SNIPS AND SNAILS AND PUPPY DOGS' TAILS: GENDERISM AND MATHEMATICS EDUCATION

INDIGO ESMONDE

In mathematics education over the last four decades, researchers have attended to gender more than other issues of equity (Lubienski & Bowen, 2000). However, the troubles of boys have not been a major focus, perhaps because of historic achievement gaps that favor boys. As Leder and Forgasz (2008) point out, although achievement gaps between boys and girls have narrowed or closed in many countries, substantial gaps still exist. They argue that the field is simply not attending to or measuring the right gaps. As a result, public discussion of the problems of boys and academic discussion of mathematics achievement for girls do not seem to have many points of connection. While in other areas of educational research (especially literacy or school discipline) it is commonplace to discuss the troubles of boys, such discussion is sparse in mathematics education research. However, as the boy turn gains ground locally and internationally, mathematics educators will be called upon to respond. In this paper, I use the concept of *genderism* to consider what that response should be. I will begin, though, by highlighting one specific example of the boy turn in education, one that is close to home for me: the recent comments by Toronto District School Board (TDSB) director Dr. Chris Spence about the need for targeted support for boys in TDSB schools.

Boys' education in the Toronto District School Board

The Toronto District School Board is the largest public school board in Canada and the 4th largest in North America. The city, which bills itself as the most multicultural city in the world, is diverse by any measure, including race, ethnicity, language, socioeconomic status and gender. As such, any programs and initiatives in Toronto will affect a large number of students. In addition, the district may serve as a model for other large, urban districts striving to meet the needs of a diverse constituency.

In one of his first public presentations as new school board director, Spence presented his "Vision of Hope" [1] to the Priorities and Planning Committee of the TDSB, beginning a conversation in the district and in the national media about the urgency of addressing boys' educational needs. [2] This vision was framed as part of an overall mission of social justice for the district, challenging racism, sexism, homophobia, and other systems of oppression. In this vision, Spence characterized the problems boys face, the causes of these problems, and proposed interventions

Boys' troubles in school, according to Spence's Vision of Hope presentation, include underachievement when compared with girls, over-representation in learning support programs, an anti-learning culture, and disruptive and violent behaviors in schools. Despite these negative findings, in another presentation entitled "Joys of Teaching Boys" [3], Spence emphasized that it is "not boy culture that is flawed. It is how we manage it" (slide 34). In a slide addressing causes of boys' troubles in school, Spence wrote that "One of the most reliable predictors of whether a boy will succeed or fail in high school rests on a single question: does he have a man in his life to look up to?" and attributed the following quote to prominent boy-turn author Michael Gurian: "A boy without a father figure is like an explorer without a map." [4] In newspaper articles, Spence described several other reasons for this lack of success: "When every bone in a boy's body says, 'Move!' we're usually saying, 'Sit down,'" (Brown & Rushowy, 2009) and "boys thrive on competition, [...] When you've got a majority of teachers who are female, that might not be the natural inclination for them to bring competition into the classroom in a balanced kind of way" (quoted in Rushowy, 2009).

Spence suggested the use of educational strategies focused on improving classroom performance (primarily through making expectations explicit), increasing motivation (through activities to capture boys' interest), and counteracting an anti-learning culture. In relation to academic content, Spence focused mainly on literacy, with suggestions that included reading programs in which older boys served as mentors, with reading material chosen to appeal to boys through action-packed narratives, male protagonists, humor, and informational narratives.

This educational initiative should be of interest to mathematics educators for two reasons. First, the discussion of boys' problems and needs resonates with the global boy turn. These remarks could have been made about boys in Iceland, Australia, the UK or the US (Jóhannesson, Lingard & Mills, 2009). Thus, the TDSB initiative should be seen as standing in for this broader movement. Second, this initiative is premised on the assertion that boys are underachieving in *all* areas of the curriculum. The story told in mathematics education circles looks quite different.

Mathematics education research on gender

Boys have not been a major focus of mathematics education research, although there have been comparative studies

comparing achievement or strategy use between girls and boys. Thus, mathematics education research cannot directly address the question posed by the boy turn: how should we teach boys mathematics? [5] However, there is a wide body of research published in the last 30 years that studies the troubles of girls, the causes of these troubles, and proposed interventions (Lubienski & Bowen, 2000). In this paper, I will focus primarily on recently published work to reflect contemporary trends and theories in the field. As I will show, the discussion of these troubles, causes and interventions parallels the current boy turn. While the academic research is more careful about claims and evidence, both share some common flaws in the ways they conceptualize gender.

