I asked a question, but that they were to raise their hand if they wanted to be called on.

During the observation period, when the specific group of ten students had their rotation time with me I filmed them without stopping for the entirety of the lesson. While the camera was running I stood in front of the students giving direct instruction and asking questions to math problems that I wanted to have answered. This was a normal and regular routine for these students. During the lesson I was conscious to remember to teach and call on students in my regular and normal fashion.

After each lesson was taught I uploaded the information onto a secure hard drive where only I could access the data. At the end of the observation period I sat down to re-watch the three lessons and tally the information presented. When I completed reviewing all three days I then re-watched the material to ensure consistency.

At the end of the three lessons, I collected the totals in the following areas; girls and boys hands raised and number of questions asked (see Appendix B). From the totals I was be able to find ratios and percentages to verify my hypothesis. In Appendix A I measured the number of girls and boys hands that were raised for each question asked, giving an insight into the state of the self-worth of the students (defined along gender lines) in this study. I used this appendix to tally the totals to show my data.

Results

It was hypothesized that in our culture and time era, teachers will favor boys more often than girls during a call and response time. This would lead to greater mathematical self-confidence in the boys in the class which would be confirmed by a higher rate of response by males in the class versus females, who would be less confident and therefore less likely to raise their hands. On Day 1, girls and boys raised their hands a total of 12 times each to answer six questions that were asked. On Day 2, girls raised their hands 41 times and boys raised their hands 64 times to answer 28 questions. On the Day 3, girls raised their hands 19 times, and the boys raised their hands 31 times to answer 14 questions. In total, over the three days, girls raised their hands 72 times, compared to boys who raised their hands 107 times. This data is represented visually in Figure 1 below.

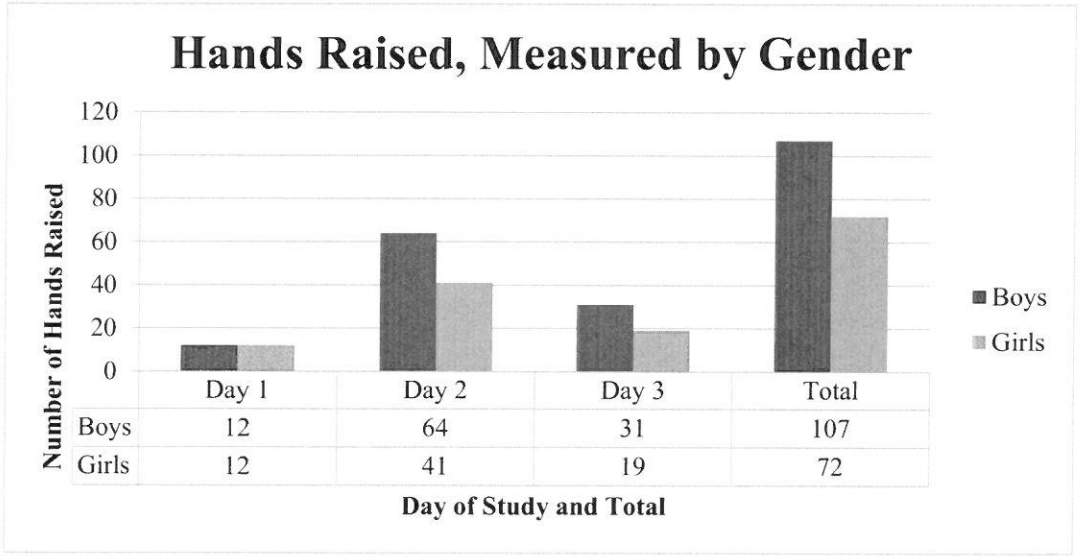

Figure 1 – Hands Raised, Measured by Gender

The ratio of response rates is represented in Table 1 below. Source data can be found in Appendix B.

	Boys	Girls
Day 1	50%	50%
Day 2	61%	39%
Day 3	62%	38%
Total	60%	40%

Table 1 – Percent of Response Based on Gender

Discussion

It was hypothesized that in today's classroom, boys will respond more often than girls during a call and response time in a math lesson, indicating a greater sense of ability and self-worth in this subject. From the data gathered, this was proven to be correct. Two out of the three lessons (Day 2 and Day 3) indicated that boys responded more often than the female students. The overall totals for the three days showed that during call and response time, girls raised their hands 35 fewer times than boys. On Days 2 and 3, girls raised their hands almost 20 fewer times than the boys did.

Each day there was at least one boy and one girl who either refused to work or otherwise did not participate in the learning process. This potentially could have lead to data being skewed due to their lack of involvement. Students who were trying to catch up or fully understand the material were less likely to raise their hand, and, if they did, they raised their hands at the last minute; however, these instances were still counted as a hand raise in the data table.

When Wade (2013) reveals that problems stem from internalized preconceptions of one's self, "girls' insecurity regarding their own math ability isn't just because they internalize cultural norm, their elementary school teachers, who are over 90% female,

sometimes do [as well], and they teach [this way]" (para. 13). Since I am a female and have been subject to this kind of inequality in the classroom from a young age, it does make sense that I would favor boys to answer mathematic questions which is why I chose to only study instances of hand raising as an indicator of self-worth, rather than the ratio of boys to girls called on, as this could not be verifiably unbiased.

Due to the fact that my sampling research statistics match all other statistics brought forward about gender inequality occurring in the classroom, I can now take a personal look and stance at how I call on students, always keeping in mind that gender bias could have already been imposed on these children before I get the chance to teach them. The research that I conducted proves that from my small sampling of a group of 10 students, female students are in fact volunteering to answer less than male students are. This indicates that at least one metric which can be used as an indicator of gender bias is present in the modern classroom.

Because my research indicated that gender bias could already be present in these students, it is also possible that the girls in this class will be more likely to be overlooked and underrepresented in math classes in the future, leading to a lack of confidence and potentially a lack of ability in these areas of study. I will take this into consideration when I teach future generations of children, trying like Hodges (1995) urges future teachers to do, to create a classroom free of gender bias and if I cannot reverse what has already been done, I can at least not perpetuate this practice in my own teaching.

To stop and prevent gender inequality from occurring in the classroom, further research will be required. Questions that need to be answered are; why do teachers decide to call on specific students? Why do students raise or not raise their hands during math

call and response time? And, do both students and teachers detect that there is an inequality occurring in the classroom? Receiving answers to these questions could allow insight into the reasoning's behind the inequality that is occurring and if it is recognized.

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Appendix A

Students Who Were Called On

	Gender	DAY 1 called on	DAY 2 called on	DAY 3 called on	TOTAL
Ryan	M	1	4	3	8
Bhargav	M	0	1	1	2
Martin	M	1	5	1	7
Kenny	M	0	4	1	5
Yahya	M	0	2	1	3
Estefani	F	1	4	0	5
Muslima	F	0	1	2	3
Emily	F	2	0	1	3
Rose	F	1	5	1	7
Elizabeth	F	1	2	2	5

Appendix B

Day Totals

	Girls hands raised	Boys Hands Raised	Total Hands Raised
Day 1	12	12	24
Day 2	41	64	105
Day 3	19	31	50
TOTAL	72	107	179