Most often, gender equity research in mathematics education characterizes the problem of equity as one of achievement gaps (*e.g.*, Leder & Forgasz, 2008). Other studies focus on qualitative and quantitative analyses of boys' and girls' *attitudes* towards mathematics and their *beliefs* about mathematics and mathematicians (see, for example, Ursini & Sánchez, 2008), frequently arguing that girls' beliefs and attitudes prevent them from full engagement in mathematics. In contrast to this focus on internal states, some researchers locate the gender problem externally and demonstrate the ways in which gendered hierarchies are constructed in moments of classroom interaction (Jungwirth, 2008).

A variety of interventions to support gender equity in the classroom have been recommended. For example, researchers who take the position that girls and women tend to be "connected knowers" argue for teaching methods to support this way of knowing (*e.g.*, Spielman, 2008). Suggestions include group work, mathematics learning based on communication (writing and speaking), and building on student experiences; these are hallmarks of what is often called constructivist teaching. Others argue that specific strategies are needed to deal with gendered power relations in the classroom; suggestions include altering the curriculum itself (Burton, 2008), and de-gendering the mathematics classroom (Jungwirth, 2003, 2008).

While the boy turn and research on girls and mathematics do hold some differences, they share some commonalities. Both tend to move away from deficit models in which boys and girls are to blame for educational problems. Instead, the focus is usually on how the school, teacher, and community can better support learning. However, there are significant flaws underlying both approaches to gender.

Both tend to use sex (male and female) and gender (woman/girl and man/boy) language interchangeably, and most do not define or theorize about these terms (in a later section, I will highlight some of the exceptions to this tendency). This lack of precision around gender is a common problem in mathematics education (Damarin & Erchick, 2010). Using the terms sex and gender is particularly important because of recent controversial neuroscientific research that argues that natural biological differences lead to natural gender differences. While this research has many flaws that call into question the validity of the results (Fine, 2010), I will simply point out that when biological terms (*i.e.*, sex) and social terms (*i.e.*, gender) are used interchangeably, there is a lack of clarity about the perceived source of the difference. Without clear definitions or theories of gender, it is difficult to draw conclusions about problems, causes, and interventions.

A second problem in both areas is the tendency to essentialize gender; that is, a tendency to treat boys and girls as if they were monolithic groups with little internal variation. In the boy turn, boys' characteristics (like a disregard for female protagonists, or a love for action-packed narratives) are treated as natural and unchangeable (Jóhannesson *et al.*, 2009). While this problem is more pronounced in public discussions around gender, it is apparent in some educational research about girls (*e.g.*, research on women's ways of knowing). Essentialism also treats all members of a group as if they are equally disadvantaged, rather than asking which boys, or which girls, are in need of further support (Martino & Berrill, 2003; Weaver-Hightower, 2003). Academic researchers are much more nuanced in such discussions, but even some research that considers intersectionality - for example, intersections of race, nationality, language, or socioeconomic status with gender - treats all members of each subgroup as if they were the same (*i.e.*, instead of boys and girls, a study might compare boys and girls of different races).

Finally, much of this work suffers from a narrow view of equity, with achievement gaps remaining the primary tool for analyzing issues of equity. While achievement gaps can be a useful focus of analysis, they cannot be the sole method of understanding issues of equity in schools (Gutiérrez, 2008). Without a broader vision of equity, strategies to close achievement gaps can sometimes reinforce oppressive systems rather than challenging them. For example, Spence's proposed interventions (*e.g.*, that boys should read action-packed novels with only boy protagonists) actually support sexism rather than challenging it. Approaches to girls' education that similarly suggest a single form of pedagogy also reinforce sexist beliefs about girls' unique characteristics (*e.g.*, they are emotional, caring, connected).

Theorizing gender and genderism

In order to respond to these underlying problems, we need a theory of gender that explicitly describes what gender is and how it develops. In this section, I will outline an alternative approach to gender equity that draws from queer theory, critical theory, and my own experiences in queer, trans* and genderqueer communities. [6] I consider two theoretical approaches to thinking about gender and genderism - one drawing primarily on the work of Judith Butler, another drawing on sociocultural theories of learning. I will use these theoretical tools to outline an anti-genderist approach to mathematics education and research.

Some contemporary gender theorists, and many within trans and genderqueer communities, distinguish between biological differences and social differences. Generally speaking, the terms male and female are used to describe biological categories, while man and woman are used to describe social categories. However, both sex and gender can be considered social constructions because biological variation does not fit simply into two sex categories. There is significant biological variation within the categories male and female, as well as intersex people who do not fit within either category. In addition, the biological variation that we consider to be significant is socially constructed. [7] The purpose of distinguishing between sex and gender is to show that one's anatomy at birth does not predetermine one's gender;

gender differences are not natural, but constructed in and by the practices in which people participate, including school practices. Gender norms are not universal, but vary considerably across the lifespan and across the multiple contexts of one's life: gender is enacted differently in the hallway, in the classroom, and at the school dance.

In any given context, *genderism* is defined as the valuing of people who are seen as locally gender normative (*e.g.*, people with female bodies who look, act and speak like women are supposed to in that particular context) over people who are seen as non-normative (Airton, 2009). Everyone is affected by genderism, which is not limited to injustice against gender non-conforming people. It also includes "the fearful *anticipation* of non-conformity" (Airton, 2009, p. 230), because this fearful anticipation encourages people to submit to gender norms. Thus, every person living in or passing through a context organized by gender is affected.

Genderism can be considered in relation to other forms of oppression, including sexism, homophobia, and transphobia. A focus on genderism does not negate a concern for sexism or misogyny (the valuing of men/maleness/masculinity over women/femaleness/femininity). Rather, genderism highlights the ways in which those who are oppressed by sexism may still be privileged by genderism. For example, gender normative women may obtain privilege "as a consequence of correctly and seamlessly approximating what it means to be that gender in that place and time" (Airton, 2009, p. 240). Genderism is related to homophobia (fear or hatred of queer people) and transphobia (fear or hatred of gender non-conforming people) because these forms of oppression are often reactions against gender non-normativity. For example, calling a boy a sissy is a way to point out that the boy is not living up to gender norms.

Genderism is displayed in education research and in everyday talk that considers only gender binary categories (*i.e.*, man/woman or male/female), or presumes that there are no important differences within a gender binary category. While there are, of course, people who identify with the labels boy, girl, man, and woman, there are countless people who do not identify with or fit any of these labels. Even people who feel quite comfortable within the binary must constantly act to reaffirm their connection to or distance themselves from these labels in each context in which they participate. For example, a person with a relatively stable gender identity as a man would probably dress and act appropriately as a man in a business context (perhaps wearing a suit and tie), and then shift their gender presentation slightly in a more informal context (loosening the tie when going to a bar for drinks after work). These slight shifts are examples of the work people do to match the gendered norms of the contexts in which they participate.

Butler's (1990) theory of gender as performance forms the foundation for this discussion of gender and genderism. In brief, Butler argues that all gender is performance, drawing on various cultural artifacts for expression. These performances do not refer to an internal, stable, gendered self; instead, they draw on recognizable aspects of a gender system to construct a gendered self (Butler, 2004). The example of the man who changes his gender performance as he moves from the workplace to the bar highlights the way gender is something people do, not something people are. Sociocultural theories of learning, currently in common use in our field, can also be used to understand the complexity of gender in a non-binary way. Gutiérrez and Rogoff (2003) introduced the term *repertoires of practice* to denote the strategies and skills that people develop through participation in various practices. This concept is used in contrast with, for example, the concepts "traits" or "learning styles" that assume that individuals possess static characteristics that are either biologically or culturally inherited. Within this conceptualization, categories like gender are still analytically useful because gender is central to many cultural practices. As Gutiérrez and Rogoff argue, categories like gender, race or ethnicity:

> have long-standing influences on the cultural practices in which people have the opportunity to participate, often yielding shared circumstances, practices, and beliefs that play important and varied roles for group members. People do not just choose to move in and out of different practices, taking on new and equal participation in cultural communities. (p. 21)

Another metaphor that may be helpful in conceptualizing gender comes from Varenne and McDermott's (1998) metaphor for culture as a house we inhabit (Boaler, 2002, also comments on this metaphor). Houses constrain our behavior, but they do not determine it. Each room in a house is set up to make some kinds of activities relatively easy – it is easier to cook in a kitchen than in a living room. I could cook in the living room if I were determined to do so, but it would be difficult and other people would probably find it odd. In the same way, cultural contexts (including gender norms) make some forms of behavior easily recognizable and valued and make others more difficult. As Boaler (2002) argues, gender should be seen as a *response* to a context, rather than a pre-existing condition. If we see gender as a response and a performance, the binary framework loses its explanatory power. In a given context, people assumed to be *within* a single binary category (*e.g.*, men, women) may respond differently by enacting or challenging different aspects of the gender norm.

It is not difficult to locate examples of genderism in mathematics education research and practice. Genderism is implicated in our public discussions and educational research on mathematics teaching in the ways described above – imprecision about relations between biological variation and gender, essentialism, and narrow views of equity based on a binary system – and is ingrained in much mathematics content as well as strategies to achieve equity. For example, many textbooks include problems in which students measure their own arm span or height and graph the distributions of these lengths for the boys and girls in the class. These mathematics problems reinforce normativity with assumptions of only two biological categories and implications about what boys' and girls' bodies should look like.

There are also mathematics problems that reinforce heteronormativity [8] and erase the experiences of queer people. For example, when teaching a geometry class in 2004, my textbook contained a problem involving several married couples. Although it did not state so explicitly, in

order to solve the problem you had to assume that the couples were in heterosexual pairings. By contrast, I have never seen a mathematics problem involving a queer or explicitly gender non-conforming character. By erasing the existence of such people, the textbooks support heteronormative and gender binary thinking

Pedagogical strategies to achieve gender equity also reinforce genderism if they are based on a gender binary approach. For example, one recommendation for a gender-sensitive pedagogy that I have frequently read suggests the creation of cooperative groups that are balanced by gender (*e.g.*, two boys and two girls). The gender binary is invoked when it is assumed that any boy or any girl could be placed equally well in these gender-balanced groups

Towards an anti-genderist mathematics education

Too many contemporary discussions of gender are reminiscent of the old nursery rhyme that tells us that boys are made of "snips and snails and puppy dogs' tails" while girls are made of "sugar and spice and everything nice" There are, however, some promising directions in the work of a few researchers in mathematics education

Closing gendered achievement gaps in mathematics education should not be the primary goal of educational equity. Since schools are situated in broader societies and are intended to influence an individual's or group's success and autonomy in society, our visions of equity should be situated at that broad level A gender-equitable education is an anti-genderist education, with the social justice goal of ending both genderism and sexism in schools and more broadly. An anti-genderist approach strives to combat the use of the gender binary (or other simplified understandings of gender categories) to structure schools and society.

In work that challenges the reader to question and move beyond a binary conception of gender, some feminist researchers suggest that mathematics pedagogies should be gender-blind [9] (Llewellyn, 2009, p 422). Unfortunately, just as ignoring race can prevent educators from discussing inequities based on race (Pollock, 2004), ignoring gender hides the fact that gender is part of the foundation of the cultural houses we inhabit I do not believe that the goal of anti-genderism should be to do away with gender (although some gender activists do hold to that goal), just as the goal of anti-racism is not to do away with race. Instead, the goal should be to challenge the gender *binary* and pervasive gender-normativity in education.

A small number of researchers have drawn on queer and poststructuralist theories to study the *construction* of gender and of mathematics in school. Most of this work has focused on the impact on girls (Jungwirth, 2003; Jungwirth, 2008; Lucey, Melody & Walkerdine, 2003; Walshaw, 2005), with just a few notable exceptions. Mendick (2005, 2006) has perhaps the most complete discussion of the gendering of mathematics with a focus on masculinity. Mendick argues that mathematics is constructed in many classrooms as a part of gendered binary oppositions like fast/slow, competitive/collaborative, and so on. Mathematics is generally associated with those qualities that are also associated with dominant masculinities (Walkerdine, 1998). Thus, doing mathematics and being good at mathematics requires gendered identity work, even if boys and girls are never explicitly mentioned in the classroom This identity work is different for people of various genders or, indeed, for people with different relationships to dominant masculinities or femininities (Barnes, 2000). Mathematics classrooms can be the site of gender struggles between boys and girls, certainly, but also between various forms of masculinity.

In the concluding chapters of her book, Mendick (2006) argues that "unfixing what is fixed and disrupting binary approaches are at the heart of queer theory and practice" (p. 117). She offers several suggestions for disrupting gendered binaries in mathematics teaching and learning These include recognizing that what seem like individual choices are in fact social (thus refusing to essentialize gender), supporting gender transgression and multiplying the ways that girls can engage in mathematics, and changing mathematics itself so that it does not line up so neatly with one side of gender binaries.

In mathematics education research, examining multiple forms of masculinity and femininity as they are locally understood and locally constructed is an important step in challenging genderism At the very least, I urge researchers who consider gender to clearly define their terms and draw on relevant theories to justify their research Additionally, researchers could be informed by educational research about the experiences of queer and genderqueer students (*e.g.*, McCready, 2004), as well as first person accounts of non-normative genders (*e.g.*, Bornstein & Bergman, 2010; Nestle, Wilchins, & Howell, 2002).

Research and frameworks that already exist in our field could become useful resources for studying gender and genderism. For example, some quantitative research breaks down the binary by considering the relationship between gender, the activities and practices that young people are engaged in, and achievement (Lubienski & Crane, 2010). Many have written about gender socialization processes and the ways in which boys and girls are pushed to conform to different gender-normative behavior This work could be extended by studying what happens when students cross these locally constructed gendered boundaries.

While several authors have written about activities that have helped students learn about sexism (Kitchen & Lear, 2000; Stocker, 2007), I have not seen any activities related to heterosexism or genderism And while there are studies of mathematics pedagogies that support and affirm marginalized ethnic groups, there are no studies of mathematics classroom pedagogies that affirm gender or sexual minorities Whereas in recent years the mathematics education research community has begun to grapple with issues of race, ethnicity and culture in ever more complex ways, research that does the same with gender is still very much in the minority If the mathematics education community is to respond to the growing political movement towards a boy turn, we must challenge binary and simplistic conceptions of gender. This means going beyond a focus on boys and girls as natural categories (and as the only gender categories), and beyond the heterosexism that pervades mathematics education research and practice

Notes

[1] TDSB A vision of hope! (2009), presentation slides retrieved June 3, 2010, from http://www.tdsb.on.ca/_site/ViewItem.asp?siteid=10391&menuid=22257&pageid=19371

[2] I draw on documents downloaded from the director's section of the TDSB website, including presentations posted at the TDSB's website between October 2009 and mid-April 2010. I also include quotes from Spence in two newspaper articles published in October 2009.

[3] Joys of teaching boys (2010), presentation slides retrieved April 12, 2010, from http://www.tdsb.on.ca/_site/ViewItem.asp?siteid=10391&menuid=22257&pageid=19371

[4] The explorer metaphor does not seem particularly apt – after all, many well-known European explorers ventured into territories beyond their maps.

[5] As achievement gaps in various parts of the world have narrowed or changed direction, some research is beginning to investigate boys' underachievement. However, even these studies tend to disaggregate to argue that girls are still disadvantaged (*e.g.*, Steinthorsdottir & Sriraman, 2008).

[6] Language within gender and sexual minority communities is constantly changing and under debate, so the terms as I use them here should not be considered definitive. I use the term "queer" as an umbrella term to describe people who identify as lesbian, gay, bisexual, queer or other sexual minority, and also as a term that opposes static category systems in favor of fluidity and resistance to binaries (Peters, 2005). While the term may be unfamiliar to many mathematics educators, it is commonly used and accepted by many in gender and sexual minority communities. "Trans*" is currently used to denote a category including people who identify as transgendered and/or transsexual. "Genderqueer" is used here to denote any non-binary gender identity.

[7] I would like to thank an anonymous reviewer for helping me to clarify this point.

[8] I use the term "heteronormative" to refer to assumptions that everyone is heterosexual, or that heterosexuality is normal and desirable, whereas queerness is not.

[9] The term "gender-blind", or its counterpart "color-blind", make use of a negative connotation for blindness and is therefore ableist. I use the term here because I have not been able to locate a suitable alternative, but I do not intend to equate blindness with ignorance.

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